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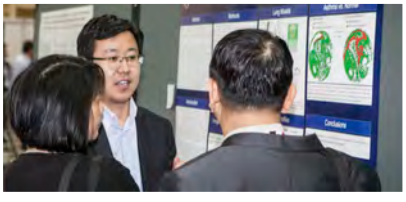
RESPIRATORY CARE

2018 OPEN FORUM

December 4–7

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The Open Forum at the AARC Congress 2018 is a unique opportunity for attendees to experience the results of scientific studies performed by their colleagues. Respiratory Care is proud to present this year's Open Forum. Once again, respiratory care professionals have stepped forward and analyzed what they do with critical eyes. This year posters will be presented in one of 3 formats.

Editors' Choice – The top abstracts in 2018. On the first two days of the Congress, the Editors' Choice posters are displayed by the entrance to the Exhibit Hall. On the third day, each presenter will discuss their findings in an 8-minute slide presentation, which will be followed by a 5-minute discussion period with the audience.

Poster Discussions – Grouped by topics, 14 sessions will be presented over 3 days of the Congress. During the first part of the session attendees review the posters and discuss them with the authors. In the second part presenters summarize the work with a brief oral presentation (no slides).

Posters Only – Posters will be displayed inside the Exhibit Hall during 2 days of exhibits. Authors will be present for discussion of their work from 12:00 pm to 1:30 pm on each day. During this time, walk rounds with a facilitator will highlight the importance of these abstracts.

The Editors of Respiratory Care are deeply grateful to the individuals who contributed their expertise and time reviewing the 2018 Open Forum abstracts.
See reviewers listed on page 78.

Critically Evaluating Posters and Poster Discussions: A Guide for Open Forum Attendees

Prepared by the Editors of Respiratory Care
(See editorial by David Pierson in Nov 2008 Respiratory Care)

Open Forum abstracts presentations are works in progress, intended to communicate preliminary findings to convention attendees. Poster symposia permit presenters to get feedback on their work prior to preparation of manuscripts for submission to a science journal such as Respiratory Care. All abstracts are screened by the Editors and peer reviewers, but it is not possible to be sure from the limited information they contain that the work described is valid and free from bias. The following points may assist attendees in objectively and critical assessing the posters and their interpretation during the symposium:

Evaluating a Clinical Study

- Is the study's hypothesis or specific purpose clearly stated? The less focus of a study, the more easily a bias is concealed.
- Is there evidence of equipoise in the design and implementation of the study? That is, was the study designed and carried out "to prove that" something was true or an intervention was effective, or "to determine whether" it was so?
- Were the data subjected to appropriate statistical analysis?
- What are the limitations, or weaknesses, in the study? (Acknowledgement and discussion of these will strengthen rather than weaken the poster.)
- How do the findings of this study differ from those of previous studies, and why is this important?
- Are the conclusions supported by the results? Is there any overstating of the study's findings?
- What should I as a clinician (or educator, manager, or student) take away from the study?

Critiquing a Study Evaluating a Device or Other Commercial Product

Concern for possible bias in the study's design and/or in the presentation and interpretation of its findings, would be raised if a sponsor:

- Funded the study, solely or in part, proposed the study to the investigator, or designed the study.
- Participated in the data collection.
- Performed the statistical analysis of the data.
- Made (or provided the data for) the figures and/or tables.
- Had final approval over what was included in the abstract and/or poster.
- Designed or produced the poster.
- Paid for or otherwise supported the presenter's trip to AARC Congress.
- Coached the presenter about how to present the study or respond to questions about a product.

RESPIRATORY CARE

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Open Forum Sessions

Tuesday, December 4, 2018

Wednesday, December 5, 2018

Wednesday, December 5, 2018 (cont'd)

Thursday, December 6 2018

See pages 81–88 for Open Forum Author Index

3009182

Use Of Neuromuscular Blockade Does Not Affect Mechanical Ventilation Duration In ARDS.

Justin S. Phillips[1,2], Lance Pangilinan[1,2], Vivian Yip[1,2], Antonio Gomez[3], Michael S. Lipnick[2], Richard Kallet[1,2]; [1]Respiratory Care Services, San Francisco General Hospital, San Francisco, CA; [2]Anesthesia, UCSF, San Francisco, CA; [3]Pulmonary & Critical Care Medicine, UCSF, San Francisco, CA

Background: NMB use in ARDS has been shown to improve oxygenation and reduce mortality.[1,2] However, its use has been associated with intensive care unit (ICU)-acquired weakness and increased days of mechanical ventilation (MV).[2] Therefore, we inquired whether NMB use in our ARDS patients impacted mechanical ventilation duration (DMV). **Methods:** Our ARDS quality assurance database was queried between March 2010 and December 2017 to identify subjects who received NMB. As this was a preliminary inquiry for an anticipated more in-depth retrospective study, we addressed the problem of controlling for confounding variables by using a case-control approach. Three inclusion criteria were used: 1) ARDS onset had to occur within 1 calendar day of initiating MV, 2) a minimum DMV of 5 days (ie. the 25% quartile of all ARDS survivors with a lung injury score (LIS) ≥ 3), and 3) survival at hospital discharge. Three matching criteria were used: 1) gender, 2) exact LIS match calculated at ARDS onset and, 3) either an acute physiology and chronic health evaluation score (APACHE II) within 5 points, or a simplified acute physiology score (SAPS II) within 10 points; both of which were calculated at ARDS onset. **Results:** There was no difference between those subjects who received NMB and controls in terms of: 1) total DMV 2) ARDS related DMV, 3) ICU Length of Stay (LOS), or 4) Post-ICU LOS. Matching was successful as indicated by lack of difference in illness severity scores and LIS; however, control patients were significantly older. **Conclusion:** In a matched group of patients with relatively severe ARDS (median LIS = 3), use of NMB had no impact on DMV, LOS, or Post-ICU LOS. This data is the basis for further in-depth study on the impact of NMB dose and duration on these outcome variables. 1. Papazian L, Forel JM, Gacouin A, et al. Neuromuscular blockers in early acute respiratory distress syndrome. N Engl J Med 2010;363:1107-16. 2. Hraiech S, Forel JM, Papazian L. The role of neuromuscular blockers in ARDS: benefits and risks. Curr Opin Crit Care 2012;18:495-502.

Sponsored Research - None

	NMB	Control	P
N	35	35	
Age	43 [33,54]	53 [43,69]	0.005
LIS	3 [2,3]	3 [2,3]	>0.99
APACHE II	21 [17,27]	22 [16,28]	0.98
SAPS II	45 [36,60]	46 [37,57]	0.99
ICU Days to MV	0 [0,1]	0 [0,0]	0.99
Days MV to ARDS	0 [0,0]	0 [0,0]	1
Total MV Days	11 [7,18]	10 [7,19]	0.64
ARDS MV Days	11 [7,17]	10 [7,18]	0.57
ICU LOS	16 [11,23]	13 [9,23]	0.69
Post ICU LOS	13 [3,25]	13 [6,23]	0.86

LOS = length-of-stay

3012316

Pump Infusion Rate During Continuous Nebulization In A Mechanically Ventilated Pediatric Bench Model Affects The Percentage Of Active Nebulization Time.

Maria E. Salazar[1], Julie A. Maglanoc[1], Justin Hotz[1,2], Edward Guerrero[1], Russelle Cazares[1], Leo Langga[1]; [1]Respiratory Care, Children's Hospital Los Angeles, Los Angeles, CA; [2]Anesthesia Critical Care Medicine, Children's Hospital Los Angeles, Los Angeles, CA

Background: Manufacturer guidelines for the vibrating mesh nebulizer (VMN) recommends a maximum pump infusion rate of 12ml/hr during continuous aerosolization, but in following this guideline there may be instances when drug delivery is not optimal due to gaps in active nebulization during mechanical ventilation. Increasing the pump infusion rate could be considered in order to minimize periods of inactive nebulization time. The purpose of this experiment was to observe the effect of increasing the continuous nebulizer pump infusion rate and its impact on the percentage of active and inactive nebulization time during mechanical ventilation with high ventilation pressures. **Methods:** AVEA and Servo-I ventilators were calibrated and placed in pressure control mode (Rate 10, PIP 32, PEEP 12, PS 10, 1.0 i-time, 50% FiO_2) and set to ventilate a passive test lung. An Alaris Pump with a 60ml syringe was filled with normal saline, primed, and connected to a vibrating mesh nebulizer (Aerogen). The nebulizer was placed on the dry side of the humidifier, and left nebulizing in continuous mode. The infusion rate on the pump was tested on 18, 20, and 22ml/hr for a period of ten minutes per run and a stop watch was used to record the time the nebulizer spent nebulizing in each ten minute period on each flow rate. We computed the percentage of time the nebulizer was actively nebulizing a visible plume in the ten minute period. Each test was repeated three times with three different nebulizers. **Results:** The mean percentage of time for active nebulization is shown in the Figure for each ventilator. The AVEA ventilator had a lower average percentage of time in active nebulization in a ten-minute period and higher standard deviation than the Servo I (78 ± 12%, and 94 ± 2% respectively). When using the highest input flow rates of 22ml/hr, there were runs where the output of the nebulizer exceeded the input of the pump resulting in percentage of time nebulizing < 100%. **Conclusion:** The percentage of time a VMN spends actively nebulizing is affected by the pump infusion flow rate chosen and the ventilator used. When using high ventilator pressures, an infusion rate greater than the manufacturer guidelines can still result in significantly low percentage of time nebulizing. Care should be taken to titrate infusion rates when necessary while acknowledging the potential for differences in nebulization rate between devices and when used in a different make of ventilator.

Sponsored Research - None

See table or figure in supplement to the October 2018 issue of Respiratory Care at www.rcjournal.com.

3013041

Controlling Drug Delivery During Mechanical Ventilation: Breath-enhanced Jet Nebulization.

Ann D. Cuccia[1], Joshua Samuel[2], Michael McPeck[2], Vijay Shukla[3], Gerald C. Smaldone[2]; [1]Respiratory Care Program, Stony Brook University, Stony Brook, NY; [2]Division of Pulmonary, Critical Care and Sleep Medicine, State University of New York at Stony Brook, Stony Brook, NY; [3]InspiRx Inc., Somerset, NJ

Background: Nebulized aerosol delivery during mechanical ventilation results in profound unregulated aerosol losses, which are a strong function of duty cycle or I/E ratio, bias flow and humidification. The present study describes a novel nebulizer and ventilator circuit that minimizes these influences by utilizing a design that results in aerosol generation primarily during inspiration (breath enhancement) and minimizes expiratory losses (breath actuation). The circuit facilitates control of supplemental humidification and functions independently of the brand of ventilator. **Methods:** The novel device may be operated continuously or via a stand-alone breath-actuated circuit. During a treatment, a 3-way valve directs all ventilator flow to the nebulizer resulting in aerosol generation primarily during inspiration. Special connections in the ventilator circuit bypass the effects of supplemental humidification and allow nebulizer removal for servicing without breaking the circuit. This combination results in controlled drug delivery of bronchodilators and other potent drugs over all ventilator settings without any electrical support. The addition of a pressure sensitive breath-actuated electrical circuit further increases efficiency affording the potential to deliver higher doses of less potent drugs such as antibiotics. The nebulizer is powered independently of the ventilator by wall gases at 50 PSIG. Nebulizer flows of 2 L/m in the continuous mode and 3.5 L/m during breath actuation were used. In vitro testing was performed on several commonly used ventilators over a wide range of breathing patterns, duty cycles and ventilator modes. The nebulizer was charged with radiolabeled saline and filled to 3 or 6 mL. Inhaled mass (IM) and mass balance were measured. **Results:** IM (% neb charge) mean± SE, breath-enhanced 11.4 ± 0.9; breath-enhanced and breath actuated 27.2 ± 0.8. **Conclusion:** During jet nebulization, breath enhancement overcomes much of the variability in aerosol delivery introduced by the ventilator circuit providing a predictable delivered dose to the patient at any ventilator setting. The addition of breath actuation further enhances aerosol delivery for specialized drugs requiring high doses. The use of wall gases and stand-alone breath actuation standardizes conditions driving the nebulizer independent of ventilator design. Circuit design eliminates variation in humidification effects and allows nebulizer servicing without circuit interruption.

Sponsored Research - The study was sponsored in part by InspiRx Inc. The State University of New York holds patents on this device that are licensed to InspiRx Inc. Fisher & Paykel supplied the humidifier and standard ventilator circuits.

3014011

Delivery Of Nebulized Colistin During Mechanical Ventilation—An In Vitro Study.

Ching-Yi Liu[1,2], Hsin-Kuo Ko[1], Gow–Haw Wan[2], Hui-Ling Lin[2]; [1]Division of Respiratory Therapy, Department of Chest Meidcine, Taipei Veterans General Hospital, Taiwan, ROC, Taipei, Taiwan; [2]Respiratory Therapy, College of Medicine, Chang Gung University, Taoyuan, Taiwan

Background: Colistin is used to treat gram-negative infections in critically ill patients. Optimal delivery and particle size distribution of aerosolized colistin during mechanical ventilation has not been reported. This in vitro evaluation explores the impact of aerosol device and dilution on aerosol colistin administration during mechanical ventilation. **Method:** A Servo*i* ventilator (Marquet) operated in volume control (500 mL, 20 breaths/min, PEEP 5 cmH_2O, Ti 1.0s) with heated humidification at 37°Cwas connected to an endotracheal tube (7.5mm), inline with a collecting filter connected to a lung model with compliance of 0.04 L/cmH_2O and resistance of 5 cmH_2O/L/s (Michigan Instrument). A vibrating mesh nebulizer (VMN, Aerogen) and a pneumatic jet nebulizer (JN, Galemed) powered oxygen at 8 L/min were placed at the inlet of the heated humidifier chamber. Two concentrations of Colistin methanesulfate (CMS) 156 mg (1 million unit) and 312 mg were dissolved in 6 mL distilled water. Drug was placed in both nebulizers, and two concentrations in the JN (JN-156 and JN-312). The inhaled mass distal to ETT was collected on filter (n=5). An Anderson cascade impactor (Thermo Scientific) determined median aerodynamic diameters (MMAD) and fine particle fraction (n=3). The collected drug was eluted from filter and impactor and analyzed by HPLC. Statistical analyses were performed with ANOVA and *Scheffé* post hoc test with a significance level of P<.05. **Results:** Table below shows inhaled dose and particle size distribution and performance (mean±SD) with VMN and JN. The inhaled mass was significantly greater with VMN. The particle size was ranged 2.03- 2.26 μm among three groups, without significant difference (P=.434). The nebulization time was 2 folds longer than JNs, while residual volume was significantly lower (P<0.001). **Conclusion:** The VMN delivered greater inhaled mass than JN with both 156 and 312 mg, despite longer administration time.

Sponsored Research - This research was funded with unrestricted grant from Aerogen Ltd.

Table: CMS deposition, particle size distribution and nebulizer performance

	VMN -156	JN -156	JN-312	*P*-value
Inhaled mass(mg)	53.8 ±14.8*	19.8 ± 3.3	31.7 ± 4.5	< .001
Inhaled mass (%)	34.4 ± 9.5*	12.7 ± 2.1	10.2 ±1.4	< .001
MMAD (μm)	2.0 ± 0.2	2.1± 0.2	2.3 ± 0.00	.434
GSD	1.6 ± 0.1	1.6 ± 0.1	1.6 ± 0.01	.994
Nebulization time (min)	42.7 ± 2.27†	20.9 ± 1.1	21.6 ± 0.5	< .001
Residual (mL)	0.2 ± 0.03*	0.9 ± 0.1	0.9 ± 0.10	< .001

*Greater inhaled dose with VMN-156 ($p < .05$) with *Scheffe test*
† Longer nebulization time with VMN-156 ($p < .001$) with *Scheffe test*
* Lower residual volume with VMN-156 ($p < .001$) with *Scheffe test*

Table: CMS deposition, particle size distribution and nebulizer performance

3016165

The Impact Of Tris-Hydroxymethyl Aminomethane On Electrolytes During Treatment Of Severe ARDS.

Vivian Yip[1,2], Richard Kallet[1,2], Michael S. Lipnick[2], Antonio Gomez[3], Romain Pirracchio[2]; [1]Respiratory Care Services, San Francisco General Hospital, San Francisco, CA; [2]Anesthesia, UCSF, San Francisco, CA; [3]Pulmonary & Critical Care Medicine, UCSF, San Francisco, CA

Background: Rapid infusion of THAM is known to cause severe alterations in serum electrolytes at higher doses and in the presence of either severe respiratory acidosis or renal impairment.[1] THAM can cause hyponatremia and hyperkalemia, as well as hypoglycemia, and hypophosphatemia associated with increased insulin release and activity.[1] We inquired as to the incidence and severity of electrolyte disturbances during the treatment of acidosis in severe ARDS. **Methods:** The SFGH ARDS quality assurance database was queried to identify subjects treated with THAM from September 2006-August 2016. Of the 97 subjects identified, 82 met inclusion criteria: 1) standard bolus infusion of at least 1 full dose of THAM (150mmol), and 2) pre-post electrolyte panels measured < 4 h of therapy initiation/completion. Data are presented as median [IQR]. Paired comparisons were made using the Wilcoxon Signed-Rank Test. Alpha was set at 0.05. **Results:** A total of 143 discreet treatments met inclusion criteria. THAM was infused at 2.04 [1.61, 2.36] mmol/kg per h over 60 [60,60] min. Paired comparisons in electrolytes were made within a total pre-post time difference (hr:min) of 5:45 [4:00, 7:40]. Differences in the primary variables of interest such as potassium (K^+), glucose and phosphate ($PO4^-$) were not statistically significant. However, in 15% of comparisons K^+ increased ≥ 1 mEq/L and in 6% of thess cases post-treatment K^+ was ≥ 6 mEq/L. Glucose decreased by ≥ 100 mg/dL in 9% of comparisons and by 50-99 mg/dL in an additional 9%. In 32% of comparisons, chloride decreased ≥ 4 mEq/L which mirrored an increased serum CO_2 of ≥ 4mEq/L in 33% of comparisons. Paradoxically, serum lactate increased despite decreasing anion gap. This may have reflected the clinical trajectory in the subset of moribund subjects in whom THAM was used as rescue therapy. **Conclusion:** At recommended infusion rates (i.e. < 5 mmol/kg over 1 hr),[1] THAM had minor impact on electrolytes. However, in a minority of ARDS subjects with severe acidosis, infusion of THAM did result in acute hyperkalemia and hypoglycemia. Careful monitoring of serum electrolytes is warranted prior to and following administration. 1. Nahas GG, Sutin KM, Fermon C. Guidelines for the treatment of acidemia with THAM. Drugs 1998;55:191-224.

Sponsored Research - None

	N*	Pre-THAM	Post-THAM	P
Sodium (mEq/L)	119	138 [134,143]	136 [132,141]	<0.001
Potassium (mEq/L)	117	4.6 [3.9,5.0]	4.7 [4.0,5.3]	0.08
Chloride (mEq/L)	118	105 [102,110]	103 [99,108]	<0.001
CO2 (mEq/L)	119	20 [15,24]	21 [17,25]	<0.001
Glucose (mg/dL)	119	138 [109,179]	128 [93,182]	0.16
Magnesium (mEq/L)	95	2.2 [2.0,2.5]	2.2 [2.0,2.5]	0.08
Phosphate (mEq/L)	92	4.7 [3.6,6.9]	4.7 [3.5,6.8]	0.63
Lactate (mmol/L)	58	6.8 [4.1,11.6]	8.6 [4.2,14.3]	0.029
Anion Gap (mEq/L)	117	16.2 [11.8,24.9]	14.8 [10.8,20.8]	<0.001

*N = number of electrolyte values present for 143 THAM treatments

3017400

Increased Dilution Volume Improves Nebulized Budesonide Delivery During Mechanical Ventilation.

Hsiao Lan Cheng[1], Hui-Ling Lin[2]; [1]Respiratory therapy, Keelung Chang Gung Memorial Hospital, Keelung, Taiwan; [2]Respiratory Therapy, Chang Gung University, Taoyuan, Taiwan

Background: Albuterol and budesonide are commonly prescribed for aerosol therapy during mechanical ventilation. Aerosolized drug delivery is affected by numerous factors, yet the delivery efficiency of budesonide is not well studied. The objective of this study was to evaluate the effect of drug dilution and chemical properties on aerosol delivery of solution and suspension during mechanical ventilation. Method The surface tension of each formulation was measured by Du Noüy ring method, and the viscosity of formulations measured by a viscometer. A Servo*i* ventilator (Maquet, Sweden) operated in volume control (500 mL, 16 breaths/min, PEEP 5 cmH_2O) with heated humidification at 37 degree-celsius was connected to an endotracheal tube, with an absolute filter connected to a lung model (Michigan instrument, USA). A vibrating mesh nebulizer (VMN, Aerogen, Ireland) and a pneumatic jet nebulizer (JN, Galemed, Taiwan) powered by oxygen at 8 L/min were operated with salbutamol and budesonide standard unit dose (2.5 mg/2.5 mL and 0.5 mg/2.0 mL, respectively), and with dose diluted to 4 mL with normal saline. Both nebulizers were placed at the inlet of the heated humidifier, and nebulization was terminated when no aerosol was visually seen. Drug collected on filter distal to endotracheal tube, and eluted and assayed by a spectrophotometery (salbutamol) and by HPLC (budesonide; n = 5). **Results:** Inhaled drug dose in Table below. The surface tension of salbutamol and budesonide were 69.0±0.1 dyn/cm and 44.0±0.2 dyn/cm, respectively, with viscosity of 1.073±0.01 mPa/s and 1.032±0.01 mPa/s. The budesonide suspension unit-dose delivered lower inhaled dose than salbutamol solution with both nebulizers, but increased significantly with dilution. The VMN delivered greater inhaled drug dose than JN. The Pearson's test demonstrated a moderate correlation between surface tension and inhaled mass (P<0.03). **Conclusion:** Dilution of budesonide suspension increased aerosol delivery during mechanical ventilation with both JN and VMN. The efficiency of drug delivery is associated with surface tension of the formulation.

Sponsored Research - This research was funded by the Ministry of Science and Technology, R.O.C Taiwan (MOST104-2314-B-182-025).

Drug\Devices	JN	VMN	*P*-value*
Salbutamol UD	12.63±0.97	19.70±0.76	<.001
Budesonide UD	6.95±1.66	13.14±1.92	.001
Salbutamol 4 mL	16.51±0.97	23.44±2.18	<.001
Budesonide 4 mL	14.08±0.98	22.41±0.81	<.001
P-value※	<.001	<.001	

*Significantly greater inhaled dose with the VMN with T-test analysis
※Significantly lower inhaled dose with UD of budesonide with ANOVA

Inhaled drug percent with unit dose and dilution to 4 mL

3017730

An In Vitro Comparison Of Jet And Mesh Nebulizers During Mechanical Ventilation, Noninvasive Ventilation And Spontaneous Breathing In Pediatrics.

Arzu Ari[1], James B. Fink[2]; [1]Texas State University, Round Rock, TX; [2]AerogenPharma, San Mateo, CA

Background: The purpose of this study is to determine aerosol deposition with jet (JN), and mesh nebulizerS (MN) during spontaneous breathing (SB), noninvasive ventilation (NIV) and mechanical ventilation (MV) using a pediatric lung model with exhaled humidity. **Methods:** Drug delivery with JN (Mistymax10, Carefusion), and MN (Solo, Aerogen) was compared during SB, NIV and MV using 3 lung models with exhaled humidity. To simulate a spontaneously breathing child, a manikin was attached to a sinusoidal pump via a collecting filter at the level of bronchi. NIV was simulated through a ventilator (V60 Phillips) attached via facemask to a manikin with a collecting filter at the level of bronchia connected to a passive test lung. To simulate a mechanically ventilated child, a ventilator (Servoi Siemens) was operated with a heated humidifier (Fisher&Paykel) with a heated-wire circuit attached to a 5 mm ID ETT. The ETT cuff was inflated in a 15 mm adapter, which was then inserted into the housing of an absolute filter (Respirgard) fixing the tip of the ETT 1 cm from the filter media. A heated humidifier (Fisher&Paykel) was placed between the collecting filter and test lung to simulate exhaled humidity (35±2 °C,100% relative humidity). Breathing parameters were set at Vt:250 mL, RR:20 bpm, I:E ratio 1:3. Nebulizers were placed at the in inspiratory limb proximal to the Y during MV; between the facemask and the leak port for NIV; and via mouthpiece during SB. Albuterol sulfate (2.5 mg/3 mL) was aerosolized with JN and MN. The drug deposited on an absolute filter was eluted and analyzed with spectrophotometry. Factorial ANOVA was used for data analysis (P<0.05). **Results:** The table below shows mean (±SD) percent dose delivered. Aerosol delivery with JN was not significantly different during MV, NIV and SB (P=0.075), while delivery efficiency of MN was greater in MV than NIV and SB (P=0.001). Delivery efficiency of MN was better than JN (P=0.001) during MV, NIV and SB. **Conclusion:** Delivery efficiency of JN is similar during MV, NIV and SB while aerosol deposition obtained from MN differs with different modes of ventilation.

Sponsored Research - None

	Mechanical Ventilation (MV)	Noninvasive Ventilation (NIV)	Spontaneous Breathing (SB)	p value
Jet Nebulizer (JN)	4.30 ± 0.61	2.97 ± 0.64	4.54 ± 0.88	0.075
Mesh Nebulizer (MN)	11.82 ± 0.65	7.25 ± 0.20	8.94 ± 0.34	0.001
p value	0.001	0.001	0.001	

3018405

Effect Of Nebulizer Type, Delivery Interface And Flow Rate On Aerosol Drug Delivery To A Spontaneously Breathing Infant Lung Model.

Arzu Ari[1], James B. Fink[2]; [1]Texas State University, Round Rock, TX; [2]AerogenPharma, San Mateo, CA

Background: Aerosol drug delivery to infants is affected by types of nebulizers, interface, and flow rates used during therapy. The purpose of this study is to determine the effect of nebulizer type, delivery interface and flow rate on aerosol drug delivery to a spontaneously breathing infant lung model. **Methods:** A teaching manikin head was attached to a sinusoidal pump via a collecting filter at the bronchi to simulate a spontaneously breathing child (Vt: 100 mL, RR: 30 bpm and Ti: 0.7 sec) Albuterol sulfate was nebulized with jet (Mistymax 10, Cardinal Health) and mesh (Aerogen Solo, Aerogen Ltd) nebulizers using low flow nasal cannula (LFNC, Hudson), high flow nasal cannula (HFNC, Fisher&Paykel), and face mask (FM, Hudson). Each device and interface were tested at appropriate flows as shown in the table below (n=3). Drug was eluted from the filter and analyzed by spectrophotometry. Descriptive statistics, Kruskal Wallis, Wilcoxon Sum rank, and Mann- Whitney U tests were used for data analysis. P<0.05 was considered statistically significant. **Results:** Table shows percent of nominal dose delivered distal to the trachea with each nebulizer and interface at various flow rates tested in this study. While no significant difference was found between jet and mesh nebulizers using LFNC(P=0.643), jet nebulizers were significantly less efficient than mesh nebulizers when they are combined with HFNC (P=0.012) and face mask (P=0.002) at 6 L/min. Delivery efficiency of face mask was significantly greater than LFNC and HFNC with jet (P=0.0001 and P=0.0001, respectively) and mesh nebulizers (P=0.001 and P=0.001, respectively) at 6 L/min. Drug delivery with LFNC at 2 L/min was significantly greater than 4 L/min and 6 L/min using mesh nebulizers (P=0.031 and P=0.015, respectively). There was no significant difference between 4 and 6 L/min using LFNC (P=0.790). Aerosol delivery with HFNC significantly decreased (P=0.007) when the flow rate increased from 6 L/min to 8 L/min with mesh nebulizers. Aerosol deposition obtained with the face mask at 6 L/min and 8 L/min were not statistically significant with jet (P=0.209) and mesh (P=0.452) nebulizers. **Conclusion:** Type of nebulizer, delivery interface and flow rate affect aerosol drug delivery to the spontaneously breathing infant lung model used in this study. Decreasing flow rate with LFNC, and HFNC increased aerosol deposition obtained with mesh nebulizers.

Sponsored Research - None

Interfaces	Low Flow Nasal Cannula (LFNC)			High Flow Nasal Cannula (HFNC)		Face Mask (FM)	
Flow Rates	2 L/min	4 L/min	6 L/min	4 L/min	6 L/min	6 L/min	8 L/min
Mesh Nebulizer	1.77±0.2%	1.20±0.2%	1.1±0.1%	3.27±0.3%	2.35±0.3%	7.20±0.6%	6.72±0.4%
Jet Nebulizer			1.0±0.2%		1.45±0.1%	3.83±0.5%	4.49±0.3%

3019833

Effect Of Circuit Size On Albuterol Delivery During Heated High Flow Nasal Cannula Therapy In A Pediatric Model.

Randy Willis[1], Gary Lowe[1], Ariel Berlinski[2,1]; [1]RCS, Arkansas Children's Hospital, Little Rock, AR; [2]Pulmonary, UAMS, Little Rock, AR

Background: Heated high flow nasal cannula (HHFNC) systems are increasingly used in the treatment of pediatric respiratory distress. Inline delivery of albuterol using a vibrating mesh nebulizer (VMN) is frequently used. Albuterol delivery during invasive and noninvasive ventilation is affected by circuit size. We hypothesize that using a larger circuit would allow higher drug delivery than a smaller circuit. **Methods:** We compared 2 different heated-wired circuits of same length but different internal diameters (13 vs. 22 mm) connected to a Fisher & Paykel Optiflow small adult cannula. A VMN was placed on the dry side of the humidifier, and the HHFNC was run at 5, 10, 15, and 20 L/min. Four units of the nebulizers loaded with 10mg/4.5 ml of albuterol were tested. An anatomically correct pediatric model of a spontaneously breathing 5-year old child was used (tidal volume 200 ml, respiratory rate 20, inspiratory time 0.9s). Albuterol mass was measured via spectrophotometer, and reported as percentage of loading dose. **Results:** See table. **Conclusion:** Changing a circuit from small to large diameter has no effect on drug delivery with HHFNC at lower flows (5 and 10 L/min) but improves drug delivery at higher flows (15 and 20 L/min).
Sponsored Research - None

Results

Flow (L/min)	5	10	15	20
Small circuit	12.1±1	7.5±0.1	4.8±0.3	2.8±0.5
Large circuit	10.1±1.8	8.2±0.4	11.7±1.1a	6.7±1
p value small vs. large	0.09	0.72	0.0006	0.001

Experiments were repeated and gave similar values

3025948

The Effect Of Ratio Of Adult Inspiratory Flow To Gas Flow On Aerosol Delivery Via High Flow Nasal Cannula For Adults.

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Background: Aerosol delivery via high flow nasal cannula (HFNC) during distress breathing generated higher lung deposition than quiet breathing. Both in vitro and radiolabeled in vivo studies report lung deposition decreased as flow increased. We hypothesize that aerosol deposition is related to the ratio of HFNC flow : patient's inspiratory flow and that an optimal ratio could improve aerosol delivery via HFNC. **Methods:** An adult patient manikin (Laerdal adult airway management trainer), with realistic airway anatomy was used. A collecting filter connected between the trachea and a model lung (TTL, Michigan Instruments), simulating distress and quiet breathing for adults with tidal volumes of 300, 500 and 700 ml. A flow and volume monitor (NICO) was placed distal to the collecting filter. HFNC was set at 5,10,20,40 and 60 L/min. A mesh nebulizer (Aerogen) was placed at the dry side of humidifier (Fisher & Paykel), with large size of nasal cannula. Albuterol (2.5mg in 1mL) was nebulized for each condition (n=3). Drug eluted from the filter and assayed with UV spectrophotometry (276 nm). **Results:** During quiet breathing (f=15bpm, I:E=1:2, Vt was 300, 500 and 700 ml), delivered dose increased as HFNC flow decreased (P<0.001), delivered dose was greatest at the lowest HFNC flow (5L/min) and delivered dose increased as tidal volume increased (P=0.027). During distress breathing (f=30bpm, I:E=1:1, Vt of 450 and 700ml), delivered dose was similar with both Vts, Max delivery for Vt 450ml with 10 L/min while Vt 700ml was 20 L/min. In the distress breathing delivered dose was greater with I:E=1:1.5 than I:E=1:1 at HFNC flows of 10 – 60 L/min (P=0.05), with a trend at 5L/min (P=0.077). A multiple linear regression identified the ratio of HFNC flow : patient's inspiratory flow (P<0.001) and I:E (P=0.013) as predictors of delivered dose. The optimal ratio was between 0.37 and 0.5 in distress breathing. **Conclusion:** In aerosol delivery via HFNC for adults, the minimum flow produced optimal lung deposition in quiet breathing, while in distress breathing, HFNC flow: Patient's inspiratory flow of 0.37 to 0.5 produced optimal "lung" deposition.
Sponsored Research - None

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3022400

Comparing The Effects Of Inhaled Pulmonary Vasodilators And Their Diluents On Airway Inflammation And Ciliary Function.

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Background: Nitric Oxide (NO) and epoprostenol (EPO) are inhaled therapies for pulmonary hypertension. The most common diluents for EPO, glycine (GLY) and arginine (ARG), have a pH of 11-13. pH > 10 has been shown to cause cessation of ciliary beating, cell sloughing, and inhibition of airway drug transport. The effects of EPO-GLY and EPO-ARG on airway epithelia are unknown. NO has been reported to be conditionally pro- or anti-inflammatory. NO donor compounds have disparate effects upon inflammatory mediators in airway cells, but this has not been evaluated in response to NO gas. W*e hypothesized* that EPO-GLY and EPO-ARG would increase inflammatory markers in airway epithelia and that NO exposure would not increase the production of inflammatory markers. **Methods:** Pseudostratified ciliated columnar epithelium (Figure 1) were exposed to NO (20 ppm), EPO-GLY (30 ng/mL), EPO-ARG (30 ng/mL), GLY, ARG, or phosphate-buffered saline (PBS, control). pH of each solution was measured immediately prior to exposure; PBS pH was 7.0, EPO-GLY and GLY pH was 12, EPO-ARG and ARG pH was 12.9. We harvested cell media and lysate for measurement of inflammatory markers. Ciliary beat was observed at each time interval using light microscopy. High-definition video images were recorded. Post-processing included noise reduction and point-feature matching to enhance visualization of cell movement. Ciliary cell clusters were directly observed and ciliary beat frequency (CBF) calculated for each experiment. **Results:** In all cells exposed to GLY, EPO-GLY, ARG, and EPO-ARG ciliary beat decreased immediately ($p < 0.05$, Figure 1) and ceased within five minutes of exposure. In control groups and NO group, ciliary beat remained throughout exposure. All cells exposed to GLY, EPO-GLY, ARG, and EPO-ARG died within 30 minutes of exposure. Lactate dehydrogenase (LDH), an established indicator of cell-stress/cell death, was evaluated via colorimetric assay in all of these groups. LDH was significantly elevated in GLY and EPO-GLY (Figure 1). LDH was not detectable in the ARG or EPO-ARG groups in the (Figure 1); to verify cell death, total RNA was evaluated in the mixture of culture media and cellular debris remaining after exposure. No RNA was detectable, indicating total cell death (Figure 1). LDH was no different between the cells exposed to NO and the control group (Figure 1). **Conclusion:** Apical exposure of EPO-GLY, EPO-ARG, GLY, or ARG causes ciliary beat cessation and cell death in NHBE cells.
Sponsored Research - MDD received an investigator-initiated unrestricted research award from Mallinckrodt Pharmaceuticals in 2017 that funded some of the experiments and data presented in this abstract.

See table or figure in supplement to the October 2018 issue of Respiratory Care at www.rcjournal.com.

3001593

Decreasing Duration Of Mechanical Ventilation With the Use of an Airway Clearance Device.

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Background: During mechanical ventilation (MV), management of the critical patient can be a challenge in the Intensive Care Unit (ICU). Complications include an increased amount of secretions adhering to the endotracheal tube (ETT), which causes higher Peak Inspiratory Pressures (PIP) and Airway Resistance (RAW), making it difficult for patients to tolerate weaning from MV. ETT suctioning can be ineffective, leaving residual biofilm. The presence of biofilm may cause increased airway resistance and lead to longer duration of MV. The endOclear Restore device purpose is to remove ETT secretions quickly and efficiently. The objective of this study was to determine any benefits of the endOclear Restore device to minimize biofilm formation, maintain airway patency, and decrease ventilation days. **Methods:** This is an IRB exempt, 2-year retrospective, observational single center study to evaluate the efficacy of cleaning the ETT with endOclear Restore after ETT suctioning and oral care has been completed. Ventilation day data was collected prior to using endOclear on 374 subjects and post data on 336 subjects. Subjects were admitted into our adult Medical/Surgical/Neuro ICU, intubated with an ETT, and mechanically ventilated. Exclusion criteria included patients admitted for coronary artery bypass grafting, valve replacement, tracheostomy, and patients younger than 18 years of age. The measurements obtained before and after cleaning the ETT were PIP (362 observations) and Raw (352 observations). The paired t-Test was used to compare sample means. **Results:** Data from this 2-year study revealed that the average duration of MV decreased from 2.85 to 2.42 days (0.43 ± 1.58, $p < 0.01$), PIP was decreased from 26.2 to 24.9 cmH20 (1.3 ± 3.9, $p < 0.01$) and RAW was decreased from 17.3 to 15.8 cmH_2O/L/sec (1.5 ± 4.2, $p < 0.01$) with the use of endOclear. Data is presented as mean ± SD. **Conclusion:** This study revealed that cleaning the ETT using the endOclear Restore device, after ETT suctioning and oral care had already been completed, significantly reduced the average duration of MV. The removal of adherent secretions/residual biofilm also dramatically decreased PIP and RAW and assisted in decreasing the work of breathing.

Sponsored Research - None

Parameter	Before	After
Average Duration of MV	2.85	2.42
PIP	26.2	24.9
RAW	17.3	15.8

3016047

Reducing Unplanned Extubations In The Neonatal Intensive Care Unit Through Plan-Do-Study-Act Cycles And Quality Improvement Methods.

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Background: Unplanned extubation (UE) is the unintended dislodgement or removal of an ET tube not ordered by the medical team. UE is the fourth most common adverse event in NICUs and has become a quality indicator for patient safety. UE is associated with hypoxia, ventilator associated pneumonia, intraventricular hemorrhage, cardiopulmonary arrest, risk of multiple intubations and increased number of ventilator days. The aim of this quality improvement (QI) project is to reduce the UE rate in NICU patients from 1.5 UE events/100 ventilator days in the year 2015 to <1 by December 2017. **Methods:** A key driver diagram was created with the following primary drivers: 1. Standardized security of the ET tube by trialing various taping methods, review of chest radiograph and ET tube placement and established RT competency training and review; 2. Standardized care of the intubated infant requiring two clinicians to reposition, standardized infant position for chest radiograph and review sedation with the medical team; 3. Reviewed UE events by completed safety report, completed audit tool, debriefed in real time and reviewed events at multidisciplinary unit council and division meetings; 4. Extubation readiness assessment through an RT driven ventilator protocol and reviewed ventilator parameters prior to UE if infant did not require re-intubation. The process measures are compliance with the completion of an audit sheet for every UE. The outcome measure is the rate of UE/100 ventilator days. Our team reports the date of the last UE at the NICU's daily safety huddle. Plan-Do-Study- Act (PDSA) cycles were performed during this effort. **Results:** The outlier data point January 2015 is a special cause variation, which required re-education on how to evaluate if an infant is intubated during a hypoxic event prior to removal of the ET tube. The U chart shows an unstable process in the UE rate during 2016. Standardization and trials of different taping methods led to a lower UE rate until February 2017 when an alternative tape was erroneously stocked in the NICU and removed. The UE has improved to < 1 UE event/100 ventilator days (U chart Fig, 3). **Conclusion:** PDSA cycles enable rapid test of change and troubleshooting on the front-line. Due to our short interval data review process, we were able to detect special cause variations and act quickly with interventions. Using QI methods enabled the improvement of UE.

Sponsored Research - None

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3016769

Developing A Standardized Multidisciplinary Process For Safe Adult Extubation.

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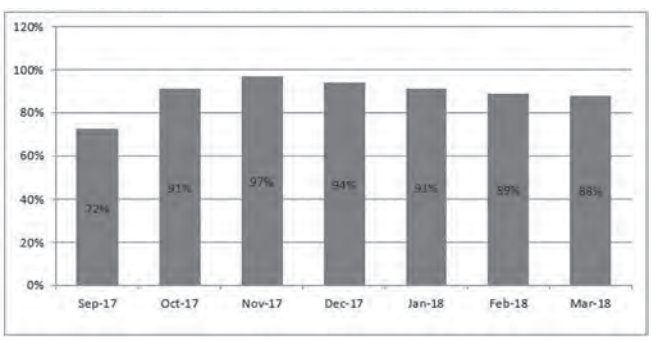
Background: Inova Fairfax Medical Campus (IFMC) has utilized physician-ordered extubation in most Adult ICUs/ED. The team of physician, resident, pharmacist, nurse and respiratory therapist participates in multidisciplinary rounds and formulates a plan to extubate a patient. Physician would write the order for Extubation, RT acknowledges the order, verbal communication among team takes place and procedure would be performed. A physician/Advanced practice provider (APP) would be close by to assure skilled personnel is available to reestablish artificial airway if needed. In 2017, an extubation was performed prematurely on an adult patient due to different interpretation of a verbal communication about the order and the timing of the extubation. We identified the root cause to be the lack of a clear closed loop communication among all team members. It was an opportunity to improve patient safety. Our institution has embarked on a "No harm, high reliability" organization journey with focus on patient safety by linking our cultural beliefs to patient safety. In addition, IFMC employees have learned TeamSTEPPS (Team Strategies and Tools to Enhance Performance and Patient Safety) to improve Teamwork, Better communication & Patient Safety. Method: A multidisciplinary team (consisting of Respiratory Care Services, intensivists, CMO, Nursing) collaborated to develop a safety pre-procedure pause before adult extubation. The pre-procedure pause includes patient identification, order for procedure, assurance that the required team members & equipment are available prior to start of the procedure. Team performs Time- out with physician in the patient's room. Closed loop communication is expected to assure a mistake is not being made. Physician must be present in the room or in the unit when extubation is performed. A SMART phrase was created in EHR documentation. Education to all team members was done in person, through critical care committees and via email. **Results:** Initial post implementation data was 72%. We reeducated and one-on-one follow up with RT showed improved compliance. EHR documentation of pre-procedure pause shows compliance of 72-97 % to date. Our goal is to achieve 100% compliance. **Conclusion:** Our result shows compliance with a pre-procedure pause to establish a standardized process to extubation of adult ICU patients and improve patient safety. References provided upon request.

Sponsored Research - None



3018364

Evaluation Of A New Balloon-Tipped Closed Suction System.

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Background: Mucus attached to the inner endotracheal tube (ETT) surface has the potential to increase airway resistance and patient work of breathing (WOB). Currently, blind suctioning through a small flexible catheter is the most common method to remove secretions from within the ETT. A new device incorporates an inflatable balloon that is designed to remove mucus by physically scraping the inner wall of the ETT (Cleansweep closed suction system, Teleflex Medical, Morrisville, NC), The aim of this bench study was to evaluate the impact of ETT scraping with this novel system on airway resistance. **Methods:** The balloon tipped suction system (BTSS) was compared to our standard suction system (Halyard, Alpharetta, Georgia). The systems were hooked up to a ventilator circuit and the ETT. The ventilator used was a Maquet Servo i with the following settings: o Volume assist control mode o Vt 500 ml o RR 12/min o PEEP 5 cm H_2O o Ti 0.8 sec o T rise 0.40 (resulted in a constant flow of 50 L/min) The distal end of the ETT was connected to an Ingmar single chamber test lung with a resistance setting of 5 cm H_2O/L/second and one spring attached. An upper airway model was used and the head was positioned at approximately 30 degrees. Three mls of artificial mucus was injected into the ETT and then the ventilator was connected at the above settings. Once the peak pressure stabilized (5-10 breaths) the peak pressure (Ppeak) and plateau pressure (Pplat) were recorded. Then suction was applied at – 120 mm Hg for 5 seconds. Readings were once again taken post suctioning. Five runs on each size ETT (7.0, 7.5 and 8.0) alternating between both suction systems with size 14 French catheters were carried out. Five additional runs on 7.0 ETT's were made alternating between the suction systems with size 12 French catheters. Peak-plateau pressure decreases were recorded after using BTSS initially, BTSS following a standard suction, standard initially and standard following a BTSS suction. Each individual catheter was cleaned and reused one time. **Results:** Mean (+/- SD) cm H_2O peak-plateau pressure changes are depicted in Table 1. All comparisons showed BTSS was significantly better than our standard system in reducing ventilator resistive pressures (P<0.001 by 2 way ANOVA and paired t testing). **Conclusion:** In this bench study the BTSS closed suction system was superior at reducing resistance through the various size ETT's.

Sponsored Research - Financial support from Teleflex

Peak - Plateau

	BTSS	Standard	BTSS-Standard
14 Fr, 8.0 mm tube, initially	-9.0 (3.1)	-4.0 (1.87)	- 5.0
14 Fr, 8.0 mm tube, after other system	-11.6 (2.1)	-1.6 (1.1)	- 10.0
14 Fr, 7.5 mm tube, initially	-19.2 (4.8)	-11.4 (3.0)	- 7.8
14 Fr, 7.5 mm tube, after other system	-15.2 (2.6)	- 4.0 (0.7)	- 11.2
14 Fr, 7.0 mm tube, initially	-34.6 (7.0)	- 14.6 (9.5)	- 20.0
14 Fr, 7.0 mm tube, after other system	- 24.6 (5.5)	- 3.6 (1.5)	- 21.0
12 Fr, 7.0 mm tube, initially	- 33.2 (12.1)	- 18.4 (6.0)	- 14.8
12 Fr, 7.0 mm tube, after other system	- 19.8 (3.3)	- 4.2 (2.2)	- 15.6

3021318

Impact Of An Endotracheal Tube Holder To Reduce Facial Injury.

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Background: Data describing an endotracheal tube holder both for securing an endotracheal tube (ETT) and reducing skin breakdown compared to cloth tape or other methods of securing the ETT in adult intensive care units (ICU) are limited. Pressure injuries associated with ETTs are concerning due to increased morbidity, treatment cost, and reduced reimbursement. Having a device specific to secure an ETT may reduce variation and improve outcomes. We have used cloth tape to secure ETTs for many years at our hospital. We hypothesize that using a device designed to secure the ETT would reduce hospital-acquired pressure injuries to the mouth and face and secure the airway better than tape. **Methods:** The Hollister AnchorFast ETT holder was initiated on all intubated patients that met criteria in our adult intensive care units starting in August 2017. Data was retrospectively collected on number of skin injuries to the mouth/face and unplanned extubations compared to ETTs secured with 1 inch cloth adhesive tape. We collaborated with the ICU nurses to ensure that the ETT holder would be repositioned as recommended every two hours. Two data periods were analyzed, PRE - January 2016 to August 2017, POST - August 2017 to present. **Results:** 7614 patients recieved mechanical ventilation in the adult ICU's since January of 2016, 5286 patients in the prior to the ETT holder (PRE) and 2328 patients during use of the ETT holder (POST). See data table for incidence of injury and unplanned extubations. **Conclusion:** Pressure injuries associated with the ETT had a significant decrease from 2.93% (PRE) to 1.97% (POST). Along with the reduction in skin breakdown, the number of unplanned extubations were unchanged. Future studies should investigate the quality of mouth care given when using an ETT holder versus cloth tape.

Sponsored Research - None

Facial Injuries and Unplanned Extubations PRE and POST Implementation of an Endotracheal Tube Holder

Data Element	PRE	POST	p value
Ventilator Patients	5286	2328	
# Facial Injury/Ulcerations	155	46	
% with Facial Injury/Ulceration	2.93%	1.97%	0.015
# Unplanned Extubations	112	57	
% With Unplanned Extubation	2.11%	2.44%	0.315

3021770

Laboratory Evaluation Of Continuous Cuff Pressure Control Methods.

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Background: Automatic cuff pressure (P_{cuff}) control devices (ACPCD) for artificial airways are available, yet there are no standards and few data to support their necessary. We hypothesized that (A) airway pressure change during mechanical ventilation (MV) is transmitted to P_{cuff} and (B) 3 different ACPCD and 1 manual method will result in zero drift in mean P_{cuff} during 12 hrs of simulated MV. **Methods:** Experiments lasted 12 hrs, at 2 inspiratory target pressures (P_{IT}), with 3 endotracheal tubes (ETT), 3 different ACPCD (Intellicuff Standalone, Pressure Eyes and Tracoe) and 1 manual method, for a total of 24 twelve-hour experimental runs. A Laerdal mannequin was intubated with an 8mm ID ETT and ventilated with: mode = PC-CMV, f (bpm) = 20, T_I (s) = 1.0, PEEP (cm H_2O) = 10, P_{IT} (cm H_2O above PEEP) = 10 and 40. For ACPCDs, the ETT pilot balloon was connected to the 1st port of a 3-way stopcock. The 2nd port was connected to a pressure transducer and data acquisition system. The 3rd port was connected to the ACPCD. For manual method, the data acquisition system was not used. The ETT was initially inflated to P_{cuff} = 25 cm H_2O. The final pressure at 12 hours (disconnected from ventilator) was measured with an AG CUFFILL device, corrected for pressure drop due to measurement (-1.1 cm H_2O). The drift in mean P_{cuff} was calculated as P_{drift} = initial mean P_{cuff} – final mean P_{cuff}. **Results:** Airway pressure fluctuations from MV were reflected in changing P_{cuff} amplitudes ranging from 2 to 23 cm H_2O. A large P_{drift} occurred with the manual method (-11.1 cm H_2O), but was only ± 0.4 cm H_2O for automatic devices. **Conclusion:** ACPCDs do regulate mean P_{cuff} and keep P_{drift} well below a clinically important threshold. However, the large P_{drift} seen with the manual method warrants periodic monitoring. Further studies are needed to determine the source of leak for this method, and the physiologic effects of P_{cuff} amplitude changes during MV.

Sponsored Research - None

3024898

Reduction of Endotracheal Tube Cuff Pressure During a Series of Routine Cuff Pressure Checks.

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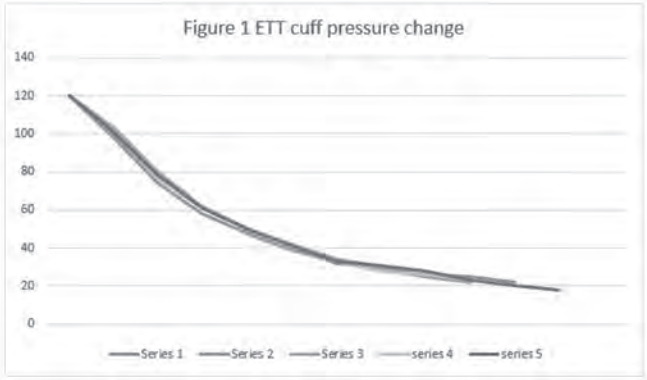
Background: Tracheal intubation is a routine practice in the operating unit as well as in the care of critically ill patients. It is estimated that 13 to 20 million intubations are done annually in the United States. The primary functions of an ETT cuff include prevention of air leaks during mechanical ventilation and protection of the airway from aspiration. Respiratory therapists often check the ETT cuff pressure as part of the overall respiratory care procedure. Due to the design of cuff pressure manometers, a small air leak from the cuff is a common occurrence when the cuff pressure manometer sampling tube opens the one-way valve in the pilot balloon. The purpose of this study was to evaluate the degree of air leaks during routine cuff pressure checks. **Methods:** An adult airway management trainer (Laerdal, Wappingers Falls, NY) was orally intubated with a new, size 8 ETT (Covidien Shiley TaperGuard Evac, Mansfield, MA). The resting position of the ETT was 21 cm at the incisors. Following intubation, the ETT cuff was deflated completely and re-inflated with 12 mL of air. The cuff pressure was measured with a cuff pressure manometer (Posey Cufflator, Arcadia, CA) at baseline with 12 mL of air in cuff and again after each removal and re-attachment of the cuff pressure manometer to the pilot balloon. These removal/re-attachement steps are repeated until an air leak around the cuff was heard. Five trials were done using the same ETT and protocol. **Results:** Changes of ETT cuff pressure are shown in Figure 1. Air leak around the ETT cuff was heard at these cuff pressures: 25 cm H_2O, 25 cm H_2O, 27 cm H_2O, 26 cm H_2O, and 20 cm H_2O. **Conclusion:** The cuff pressures measured with initial air leak around the ETT cuff are within or below the recommended cuff pressure range (25 cm H_2O to 30 cm H_2O). Cuff pressure checks may cause unintended air leaks around the cuff. Since air leak around the ETT cuff poses a risk for aspiration, routine or frequent cuff pressure checks should be performed with caution. In addition, routine use of a cuff pressure that falls within the recommended cuff pressure range does not guarantee a leak-free ETT cuff.

Sponsored Research - None



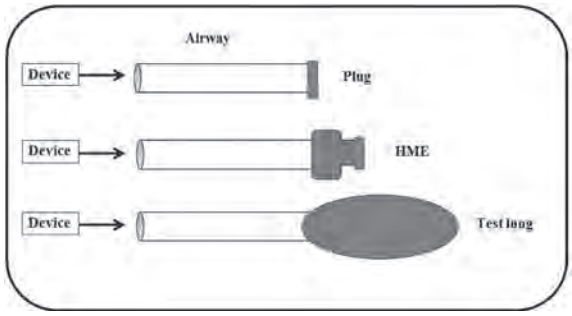
3024965

The Compliance Of Distal Airway Volume Affects Secretion Mobilization Device Evaluation.

William M. LeTourneau[1], Abby C. Schramel[1], Ryan S. Diesem[2]; [1]Mayo Clinic, Rochester, MN; [2]Valley Inspired Products, Apple Valley, MN

Background: Retention of airway secretions is a common clinical problem. Although multiple secretion clearance adjuncts claim beneficial results, limited studies have been conducted to show the physical movement of secretions within the airway. Studying secretion movement within the airways may contribute to the evaluation of airway clearance devices. Method: Bench models were constructed to determine an ideal environment for the assessment of secretion mobilization. The models included an adult 3D printed tracheal model with multiple airways and had the ability to isolate lung zones, as well as single airway models that ranged in lumen size from 7.5 mm to 2 cm. The distal airway volume of the models was manipulated to represent three different environments: a terminal point at the end of the airway (no volume), a distal volume that was non-compliant (bacteria filter), and a distal volume that was compliant (test lung). Two devices were used; the Percussionaire Impulsator and the Hill-Rom MetaNeb. The devices were operated under manufacture recommendations for use with an intubated patient. **Results:** Movement was defined as any oscillations or actual proximal movement of secretions. The single airway model demonstrated movement of secretions when distal volume was non-compliant. No movement of secretions was observed in the airways that had a terminal end or distal volume that was compliant. The multiple airway model demonstrated secretion movement in the zones that were absent of collateral flow, while the secretions in zones with collateral flow showed limited movement. **Conclusion:** Regional lung compliance, as well as collateral flow to adjacent lung units, may affect the ability to effectively mobilize secretions while utilizing airway clearance devices. Bench testing of two airway clearance modalities demonstrated limited but inconclusive results. The addition of distal volume with greater compliance reduced observed secretion movement. These models were not physiologically accurate, which may have played a role in the limited results seen. This testing demonstrated the difficulty in assessing and measuring the performance of secretion mobilization devices in a bench model. These results can inform future studies utilizing percussive/oscillatory flow devices and the effects on retained secretions in various lung environments. Disclosures: RD discloses a financial relationship with Percussionaire. Percussionaire had no involvement in the study.

Sponsored Research - Percussionaire supplied equipment. Percussionaire had no involvement in the study.



3025348

Trach Safe: An Approach For Reducing Preventable Death In Tracheostomy-Dependent Children.

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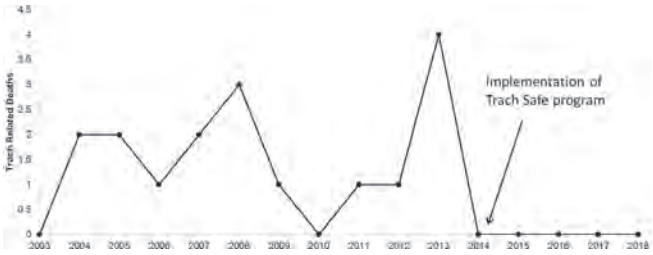
Background: Each year, there are approximately 35 trach-dependent children (TDC) discharged from Seattle Children's Hospital. They receive nursing support at home or at a skilled nursing facility. These patients are at increased risk for mortality and/or morbidity due to unanticipated airway events (UAEs) associated with the tracheostomy tube obstruction or decannulation. We developed a comprehensive program in order to improve the safety for TDC outside of the hospital. The goal was to identify common risk factors for UAEs and prevent mortalities. **Methods:** Using a retrospective chart review, we tracked total number of outpatient UAEs that led to death in our TDC population between 2003 and 2013. We included TDC with/without mechanical ventilation and excluded those with cause of death determined from underlying disease process or guardian decision for withdrawal of support. We performed a root-cause analysis to determine variables that may have predisposed patients to outpatient death or UAEs. A multidisciplinary group comprised of hospital and community providers developed the Trach Safe program in 2014. Key components included: 1) a comprehensive pre-discharge airway evaluation; 2) an emergency airway management course for home and school nurses, and 3) a system for standardized reporting of home adverse events. **Results:** Our chart review revealed: 17 of 41 deaths (41%) were identified as preventable, 53% of patients died within the first year from initial trach discharge, 76% were ventilator-dependent, 71% had a known upper airway obstruction, and 47% were at home without a skilled nurse. Suspected causes of death included: 1) decannulation/obstruction; 2) ventilator disconnect; or 3) parent sleeping/missed alarms. Accidental trach-related deaths ranged between 1-4/year prior to implementation of Trach Safe. Following the Trach Safe program, there has been zero trach-related deaths over a four year period (see Figure). **Conclusion:** Based on our findings, the Seattle Children's Trach Safe program is preventing trach related deaths. We will continue to monitor outcomes and partner with our care community of trach dependent patients and their families to develop this model of safety.

Sponsored Research - None



Trach Related Deaths Over 15 Year Span

3025724

Secretion Mobilization Capabilities of Two Airway Clearance Devices.

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Background: Secretion clearance is one of the most important tasks for respiratory therapists and patients. We tested two high frequency airway clearance devices to determine which device is more efficient at mobilizing secretions in a bench model. The null hypothesis is that there will be no difference in secretion mobilization between the IPV (Model IPV-1C, Percussionaire, Sandpoint, ID) and MetaNeb System (Hill-Rom, St. Paul, MN). **Methods:** An Ingmar Medical ASL 5000 lung simulator was set to mimic a chronic bronchitis patient with a compliance of 60 ml/cmH_2O and resistance of 18 cmH_2O/L/s. The simulator was then programmed to produce a tidal volume of 500 ml, respiratory rate 15, and I:E ratio of 1:3. A section of Tygon tubing with a length of 33.2 cm and internal diameter of 13 mm was used to simulate an airway. Using appropriate adaptors, the airway was then connected directly to the ASL 5000. The two devices were then connected to the distal end of the airway which was lubricated with a silicone lubricant. A mucous simulant was created by crosslinking 100 ml of a locust bean gum solution (0.38 mg/100mL) with 3 ml of sodium tetra borate (19 mg/L). Using a syringe, 2 ml of mucous simulant was injected into the end of the tubing closest to the ASL 5000. To determine mucus velocity, a ruler was placed next to the tubing and the leading edge of the mucous was noted. After each device was allowed to run for a period of two minutes, the leading edge of mucus was again noted and the velocity was calculated. The tubing was cleaned, dried, and lubricated after each run. This procedure was repeated three times at both the high and low frequencies on the MetaNeb as well as the highest and lowest frequency settings on the IPV. **Results:** The IPV set on the highest frequency produced a mean positive velocity of 3.98 cm/min. The IPV set on the lowest frequency produced a mean negative velocity of 1.02 cm/min. The Metaneb produced a velocity of zero on both the high and low frequency settings. **Conclusion:** The MetaNeb produced no net movement of secretions. The high frequency setting of the IPV produced secretion mobilization away from the ASL or cephalad. On the low frequency setting, the IPV moved secretions toward the ASL or caudad. When using the IPV for secretion clearance, the best results will be obtained when it is set on the on the highest frequency.

Sponsored Research - None

3025873

Positive Pressure Nasal Irrigation Decreases Upper Respiratory Symptoms In An Adult Urban College Population.

Alexis Huff, Michelle Moore; Gannon University, Erie, PA

Background: The Schnozzle™ is a smooth tip adapter, attached to a syringe which forms a seal within the nostrils to enable quick and effective flow nasal lavage. The Schnozzle™ syringe adaptor improves the ability to routinely clear the nasal passages for all patients with positive pressure reduce upper respiratory symptoms such as, nasal and sinus congestion. The purpose of this project was to analyze if the Schnozzle™ nasal irrigation product is effective in reducing upper respiratory symptoms related to nasal and sinus congestion in adults, in an urban university population. **Methods:** After Institutional Review Board approval, 29 voluntary participants with nasal or sinus congestion were instructed in the nasal irrigation procedure and completed an anonymous survey. Using a 60 cc syringe with a Schnozzle™ syringe tip adapter, participants instilled 60 cc of normal saline solution (NSS) into each nare, twice per day for 10 days. Additionally, volunteers were instructed to position their head horizontally and hold their breath as they administered the normal saline solution to ensure they filled the sinus cavity and drain out the opposite nare avoiding the lower airways. Survey assessments included reason for participant interest, compliance, frequency, signs and symptoms, mucus color and changes, comfort, medication use, and alternative outcomes. The 29 adult participants were separated into a compliant and non-compliant group. Compliance for this research was determined as those participants who documented routine nasal irrigation twice per day for 10 consecutive days. Excel (version 2010) was utilized to analyze data and the Chi square test was used to determine significance of reported outcomes within the 2 groups. **Results:** Participants in the compliant group reported a decrease in headaches, coughing, and work of breathing (i.e., easier to breathe) which was statistically significant (P<0.05). As well, a decrease in nasal congestion was marginally significant (P=0.073)with use of the Schnozzle™. There was no significant difference in nasal stuffiness or reports of runnier nasal secretions. **Conclusion:** Adult using positive pressure nasal irrigation for a 10-day period are more likely to experience a decrease in upper respiratory symptoms and find it easier to breathe. The decrease in upper respiratory symptoms may be related to reduced inflammation and secretions prompted by pushing secretions out of the nasal and sinus cavities.

Sponsored Research - SplashCap Medical Devices LLC provided supplies including:
Schnozzle leur-lock tip
60cc syringes
Normal Saline Solution (NSS)
and incentives for the 29 participants

See table or figure in supplement to the October 2018 issue of Respiratory Care at www.rcjournal.com.

3015653

Low Tidal Volume Ventilation And Threshold Opening Pressures During Lung Injury: Implications For Managing Severe ARDS.

Gregory S. Burns[1,2], Richard Kallet[1,2], Michael S. Lipnick[2], Antonio Gomez[3], Romain Pirracchio[2]; [1]Respiratory Care Services, San Francisco General Hospital, San Francisco, CA; [2]Anesthesia, UCSF, San Francisco, CA; [3]Pulmonary & Critical Care Medicine, UCSF, San Francisco, CA

Background: In ARDS recruitment requires a threshold opening pressure (the clinical correlate being plateau pressures or Pplat) that progressively increases from non-dependent to dependent lung over a range of 20-60 cmH_2O.[1,2] Three recruitment nodal points signifying these anatomic transitions (mid-to-dorsal lung) have been identified as 30,35 and 45 cmH_2O.[1] Because the ARDSNet "ARMA" protocol goal is Pplat < 30 cmH_2O, lung-protection maybe at odds with stabilizing oxygenation. We examined the frequency in which this occured in subjects managed with the ARMA protocol **Methods:** Our ARDS quality assurance database contained 1,287 subjects managed with the ARMA protocol with reference period ventilator data on the day following protocol initiation. Calculations included: 1) median and 75th percentile Pplat, 2) percentage of Pplat that met each recruitment nodal point, 3) percentage of subjects with severe ARDS (arterial oxygen tension-to- inspired oxygen fraction or PaO_2/FiO_2< 100 mmHg), 4) percentage requiring a toxic FiO_2 (> 0.7), 5) median and 75th percentile of tidal volume (VT) and 6) driving pressure (Pplat-PEEP). **Results:** At PEEP > 10 cmH_2O, substantial and increasing numbers of subjects met severe ARDS criteria and required a toxic FiO_2. Moreover, until PEEP reached 18 cmH_2O, the majority of subjects did not cross any of the nodal points associated with alveolar recruitment; particularly those associated with dorsal lung recruitment (i.e. Pplat > 35 cmH_2O) (Table). Reasonable lung-protection (particularly at higher PEEP levels) was maintained as noted by median and 75th percentiles for both VT driving pressure. **Conclusion:** Increasing PEEP to stabilize oxygenation using the ARMA protocol often does not achieve sufficient Pplat to reverse dependent atelectasis. Depending upon PEEP and severity of hypoxemia, reasonable alternatives include increasing PEEP to increase Pplat, prone position (which increases dorsal transpulmonary pressure) or recruitment maneuvers. 1. Crotti S, et al. Recruitment and derecruitment during acute respiratory failure: A clinical study. Am J Respir Crit Care Med 2002;164:131-140. 2. Borges JB, et al. Reversibility of lung collapse and hypoxemia in early acute respiratory distress syndrome. Am J Respir Crit Care Med 2006;174:268-278.

Sponsored Research - None

PEEP (cmH2O)	5	8	10	12	14	16	18	20+
Pplat (cmH2O)†	19 [24]	21 [25]	23 [26]	25 [28]	28 [31]	29 [32]	33 [36]	35[40]
% Pplat 30-34	5%	6%	8%	13%	29%	34%	36%	38%
% Pplat 35-44	0%	3%	2%	2%	7%	10%	31%	54%
% Pplat > 45	2%	0%	0%	1%	0%	1%	3%	5%
% PaO2/FiO2 < 100 mmHg	4%	3%	9%	24%	34%	39%	53%	46%
% FiO2 > 0.70	5%	4%	9%	24%	50%	60%	68%	86%
VT (mL/Kg)†	6.1 [6.6]	6.2 [6.6]	6.1 [6.5]	6.1 [6.7]	6.1 [6.6]	6.1 [6.4]	6.2 [7.0]	6.1[6.7]
Pplat-PEEP (cmH2O)†	14 [19]	14 [17]	13 [16]	13 [16]	13 [17]	13 [16]	15 [18]	14 [18]

† data reported as median [75%] to refine assessment of lung injury risk

3016612

Ability Of ICU Health Care Professionals To Recognize Common Patient-Ventilator Asynchronies.

Jeremy Stull, Greg Holt, Mohammed Alomran, Robin Jacob, Samantha Vo, Berenice Romo, Ruben D. Restrepo; Respiratory Care, UTHSCSA, San Antonio, TX

Patient-ventilator asynchrony (PVA) has detrimental effects that include increased WOB, patient discomfort, increased need for sedation, prolonged mechanical ventilation, and decreased survival. Ventilator waveforms could assist identifying and correcting PVA by matching ventilator parameters to patient respiratory needs. The goal of this study was to assess the ability of HCPs working in ICUs to interpret common types of PVA. **Methods:** Descriptive observational study at a 496-bed university-affiliated institution in San Antonio, TX. Study was approved by the IRB. Four waveforms showing examples of PVA (ineffective effort, flow asynchrony, double-triggering, and auto-triggering) were presented, one at a time, to each HCP in the same order and asked to select the best answer from a multiple-choice questionnaire. HCPs with previous training on waveforms were compared to non-trained. **Results:** A total of 47 HPCs, including 19 RRTs (40.4%), 2 CRTs (4.3%), 6 resident physicians (12.8%), 7 fellows, (14.9%), 1 attending physician (2.1%), 1 physician assistant (2.1%), and 11 RNs (23.4%), completed the evaluation. Only 9 (19.1%) HCPs recognized the 4 types of asynchrony correctly, whereas 9 (19.1%) detected 2 types correctly, and 16 (34.0%) detected 1 type correctly. Thirteen participants (27.7%) did not identify any asynchrony correctly. Flow asynchrony was identified by 12 HCPs (25.5%), double-triggering by18 (38.3%), while autotriggering and missed trigger was identified by the same number of HCPs, 20 (42.5%). There was not a significant difference between trained and non-trained HCPs who identified 4 asynchronies. Only 2 (10.5%) of the 19 RRTs identified all PVAs, while both CRTs (100%), one attending (100%), 2 CRTs (100%), 1 resident (16.7%), and 2 RNs (18.2%) identified all PVAs. The great majority of RRTs (57.9%) recognized only one type of PVA. The percentage of trained HCPs who identified 2 asynchronies (77.7%) was significantly higher than non-trained HCPs (22.2%; P = 0.023). Lack of recognition of any asynchrony was significantly higher in the non-trained group (76.9%) than in the trained group (23.1%; P = 0.005). **Conclusion:** A small number of HCPs in the ICU are able to recognize common types of patient-ventilator asynchronies. Previous training on ventilator waveform analysis may significantly impact the ability of professionals to identify ventilator asynchrony.

Sponsored Research - None

Number of PVAs detected correctly	Trained	Non-trained	P
4	5	4	1.0
3	7	2	0.005
2	12	4	0.001
1	3	10	0.001

3017278

Mortality Rate In ARDS Is Higher In Those Meeting NIH ARDS Net Exclusion Criteria.

Richard Kallet[1,2], Romain Pirracchio[2], Michael S. Lipnick[2], Pratik Sinha[3], Antonio Gomez[3], Michael A. Matthay[3]; [1]Respiratory Care Services, San Francisco General Hospital, San Francisco, CA; [2]Anesthesia, UCSF, San Francisco, CA; [3]Pulmonary & Critical Care Medicine, UCSF, San Francisco, CA

Background: ARDS mortality is lower among subjects participating in randomized controlled trials (RCT) versus the general ARDS population (23-29% vs. 35-46%).[1] The need to exclude subjects with inordinately high mortality risk is necessary in RCTs to prevent masking the impact of potentially effective treatments. We inquired whether these differences would be apparent in subjects managed clinically using the ARDSNet ventilation protocol based upon ARDSNet eligibility or exclusion criteria. **Methods:** The SFGH ARDS quality assurance database used for tracking lung protective ventilation (LPV) practices was queried to identify 1,986 subjects meeting Berlin Taskforce criteria for ARDS from July 2002 through December 2017. Subjects had been differentiated by enrollment criteria into an ARDSNet trial (i.e. exclusions based on comorbidities, moribund conditions, etc). Mortality was assessed at 90 days after ARDS onset by two-sided chi-square test with Yates correction. Cox proportional hazard model was used to compare the risk of death between subjects eligible for or excluded from enrollment into a RCT. Alpha was set at 0.05. **Results:** Day 90 mortality was significantly lower in those meeting eligibility criteria vs. exclusion criteria (29% vs 52%, *P*< 0.001). After adjusting for potential confounding variables, the mortality risk for those meeting RCT eligibility criteria was approximately half that of those excluded from enrollment : HR (95% CI): 0.55 (0.47-0.64), P < 0.001 (Fig). **Conclusion:** Among subjects not enrolled into an RCT, but managed using the ARDSNet ventilator protocol, mortality differences were apparent based upon standard ARDSNet RCT eligibility and exclusion criteria. This likely reflects differences in the presence of comorbidities. Moreover, the relatively precipitous drop in survival over the first week of ARDS underscores the importance of excluding this cohort from RCTs as it suggests insufficient time for potentially beneficial treatments to demonstrate efficacy. 1. Pais F, et al. Influence of clinical factors and exclusion criteria on mortality in acute respiratory distress syndrome between observational studies and randomized controlled trials. Respir Care 2018;63[in press]

Sponsored Research - None

See table or figure in supplement to the October 2018 issue of Respiratory Care at www.rcjournal.com.

3015916

A Descriptive Analysis Of Adherence To Ventilator Alarm Policy.

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Background: The Joint Commission National Patient Safety Goal 6.01.01 requires hospitals to, "Make improvements to ensure that alarms on medical equipment are heard and responded to on time." Our department policy states, "Alarms are set to ensure safe delivery of the mechanical ventilation to the patient, alert caregivers to possible changes in patient condition, ensure proper functionality of the ventilator, and to reduce unnecessary alarms to minimize staff alarm fatigue without risk to patient safety." Past abstracts have described inappropriately set alarms, while some organizations are attempting to benchmark ventilator alarm settings. As a quality assurance project, we sought to determine staff adherence to department policy. **Methods:** Data collected from fifty ventilators included: high peak inspiratory pressure, high minute ventilation, low minute ventilation, high respiratory rate, high tidal volume, and low tidal volume alarms. Data were compared to our departmental policy by finding the mean and standard deviation for each parameter. **Results:** We found that clinicians were grossly non-compliant with ventilator alarm settings. When setting high tidal volume, 4% of alarm settings were complaint to our policy. For low tidal volume, low minute ventilation, and high respiratory rate the compliance rates were 28%. Two percent of high minute ventilation alarms were set according to policy. High peak inspiratory alarm settings were set to policy on 22% of the ventilators. Mean difference between high tidal volume alarm setting and the policy was 299.75 mL ± 358.78 mL. A mean divergence from policy of 138.72 mL ± 163.35 mL was found in low tidal volume settings. High minute ventilation alarm means were low by 6.15 L/min ± 2.97 L/min. Conversely, low minute ventilation alarms were set too high, with a mean of 1.49 L/min ± 2.67 L/min. Mean respiratory rate settings were too high by 6.4 BPM ± 7.22 BPM. Finally, high peak inspiratory pressure alarms had a mean setting 8.76 cmH_2O ± 7.15 cmH_2O higher than stated in departmental policy. **Conclusion:** Although benchmarking ventilator alarm data is worthwhile it may be challenging to achieve. One theory for why clinicians did not adhere to our policy is that it may be too conservative. Future research may indicate why clinicians deviate from standards and how best to align ourselves with stated policies. Based on our findings we are devising a plan to meet the Joint Commission standard.

Sponsored Research - None

3009167

Acute Renal Injury At Mechanical Ventilation Weaning Increases Risk Of Tracheal Extubation Failure.

Andrey W. Sousa[1,2]; [1]Department of physiotherapy, University of São Paulo, São Paulo, Brazil; [2]Intensive Care Unit, Hospital Samaritano de São Paulo, São Paulo, Brazil

Background: Current research seeks to improve the success rate of tracheal extubation, however, little is known about the effects of acute renal injury on the tracheal extubation process. Therefore, the aim of this study is to verify if acute renal injury contributes to the failure of tracheal extubation. **Method:** A retrospective observational study of electronic medical records was performed. Patients admitted to the intensive care unit, between January 2015 and December 2016, age ≥ 18 years, both genders, requiring invasive mechanical ventilation for a period ≥ 48 hours had their electronic records evaluated. Patients who needed to return to invasive mechanical ventilation within 48 hours of tracheal extubation were classified as ventilatory weaning failure, otherwise they were classified as ventilatory weaning success. Acute renal injury was assessed by the RIFLE criterion. Patients who had at least 100% increase in serum creatinine during the use of invasive mechanical ventilation were classified as acute renal injury. **Results:** Total of 167 patients were evaluated and failure of weaning from invasive mechanical ventilation was 15.6%. Cretinine clearance and water balance were similar between day before and day of tracheal extubation. Tracheal extubation failure group presented lower creatinine clearance when compared to the success group (42 mL/min vs. 100 mL/min respectively, *P*=0.01). The water balance was higher in the tracheal extubation failure group compared to the success group (739mL vs. -189mL, *P*=0.01). Patients with acute renal injury are 51% more likely to fail tracheal extubation than patients without acute renal injury (OR=2.7; 95%CI: 1.6-4.7; *P*=0.01). **Conclusion:** Acute renal injury during weaning from invasive mechanical ventilation contributes to the failure of tracheal extubation.

Sponsored Research - None

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3021791

Do Early Changes In Oxygen Saturation Index Correlate To Patient Outcomes.

John S. Emberger, Tom Gillin; Respiratory Care, Christiana Care Health System, Newark, DE

Background: Oxygen Saturation Index (OSI) has been shown to correlate with the Oxygen Index (OI) and is associated with increased mortality on the day of ARDS diagnosis[1]. OSI is calculated by (FiO_2 X 100 X MAP) / SpO_2. OSI is readily available data with no ABG required as is needed with OI. OSI can be calculated with every ventilator-patient assessment. There is limited information concerning the use of OSI outside of ARDS patients at at the time of ARDS diagnosis. We wanted to determine if early changes in OSI on all adult ventilator patients would be associated with differeces in patient outcomes. **Methods:** This study is a retospective review of all mechanically ventilated patients in our adult ICUs since January 2014 who were ventilated in an ICU at least 48 hours. We collected the FiO_2, mean airway pressure, SpO_2 and location for each documented patient-ventilator assessment on day 1 and day 2 of ventilation. We excluded SpO_2 values ≥ 97% and FiO_2 values of 100% because large changes in oxygenation only result in small changes of SpO_2 in this range, similar to other OSI studies[1]. We calculated the maximum OSI on day 1 and day 2 of ventilation. We collected the outcomes (death, home discharge or other facility discharge) for all of the included patients. Patients were divided into two groups. **Group 1**: Maximum OSI decreased from day 1 to day 2. **Group 2**: Maximum OSI increased from day 1 to day 2. Minitab 18 was used for the data analysis. **Results:** 2870 patients recieved ventilation > 48 hours in an ICU since January 2014. **Group 1 data**: *n*=1829, mortality=21.0%, home discharge=31.1%. **Group 2 data**: *n*=1041, mortality=30.6%, home discharge=24.3%. Outcomes were significantly different between groups (*P*=0.000). All ICU's had lower mortality and higher discharge home for Group 1 patients. See chart for unit specific outcomes. **Conclusion:** OSI can be calculated with readily available information at bedside. This study shows that the direction of change in the OSI between day one and day two of mechanical ventilation correlates to significant changes in mortality and home discharge of mechanically ventilated ICU patients. Awareness of the changes in OSI could help guide care towards more protective therapies if OSI is worsening. Future prospective studies could match patients by disease and severity to better understand the impact on those specific populations. **REFERENCE:** 1 - Chest 2017;152(6):1151-1158

Sponsored Research - None

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3021993

Impact Of Complying With Lung Protective Tidal Volumes On Patient Outcomes.

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Background: Evidence exists that lung protective ventilation (LPV) reduces mortality[1], compliance with LPV affects mortality[2] and major centers struggle complying with LPV[2]. We have had ongoing efforts to increase compliance with LPV at our health system. Our efforts focus on 8 ml/kg for all adult patients and 4 to 6 ml/kg for ARDS patients. We wanted to determine what percentage of our patients were never exposed to > 8.25 ml/kg and the outcomes associated with being 100% compliant with LPV. **Methods:** A retrospective review was conducted for all ventilator patients in our adult ICUs since January 2015. We collected tidal volume, height and gender of patients on volume ventilation. For each patient-ventilator assessment on volume ventilation, ideal body weight and tidal volume in ml/kg was calculated. Patient's were divided into 2 groups. Group 1: 100% compliant with LPV, defined as ALL exhaled tidal volumes during volume ventilation ≤ 8.25 ml/kg. Group 2: Not 100% compliant with LPV during volume ventilation. Hospital outcomes of death, discharge to home or other discharge to a facility were analyzed for each of the 2 groups by ICU. Minitab 18 was used for analysis. **Results:** 7034 ventilator patients had volume ventilation at sometime while mechanically ventilated (2062-Cardiac ICU, 2536-Medical ICU, 954-Neuro ICU, 1482-Surgical ICU). Group 1 Data: *n*=4610 (66%), mortality=17.2%, home discharge=45.2%. Group 2 Data: *n*=2424 (34%) mortality=18.9%, home discharge=28.9%. Outcomes were significantly different (*P*=0.000). Individual ICU data (total number / % in Group 1): Cardiac - 2062 / 74%, Medical - 2536 / 57%, Neuro - 954 / 63%, Surgical - 1482 / 70%. See Figure for outcomes by ICU for patients in Group 1 versus Group 2. **Conclusion:** Complying with LPV is associated with lower mortality, higher percentages of discharges home and less discharges to other facilities after the acute hospitalization across all adult ICU's. To have maximum positive impact for patients, mechanisms such as education, dashboards, electronic indicators and automatic protocols that promote LPV on all patients all of the time should be maximized. **REFERENCES:** 1 - New England Journal of Medicine. 2000 May 4;342(18):1301-8 2 - British Medical Journal. 2012;344:e2124

Sponsored Research - None

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3020047

Selecting The Right Tidal Volume For Patients With Ards: Are We Staying Within The Recommended Range For A Lung Protective Strategy?

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Background: Low tidal volumes (VT) may improve the outcomes of patients with ARDS outcomes; however, it may also promote atelectasis and patient-ventilator asynchrony. Tidal volume (VT) selection for adult patients should be based on ideal body weight (IBW), but sometimes is set arbitrarily or calculated based on actual body weight (ABW) in adult ICUs. Since the publication of the Acute Respiratory Distress Syndrome (ARDS) Network Trial almost 20 years ago on the benefit of low VT for patients with ARDS, there have been reports on how VT selection is inconsistently used. The aims of this study were to determine how was VT selected in a group of adult mechanically ventilated patients and to determine if a lung protective strategy (VT 6-8 ml/Kg) was used, particularly in patients with P/F ratio < 150 mm Hg. **Methods:** Retrospective cohort study in several university-affiliated medical ICUs. Patients admitted to the ICU with a diagnosis of ARDS, 18 years of age and older, intubated and mechanically ventilated between January of 2017 and March of 2018 were included for analysis. Patient and ventilator parameters collected included IBW, VT, RR, FiO_2, PEEP, P/F ratio, and oxygenation index (OI). Lung protective strategy defined as VT 6-8 mL/Kg based on IBW. **Results:** The VT selected for these 61 patients based on IBW was 7.48 mL/kg (+/- 1.51; range 3.87-11.21). A total of 6 patients (9.84%) received a VT < 6 mL/kg (5.12+/-0.92) while 19 patients (31.15%) received a VT > 8mL/kg (9.08+/-0.95). The mean VT selected for these patients based on ABW was 6.07 mL/kg (+/-1.93). The single most often selected VT was 500 mL (*n*=12; 60%) and 36.7% of patients were placed on a VT of 500 mL or greater. Twenty-five patients (41%) were on PEEP > 5 cm H_2O and 72% of those received a PEEP >/= 10 cm H_2O. Mean FiO_2 was 63.3% (+/-27.0). P/F ratio for 54% of the patients with ABGs was 175.80 (+/-128.77; range 28.75-603; IQR 85.79-226.5) and OI 14.56 (+/-13.78; range 1.33-66.09; IQR 4.72-16.36). Almost 61% of patients had a P/F ratio < 150. For these patients VT set was 7.97 ml/Kg (+/-2.02). **Conclusion:** Although the average VT selected for this group of patients admitted to the ICU with ARDS was within the 6-8 ml/Kg based on IBW, a considerably large group of patients (almost 1 out of 3) received VT > 8ml/kg. Furthermore, patients with moderate-to-severe hypoxemia, based on P/F ratio and OI, did not receive VT consistent with a more aggressive lung protective strategy.

Sponsored Research - None

2988085

Non-Invasive Estimation Of Optimal PEEP For Mechanically Ventilated Obese Patients.

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Background: Initial PEEP is difficult to set in ventilated obese patients (body mass index [BMI] ≥30 kg/m2). As obese patients have decreased chest wall compliance, there is potential for not receiving adequate PEEP. Currently, esophageal balloons, an invasive and costly device, can be used to determine optimal PEEP in mechanically ventilated patients. In the absence of these measurements, our clinical practice is to set initial PEEP as BMI/4 in cm H_2O. However, to our knowledge, no studies have suggested the use of BMI or any formula for accurately setting initial PEEP at the bedside. Determine the relation between BMI and optimal PEEP and calculated PEEP = BMI/4 as cm H_2O. Optimal PEEP is defined as end-expiratory transpulmonary pressure (Ptp exp) = 0 cm H_2O. Ptp exp = (PEEP– Pes, where Pes is esophageal pressure at end-expiration) **Methods:** We conducted a retrospective chart review on obese patients ≥18 years of age who were admitted to the ICU and mechanically ventilated for ≥48 hours during July 2015-July 2017 in whom Pes was monitored and Ptp exp was calculated. Two linear regression models were used to examine the relationship between BMI and optimal PEEP determined by Ptp exp. A single variable model included BMI/4 and a multivariable model included age. IRB approval was obtained for this review (17-73MR). **Results:** A total of 53 patients met inclusion criteria. Patients were predominantly white non-Hispanic (81.1%), with mean age of 61 years and BMI at initial balloon placement of 43.7 kg/m2. The single variable regression model suggested that optimal PEEP determined by Ptp exp increased 1 cm H_2O per 1kg/m2 increase in BMI/4 (β=1.0, P=0.0007, Adj-R2=0.19). The multivariable regression model including age suggested that optimal PEEP increased 1 unit per 0.96kg/m2 increase in BMI/4 (β=0.96, P=0.0008, Adj-R2=0.24). **Conclusion:** There is a relationship between optimal PEEP determined by Ptp exp and BMI. Furthermore, PEEP, estimated as BMI/4, is consistently less than PEEP determined by Ptp exp and may be used as a conservative guide to set initial PEEP in obese patients without esophageal manometry. However, given low model predictability, further study inclusive of a larger patient population is warranted.

Sponsored Research - None

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3019555

The Impact On Spontaneous Breathing Trial Compliance With The Addition Of Respiratory Therapists To The Virtual Critical Care Team.

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Background: A Virtual Critical Care Respiratory program was evaluated on the impact of Spontaneous Breathing Trial (SBT) compliance and ventilator management in the critical care setting. This program can improve overall VLOS and management by enforcing best practice guidelines. **Methods:** A retrospective cohort study was performed. All vented subjects prior to implementation, October to December 2017, were identified. Every third subject was selected to be analyzed for compliance with the systems Vent liberation protocol and actively weaning. Subjects were also evaluated for possible retrial opportunities later within the same day. The telehealth respiratory therapy program was piloted beginning January 2018. All patients requiring mechanical ventilation from March to May were identified, selected and analyzed the same way as the pre-implementation subjects. Upon the implementation of the program, Virtual Respiratory Therapist (VRT) partnered with the ICU's in the use of the protocol. VRTs assessed all vented patients daily for proper use of the protocol. The VRT would contact the bedside Respiratory Therapist to discuss the plan of weaning, re-addressing SBT readiness, and arranging a re-trial to aid in decreasing VLOS. The VRT documented the plan and followed up to assure the plan was carried out when appropriate. **Results:** 230 of 700 vented subjects were selected for October thru December 2017 for pre-implementation analysis and 550 of 1750 were selected for March thru May 2018 for post-implementation analysis. Retrials are defined as a second trial or attempt a trial for subjects meeting the SAT/SBT criteria per protocol, who may have failed the initial daily trial, or who did not meet criteria previously but now have been managed up. A considerable increase in compliance in the use of the protocol and number of SBT re-trails done was noted with the addition of VRTs. Tableau's, the systems critical care data base, SBT data compliance rates pre-VRT program were 85% in October 86% in November, and 86% in December. Post-implementation compliance improved to 91% March, 91% April, and 92% May. **Conclusion:** The addition of Respiratory Therapists to the Virtual Critical Care team to aid in the management of mechanically ventilated subjects had a positive contribution to an increase in SAT/SBT protocol compliance and will subsequently affect VLOS in a positive manner as the Tableau vent days for March 2017 were 3.6 and decreased for March 2018 to 2.95 days

Sponsored Research - None

3008899

Trials Of Unassisted Breathing In Adult Patients With Tracheostomy: A Single Center Experience.

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Background: Tracheostomies are performed for a variety of indications, predominantly to facilitate weaning from invasive mechanical ventilation or to establish a stable, permanent artificial airway. If a patient is deemed ready to be assessed for liberation intermittent trials of unassisted breathing ("trach collar trials"-TCTs) are performed. In our institution TCTs are not standardized and are usually terminated by individual clinicians based on either physiologic parameters or after a pre-defined time limit is reached. The purpose of this quality improvement project is to review the consequences of our TCT clinical practice. **Methods:** As part of an IRB exempt, departmental quality improvement project, data on all adult tracheostomy patients undergoing unassisted breathing trials within our five adults ICUs were recorded between August 2015 and September 2016. TCT details were recorded prospectively each day by respiratory therapists. Included was: reason for tracheostomy, time from mechanical ventilation to tracheostomy, time from tracheostomy to liberation, ventilator settings, length of initial trial of unassisted breathing, and reason for trial termination. Subjects with a pre-existing tracheostomy were excluded from data on time to tracheostomy, and time from tracheostomy to liberation. Subjects who were not liberated were excluded from total days of mechanical ventilation. Data were analyzed using SPSS v24 and described as median (interquartile range) and percentages. Nonparametric testing was performed to compare differences between ICUs due to non-normally distributed data. **Results:** A total of 190 patients were evaluated. 19 (10%) of subjects were not liberated from mechanical ventilation and 23 (12%) subjects had tracheostomy in place when mechanical ventilation was initiated. Data are summarized in Table 1. Time to tracheostomy (P=0.008), days from tracheostomy to liberation (P=0.001), inspiratory pressure/pressure support (P<0.001) varied significantly between different ICUs. There were no statistically significant differences for total days of mechanical ventilation, total trials, PEEP, FiO_2, or length of first trial between different ICUs. Reason for trial termination varied significantly (P<0.001). **Conclusion:** Clinical practice appeared to vary significantly between units with half of the unassisted breathing trials being terminated due to a time goal or per team decision and 43% being terminated due to physiologic reasons.

Sponsored Research - None

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3024827

Decreasing Ventilator Length Of Stay Using Lean Methodology.

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Background: There is an annual incidence of approximately 11,000 Spinal Cord Injuries (SCI), and 2.5 million Traumatic Brain Injuries (TBI) in the United States per year. This group of patients are classified as diagnosis related group (DRG) 3,4. Lean methodology was used to decrease length of stay (LOS) and ventilator length of stay (VLOS). An independent "Lean Team"(LT) was formed using a multidisciplinary approach. The team consisted of MD, NP, RT, RN navigator, PT, OT, Pharm D, Speech, Case Mangement, and Palliative Care. Method: The team focused on SCI and TBI patients admitted to the ICU. The team rounded five days a week, had bi-weekly huddle to discuss barriers, improvements, and up to date cost savings in real time. The historical cost of this group of patients from (Oct 2012-Sept 2013) was estimated at $4.5 million. After completing a fully funded six-month trial in 2016 (72 pts.) we observed a cost savings of approximately $1.5 million, by reducing VLOS by 28%, LOS by 32%, and hospital cost by 63%. Due to the success from the 6-month trial the Lean Team became a permanent service. **Results:** In 2017 the Lean Team developed and implemented standardized care for this group of patients. We developed a rounding sheet that was used daily. We rounded on these patients five days a week, and most procedures were done at bedside when clinicaly safe. Consistency is key to decrease cost with these complex patients. We followed these patients from time of admission to discharge and even to rehab if on campus. We worked with our adult and pediatric rehab to develop guidelines that needed to be met prior to transfer. In 2017 we observed an approx. cost savings of $1.8 million. We decreased our target VLOS from 17 days down to 11.05. The target LOS decreased from 23 days to 17.2 (73 Pts.). In contrast there was no increase in ICU readmissions. **Conclusion:** Overall it appears that "going lean" is financially sustainable and beneficial to this patient population. Consistency is key, and initiatives that include an interprofessional team will be most successful in providing standardized, high quality care. The RT specialist was an integral part of this process and its success. We will continue to look for ways to expand and utilize the role of the Respiratory Care Practitioner.

Sponsored Research - None

3025684

Development Of An Interdisciplinary CVICU Ventilator Weaning Team To Improve Patient Outcomes And Decreased Intubation Times.

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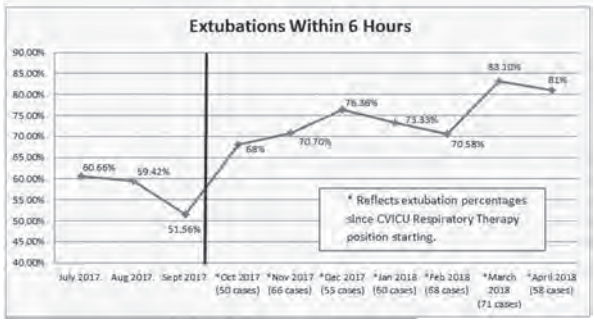
Background: Historically, the overall post-operative care (including, ventilator weaning) in the Cardiovascular ICU was the responsibility of the nursing staff. Respiratory therapy staff would assist with ventilator weaning on an as-needed basis. When transitioning to new ventilators, it was suggested that a dedicated Respiratory therapy team could wean the patients from mechanical ventilation in less time than a primary nurse-lead weaning approach. Method:Data collected from patients' that underwent cardiac surgery from January 2017 through August 2017 was reviewed. An opportunity for improvement was noted in regards to streamlining the weaning and extubation process. A two person respiratory therapist based weaning team was put into place to focus on these patients upon arrival into the ICU. Additionally, a revised ventilator management protocol was utilized to manage these patients improving the weaning and extubation process. Each medical discipline developed recommendations for improving patient care in their respective areas. The respiratory therapists implemented a weaning team that was focused solely on management of these post- operative patients. This allowed direct observation of respiratory patterns, selection of appropriate ventilator settings, blood gas management, and timely assessment for the readiness of CPAP. Recently, we revised the standard process to include administration of a paralytic reversal agent upon admission to the ICU. This further reduced the time for nursing staff to decrease sedation. Our standard process also included a standardized PEEP of +8 to help post-surgical alveolar recruitment and oxygenation. Finally, all staff completed Team STEPPS and Cultural Beliefs training which facilitated open communication between all team members regarding care management, patient extubation readiness, and options for oxygen devices post extubation **Conclusion:** Data regarding outcomes for RT weaning of post-operative patients in the CVICU shows an increase of patients being extubated within 6 hours from 51.56% in September of 2017 to 81% as of April of 2018. Disclosures: There are no disclosures

Sponsored Research - None



3025698

Rapid Liberation From Mechanical Ventilation, The ICU And Hospital By Using An ICU Dashboard And Alert Program.

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Background: At the Hospital of the University of Pennsylvania, Respiratory Therapists (RT) are required to assess for Spontaneous Breathing Trial (SBT) readiness on all ventilated patients every AM. The RT's manually assess for SBT readiness by gathering different parameters from the Electronic Health Record (EHR). This can become somewhat burdensome in a busy ICU. In addition patients may be ready for SBT at any time throughout the day and more frequent readiness assessments could expedite the liberation process. Our Committee, looked to leverage the EHR to create a novel program that will continuously screen EHR elements to assist the care team with ongoing SBT readiness assessments. **Methods:** A novel computer program (called the ABC App) was created, in collaboration with the Data Science team and Penn Center for Innovation to continuously screen all vented patients in the MICU by extracting data from the EHR. The information is then displayed in real-time on an ICU Dashboard, with green indicating "SBT ready" and red for "Not SBT ready". When patients meet criteria for SBT readiness, the system alerts the RT via text message to do an SBT. If the patient is over sedated (based on RASS) the RN and provider are also prompted via text alert to address sedation. For patients not meeting readiness criteria, the parameters limiting weaning (i.e. FiO_2 or PEEP) are displayed on the dashboard with icons to nudge clinicians to consider weaning that parameter. The ICU dashboard and alerts were implemented in the HUP MICU for a 6-month pilot assessment. **Results:** Duration of ventilation decreased from 4.6 to 4.0 days. ICU LOS decreased by 1.2 days and hospital LOS dropped by 1.4 days. **Conclusion:** A real-time electronic dashboard and alert system affected a reduction in duration of mechanical ventilation and ICU length of stay. The RTs have found the text alerts and dashboard to be highly beneficial in the ICU with many competing priorities. With these positive results, we plan to expand the ICU dashboard and text alerting system to all ICUs in the PENN Medicine Health System.

Sponsored Research - None

3025613

The Validation Of Rapid Shallow Breathing Index On Weaning Off Mechanical Ventilator Of Medical And Surgical Patients In Adult Intensive Care Unit.

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Background: Medical professionals have set Rapid Shallow Breathing Index(RSBI) to predict whether or not patients can successfully wean from mechanical ventilator(MV). RSBI is measured with handheld spirometer or through MV. Measuring through MV has been proven to have less artificial error. Some studies have discussed the validation of RBSI of medical patients in Intensive Care Unit. Therefore, we want to compare the successful prediction rate of RSBI between medical patients and surgical patients. **Method:** This is a retrospective study. We reviewed patients who were intubated and admitted to the adult Intensive Care Unit from June 2017 to December 2017. Patients' age, sex, height, weight, BMI, APACHE II within the first 24 hours of hospitalization, and duration of MV use were collected. Excision criteria including: the patient's endotracheal tube ID was smaller than 7.0mm, or instances where the PEEP of the MV was set exceed $8cmH_2O$ while measuring RSBI. Failing the weaning process is defined as they were re-intubated within five days or use noninvasive ventilator exceed 6 hours after extubation. The criteria of weaning successful is set up as RSBI<105(breath/min/L). RSBI was measured through MV. Statistical analysis of the study was accomplished through the independent sample t-test and stratified Cox regression by using SPSS statistics 17.0. **Results:** A total 108 patients(medical:62, surgical:46) were enrolled for this study. Comparing medical patients with surgical patients, their sex(P=0.324), age(P=0.092), height(P=0.472), weight(P=0.879), BMI(P=0.893), APACHE II(P=0.721), duration of MV use(P=0.803) were found no significant difference. Their RSBI(P=0.007) and successful prediction rate (medical:67.7%, surgical:87.7%, total:75%, P=0) were found significant difference. The result of weaning off MV among the enrolled patients, 81 patients were successfully predicted and 27 patients were not. Comparing successful group and unsuccessful group (Table.1), only department was found a significant difference (P=0.033). **Conclusion:** In adult Intensive Care Unit, successful prediction rate of RSBI is high. And successful prediction rate of RSBI in surgical patients is even greater. The result was not affected by age, sex, height, weight, BMI, illness severity, and duration of MV use. **Keywords:** Rapid shallow breathing index, validation, medical, surgical

Sponsored Research - None

Result of prediction analysis

	HR(95% CI)	P value
Age	0.674 (0.370-1.226)	0.196
Sex	1.006 (0.991-1.002)	0.437
Height	1.058 (0.935-1.197)	0.372
Weight	0.932 (0.796-1.090)	0.376
BMI	1.219 (0.795-1.867)	0.364
APACHE II	0.982 (0.950-1.015)	0.280
RSBI	0.991 (0.983-1.000)	0.520
Department(medical/surgical)	0.576 (0.346-0.958)	0.033

Table.1

3003779

The Utilization Of Venous-Venous Extracorporporeal Oxygenation Membrane For The Management Of Status Asthmaticus.

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Background: Life threatening refractory asthma requiring intubation and mechanical ventilation is often associated with a high incidence of ventilator induced trauma (VILI) and has a mortality rate of around eight percent. Often these patients present with high level of arterial $PaCO_2$ which require both a high minute ventilation and airway pressures despite lung protective ventilation and the administration of Heliox gas mixture. These ventilator requirements place this patient population at risk for excessive auto-peeping and baro-trauma. Another approach to meet gas exchange goals and to provide maximum lung protective is to place these patients on venous-venous extracorporeal oxygenation membrane (ECMO) support. The clinical rational for this management would be to protect the lung from any additional VILI and provide a stable level of ventilation and acid-base balance. **Methods:** During a two year time frame we placed six status asthmaticus patients with refractory gas exchange on V-V ECMO. Five of the six patients were management on V-V ECMO until the asthma exacerbation was stabilized and progressed to both ECMO and ventilator liberation. One patient expired secondary to multi-system organ failure unrelated to asthma. All patients were ventilated via pressure or volume target modes to achieve an exhaled tidal volume between 4-5cc/kg/IBW and PEEP was set via either a pressure/volume tool or via transpulmonary monitoring. ECMO parameters we set to achieve a SpO_2>88% and a PH>7.25. **Results:** There was no additional occurrences of additional VILI post ECMO intervention. And all patients receive pharmacological paralytics, Heliox, and continuous beta-agonist therapy for the first forty hours of mechanical ventilation and ECMO support. (**Table 1**) **Conclusion**: Based on our clinical experiences V-V ECMO along with lung protective ventilation can provide a safe management of the status asthmaticus with refractory gas exchange.

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V-V ECMO for Life threatening asthma

Patient #	Age/G	Vent Mode/TV setting	V-V ECMO LOS	ECMO FIO2/Flow	Ext ubation time from cannulation	Heliox	Survival
1	51/M	PCMV 4cc/kg/IBW	7	100%/5lpm	120 hrs.	Yes	Yes
2	28/M	CMV 4cc/kg/IBW	8	100%/9 lpm	70 hrs.	Yes	Yes
3	49/M	PCMV 5cc/kg/IBW	5	100%/4.5 lpm	42 hrs.	Yes	Yes
4	31/F	PCMV 5cc/kg/IBW	15	80%/ 3lpm	NA	Yes	No
5	18/M	CMV 4cc/kg/IBW	8	80%/4 lpm	209 hrs.	Yes	Yes
6	31/F	PCMV 4cc/kg/IBW	9	100/1.5 lpm	52 hrs.	Yes	Yes

All pts. received continuous beta-agonist delivery
PEEP setting were guided by transpulmonary E

3004717

Evaluation Of The Effectiveness Of An Asthma Care Management Team On Patient And Process Outcomes.

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Background: Practice-based care coordination facilitates asthma-management knowledge and confidence, improving asthma control in vulnerable populations. A dearth of information is available regarding the efficacy of a hospital- based care coordination model for children with asthma. We sought to identify the effect an asthma care management team had on self-management quality indicators for children hospitalized for an acute asthma exacerbation. We hypothesized that children receiving care management would demonstrate increases in competence with medication administration, adherence with scheduled post discharge clinic appointments and prescribed home health visits, as well as having lower emergency room visit and hospital readmission rates, compared to those not receiving asthma care management. **Methods:** Demographic and outcome data were collected in two phases. Data for Phase I were collected from a retrospective review (1/1/16 – 8/1/16) of children admitted with an acute exacerbation of asthma who did not receive asthma care management. Data for Phase II were collected prospectively (1/1/17-8/1/17) for children admitted with an exacerbation of asthma and receiving care coordination by our asthma care management team (ACMT). Descriptive statistics reported demographics. Fisher's Exact Test analyzed population characteristics and quality indicator outcomes. Wilcoxon Rank Sum analyzed resource utilization outcomes. Statistical significance was established at $p < 0.05$. **Results:** 210 children were hospitalized for an acute asthma exacerbation and received standardized care on the asthma pathway. Phase I, n = 121. Phase II, n = 89. Cohorts were statistically similar for: age (median = 6 years, p = 0.1), gender (p = 0.6), ethnicity (p = 0.4), and pediatric asthma score on admission (median = 3, p = 0.2). 11 children (12%) in Phase II did not receive asthma care management. Outcomes are described in Table 1. **Conclusion:** Hospital based asthma care coordination improved process outcomes. Although not statistically significant, resource utilization outcomes were clinically relevant.

Sponsored Research - None

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3005805

Increased Risk Of Pulmonary Tuberculosis In Patients With *Helicobacter pylori* Infection: A Population-Based Cohort Study In A Tuberculosis-Endemic Area.

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Background: The risk factors for pulmonary tuberculosis are not fully explored in a tuberculosis-endemic area such as Taiwan, and merging evidence has suggests that *Helicobacter pylori* infection (HPI) plays a role in several extragastric diseases. This study investigated whether HPI increases the risk of developing pulmonary tuberculosis. **Methods:** A retrospective population-based cohort study was conducted by using data retrieved from the Taiwan National Health Insurance Research Database. During the period of 2004-2010, 4470 patients aged > 20 y with newly diagnosed of HPI were selected, and follow-up until the end of 2013. Every patient with HPI was frequency-matched with 4 enrollees without HPI. A Cox proportional regression model was used to evaluate the hazard ratio (HR) of pulmonary tuberculosis in patients with HPI as compared with those without HPI. The covariates considered were annual income, urbanization, diagnosis of diabetes, coronary artery disease, heart failure, cerebrovascular disease, and chronic kidney disease at baseline. **Results:** The HPI and non-HPI cohort comprised 4470 patients and 17880 enrollees, respectively. After adjustment for covariates, the HPI cohort exhibits a 1.65-fold increased risk for pulmonary tuberculosis. (HR 1.65; 95% CI 1.24–2.21). Further stratified analysis revealed that the risk exist in both sexes and age group between 20 and 64 y. **Conclusion:** HPI is associated with an increased risk of pulmonary tuberculosis development. Additional studies exploring the underlying mechanisms and clinical and epidemiological consequences are warranted. **Disclosure:** The authors declare no conflict of interest.

Sponsored Research - None

3008767

A Volume Expansion Protocol—Using Incentive Spirometry As An Inspiratory Capacity Screening Tool Only.

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Background: Intermountain Medical Center is a 504-bed hospital and one of 23 acute care hospitals of the Intermountain Healthcare Corporation. Over the last few years, we have created and implemented an adult RT Evaluate and Treat (RET) program that includes over 20 evidence-based protocols. Physicians order RET, and RTs perform comprehensive and focused evaluations and begin the interventions for which the patient meets specifically defined criteria. A Lung Volume Expansion (LVE) Protocol is included. The LVE protocol utilizes an incentive spirometer (IS) as an inspiratory capacity (IC) screening tool. If a patient achieves less than one-third of their predicted IC, then other LVE strategies using positive airway pressure devices/maneuvers are employed (i.e., EzPAP®). The patient's ability and key goals of therapy are considered. **Methods:** During 2016 and 2017, 56,645 patients were evaluated for the LVE Protocol. **Results:** Outcomes of the evaluations are reported in Table One. It should be noted the small number that truly met the criteria for continued volume expansion maneuvers. In the past, almost all patients received an IS with an ordered frequency. Under the protocol, they are put to self-use and RTs are only called if the IC falls below one-third of predicted. **Conclusion:** With the accumulating evidence, initiatives to decrease wasteful spending of healthcare funds while assuring Respiratory Care (RC) resources are placed where most needed, our corporation sought to create protocolized care with the main goal of providing medically necessary interventions. Surgeons were our most resistant group to influence; however, reporting a review of the literature[1], the reported outcomes and providing timely feedback regarding patient responses to interventions has improved "buy in" from this subset of physicians. It is our conclusion that RC is in a unique position to provide high quality patient evaluations and apply evidence-based, medically necessary interventions to do the right thing in the right place at the right time. It is our impression that quality of patient care and our profession will be elevated. [1]Eltorai A, Szabo AL, Antoci V, Ventetuolo CE, Elias JA, Daniels AH and Hess DR (2017). Clinical effectiveness of incentive spirometry for the prevention of postoperative pulmonary complications. *Respiratory Care*, Dec 2017;60 (5):1-6.

Sponsored Research - None

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3011231

Prospective Cohort Study Of Minority Inpatients With A Primary Discharge Diagnosis Of COPD Exacerbation.

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Background: COPD exacerbations (COPD-E) contribute to increased morbidity & mortality, & adversely affect patient quality-of-life. These events are also costly, & CMS is now penalizing hospitals for 30-d readmits related to COPD. Economic status will be included in the ratio calculation beginning FY 2019, which may help some hospitals avoid financial penalties. However, these adjustments may still be insufficient, so analyses of patient characteristics that may contribute to the incidence of COPD-E & readmissions in specific populations is needed. **Methods:** Data was prospectively collected on a sample of patients admitted with a diagnosis of COPD-E (n=107) (IRB 2570). Extensive interviews were conducted to include demographics, PMH, inhaled meds, insurance, & potential barriers to outpatient (OP) management. A DC-pharmacy data repository & CRISP were accessed to determine prescription refill behavior & readmission to any hospital, respectively. Using finance data, the subgroup with a J44.1 primary discharge code, COPD with exacerbation (n=49), was determined. Characteristics were summarized using descriptive statistics. Following univariate logistic regression, variables with a P <.10 were entered into a multivariate model to determine factors independently related to readmission. **Results:** The average age of subjects coded J44.1 was 65.8±9 y, 75% were female with 96% black; 47% had Medicare primary & 46% were dual eligible. Charleson comorbidity (CCM) averaged 5.2±2.2, 43% reported currently smoking, 57% were on home O_2 & 57% had a psychiatric illness. Only 35% had an OP pulmonologist. The most common educational issues were health literacy & illness acuity. Subject-reported management barriers included lack of inhaler ed (65%), no spacer (65%), lack of home support (50%) or transportation (50%), med costs (39%), & forgetting meds (28%). Pharmacy data indicated only 35% of subjects had a current refill of any long-acting inhaled med (LAIM) prior to admission, while 48% obtained a LAIM in the 10 d post discharge. 31% of subjects were readmitted, with the majority dual eligible. Univariate analysis showed only dual eligibility (P=.056) & CCM (P=.09) were significant, but entry in the multivariate model found no independent variables associated with readmission. **Conclusion:** Subjects discharged with J44.1 had a variety of health-based & social needs which may impact readmission. Discharge coding did not always reflect the top diagnosis listed in progress notes.

Sponsored Research - None

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3011990

The Perception Of Adherence To Cystic Fibrosis Guidelines By Respiratory Therapists In Saudi Arabia.

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Background: Adherence to cystic fibrosis (CF) clinical guidelines play a crucial element in the management of respiratory complication associated with CF disease. Despite the importance of adherence to CF clinical guidelines, there is a lack of literature in this area of research specifically relating to Respiratory Therapists (RTs). The aim of this study was to assess the adherence level of RTs to CF clinical guidelines in Saudi Arabia. **Methods:** Data were collected through a descriptive survey using questions based on CF clinical guidelines. This survey study was approved by university IRB. The survey was emailed to all members of the Saudi Society for Respiratory Care (SSRC). Two main dimensions were assessed Knowledge and Management of CF disease. Excluded from the study were other healthcare providers and students. **Results:** The total adjusted number of participants was one hundred-sixty-six (n=166) out of (n=351) responses. The study response rate was 46.8%. Most participants hold an undergraduate degree (BS and AS) 80.1% while 19.9% were graduate. Females accounted for 30.1% of all participants while males accounted for 69.9%. The study showed 35% of RTs in Saudi Arabia adhered to CF clinical guidelines. The study showed knowledge domain needs improvement compared to management domain (Mdn = 2), Z = -10.45, p < .001, r_s = 0.49. The study findings showed the level of RT education did not have a significant effect on the level of adherence to CF clinical guidelines $H(2)$ = 2.7, p = .255. Moreover, the study findings indicated that senior RTs (with > 5 years of experience) demonstrated a higher adherence level to the guidelines than RTs with less than 5 years of experience (Mdn = 8.7), U = 2056, p < .001, r_s =0.314. Additionally, the study revealed no significant difference in adherence of the guidelines between regions of practice in Saudi Arabia, $H(4)$ = 2.5, p = .645 **Conclusion:** The average overall level of adherence to CF clinical guidelines is low among RTs in Saudi Arabia. Education materials need to be implemented to enhance the level of awareness, knowledge, and management of CF.

Disclosures: None; Sponsored Research-None.
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3012029

Carbon Monoxide Levels And Indoor Cooking Practices Among Participants Living In Rural Nicaragua.

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Background: Indoor cooking practices have been associated with high levels of carbon monoxide. Furthermore, smoking is known to compound these risks. The purpose of this study was to determine the association between indoor cooking practices and carbon monoxide levels in rural Nicaragua. **Methods:** Participants were randomly sampled from a village in rural northwestern Nicaragua. This study was approved by the ethical board. Individuals were given a quick survey and vital signs were measured. Faculty members and health science students collected the data and vital signs. Descriptive statistics were computed among predictors for carbon monoxide levels, and linear regression was used to determine the association between predictors (age, gender, cooking stove practices, health-seeking behaviors and smoking behaviors) with the outcome of measured carbon monoxide levels. **Results:** Among the total participants (n=76), 88% reported cooking with a stove only, while 12% reported using a stove with a pipe. The smoking prevalence among participants was 9%. The majority of participants visited a health clinic or outpost within the past year (65%). The mean carbon monoxide level was 3.5% (SD= 2.8). In the multivariable model, carbon monoxide levels were associated with age (B= 0.05; 95% CI: 0.03, 0.07) and gender (B=-1.44; 95% CI: -2.70, -0.17). On average, females had a lower carbon monoxide level by 1.44% compared to males, after adjusting for the other covariates. Additionally, each one year of age was associated with a 0.05 positive difference in carbon monoxide levels, after adjusting for all covariates. Having a stove with a pipe compared to a stove without a pipe as well as smoking cigarettes were not statistically significantly associated with carbon monoxide levels. **Conclusion:** Future research should investigate other environmental factors associated with high carbon monoxide levels in this population, in addition to ameliorating high-risk cooking practices that are known to increase carbon monoxide levels.

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3012223

Evaluating The Knowledge Of COPD Patients About Pneumonia Signs And Symptoms.

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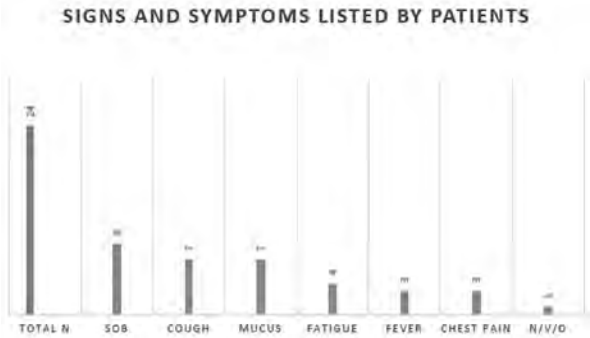
Background: Section 3025 of the Affordable Care Act added section 1886(q) to the Social Security Act establishing the Hospital Readmissions Reduction Program, which requires Centers for Medicare and Mediaid Services to reduce payments to hospitals with excess readmissions in six diagnoses. COPD and pneumonia are two of the affected cohorts. Patients with COPD often develop pneumonia and they may require hospitalization if not recognized and treated early in a sub-acute or home care setting. The goal of this study is to evaluate the knowledge of COPD patients on the signs and symptoms of pneumonia. **Methods:** Institutional IRB approvals were obtained. A patient interview form was developed to collect patient data and verbal responses. From review of literatures, seven common signs and symptoms of pneumonia were included in the interview form: (1) cough, (2) mucus production, (3) fever, (4) shortness of breath, (5) chest pain, (6) fatigue, and (7) nausea, vomitting and diarrhea (N/V/D). Patients admitted to a private hospital in South Alabama with a diagnosis of COPD were asked "Do you know the signs and symptoms of a lung infection or pneumonia?" Responses to this and other questions were recorded on the interview form. Data analysis was done by using the frequency count method. **Results:** The results are summarized in the Figure where N represents the total number of patients (12 M and 12 F). The signs and symptoms of pneumonia correctly named by these patients are as follows: Shortness of breath - 9 patients (38%); Cough / Mucus production - 7 patients (29%); Fatigue - 4 patients (17%); Fever / Chest patin - 3 patients (13%); N/V/D - 1 patient (4%). **Conclusion:** With a total of 24 patients with COPD, only 10 patients (42%) could name at least one of the common signs and symptoms of pneumonia. Fourteen patients (58%) could not name any common signs and symptoms of pneumonia. Patient education on the recognition of signs and symptoms of pneumonia should be emphasized in the hospital, sub-acute and home care settings. Early recognition and prompt treatment of pneumonia in an out-patient setting may reduce the needs and frequency of hospital admissions. A small sample size from a local private hospital is a limitation of this study.

Sponsored Research - None



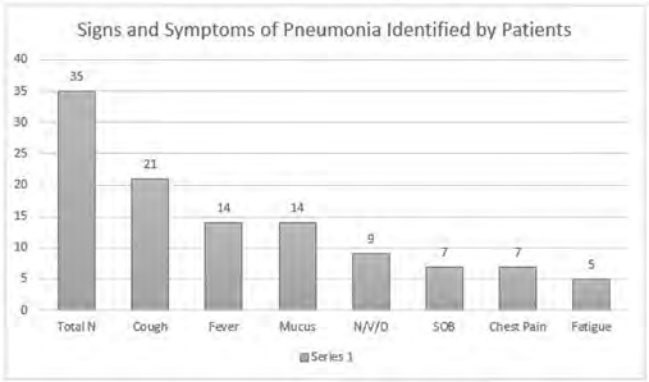
3012498

Knowledge Of COPD Patients On The Signs And Symptoms Of Pneumonia In A Public Hospital Setting.

Samantha Brown, Hannan Alsheikh, David Chang; University of South Alabama, Mobile, AL

Background: In 2012, the Affordable Care Act established the Hospital Readmission Reduction Program (HRRP). The intent of this program is to reduce hospital readmission rate in six medical conditions. COPD and pneumonia are two conditions in the HRRP. Patients with COPD are prone to develop pneumonia and require hospitalization if it is not recognized and treated promptly. The goal of this study is to evaluate the knowledge of COPD patients on the signs and symptoms of pneumonia in a public hospital setting. **Methods:** Institutional IRB approvals were obtained. A patient interview form was developed to collect patient data and verbal responses. From review of literatures, seven common signs and symptoms of pneumonia were included in the interview form: (1) cough, (2) mucus production, (3) fever, (4) shortness of breath, (5) chest pain, (6) fatigue, and (7) nausea, vomitting and diarrhea (N/V/D). Patients admitted to a public hospital in Alabama with a diagnosis of COPD were asked "Do you know the signs and symptoms of a lung infection or pneumonia?" Responses to this and other questions were recorded on the interview form. Data analysis was done by using the frequency count method. **Results:** The results are summarized in the Figure where N represents the total number of patients (20 M and 15 F). The signs and symptoms identified by these patients are as follows: Cough - 21 patients (60%); Fever / Mucus production - 14 patients (40%); N/V/D - 9 patients (26%); SOB / Chest pain - 7 patients (20%); Fatigue - 5 patients (14%). **Conclusion:** With a total of 35 patients with COPD in a public hospital setting, seven (20%) could not name at least one of the common signs and symptoms of pneumonia. Patient education on the recognition of signs and symptoms of pneumonia should be emphasized in all patient care settings. If recognized early, pneumonia can readily be treated in a subacute or home care setting. Early recognition and effective treatment of pneumonia may reduce the needs and frequency of hospital admissions. (no table selected)

Sponsored Research - None



3015419

Breathing Easier When A Lung-Health Outpatient Team Has Your Back.

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Background: The goal of this program is to improve the quality of life in COPD patients. An outpatient resource center provides post-discharge follow-up to facilitate continuum of care. Frequent readmissions are common in the COPD patient population and have become a focus of the CMS value based measures. Research has shown there to be a 7.1% 30-day readmission rate for a principal diagnosis of COPD and a 20.5% for all-cause 30-day readmission. Understanding the disease process and progression is key if patients are to receive the maximum benefit from their medications. Many of these patients have comorbidities which leads to complicated medication regimens. An early follow-up process is recommended by the Global Initiative of Chronic Obstructive Lung Disease to lessen exacerbation related readmissions. Upon discharge, many of these patients are not back to their baseline and are unclear about their treatment regimen. According to the Institute for Safe Medication Practices, 94% of patients with COPD and asthma use their inhalers incorrectly which can lead to a reduction of efficacy and poor outcomes. Intensive outpatient monitoring, evaluation, and education are needed to prevent readmissions. **Methods:** A lung-health outpatient clinic was assembled with a multidisciplinary team. The goal is to improve the quality of life and decrease readmissions through the continuum of care. Prevention strategies are initiated. Pharmacological and non-pharmacologic interventions are used to complement the individual's treatment goals. The multi-disciplinary team headed by the respiratory department, scheduled appointments at the lung health outpatient resource clinic, prior to discharge. During the appointment, the ARNP, RT, and RN evaluate the patient and provides treatment as needed. Education about the COPD disease process and self-management are provided by the respiratory therapist. The team helps identify and reduce exposure to internal and external risk factors. If further interventions are indicated, physicians are notified. **Results:** The program started in June of 2017 and data was collected for 9 months. A total of 56 patients were seen in the outpatient clinic; 5 were readmitted for all cause diagnosis and zero were admitted for COPD exacerbation. **Conclusion:** An outpatient lung health clinic made a significant impact in the reduction of COPD readmission rates.

Sponsored Research - None

3022157

Implementation Of A Comprehensive Program For Respiratory Therapists Providing Asthma Education.

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Background: Asthma is one of the most common treatable diseases of childhood. Patient and family education for self-management and adherence to a treatment plan is key to gaining control of asthma and improving outcomes. Literature supports that knowledge of the asthma condition alone often does not increase patient adherence. Asthma control is dependent on both patient behavior and guideline-based therapies. Thus, educators should impart knowledge using evidence-based learning strategies that impact behavior and empower self-management. These learning strategies include teach-back method (TBM), teach-to-goal (TTG), and motivational interviewing (MI). Many healthcare organizations lack a comprehensive program to train asthma educators on these techniques. **Method:** This study was deemed not human subject testing by the local IRB. Fifty observations taken from a respiratory therapist (RT), an asthma education provider, and patients/families were obtained. An assessment tool evaluated if all required topics were discussed and if strategies of TBM, TTG, and MI were utilized. The educators included 12 RTs who routinely perform asthma education. **Results:** Observations of asthma education encounters indicated RTs were consistent in providing patients/families with scripted information about asthma. Neither TBM, TTG, nor MI were previously part of initial training or competency assessments. Many of the RTs used various communication elements associated with motivational interviewing such as open-ended questions, but there were no interactions where the spirit, process, and communication skills related to MI were used together. The style of verifying inhaler technique varied. **Conclusion:** A comprehensive education program was warranted to teach RTs learning strategies. The program included e-learning, interactive classroom and education simulation sessions in a dedicated simulation center.

Sponsored Research - None

3022984

Impacts Of Measuring Lung Age Through The COPD Awareness Event.

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Background: Chronic Respiratory Certified Nurses: CRCN conducted an event to facilitate people's awareness of COPD. Information about COPD were displayed in the events which was held in a shopping center in Fukui. Attendants got apulmonary function test and received own lung function result (lunge age). The purpose of this study is to clarify the impacts of the event and knowing own lung age. METHOD**:** They were also asked to answer a questionnaire which was consisted about impacts of the event and knowing about own lung age. This project was approved by ethical review in of the Ethical Committee of the University of Fukui. **Results:** There were 198 people attended the event and 189 subjects responded the questionnaire (95% response rate). There were 79 smokers or ex-smokers (41.8%) and 108 non-smokers (57.1%). Range of the subjects age was 18 to 92 years and the mean age was 53.2±18.7. The mean of lung age was 58±23.5. There were 135 (71%) subjects who had never received a pulmonary function test in past. The mean gap between actual age and lung age was significantly higher in the smokers than the non-smokers (7.80 vs 1.80,$t_{(178)}$= -2.04, p = 0.022). There was a positive correlation between actual and lung age difference and motivation to change of lifestyle(r_s=0.19,P<0.01). But there was nosignificant correlation between actual and lung age difference and motivation to receiving health check (r_s=0.09P=0.23). **Conclusion:** These results showed exposure of COPD information and recognizing own lung age stimulated people's awareness of changing life styles and health related behaviors. When a person notices that his/her lung age is older than his/her actual age, hi/she might feel sense of health crises. Among smokers, lung age was higher than actual age, and this results was similar to those of previous studies. Knowing about own lung age seemed to be significantly stronger trigger to change their lifestyle. Because a pulmonary function test is not included in the regular health check-ups in Japan, most of people do not know their own lung functions and lung age. However, recognition of own lung age has impact on motivations of changing life styles, therefor, facilitating measurements of lung age is important for early detection of COPD. As CRCNs, we should more focus on preventive interventions as well as patient cares. We will continue to provide COPD information for people with all range of health.

Sponsored Research - None

3025601

Respiratory Risk Associated With Indoor Air Pollutants In The Form Of Settled House Dust.

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Background: Asthma and allergies are considered by many physicians as being triggered by different substances in the air we breathe. The lung is the most common site of injury by airborne pollutants. Studying of indoor air quality can provide a method for appropriate remedial action. Research suggests that SHD (Settled House Dust) may be a significant source for indoor exposure. This research study consisted of sampling dust from homes in different area codes. The purpose of this research study will display how sampling household dust is a powerful tool for identifying chemicals that contribute to poor indoor air quality. Over the last few decades, the diagnosis of asthma and allergy cases have increased all over the world. Environmental changes are suspected as a possible cause. Studies suggest pollutants in the indoor environment may contribute to the increase incidence of asthma and allergy cases. These pollutants include chemical contaminants (e.g. pesticides, metals, plasticizers) and biological contaminants (e.g. bacteria, molds, viruses, dust mites). Many of these contaminants combined with particulate matter suspended in indoor air that later settles out as house dust. Inhalation of dust can occur when dust is suspended or re-suspended by activities such as vacuuming, cleaning, playing or simply walking through a room. **Method:** The study was carried out in Houston and its surrounding areas. The areas were residential with no industrial activities nearby. In the study area, several types of houses were present: multi-storey, single floor, houses with many facilities (air-conditioning, air cooling systems, with good ventilation). The occupants of each resident were asked to give background medical history. Dust samples were collected from vacuum bags and air condition filters. Gas Chromatography /Mass Spectrometry was used to analyze all dust samples. **Results:** There were a variety of chemicals identified. A majority of chemicals identified were consistent with everyday household products. These products included cleaning agents, oils and fragrances. **Conclusion:** There were several homes in which the chemical phthalates were identified in dust samples. Epidemiological studies have suggested an association between exposure to phthalate plasticizers including DEHP and increased prevalence of asthma, rhinitis or wheezing. It can be concluded; the Settled House Dust Method is a unique and reliable tool for identifying a broad range of chemicals.

Sponsored Research - None

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3008834

What Pulmonary Function Testing Frequency Is Recommended For COPD Patients?

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Background: Dixie Regional Medical Center is a 245-bed hospital and one of 23 acute care hospitals of the Intermountain Healthcare Corporation. To improve CMS COPD Core Measures[1], we instituted a Pulmonary Disease Navigator (PDN). In tracking PFT results in the medical record, we found inconsistency in the frequency of PFTs performed. We sought to determine baseline data of diagnostic and ongoing PFTs in COPD patients. **Method:** Between May 2017-March 2018, 127 patients were identified as diagnosed at some time with COPD. Sixty-seven (53%) were admitted due to COPD exacerbation. Seventy-four of the 127 (58%) had a resulted PFT results viewable in their medical record. **Results:** Frequency of PFT results in the medical record are reported in Table One. **Conclusion:** Controversy remains regarding the frequency for PFTs in the diagnosis and ongoing care for COPD patients. We identified patients who did not meet either GOLD guidelines (forced vital capacity $FEV_1/FVC < 0.70$) or Lower Limits of Normal (LLN) criteria but who were given a COPD diagnosis complicating accurate identification of COPD patients. Our pulmonologist identified patients with normal spirometry but low DLCO and positive for emphysema. Current GOLD guidelines view smokers with preserved lung function but respiratory symptoms as having similar outcomes as "COPD". One study suggested increased diagnosis accuracy by including an extensive history, physical examination spirometry, diffusion testing and the consensus of an expert panel[2]. The American Thoracic Society recommends a PFT when respiratory symptoms present; however, Mehta's suggestion that PFTs can be done before clinical symptoms are evident (especially in early smokers[3,4]). More research will be required before conclusions can be accurately drawn. [1]https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment Instruments/HospitalQualityInits/Measure-Methodology.html [2]Mohamed Hoesein FA, Zanen P, Sachs AP Verheij TJ, Lammers JW & Broekhuizen BD (2012). Spirometric thresholds for diagnosing COPD: 0.70 or LLN, pre- or post-dilator values? *COPD*;(4):338-43. [3]Mehta, V., Desai, N., & Patel, S. (2016). When pulmonary function test is available, should we wait for the COPD symptoms to develop? *Journal of Clinical and Diagnostic Research : JCDR, 10*(10), OE08–OE12. http://doi.org/10.7860/JCDR/2016/21006.8705 [4]Han MK, Kim, MG, Mardon R, Renner P, Sullivan S, Diette GB and Martinez FJ (2007). Spirometry utilization for COPD. *Chest,* 132(2):403-409.

Sponsored Research - None

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3025628

School Absenteeism In Asthmatic Students Of An Academic Institution In Cali, Colombia During 2017.

Freiser Cruz[2], Ana C. Arango[2], Edward Banguera[2], Ana Gallon[2], Ana M. Yela[2], Lorena Franco[2], Katherine Lozano[2], Ivon Avila[2], Sandra Moreno[2], Ruben D. Restrepo[1]; [1]Respiratory Care, UTHSCSA, San Antonio, TX; [2]Universidad Santiago de Cali, Cali, Colombia

Background: Despite current diagnostic and therapeutic advances, asthma generates limitations of daily activities, interferes with sleep, affects academic performance and leads to absenteeism school. The CDC has reported that the number of lost school days reported among children with asthma was 12.4 million in 2003, 10.4 million in 2008 and 13.8 million in 2013 (1 day/mo; > 2x of healthier peers). In Colombia, data on impact of asthma on academic performance is limited. One study showed that the avg number of emergency visits in last year was 3 (14 d of school absenteeism). The goal of this study was to determine the rate of absenteeism in one academic institution in Cali, Colombia during 2017. **Methods:** Cross-sectional descriptive observational study of all students between 5 and 14 years of age attending an educational institution in Cali during 2017. Consent was provided by participants and institutional IRB approved the study. The ISAAC self-administered questionnaire was administered. Attendance record databases were accessed to extract the information from Feb through Oct, 2017. SPSS was used for statistical analysis. **Results:** The ISAAC questionnaire was distributed to a total of 385 students. The incidence of asthma found was 27% (n=103). Majority were male (55%), age ranged between 5 and 8 (67%), low socioeconomic status constituted more than half of the population. According to GINA criteria, 71% of the sample had intermittent asthma and 29% had mild persistent asthma. A total of 776 days was missed during this year (mean 7.5/student/academic year). 91% of the children missed at least 1 time and 9% of them never missed classes. September was the month of the year with the highest percentage of absences (15%) followed by March (14%), and August (13%). The highest percent of absences (59%) was reported in the group with intermittent asthma. **Conclusion:** In this group of students, the incidence of asthma was almost twice as large as reported by previous studies in Latin America (7%-14%), but lower than reported in other cities in Colombia (36%). The number of school days missed was higher than previously reported in several studies in Colombia (2.8 days in 9 months) but certainly lower than in Venezuela (6 days/month). Spirometric confirmation of asthma incidence could improve the accuracy of the data. Memory bias needs to be kept in mind as the ISAAC survey contains items that date back to events that could have occurred 12 months.

Sponsored Research - None

3019980

Care Transition Program And Patient Education Leads To Reduction In Readmission Rates In Patients Discharged With Chronic Obstructive Pulmonary Disease And Pneumonia.

Kimberly Newlin, Kelly Switzler, Tina Wu, Kristina Zekos-Ortiz; Cardiopulmonary, Sutter Roseville Medical Center, Roseville, CA

Background: In 2016 the average 30-day readmission rate for COPD and Pneumonia (PNA) at Sutter Roseville Medical Center (SRMC) was 15.4% and 12.2% respectively. In an effort to improve quality of care and reduce readmission rates at SRMC a Care Transition Coordinator (CTC) program was created. This program is intended to accurately identify appropriate patients in need of intensive transition planning and support and partnership with Pulmonary Medical Associates (PMA) to provide Transitional Care Management (TCM) services to patients after discharge from the hospital. **Methods:** Patients admitted for COPD or PNA are identified within 24 hours allowing for timely interactions, risk stratification, and transition planning. Daily communication occurs via email, plus rounding with multidisciplinary team. Timely documentation occurs and is accessible to all team members. Patients are provided education on symptom management, signs of recurrent illness and are encouraged to contact their PCP's at the first signs of illness. Those eligible for TCM follow-up are provided information and appointments are scheduled prior to discharge. Patients are contacted within 48 hours of discharge by a Nurse Practitioner. Recommendations are given for services prior to discharge based on needs assessment including exercise oximetry, rehab evaluation, consults with Speech Therapy, Palliative Care, and Social Work in addition to Pulmonology consults. Resources and education provided include Stoplight tools for symptom recognition, medication review, COPD Assessment Test (CAT) to classify disease severity, assessment of patient symptoms and FEV1/FVC to assign GOLD Guideline Grade, referral to PR for qualifying patients and PNA kit (thermometer, oral, and hand hygiene supplies). **Results:** The outcome at SRMC was a reduction in 30-day readmissions for COPD from 15.4% in 2016 to 12.4% in 2017. This rate has continued to drop to an average of 8% in the 1st quarter of 2018. PNA 30 day readmissions have decreased from 12.2% in 2016 to 9% in 2017 and continues to be at 9% in the first quarter of 2018. **Conclusion:** The CTC program at SRMC has reduced 30-day readmission rates for people admitted with COPD or PNA. This has happened through supplying greater resources to assess patient needs in transitioning out of the hospital. Education is provided to patients, families, and caregivers in an effort to increase compliance with medications, symptom management and recognition of when to seek medical care.

Sponsored Research - None

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REQUEST FOR PROPOSALS FOR AARC CONGRESS 2019

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3021707

Am I Doing This Right? The Importance Of Performing Respiratory Equipment Checks And Assessment.

Lindcey P. Telesford, Jessica Winn, Aledie Navas Nazario, Bruce Brown, Sherry Wooldridge; Pulmonary, Nemours Children's Hospital, Orlando, FL

Background: By reviewing the therapies with patients, we discovered difficulties in operating equipment, replacing parts, and even knowing what company supplied their devices. We also found compliance and adherence were significant challenges for many reasons. Talking and advising over these issues, our patients have become more independent and better acquainted with their diagnosis. Patients have also learned to keep in contact with the clinic and inform us of any equipment issues, rather than putting therapies to a halt. **Methods:** To determine the current use and knowledge regarding therapies our clinic began calling patients the day before their visit to ask if they would bring in their equipment. Documentation consisted of the number of checks and tracking the types of adjustments made in settings, technique, and supplies. Our clinic started keeping track of our equipment checks through a spreadsheet at the beginning of 2018. **Results:** Through the end of May 2018, we have completed 74-airway clearance and 32 BIPAP/CPAP checks. Six of the airway clearance reviews were a re-check of equipment already brought in. Topics discussed included frequency of treatments, demonstration of therapy and were supplies re-filled. Some of the major issues discovered were poor technique, broken or defective parts, supplies never replaced, and incorrectly sized masks or garments. We found supply issues with both PAP therapy and neuromuscular patients' airway clearance devices with 28% and 26% of those checked, respectively. We were able to adjust settings on cough assist and vest devices for 81% of equipment checks. These adjustments were typically an increase in pressures to make therapy more effective. A few patients required changes in inspiration and expiration time or a decrease in pressure for comfort. **Conclusion:** With our CPAP/BIPAP patients, these checks revealed that less than half of those assessed were compliant with their therapy using insurance guidelines. We will continue with our respiratory equipment check program indefinitely. We found the patient, caregiver, and clinic all benefited from these visits with a respiratory therapist. Device comfort, effectiveness, and communication with clinical staff improved. Patients and caregivers know that we will be periodically evaluating the use of their particular equipment and are partners in ensuring it is used to its fullest potential. That way they feel empowered in all aspects of their therapy and can answer their question "am I doing this right"?

Sponsored Research - None

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3024729

Bench Study Simulations: Matching Patient Effort To Four Different Oscillating Positive Expiratory Pressure For Airway Clearance Devices.

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Background: Positive expiratory pressure (PEP) and Oscillating PEP (OPEP) devices (those that incorporate flow interruptions during active exhalation), are airway clearance therapy (ACT) tools used to assist with the removal of secretions from the lungs. During PEP/OPEP therapy, the patient exhales against a fixed-orifice or oscillation mechanism generating pressures ranging from 10 to 20 cmH_2O. The AARC Clinical Practice Guidelines for PEP/OPEP instruct patients to sustain exhalation actively, but not forcefully, for 3-4 seconds creating a pressure above baseline of 10 to 20 cmH_2O. Our objective was to evaluate the characteristics of currently available OPEP devices, determine the required flow and prerequisite lung volume necessary to generate and sustain the therapeutic pressure. **Methods:** Four different OPEP devices were studied, Acapella® DH, (Smiths Medical), Aerobika® (Monaghan Medical Corporation), VibraPEP® (Curaplex), vPEP (D.R. Burton Healthcare), to determine flow requirements to achieve and sustain a pressure of 15 cmH_2O. Flow was directed through a TSI flowmeter and pressures were measured using a Cecomp pressure gauge. Voltage readings were acquired and exported to an Excel spreadsheet that provided the following calculations; average pressure, average pressure amplitude, average flow rate and frequency. Device results were compared to the ability of a patient to sustain sufficient pressures/flows. **Results:** Average Pressures (cmH_2O): Aerobika - 14.08, Acapella- 14.25, VibraPEP-14.62, vPEP-13.18. Avg Flow (L/min): Aerobika – 41.9, Acapella- 38.8, VibraPEP-25.7, vPEP- 55.3 Calculated Exhaled Volume (mL) required to sustain pressure for 3.5 seconds: Aerobika – 2,442, Acapella- 2,265, VibraPEP®-1,498, vPEP- 3,224. Literature review reveals a mean exhaled tidal volume during OPEP is 33.5 mL/kg, yielding an exhaled volume for a healthy 57kg patient of 1,909.5 mL. **Conclusion:** When choosing an OPEP device for ACT, one must take into consideration the patient's ability to match flow requirement of the device with individual patient physical characteristics to successfully meet the therapeutic objective. Patients that cannot achieve the required flow for 3-4 seconds may hyperventilate or fail to maintain the prescribed pressures.

Sponsored Research - None

3025090

Dynamic Hyperinflation And Hypoinflation During HFOV And Their Measurement Using Electrical Impedance Tomography.

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Background: Dynamic hyperinflation is reported as a potential risk during HFOV. Electrical impedance tomography (EIT) has been proven as a method suitable for lung volume measurement. The aim of the study was to design and test a non-invasive radiation-free method for measurement of dynamic hyperinflation of the lungs during HFOV. **Method:** The animal study was approved by the Institutional Animal Care and Use Committee (IACUC) of the 1st Fac. of Medicine, Charles University in Prague. Twelve paralyzed pigs under general anesthesia were ventilated by 3100B (CareFusion) HFO ventilator (f=5 Hz, normocapnic ΔP). Chest EIT (PulmoVista 500, Draeger), esophageal pressure (Pes) and continuous distending pressure (CDP) (iMON monitor, CTU, Prague) were measured continuously. CDP was stepwise set to 12, 18 cmH_2O (and 24 cmH_2O when tolerated), each 10 minutes, with I:E=1:1 and 1:2. At the end of each CDP step for both I:E, oscillations were stopped in order to equilibrate alveolar pressure (Palv) with CDP. The changes in Pes and EIT caused by switching the oscillations off corresponded to the magnitude of dynamic hyperinflation. Then, a calibration maneuver was conducted in order to make possible recalculation of the changes in EIT to the actual changes in Palv: After the first 15 seconds without oscillations the ETT was occluded using a ball valve and 60 mL of air was injected into the lungs. The change in EIT corresponding to the change in CDP induced by the air injection was used for recalculation of the recorded EIT to real Palv values. Magnitudes of dynamic hyperinflation determined from EIT were verified by measured Pes. Wilcoxon test was used for statistical comparison and $P<0.05$ was considered as statistically significant. **Results:** Eleven pigs completed the full protocol; only 5 of them tolerated the highest CDP level of 24 cmH_2O. The evaluated differences between CDP and Palv during HFOV are presented in the Figure. In all the animals, a dynamic hyperinflation (i.e. Palv>CDP) was detected for I:E=1:1, whereas in all the animals a dynamic hypoinflation (Palv<CDP) was identified for I:E=1:2. The data derived from EIT were confirmed by Pes measurement. **Conclusion:** Except for dynamic hyperinflation occurring at I:E=1:1, a strong dynamic hypoinflation developed at I:E=1:2. EIT is a suitable modality for dynamic hyper/hypo inflation determination during HFOV. **Disclosures:** The authors declare no conflict of interest. Supported by CTU grant SGS17/203/OHK4/3T/17.
Sponsored Research - None

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3025926

A Novel Approach To Respiratory Flow-Volume Loops Using A Non-Invasive Respiratory Volume Monitor.

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Background: Pulmonary function tests rely on flow-volume loops (FVLs) to diagnose and monitor lung disorders and to assess reaction to broncho-constrictors or -dilators. The gold standard for FVL generation is a spirometry-based forced vital capacity test, which requires patient cooperation. This often limits the utility of FVLs in pediatric patients or adults with limited ability to comply. For these patients, tidal breathing FVLs using respiratory inductance plethysmography bands were previously proposed but not widely adopted due to technology limitations. The objective of this study was to evaluate the utility of a non-invasive respiratory volume monitor (RVM) in measuring continuous tidal breathing FVLs in adult and pediatric patients in the perioperative period. **Methods:** After IRB approval, two clinical studies were conducted on adult and pediatric patients undergoing various surgical procedures under general anesthesia. A non-invasive RVM (ExSpiron1Xi, Respiratory Motion, Inc., Waltham, MA) was used to collect continuous respiratory volume traces intra- and post-operatively. Flow traces were generated by taking the first derivative of the volume traces. To reduce breath-to-breath variability, individual tidal breaths were aligned at the start of inhalation with volume and flow set to "zero." Series of consecutive and similar breaths were grouped together. Individual breaths were divided into equal time segments and averaged across all breaths within a series to generate an average "representative" FVL for each patient during full mechanical ventilation, spontaneous breathing on the ventilator and spontaneous breathing post-extubation. **Results:** Preliminary data from 10 adult patients (5 males, age: 48.3 ± 21.6 years; BMI: 29.1 ± 6.4 kg/m^2, mean ± SD) and 10 pediatric patients (5 males, age: 5.7 ± 4.9 years; BMI: 17.3 ± 2.6 kg/m^2, mean ± SD) were analyzed (Fig. 1). **Conclusion:** We demonstrate that the RVM can generate continuous tidal breathing FVLs in adults and children with distinct shapes based on breathing and mechanical ventilation. The RVM FVLs can theoretically be obtained for patients with pulmonary disease and potentially identify distinct breathing patterns related to disease diagnosis, progression, and response to therapy. The RVM may eliminate the need for bedside spirometry and vastly expand the applications of FVL analysis, especially in pediatric and non-compliant patients. **Disclosures:** None.

Sponsored Research - None

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2949779

Home Monitoring Of Adult & Pediatric Patients On Opioids For Pain Post-Surgery.

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Background: Opioid related deaths have been rapidly increasing and are a national focus[1]. Uintah Basin Medical Center is a 49-bed hospital located in eastern Utah. Following 3 unplanned home deaths in patients taking opioids post-operatively who had undergone ENT surgery, we sought to pilot a home monitoring protocol to earlier identify & intervene with patients most at risk for opioid induced respiratory depression (OIRD). **Method:** From February-July 2017, pediatric & adult patients prescribed opiates were discharged with a Masimo RAD 8® monitor for 7 days. Data was recorded and analyzed post device return. Pts were educated about the risks of opioid use, the relation between OIRD & falling blood oxygen levels (monitoring with a pulse oximeter) & instructed to call or come to the hospital if oxygen saturation alarmed (≤ 86%). **Results:** Sixty-nine total patients were monitored. Results are reported in Table One below. **Conclusion:** Some argue the addition of O_2 masks OSA episodes. At the time of our study, SpO_2 monitoring was an inexpensive and approved way to monitor for "recurrent respiratory events". It was our impression that using the Masimo® technology would diminish false alerting. The FDA has since approved the Masimo® acoustic monitoring (RAM) for home use. We are performing a side-by-side study comparing SpO_2 with RAM home monitoring.. With 66 (96%) of the pts studied being opioid naive, we agree with guidelines from the Centers for Disease Control & Prevention and other organizations which recommend short- acting opioids rather than long-acting or extended release opioids for acute pain in opioid naïve pts. Factors such as age, gender, hepatic/renal impairment, comorbidities, benzodiazepine use and drug metabolism should be considered. More education to ED staff regarding protocol compliance is needed. We recognize relying on patients/caregivers to identify & respond to out of range parameters is not ideal. It is our impression that opioid related deaths are under diagnosed/reported. Our facility, with representatives from Intermountain Healthcare, have assisted Utah Senator Van Tassell in a resolution to raise awareness of the need for home monitoring. A news agency featured our collaborative efforts in multiple media platforms. More studies will be required before conclusions can be drawn; however, we support Respiratory Care Services as being in a unique position to perform impactful studies.

Sponsored Research - None

See table or figure in supplement to the October 2018 issue of Respiratory Care at www.rcjournal.com.

3010680

Evaluation Of Pulse Oxygen Saturation And Heart Rate While Training With Elevation Mask.

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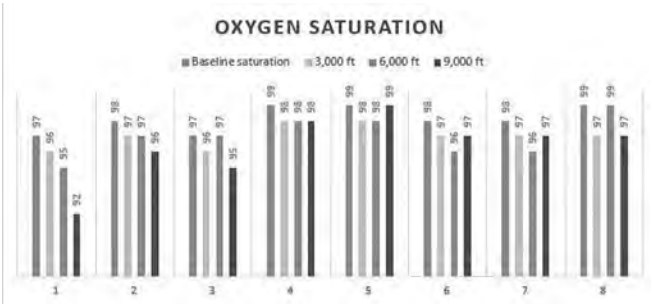
Background: Some athletes train at higher altitudes to allow their bodies to produce more red blood cells and increase their exercise performance and endurance. Elevation mask is an adjustable facial device that simulates different altitudes. Athletes may use this device anywhere and be able to train at the desired altitudes. Since high altitudes lower the partial pressure of oxygen, elevation masks may produce undesirable physiologic effects such as oxygen desaturation and arrhythmias. The purpose of this study was to evaluate changes in pulse oxygen saturation (SpO_2) and heart rate (HR) when using the elevation mask. **Methods:** Institutional IRB approval was obtained. Eight healthy volunteers (4 F and 4 M) above 18 years old participated in this study. The treadmill speed was set at walking speed (3.2) with no incline. The SpO_2 and HR were recorded every 3 minutes following each altitude change. The first session was done without the mask while on treadmill (baseline) and the second session was done on treadmill with the Elevation mask set at baseline, 3,000 feet, 6,000 feet, and 9,000 feet above sea level. The One-Way ANOVA was used to analyze the data. **Results:** A majority (21 of 24) of SpO_2 measurements at high altitudes were lower than the baseline value (Figure). The lowest high altitude SpO_2 was 92%. Most HR measurements (20 of 24) at high altitudes were higher than the baseline value. The highest HR at high altitude was 138/min and no arrhythmias were observed. ANOVA analysis of the SpO_2 yielded an F of 2.2559 with a p of 0.1038. For the heart rate, the F was 2.2294 with a p of 0.1068. Based on these results, there were no significant differences between the measurements recorded at baseline and all 3 high altitude settings. **Conclusion:** Elevation mask with an altitude setting of up to 9,000 ft is a safe device for training purposes because SpO_2 remain above 92% on the test subjects and no arrhythmias were observed. Limiting the highest altitude at 9,000 ft on the Elevation mask and having a small sample size of 8 subjects were two main limitations of this study.

Sponsored Research - None



3012199

Performance Analysis of Two Point-of-Care Analyzers for Generating Oxygen Saturation Values During Acid-Base Homeostasis.

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Background: The i-STAT® (Abbott Laboratories, Princeton, NJ) and the RapidPoint 500® (Siemens, Norwood, MA) Point-of-Care analyzers each generate oxygen saturation values at the bedside by applying an on-board algorithm to the oxygen tension (p_aO_2) figure generated by their internal miniaturized Clark electrodes. We sought to compare the accuracy of the digital readouts supplied by each analyzer, both to each other, and also to a polynomial expression first described in 1966, when applied to a homeostatic arterial blood gas (ABG) data set (pHa = 7.40; $paCO_2$ = 40 torr; $[HCO_3^-]$ = 24.0 mEq/L). **Methods:** We implemented the i-STAT's and the RapidPoint's algorithms for this data set for integer values of paO_2 ranging between 10 and 100 torr. This succeeded in generating an oxyhemoglobin dissociation curve (OHDC) for each of the analyzers. We then generated an actual OHDC using a polynomial equation originally described by G. Richard Kelman (Kelman GR. Digital computer subroutine for the conversion of oxygen tension into saturation. J Appl Physiol 1966; 21: 1375-1376). The OHDCs for the Kelman Equation, the i-STAT's algorithm, and the RapidPoint's algorithm were plotted on the same grid, using Numbers® spreadsheet software (Apple, Inc., Cupertino, CA). This provided us with a visual comparison of the respective accuracy of the analyzers over a broad range, as compared to the Kelman Equation, which has long been considered to be "the Gold Standard". **Results:** The accuracy of each of the analyzers was observed to be impressive, with the RapidPoint being slightly more accurate than the i-STAT. In the Figure displaying below, the actual OHDC, generated using the Kelman Equation, displays in red, while the RapidPoint-generated OHDC displays in blue, and the OHDC referable to the i-STAT displays in black. **Conclusion:** In this mathematical modeling study of oxyhemoglobin saturation, the accuracy of the oxygen saturation readouts from two Point-of-Care analyzers were found to be within two percent of the actual value throughout the physiologic range, in the presence of homeostasis. Furthermore, the OHDCs generated by the Point-of-Care analyzers were strikingly similar to the corresponding curve generated by a methodology that has long been considered to be "the Gold Standard", lying well within one percent of the prevailing actual saturation at paO_2 values lying between 23 and 100 torr.

Sponsored Research - None

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3012838

The Effect Of Waist Trainers On Breathing.

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Background: Having and sustaining a perfect body is a goal that many people are trying to reach. This is further influenced due to increasing interest in social media. TAmong these products is a popular trend that has spread rapidly: corset-like belts, or "waist trainers." These belts are designed to slim the waist, while providing the illusion of an hourglass silhouette. Because of where the belt sits in relation to the diaphragm, the purpose of this research is to discover what kind of effect it has on breathing. **Methods:** A pre-test survey was administered to collect non-specific information and to analyze beliefs towards waist trainers and social media. The participants were then instructed to perform a series of breathing techniques while wearing the "waist trainer" and without it. The three pulmonary function maneuvers selected for this research were the forced vital capacity (FVC,) slow vital capacity (SVC,) and maximum voluntary ventilation (MVV) tests. Afterwards, a second survey was administered to analyze subjects' subjective responses to the bedside pulmonary function test. Permission was granted by University's Institutional Review Board to proceed with this research prior to data collection. **Results:** A total of ten women participated in the research. Results of the FVC and SVC tests showed little to no change in lung function while wearing the waist trainer (3.222/3.138 L/s; 3.681/3.441 L/s, respectively). Of the three maneuvers performed for this research, the MVV is the most adjacent maneuver in comparison to exerting force, or exercise. Clinically, MVV results are decreased in patients with pulmonary impairments, likewise with the FVC and SVC. The predicted average of the participants was 113 L/s. The average MVV result quantified without the waist trainer was 77.3 L/s. Significantly, the average MVV with the waist trainer was 68.8 L/s. Juxtaposed with SVC and FVC, the MVV results showed the greatest variation between performance with the waist trainer and without it. MVV results showed the most significant difference (77.3/68.8 L/s). **Discussion:** Important conclusions are made from these results, such as pulmonary impairments, the degree of impairment, and impairment progression. When asked about the MVV, most of the subjects stated that performing the MVV (with and without the waist trainer) was difficult. Moreover, the participants exhibited signs of shortness of breath, sweating, and pain more while wearing the waist trainer.

Sponsored Research - None

2953465

Custom Task Trainer For The Placement Of Esophageal Balloon Catheters.

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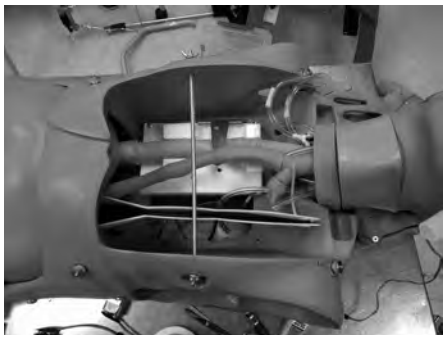
Background: The lack of high fidelity task trainers presents a barrier to implementing invasive diagnostic procedures. The complexity of new evidence based modalities, such as esophageal balloon monitoring, requires comprehensive training to diminish patient risk. The objective of this study is to determine whether creating a custom task trainer improves confidence and simulates the appropriate ventilator scalar waveform responses for accurate placement. **Methods:** Sixteen hospital based registered respiratory therapists participated in the task training, with each performing three attempts at catheter placement. A non-functional, modified SimMan Classic® was used as a chassis foundation. Extension tubing for the esophagus and trachea was created from silicone tubing. The stomach was created from a self-inflating bag and a one-way valve was placed at the top of the esophagus to maintain circuit pressure. A Y-connection was used to connect the trachea to the test lung and the back of the stomach to translate airway pressure to the esophagus. A servo control closed a hinge on the esophagus to create the cardiac oscillations in the correct location. Multiple "dry runs" were conducted to ensure alterations to the SimMan Classic® were able to produce cardiac oscillations for accurate catheter placement. Data collected from a post-training survey was used to determine if objectives were met. **Results:** Participant success rate for placing the catheter while observing the appropriate ventilator scalar waveform response mean (SD) 2.8 ± 0.4, or 93.7%. Limitations to the device include the inability to simulate inspiratory and expiratory maneuvers due to the one-way valve, which required the use of a secondary simulator for pressure interpretation and ventilator optimization. When participants were asked if the simulator increased confidence for performing this procedure, results showed 38% strongly agreed, 50% agreed and 12% somewhat agreed. When asked if the simulator was realistic enough to practice the skills necessary to accurately place the catheter, 50% strongly agreed and 50% agreed. **Conclusion:** There is a need for further investigation and development of simulators for the training of complex, invasive respiratory procedures. Future simulator versions to include the ability to perform inspiratory and expiratory maneuvers would be optimal for comprehensive training in esophageal balloon monitoring.

Sponsored Research - None



3025890

Lung Ultrasound Images Acquired And Assessed By Respiratory Care Students: Training Model Development.

Richard D. Nelson; Loma Linda University, Loma Linda, CA

Background: Lung ultrasound (LUS) is a rapid non-invasive evidence-based assessment considered superior to the portable chest x-ray for evaluation of many acute conditions (Volpicelli, et al, 2012; Lichtenstein, 2015). It was never designed who should hold the LUS probe (Lichtenstein, 2016) placing impetus on expansion of assessment skills of the respiratory care practitioner (RCP) who assists the physician in the evaluation of the critically ill. This study sought to observe student pre-clinical self-efficacy for LUS upon completion of didactic training. This study also sought to identify physician perceptions of RCP involvement in LUS. This appears to be the first description of a LUS training model for RCP students noting a related study in Singapore (See, et al, 2016). **Methods:** IRB approval was obtained to survey perceptions of BS Respiratory Care students and physicians related to LUS training. In developing a training model, an evidence-based, standardized LUS protocol was sought that was practical to learn. The basic BLUE-Protocol (Lichtenstein, 2015) was selected following hands-on ICU practice by this author the author of the BLUE-Protocol, Daniel Lichtenstein. Twelve student participants were recruited. Also, 4 physicians were surveyed who were the medical director for respiratory care, the director of physician ultrasound training, and two critical care intensivists at our university medical center. BLUE-Protocol training during 8 hours over a 3 week period included how to place the probe and acquire images, how to recognize ten basic lung ultrasound signs, and identify seven BLUE-profiles. **Results:** All twelve students enrolled in LUS training mastered the ten signs of the BLUE-Protocol by examination and along with physicians had positive perceptions pertaining to RCPs performing LUS. See image. **Conclusion:** A LUS training model was completed by 12 students who elicited positive self-efficacy and perception of LUS usefulness. All of surveyed students (100%; *n*=12) and all of the physicians (100%; *n*=4) acknowledged the BLUE-Protocol to be an understood protocol for LUS practice. As this was a pilot study, further study evaluating a LUS training model with a larger sample size and using multi-centers is needed to confirm these results. Furthermore, study to establish LUS assessment accuracy by RCP students is needed; such may be accomplished using an inter rater assessment form by blinded physician evaluation.

Sponsored Research - None

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3015906

PEEP Generated By High-Flow Nasal Cannula In A Pediatric Model.

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Background: High-flow nasal cannulas (HFNC) have been increasingly used in pediatric critical care settings. Different mechanisms have been theorized as to how HFNC reduces work of breathing. The likely primary mechanism by which HFNC reduces work of breathing is by generating positive end-expiratory pressure (PEEP). However, there are limited data assessing the PEEP delivered by moderate gas flows (8 to 50 liters per minutes), which are used most commonly in pediatric patients. **Methods:** Pediatric upper airway models were created with a 3D printer and were connected to an ASL 5000 lung simulator (version 3.5, IngMar Medical, Pittsburgh, Pennsylvania). Respiratory system mechanics for patient body weights of 4 kg to 75 kg were simulated by the ASL 5000. Age/weight-specific flows were delivered via five Teleflex Comfort Flo® HFNC devices (Research Triangle Park, NC) using a high flow generating system with a Teleflex Neptune® Humidifier. Pressure throughout the simulated airway were measured at HFNC flows of 6 LPM to 60 LPM with 25%, 50%, and 75% air leak to simulate open-mouth breathing. **Results:** PEEPs of 1.5 to 36 cm H_2O were delivered by HFNC flows of 8 to 50 LPM. In general, for each specific cannula, increasing the flow and decreasing the air leak resulted in higher levels of PEEP ($p < 0.001$ and > 10% difference). Using appropriate flows for each patient model's weight, increasing model size from 4 kg to 15 kg was positively associated with increasing levels of PEEP ($p < 0.001$ and > 10% difference). However, the 20 kg, 35 kg, and 75 kg models generated less PEEP than the 15 kg model, but the 75 kg model generated more PEEP than either the 20 or 30 kg models ($p < 0.001$ and > 10% difference). Airway and alveolar pressure (PEEP) trended similarly. **Conclusion:** High flow nasal cannulas deliver a varying amount of PEEP at the alveolar level with flows of 8 to 50 LPM. With each specific sized cannula and model weight, increasing flow and decreasing leak resulted in the generation of greater PEEP. PEEP levels differed across cannulas and model weights at the same leak level, likely partially related to differences in the nasal interface between the HFNC device and the model nares. **Key Words:** non-invasive ventilation, ventilation, cannula, PEEP, CPAP, child, pediatric intensive care units

Sponsored Research - None

3018198

Do Respiratory Therapists Follow Oxygen Weaning Protocols On A Timely Manner?

Marian Ogoe, Thomas Stokes, Seher Bachoo-Ali, Hawra Alowiwi, Sophia Yang, Bandar Ibnshamsah, Ruben D. Restrepo; Respiratory Care, UTHSCSA, San Antonio, TX

Background: Supplemental oxygen (O_2) is the treatment of choice for patients exhibiting documented hypoxemia. Evidence suggests however, that the over usage of O_2 may be associated with an increase in patient's medical cost, length of admission, and risk of O_2 toxicity. Departmental oxygen protocols have been created to minimize unnecessary exposure to O_2. Adherence to such protocols is rarely documented. The main goal of this study was to determine the overall recognition and response time it took for RT's in the ICU to wean the FiO_2 of patients as they met specific O_2 weaning protocol criteria. **Methods:** Retrospective chart review (Medical, Surgical-Trauma, Neurological, and Transplant ICUs) conducted at a 622-bed university-affiliated hospital in San Antonio, TX. Inclusion criteria: > 18 years of age, current oxygen orders, ICU admission. Exclusion criteria: patients receiving ECMO, prn O_2 orders, respiratory arrest within the last two hours, and emergency intubation for CPR. Once the physician order was placed to initiate O_2 therapy, the following patient information was obtained from the EMR: demographics, O_2 modality, initial FiO_2, any changes to FiO_2 and time in hours before the first initial change in FiO_2. **Results:** Data was collected from 64 ICU patients (60% male) with a mean age of 56.0 years (+/-18.3). On average, these patients spent 8.19 (+/-8.4) days in the ICU. Most physician's orders were instructions for RT to maintain SpO_2> 92%. The mean number of hours on oxygen therapy was 7.27 (+/-8.25) days. The mean FiO_2 that patients were initially placed on was 62.9% (+/-28.3), and the most common documented oxygen weaning adjustment was a reduction of FiO_2 by 12.2 % (+/-8.6). Mean SpO_2 before first change in FiO_2 was 96.6% (+/-4.7) and time to first change in F_iO_2 after meeting weaning criteria was 11.92 hours (+/-18.9). **Conclusion:** The results of this study suggests that oxygen weaning in ICU does not occur in a timely manner. RTs should be be more proactive in weaning patients from oxygen therapy when parameters are met. These results could be used to revaluate and reinforce oxygen protocols and its adherence in order to minimize the time patients remain on oxygen.

Sponsored Research - None

3021366

High Flow Nasal Cannula Use On The Medical Floors.

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Background: As our use and comfort level with High Flow Nasal Cannula (HFNC) has increased we started to transition patient to the medical floors with HFNC. HFNC has been well tolerated by our COPD population and our use of Non-Invasive Positive Pressure Ventilation (NIPPV) has decreased. These are patients that would have been admitted to our Intensive Care Unit (ICU) and likely placed on NIPPV. This study was to evaluate the success rate of these patients on the medical floors. **Methods:** We implemented a policy to allow HFNC on the medical floors in March of 2018. Maximal allowed FiO_2 on any floor outside ICU was 50% unless patient was at end of life. We evaluated all patients who received HFNC from 5/1/2017 to 4/30/2018. We looked at where the HFNC was initiated, if it was used on the medical floor and if an ICU transfer was needed. **Results:** 147 patients received HFNC during this period. 72 were initiated in the Emergency Department (ED), 41 were initiated in the ICU and 34 were either transferred from the ICU to the medical floor on HFNC or initiated on the medical floor. Of the ED patients 39 were admitted to the ICU and 33 were admitted directly to the medical floor. Of these 33 medical floor patients 3 required ICU transfer. Of the 34 other medical floor patients 5 required ICU transfers. Of the 67 patients managed on the medical floor 59 avoided ICU care (88% success rate). **Conclusion:** Patients requiring HFNC can be safely managed on the medical floor. This can free up ICU resources and decrease NIPPV use. Disclosures Acevedo: Sunovion Advisory Board, Monaghan Medical consultant.

Sponsored Research - None

3022125

Does The Use Of A Pop-Off Valve Affect The Accuracy Of Delivered Flow And Pressure In Heated High Flow Nasal Cannula Therapy In Pediatric Patients?

Ben Downs, Gary Lowe, Randy Willis; Respiratory Care Services, Arkansas Children's Hospital, Little Rock, AR

Background: The practice of managing work-of-breathing and oxygenation through the use of heated high flow nasal cannula (HHFNC) therapy has continued to increase at our institution. Based on our bench study published in 2012, our HHFNC set-up does not include the use of an in-line pop-off valve (POV). With our organization's recent transition to using the Optiflow Junior 2 nasal cannulas and the RT330 heated single-limb circuit, we performed an additional bench study to assess whether use of the POV in conjunction with the Optiflow Junior 2 cannulas and RT330 circuit may prevent the system from reaching the manufacture-listed maximum flows. **Methods:** A bench study was conducted comparing maximal flows and pressures in a HHFNC system with and without a POV in line. Flow rates for cannula sizes were set as follows: extra-small (ES) 8 LPM, small (S) 9 LPM, medium (M) 10 LPM, large (L) 23 LPM and extra-large (EL) 25 LPM. For this study, three cannulas of each size, along with three POV were used. For each set of three cannulas (for each size), three sets of data were collected for a total of 45 data sets. Data were collected at 37°C. FiO_2 was 1.0. Measurements of flow and pressure were acquired using a Magnehelic pressure manometer and a TSI/Alnor 41403 Flow Meter. Between measurements of each set of three cannulas, the baseline flow was recalibrated using the TSI/Alnor 41403 flow meter. **Results:** The most significant pressure differences with the POV inline occurred in the L and EL cannulas (Table 1). The pressure within the circuit averaged 28.40 cmH_2O when using the POV with the EL cannula and 27.9 with the L cannula, although the POV limit is stated as 40 cmH_2O. There was a correlated difference observed in the measured flow with the POV inline for the L and EL cannulas. Respective flow rates of 20.3 and 21.6 LPM were observed, as compared with manufacturer listed maximum flows of 23 and 25 LPM respectively (Table 2). Though measured values for the M, S and ES cannulas (POV inline) resulted in p-values of <0.05, the differences would not reach clinical significance for the patient. **Conclusion:** Our current practice for not utilizing the POV inline was validated in this study. The circuit pressures were not extreme. With the POV inline, the circuit pressures and cannula flows were reduced significantly below the manufacture listed maximum flow level in the L and EL cannulas, which could potentially impact the patient's course of treatment.

Sponsored Research - None

3025408

The Influence Of Variable Flows On FiO_2 Delivery Via Self Inflating Resuscitation Bags.

Isaac Zamora, John Newhart; Respiratory Care, UC San Diego, Fallbrook, CA

Background: The appropriate delivery of oxygen therapy during patient resuscitation is a critical task for respiratory therapists. Normal textbook guidelines for resuscitation bags instruct oxygen flows to be set at 10-15 LPM during code blues and rapid responses. This conservative approach to oxygen administration seems to be the cultural norm across classroom and hospital settings. Our staff respiratory therapists found benefit to increasing the oxygen flow to >15 LPM as effective tool to reverse or prevent hypoxia during resuscitations, particularly in patients with high oxygen requirements. Method: We took our self inflating resuscitation bag(AmbuBag Spur II) and connected its oxygen tubing to an oxygen flowmeter(Timeter) which was plugged into the quick connect hospital wall oxygen outlet. The ventilation side of the bag was then connected to a test lung(Bio-Tek VT-2) with an oxygen analyzer(Mini Ox I) installed in the test lung. Respiratory rate timing for hand bagging was set by using a metronome(Metro Timer). Resuscitation bag was immobilized and compressed fully using a hinged manual compressor. Maximum acheived Fi02 was measured with variable flows of 10 LPM, 15 LPM, >15 LPM "top of valve"(with metal ball floating at very top of flowmeter), and "full flush"(oxygen flowmeter valve completely open). **Results:** We found a significant increase in measured FiO_2 with increased oxygen flows. At 10 LPM, the highest measured Fi02 was 43.2% At 15 LPM, the highest measured Fi02 was 54.5%. At "top of the valve" >15 LPM, the highest measured Fi02 was 74.2%. Lastly, when the flowmeter valve was set to "full flush", highest measured Fi02 was 92.2%. This translated into a 113% increase in Fi02 from when going from 10LPM to "full flush." We took a razorblade to one of our resuscitation bags and after entirely disassembling, we discovered the advantage of having a length of corrugated tubing tail that surrounds the oxygen tubing. When flowmeter is set to >15LPM, this tail collects and stores supplemental oxygen that can be drawn from, during vigorous bagging. This study was presented to our Respiratory Care Leadership and led to our adopting a new clinical practice advisory that supports the delivery of higher oxygen flows when indicated. **Conclusion:** When using certain self inflating resuscitaion bags, our data suggests that increasing the oxygen flow to >15 LPM is an effective way for clinicians to dramatically increase Fi02 delivery. Disclosures: None to disclose.

Sponsored Research - None

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3009564

Correlation Of Forced Expiratory Maneuver To Impulse Oscillometry During Methacholine Challenge Testing In Adults.

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Background: In adults, Impulse Oscillometry is more sensitive in detecting response to low levels and therapeutic levels of a short-acting bronchodilator than FEV_1 in both asthmatic and COPD. There is limited data on the use of IOS during bronchoprovocation testing. The objective of this study is to correlate FEV_1 and IOS values during methacholine challenge testing in patients with exertional dyspnea and normal resting spirometry. **Methods:** Increasing doses of Methacholine (MCT) were administered at the following concentrations: 0.0625 mg/ml, 0.25 mg/ml, 1.0 mg/ml, 4 mg/ml, 8 mg/ml, and 16 mg/ml via five breaths through a Salter model 0700 dosimeter. Both a forced expiratory maneuver with FEV_1, FVC, and FEF_{25-75} were recorded in addition to IOS values (R_5, R_{20}, X_5, AX) with each dose of MCT and post-bronchodilator. Correlation of spirometry and IOS values were made at baseline and maximum dose. **Results:** To date, 29 patients with exertional dyspnea and normal baseline spirometry without baseline obstruction have undergone Methacholine challenge testing. 22 patients had no reactivity at maximum dose of 16 mg/ml while 7 patients demonstrate mild to moderate bronchial hyperreactivity (BHR). Baseline values were not significantly different for FEV_1, FVC, R_5, R_{20} and X_5 between the groups. At maximum dose of the BHR negative vs. BHR positive group, comparison of changes during IOS, X_5 (-2.70 vs. -4.24, p = 0.07), R_5 (178% vs. 254%, p = 0.02), and R_{20} (136% vs. 148%, p = 0.40). These findings in the BHR positive group correlated to a -2.45 decrease in X_5, 31% decrease in R_5, 9% decrease in R_{20}, and 62% increase in AX (all p values > 0.05). **Discussion:** This study demonstrated while X5 changed significantly during MCT, there was a more significant change using the R_5 value which increased by 30% at PC20. All other IOS parameters changed during the tests but only changes in X_5 were significantly different between BHR negative and BHR positive groups. The receiver operating characteristic (ROC) curve for changes in X_5 (to predict a 20% decrease in FEV_1) showed a best decision level for a 50% decrease in X_5 with a sensitivity of 36% and a specificity of 85%. **Conclusion:** Impulse oscillometry may be an adjunct during methacholine challenge by correlating decrease in FEV_1 to increases primarily in R_5. Further study is required to determine if other IOS values may also demonstrate significant correlation with the PC20.

Sponsored Research - None

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3003234

New Faculty Mentoring In Respiratory Care Programs.

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Background: The purpose of this study was to identify current mentoring practices of new faculty members in Commission on Accreditation for Respiratory Care (CoARC) accredited respiratory care programs in the U.S. and to identify the perceptions of program directors regarding the observed impact of program mentoring practices. **Methods:** The methodology for the study was quantitative nonexperimental survey research. The survey instrument was an electronic questionnaire. The survey consisted of 25 items that were divided into 3 dimensions: mentoring practices, mentor/mentee relationship, and perceptions of mentoring program impact. The Institutional Review Board (IRB) at East Tennessee State University granted approval of the study. Of the 410 possible participants, 126 (30%) responded to the survey. Data from the survey were used to analyze 12 research questions and 12 null hypotheses. Six research questions were analyzed using an independent-samples *t* test and 6 research questions were analyzed using a one-way analysis of variance. Testing of the null hypotheses associated with the 12 research questions resulted in 3 significant findings and 9 findings that were not significant. **Results:** Significant findings included female program directors reported greater opportunities for mentoring within their programs and greater levels of expectations in regard to mentoring. Associate degree programs also reported a higher level of expectation in regard to mentoring. There was overwhelming agreement concerning the potential impact and benefit of new faculty mentoring on job performance, turnover, job satisfaction, and organizational commitment. **Conclusion:** The results of this study may benefit administrators and educators in the field of respiratory care in efforts to support new faculty in higher education who possibly feel underprepared or overwhelmed in the new role. Because other allied health fields of study are similar in nature to respiratory care, the findings of the study could have potential implications across a range of health related professions. **Disclosures**: The author has no relation to industry.

Sponsored Research - None

3006196

Respiratory Care Faculty And Students' Perceptions Of Effective Clinical Instructor Characteristics.

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Background: Clinical instructors play a crucial role in shaping the future of healthcare by training students on site to deliver patient-centered team based care. Respiratory care clinical instructors play an integral part in preparing respiratory care students to be effective practitioners given that almost 50% of the respiratory care curriculum is conducted in the clinical environment under the supervision of clinical instructors. Professional competence, interpersonal relationships, personality characteristics and teaching ability are all qualities that clinical instructors should possess in order to provide students with quality clinical education experiences. This study aimed to explore and compare respiratory care faculty and students' perceptions of the most important characteristics of an effective clinical instructor. **Methods:** A letter of solicitation which housed the link to an online questionnaire was sent to all respiratory care program directors in the US via email. Program directors' emails were secured from the Commission on Accreditation for Respiratory Care (CoARC) website which provides an alphabetical listing of all accredited respiratory care education programs. The clinical instructor's effectiveness questionnaire was used to collect the data (Tang, et al., 2005). The questionnaire categories are clinical instructor's professional competence, interpersonal relationships, personality characteristics, and teaching ability. Institutional Review Board IRB approval was obtained. **Results:**176 faculty and 122 students completed the questionnaire. Respiratory care faculty scored the highest mean in the professional competency category μ= (4.81) and the lowest mean in the interpersonal relationship category μ= 4.51, while respiratory care students scored the highest mean in the interpersonal relationship category μ= (4.58) and the lowest in the personality characteristics category μ=(4.53). A Mann Whitney U test revealed significant differences between respiratory care faculty and students in the professional competence (P=.001) and interpersonal relationship (P=.01) categories. **Conclusion:** Besides being professionally competent, clinical instructors should be able to supports students as they seek to overcome stressors that might arise in the clinical education portion of their curriculum. Clinical instructors must understand their role as mentors and develop a positive interpersonal relationship with students.

Sponsored Research - None

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3008814

A Descriptive Study On Communication Skills Of First Year Undergraduate Respiratory Therapy Students.

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Background: The age old adage of "communication is key" holds true for healthcare professionals to effectively treat patients and work with healthcare team members. Specifically in respiratory therapy (RT) education, interpersonal communication skills and how these skills translate to successful health outcomes are emphasized. However, formal training in communication skills may be lacking, which can result in challenges for RTs integrating in a new work environment. It is unknown if communication skills training is needed in RT education. The purpose of this study is to describe the impact of evaluation and feedback on face-to-face communication skills in undergraduate RT students. **Methods:** This study was approved by the IRB. First-year RT students self-evaluated their communication skill performance using a standardized interpersonal communication skills inventory. Communication skills were also evaluated during laboratory check-offs and clinical rotations using a standardized rubric and analyzing comments from the evaluators. Multiple evaluators were used, including faculty, second-year RT students and dedicated clinical preceptors. Multiple assessments were completed from program entry until the end of the first major clinical experience. **Results:** There were 18 participants in this study. Overall, self-assessment means increased from their baseline self-assessment to their final self-assessment. However, the only statistically significant changes from baseline to final were in sending clear messages (P=0.020) and giving and getting feedback (P=0.011). Minimal change in communication skills was noted during laboratory check-offs. Communication skills assessed by clinical preceptors improved significantly in all but one category. Faculty comments indicated a trend in improved verbal communication skills, but revealed a need to focus on nonverbal, patient education, building rapport, empathy, and understanding. Clinical preceptor comments indicated an improvement in verbal and nonverbal communication skills as well as building rapport with patient. **Conclusion:** Prior training and on the job experience in customer service may lead to higher proficiency in communication. In order to develop appropriate communication skills, it may be necessary to implement interpersonal communication training early in RT education. Additionally, communication skills could improve with more clinical hours. Disclosures: None

Sponsored Research - None

3010683

Promotion Of "Flipped Learning" For Junior Therapist Of Respiratory Therapy Professionals.

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Background: With the increase in the quality and quantity of clinical work and the implementation of the new Law of Labor, the teaching and learning time of clinical teachers and trainees trained in junior respiratory therapists has been severely reduced. Therefore, how to make junior therapist really learn, teachers can to save time and make effective teaching, flipping teaching becomes an efficient teaching method. **Method:** This study expects to integrate online clinical knowledge learning and face-to-face clinical care through the current "clinical hybrid learning" and further integrate into the new pedagogy "flipping classroom" to strengthen the interconnection between the online and face-to-face end, and focus on the face-to-face end Clinical nursing practice "turning learning course" and evaluation of learning effectiveness. Students complete pre-test and post-test of the course and use their scores as a paired sample T test, if the P<0.05 has a difference in learning outcomes. **Results:** According to the new two-year junior therapist three-stage training course, 11 courses, 11 courses and 16 courses were respectively prepared, each of which has 7, 6 and 6 trainees tested. The results before and after the test were (76.21±9.41 vs 95.38±5.81, respectively). 75.25± 12.24 vs 92.00±8.01, 66.25±10.08 vs 94.37±5.77), all P values were less than 0.01, which was statistically significant. The satisfaction of the students also reached 100%. **Conclusion:** With the requirements of the Labor Force Law, it is becoming more and more difficult to conduct teaching courses outside of work. Using flipping teaching methods to save classroom teaching seems to be feasible in this study, and the post-test results are significantly better than the pre-test results, and it has statistical significance. The trainees also pay high satisfaction for the training. **Key words**: flipped learning, Junior Therapist, Respiratory Therapy Professionals **Disclosures** The study was supported by China Medical University Hospital (CMUH-EDU-10521-6). The authors have disclosed no conflicts of interest.

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3012338

Using A Test Blueprint To Evaluate Multiple Choice Questions In A Respiratory Care Program.

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Background: The focus of this study was to use a test blueprint to evaluate the cognitive level of test questions. The research question of the study was; can a test blueprint be a useful tool for determining if test questions administered to Respiratory Care students is equivalent to NBRC cognitive levels? **Methods:** The faculty of the Northern Kentucky University's Respiratory Care program provided twenty examinations from didactic classes for evaluation. A simple percentage was calculated and compared to the percentages of these three categories for both the NBRC's Therapist Multiple Choice (TMC) exam at the Certified Respiratory Therapist and Advanced Level. **Results:** The aggregate results showed an average cognitive level for each of the categories as follows: 58.25% recall, 23% application, and 16.5% analysis. These results were compared to the NBRC's published values for each category: 22% recall, 44% application, and 34% analysis for the TMC. **Conclusion:** The comparison demonstrated a need for an evaluation of the cognitive levels of test questions administered to Respiratory Care students. A test blueprint may be one tool that can be used by a Respiratory Care program to assess the cognitive level of examination questions. The NBRC has established standards, for the cognitive levels for Therapist Multiple Choice examinations, by which Respiratory Care program faculty can evaluate the examination questions administered in the faculties' programs. The faculty can then modify, if necessary, the cognitive level of the questions, administered in programmatic examinations, to better prepare these students for the NBRC exams. **Disclosures:** None

Sponsored Research - None

3015942

Survey Of Respiratory Therapy Alumni: Research Related Competencies And Skills.

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Background: The respiratory therapy (RT) field is at a turning point in academic progression. Competencies valued by RT managers may be more evident among bachelor's prepared therapists including leadership, evidence-based practice, and research. Evaluation is needed to determine the value and benefit of incorporating research related competencies and skills in RT curriculums. The purpose of this study was to determine the research-related competencies and skills respiratory therapists with a bachelor's degree have utilized during their career. **Methods:** IRB approval was obtained for this study. An online survey link was emailed to alumni of The Ohio State University Respiratory Therapy Program from 2006-2017. Participants were asked about current and past job histories and responsibilities and how frequently they utilized, valued, and benefited from the competencies and skills garnered from their research project experience. **Results:** The response rate was 52%. Of the 107 participants that initiated the survey, 59 met inclusion criteria and completed the survey. 94.9%-100% of respondents believed the research project helped them develop competencies and skills including searching and analyzing scientific literature, scientific writing, data management, presentation skills, communication skills, working both independently and with a team, critical thinking, self-motivation, flexibility, resourcefulness, and time management. Some primary research-related competencies are highly valued but used less frequently, with 32.2%-52.5% reporting occasionally or regularly using these in their current role as an RT. Overall, participants rated all competencies and skills gained during the research project experience valuable and beneficial in their career development. Graduates thought incorporating the research project was beneficial because it provided additional marketable and useful skills and prepared them for graduate school. **Conclusion:** Research-related competencies and skills directly and tangentially developed by engaging in a research project are highly valued and used with varying frequency by RTs in various roles. These results indicate it is worthwhile to dedicate the time and resources required for a research project in an RT curriculum. Educational programs with existing research projects should continue to include the experience in the curriculum, and other programs should consider incorporating a similar experience. **Disclosures:** None.

Sponsored Research - None

3016827

Evaluation Of Clinical Preceptor Training And Its Impact On Inter-Rater Reliability.

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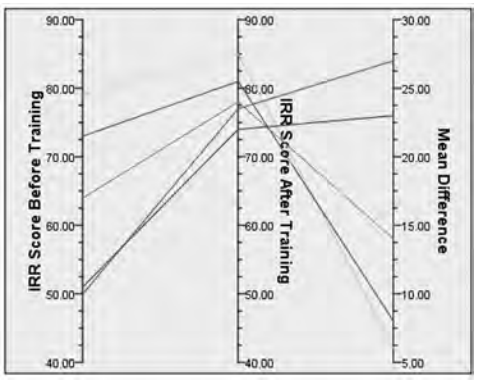
Background: The consistency of clinical evaluations of respiratory therapy (RT) students by clinical preceptors is an area where research is needed. The purpose of this study is to evaluate if standardized clinical preceptor training will improve inter-relater reliability (IRR) scores for staff involved in evaluating the clinical skills of respiratory therapy students. We hypothesized that standardized clinical preceptor training will not significantly affect IRR scores for faculty members. **Methods:** Study design is a one-way repeated measures design evaluating mean IRR scores of faculty members involved with evaluating RT students before and after completion of training for clinical preceptors. We obtained IRB approval and used a purposive sampling approach. We could not blind or randomize this nonprobability sample due to the nature of the study design. We measured IRR by percentage agreement. We categorized scores as <70% = Needs Improvement; 70-79% = Good; 80-89% = Great; >89% = Excellent. We also assessed IRR scores by using a paired-sample t-test with an alpha level of <0.05 showing significance. **Results:** All faculty members met inclusion criteria and results showed that standardized training improved IRR scores for faculty members. Mean pre-training IRR scores for participants resulted in a score of 63% which was a "Needs Improvement" score. Mean post-training IRR scores for participants resulted in a score of 78% which was a "Good" score. Standardized preceptor training improved IRR scores by 15% and had a P value <0.05 showing that scores were significantly different. **Conclusion:** This study showed that standardized clinical preceptor training can improve IRR scores needed for accreditation. RT programs, and more importantly, RT students will benefit from standardized clinical preceptor training for all faculty members involved with clinical evaluations of students. This training will help improve the quality of clinical evaluations and guidance to RT students.

Sponsored Research - None



Pre/Post Training Mean IRR Scores

3018228

Level Of Competence Of Msrc Students During A Simulated Pre-Clinical Patient Encounter.

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Background: Simulated patient encounters are used in the training of health care professionals. A special set of interviewing and physical exam skills are required for RTs to become advanced practitioners. This simulated encounter required the respiratory therapy students (RTS) to perform a thorough patient interview, complete a physical exam of the chest, and document the findings of the medical history. This study aimed to evaluate the level of competence of the RTS during their first year of the Master of Science in Respiratory Care (MSRC) program during a pre-clinical simulation experience using standardized patients (SP). **Methods:** MSRC RTS and SPs were given a "cough and shortness of breath" scenario. The simulated patient encounter occurred in a mock examination room with two-way mirrors with headphones provided for the respiratory therapy faculty (RTF). Overall performance during the encounter was evaluated by using a previously validated 16-item rubric. (RTF) revised the notes transferred to a computer after the patient encounter and evaluated competence against the original script on a total of 36 items. **Results:** 34 students participated in this patient encounter. The mean overall performance scored by RTF during the interview process (appearance, introduction, type of questions, listening, order of interview) and the physical exam was 90.6% (+/-6.3%). Evaluation of transcripts revealed that overall competence in documenting the interview was 68.7% (±17.5%; range 32.4%-100%). The areas where RTS showed the best documentation (>/= 90%) were: onset of chief complaint, alleviating factors, family history, and tobacco use. The areas that showed least documentation (</= 50%) were the following: evaluating symptom #2 (SOB), medication allergies, sleep disturbances, weight changes, hobbies, and life stressors (figure 1). **Conclusion:** This study showed that, while overall performance during the patient encounter (interview process and physical exam) scored highly by RTF, overall documentation of the patient interview by RTS in the MSRC program was very low. The RTS should spend a reasonable amount of time to prepare for the patient encounter to improve documentation and the faculty should reinforce areas of the interview and documentation that could significantly impact quality of life on patients with respiratory symptoms.

Sponsored Research - None

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3019991

Correlation Between The Comprehensive NBRC Secured TMC SAE And The TMC Credentialing Exam.

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Background: Since 2015, the National Board for Respiratory Care (NBRC) has made available a Comprehensive Therapist Multiple-Choice (TMC) Self-Assessment Examination (SAE) for RT educational programs. The contents and difficulty level of the TMC SAE are similar to the actual TMC credentialing exam. For this reason, the SAE is used by some RT programs as one of the accreditation outcome measures. The purpose of this study was to evaluate the correlation between the TMC SAE and the TMC credentialing exam. **Methods:** On April 6, 2018, 14 senior RT students (class of 2018) took the TMC SAE (Form 2015) under a proctored condition with a time limit of 3 hours. The individual score of the TMC SAE was recorded and compared with the respective score of the actual TMC credentialing exam. The scores of both exams were obtained via the online NBRC school reports. Pearson Correlation and *t*-value were calculated to evaluate the correlation and degree of differences between the scores. **Results:** As of June 1, 2018, 11 RT graduates of class of 2018 took the TMC credentialing exam. The mean scores for the TMC SAE and TMC credentialing exam were 94.3 (n=14) and 104.7 (n=11), respectively. Ten of 11 graduates (91%) earned or exceeded the NBRC high cut score of 94 on the TMC credentialing exam. Eight of 11 graduates scored higher on the TMC credentilaing exam than on the TMC SAE. One graduate scored ths same and two graduates scored lower on the TMC credentialing exam. The calculated r was 0.257 and the calculated t *was* 0.445. **Conclusion:** There is a positive but weak correlation between the TMC SAE and the TMC credentialing exam. The scores between these two exams do not show significant differences at the 0.05 confidence level. A majority of graduates (8 of 11 or 73%) earned a higher score on the credentialing exam than on the TMC SAE. This is possibly due to the time-lapse (i.e., more preparation time) between the exams and the high-stake nature of the credentialing exam. A small sample size is a limitation of this study.

Sponsored Research - None

3020189

Student Perceptions Of 3D-Printing In An Undergraduate Respiratory Care Curriculum.

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Background: Research on active learning strategies reveals that didactic lecture alone is minimally effective as an instructional method, yet continues to be the standard in academic institutions worldwide. To further engage students with course content and each other, in Spring 2018, undergraduate respiratory care students enrolled in a neonatal/pediatric course used 3D-printing technology to create models of congenital heart defects. 3D-printing is an innovative technology which allows users to create physical objects from a digital design. This technology is trendy and fun; however, the purpose of this study was to see if 3D-printing is an effective educational tool for a respiratory care curriculum. **Methods:** Eighteen students were divided equally into nine groups; each group was assigned a congenital heart defect. Students received training facilitated by MakerLab (3D-printing lab) personnel covering best practices, using technology within the space, and making equipment reservations. Each group revised and re-printed their model until they were satisfied. Students were required to paint their model, clearly identify the defect, and prepare a class presentation. After receiving Institutional Review Board (IRB) approval, informed consent was obtained from 16 of the 18 subjects. Participants completed an anonymous 15-question survey detailing their perceptions of the project. **Results:** Of the 18 students enrolled in the course, 16 students (89%) returned surveys. Overwhelmingly, perceptions of the project were positive, with 100% indicating that they believe 3D-printing can be successfully used as an educational tool. All subjects felt that they were required to act as a leader and felt encouraged to take ownership over their educational experience. Thirteen subjects (81%) felt that the use of this technology enhanced their comprehension of cardiac defects. Many students experienced challenges with the technology, which is reflected in the data. Eleven subjects (69%) indicated that challenges outside of their control affected their perceptions of the project. See graph for additional results. **Conclusion:** Results from this survey on the use of 3D-printing technology provide encouraging feedback to educators looking for innovative instructional methods to incorporate in the classroom. Although students experienced challenges along the way and may have been pushed outside of their comfort zone, the educational experience was both positive and effective.

Sponsored Research - None

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3021805

Enhanced Learning Through A New Simulation Debriefing Method For Respiratory Care Students.

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Background: Simulation based education (SBE) has become an essential part of healthcare curriculum. The literature supports the premise that student learning in simulation occurs during the debriefing session. The purpose of this project was to use and evaluate a new debriefing method for Respiratory Student SBE. This systematic method was designed by Gina Fieler, MSN, CHSE, Director of Simulation at Northern Kentucky University (NKU) using elements from nursing debriefing techniques. NKU Institutional Review Board gave approval for this project. Method: Junior Respiratory Students attended SBE as part of their clinical practicum. The instructor gave a short pre-briefing report and invited all students to enter the simulation lab to observe the patient situation. Students individually noted their findings and returned to debriefing classroom. They described what they saw and the instructor marked their findings on the room's large white board using the new structured format for pre and debriefing. For each finding, the students were prompted to consider 'what it meant' and 'what further information was needed'. The instructor gave student caregivers detailed report and they attended to the patient; the student observers watched from the classroom via video. The instructor ended the simulation when objectives were met. Caregivers joined the class for the debriefing and were asked to describe their experience. The instructor asked all students to consider 'interventions recommended', 'did these achieve the desired outcome', and 'if not, why not, what else is recommended'. After debriefing, students completed the Simulation Effectiveness Tool-Modified (SET-M), (permission by Society for Simulation in Healthcare) a 3 level Likert Scale with one open comment. This was done for two patient scenarios: dislodged trach (n=16), foreign body airway obstruction (n=11). **Results:** Descriptive statistical analysis showed students 'strongly agreed' or 'somewhat agreed' on the majority of items of the SET-M for both scenarios. Open comments described increased confidence, decreased anxiety, and prebriefing was helpful. **Conclusion:** Using a structured pre and debriefing method that encourages students to observe and question in an organized, logical format increased student learning in SBE.

Sponsored Research - None

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3023315

The Incidence Of Smoking Electronic Cigarettes Among Healthcare Students In Riyadh, Saudia Arabia.

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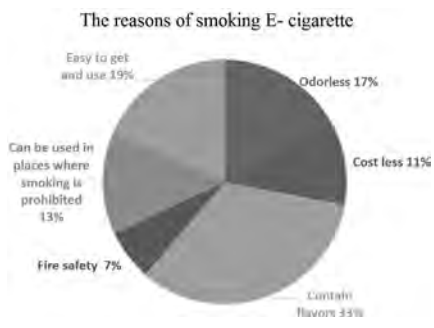
Background: Electronic cigarette (E-cigarette) is a new trend in smoking, and it increased remarkably across the world. The aim of this study is to find the incidence of smoking E-cigarette among healthcare students at King Saud bin Abdulaziz University for Health Sciences (0KSAU-HS) in Riyadh. The objectives of this study are to identify the reasons of smoking E-cigarette among students, find the possibilities of replacing regular cigarette with E-cigarette in the process of quitting smoking, to assess the duration of smoking E-cigarette in comparison with the regular cigarette, and to find the main source of influence to smoke E-cigarette. **Methods:** Institutional review board (IRB) approval was obtained. The study was conducted in KSAU-HS campus in Riyadh by distributing soft and hard copy of 15 items questionnaire. A consent form to participate in the study was given as well. The sampling technique was convenience sampling and the number of participants was 658 students. **Results:** The result showed that in general the number of smokers is 113 out of 658 students (17%) and from these 113 smokers 72 student (64%) are regular cigarette smokers, 15 students (13%) E-cigarette smokers, and 26 students (23%) are both regular and E-cigarette smokers. We found that the reasons of smoking E-cigarette are most likely because it contains flavors (33%), easy to get and use (19%), and odorless (17%). 23 students (56%) of E-cigarette smokers are in the process of quitting smoking while the other 18 students (44%) are not. The duration of smoking E-cigarette was mostly less than 1 to 2 hours (88%) while in regular cigarette, the majority used to smoke 1 to 10 cigarettes (64%). The main source of influence for smoking electronic cigarette was friends (82%) followed by family (13%) and finally commercials (5%). **Conclusion:** In conclusion, E-cigarette is a new trend among healthcare students that should be taken seriously to prevent its spread. Also, due its ease to use, it is important to increase the restrictions of using E-cigarette in the public. Majority of E-cigarette users were influenced by their friends, therefore, it needs more awareness about the adverse effect of E-cigarette smoking.

Sponsored Research - None



3024712

Disease Management In The Respiratory Therapy Curriculum.

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Background: Comprehending disease management (DM) in a variety pulmonary conditions is a major pillar in building the future for Respiratory Therapy (RT) practice. Appropriate DM has been demonstrated to impact health outcomes in the healthcare system. The purpose of the study was to explore the extent to which DM is included in the RT program curriculum. **Methods:** Following IRB approval, two separate surveys were created: one for PDs and one for RT students graduating in 6 months or less. 433 Respiratory Therapy PDs throughout the United States were sent the link and PDs were asked to forward to their students. Each group was asked about the implementation of DM competencies into the RT curriculum, and students were asked about their level of preparedness and confidence to implement DM competencies. **Results:** 101 PDs responded, most from Associate Degree programs (67%). The DM competencies (11 out of 15) were implemented in didactic, lab, and clinical settings. Some PDs (28%) stated that they do not have a dedicated DM course and 2/92 (2.17%) were working toward implementation. PD's stated that in the community their programs lacked experiences evaluating the patient disease process, implementing patient education tools, collaborating with other professions, and smoking cessation counseling. Barriers to including content were identified as resources (44%), time (36%), and faculty (2%). 190 students participated, mostly from Bachelor's degree programs (50%). Students felt unprepared and were not confident in the following areas: providing education on nutrition/wellness, economic support, developing action plans, documenting outcomes, smoking cessation counseling, and evaluating health literacy. **Conclusion:**Increasing DM education in the curriculum is consistent with the current evolution of Respiratory Therapy practice. Opportunities for exposure to learning these skills may be abundant in the RT curriculum, such as community style clinical rotations, modules on health literacy, and online learning modules. These may be incorporated into the curriculum to benefit the students and the community. Broadening the Respiratory Therapists' skills and competencies to areas outside of the acute care environment has the possibility to impact health outcomes and reduce readmissions related to improper disease management, thereby demonstrating the value of the RT to the interprofessional healthcare team.

Sponsored Research - None

3025211

Evaluation Of The Effects Of An Educational Module About Electronic Cigarettes On Undergraduate Health Professional Students' Knowledge And Perceptions.

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Background: The safety and health effects of electronic nicotine delivery systems (ENDS), or e-cigarettes, are largely unknown. Additional research continues to emerge. There are public misconceptions about ENDS, especially as compared to conventional cigarettes. To that end, healthcare providers are among the first to be trusted by patients to answer questions, provide evidence-based information and dispel myths. Students training to become health professionals should be prepared to address the current issues and trends in health behavior. The purpose of this descriptive study was to examine the effects of viewing an evidence-based e-cigarette educational module on health professional students' knowledge, perceptions and confidence in providing information to patients about e-cigarettes. **Methods:** Following IRB approval, 220 students in senior health professions programs from Respiratory Therapy, Nursing, Medical Dietetics, and Health Sciences elected to participate. Students took a pre-survey, viewed a seven minute online educational video including synthesis of ENDS evidence-based research, and completed a post-survey. Data analyses included descriptive statistics and t-tests. **Results:** Participants indicated that they received very minimal education about ENDS in their curricular content, but also reported that they were likely to be exposed to questions both in and outside of their health profession programs. They indicated that they had received ENDS information from advertisements, peers, and social media. T-tests analyzing differences after viewing the module found that seven of the eight pre- and post-survey questions were statistically significant (P<.001), which indicates the ENDS module positively impacted knowledge and perceptions. Most participants had low confidence in counseling about ENDS initially, but student's confidence in counseling a patient about ENDS increased following viewing of the module (P<.001). **Conclusion:** Students were poorly informed, yet indicated exposure to ENDS both in their professional settings as well as outside of their programs. Health professions programs are challenged to provide updated content on emerging topics such as ENDS. Brief online educational modules with an overview of evidence-based research may address this need. Overall, this pilot study supports the use of a short ENDS education module to increase students' perceptions, confidence, and knowledge of ENDS.

Sponsored Research - None

3023823

The Use Of Debriefing Tools And Education Of Staff To Reduce ABG Scanning Or Labeling Errors.

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Background: Could the Respiratory Therapy department reduce the number of ABG scanning and labeling errors through education and a debriefing tool? The hypothesis is that ABG scanning and labeling errors could be reduced with awareness and staff education. The baseline for ABG scanning and labeling errors in August 2017 was 24 scanning or labeling errors during that month, resulting in a 0.66% error rate. 24 errors in a month meant there were 24 patient ABG's that did not post to the electronic chart in a timely manner or could potentially post to another patient's electronic chart. This is a potential for delayed patient care if the ABG did not appear in the patient's chart, or if the ABG results ended up in another patients chart, the results could be acted upon with the wrong patient. Method: A high rate of ABG errors was noted by the leadership of the Respiratory Therapy department. A fishbone was done to determine possible causes. A baseline ABG error rate was established using August 2017 data. The error rate was obtained by taking the number of ABG scanning or labeling errors and dividing by the number of ABG samples analyzed by members of the Respiratory Care department. A debriefing form, developed based on the fishbone, was utilized to determine the cause of each ABG scanning or labeling error. This form was used for staff with every ABG error. Interventions, such as creation of a quiet zone around the blood gas analyzer, were designed based on the findings in the debreifing form. Data was presented at each monthly staff meeting with an emphasis on error rate for each month, causes of the errors noted, and the progress of reduction in the error rate. The goal was to reduce the error rate from 0.66% to 0.5% or less. **Results:** Debriefing with each employee to determine the error cause and presentations at staff meetings to educate the Respiratory Therapy staff resulted in a reduction of ABG scanning and labeling errors to 0.05% which was sustained in both March and April of 2018. **Conclusion:** The reduction in ABG scanning and labeling errors shows that use of a debriefing tool and staff education at monthly staff meetings was an effective way to reduce errors, thus increasing accuracy and timeliness of ABG results being available for the medical team to determine treatment. Disclosures: Author(s) are employed by UT Southwestern Medical Center.

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3016037

Integrating Sleep Education Into Nursing And Allied Health Programs Using Technology.

Tamara Douglass-Burton; CHP, Towson University, Sykesville, MD

Background: Insomnia and obstructive sleep apnea (OSA) are the two most prevalent sleep disorders reported in the United States, and affect many Americans each year (Centers of Disease Control and Prevention (CDC), 2015). These disorders are expected to become more prevalent due to the rise in poor sleep habits and obesity in the United States (CDC, 2014, 2012). Unfortunately, healthcare professionals are not fully aware of or knowledgeable about sleep and its related disorders, or its profound impact on an individual's health (Allen & Seaman, 2013; Ingram et al., 2015). The use of a hybrid or online sleep learning module may provide an alternative to traditional learning platforms. **Method:** Before conducting this study, Institutional Review Board (IRB) approval was obtained. This study compared the impact of sleep knowledge acquisition when using a hybrid method of instruction compared to a fully online learning module. A quasi-experimental design using a four-group convenience sample was conducted at a mid-size regional university in the mid-Atlantic United States. A convenience sample of 64 4th-year nursing students (RN) and 39 respiratory therapy (RT) students was used. The Dartmouth Sleep Knolwege and Attitude Survey (DSKAS) was the assessment tool used to compare scores between the hybrid (H) and online (O) groups, and across disciplines, RN and RT. The data were analyzed using SPSS. Analysis of co-variance (ANCOVA) was used when comparing groups' post-test data. The learning tool contained information that targeted basic sleep knowledge, signs and symptoms of sleep disorders, the most common sleep disorders, and diagnostic and treatment options for both diseases. **Results:** The data suggest that the sleep learning module facilitated an increase in knowledge of sleep medicine for all participants, 2.89 to 6.18, t (102) = -16.17, p < .01,. Furthermore, the sleep learning module provided comparative learning outcomes in both learning formats, 6.53 (O) to (H) 5.91, F(1, 97) = 3.54, p > .05, as well as between disciplines, RN 6.34, RT 5.93, F (1, 97) = .746, p > .05. **Conclusion:** The conclusion supported by the data suggests that the sleep learning module and associated activities facilitated an increase in knowledge of sleep medicine, as students appeared to be able to recognize classical signs and symptoms of OSA and Insomnia more after being exposed to the sleep learning module using either an online or hybrid learning environment.

Sponsored Research - None

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3012485

Inhaled Medication Reconciliation In The Electronic Medical Record.

Gail Drescher, Joseph P. Lynott; Respiratory Therapy, MedStar Washington Hospital Center, District of Columbia, DC

Background: The prevention of medication errors was a TJC priority, per the 2017 National Patient Safety Goals. The literature states that medication errors are quite common, and that 40% are related to inadequate medication reconciliation. In general, there should be "one truth" or list of home medications in the electronic medical record (EMR). Our EMR contains 4 areas for documentation of home medications. Previously, our RTs lacked access to one area - the "External Rx History" - which links to an OP pharmacy data repository. Per pharmacy, this is the most accurate data related to home medications. Our RTs rely on home inhaled medications as the foundation for our inhaled medication (bronchodilator and inhaled steroid; BDT) protocol, and discrepancies in EMR and patient reporting can influence appropriate in-hospital ordering of these drugs. **Methods:** We retrospectively reviewed the EMRs of a convenience sample of patients placed on our bronchodilator protocol (*n*=30) (IRB - 2571). Using structured intake, we reviewed "Inpatient Summary", "Transition of Care", "Document Med by Hx", and "External Rx History", for consistency of information across charting areas. We also sought to determine whether 1) Home inhaled medications were congruent with inpatient orders, 2) Any outpatient inhaled medications were omitted, and 3) Transition of care included appropriate discharge inhaled medications. Descriptive statistics were used to summarize data. **Results:** A total of 30 charts were reviewed. The inpatient summary matched the External Rx History in 72% of cases (*n*=29, with data missing for 1 subject), and congruency of our BDT with home inhaled meds was only 63%. Thirty percent of subjects had an outpatient-inhaled medication omitted from inpatient orders, and there were discrepancies in the Transition of Care inhaled medication list in 60% of subjects. Only 11% of subjects had congruence among all sources of inhaled medication reconciliation across designated areas within the EMR. **Conclusion:** Multiple areas to display home medications leads to a lack of consistency and congruence within the EMR.

Sponsored Research - None

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3016143

Implementation Of A Breath-Actuated Nebulizer Regimen May Reduce Nosocomial Influenza Acquired By Exposure To Fugitive Droplet Emissions From Continuous Nebulizers Whose Droplets Produced During Exhalation Are Vented To The Environment.

Dawn Copelin; Respiratory Therapy, Lee's Summit Medical Center, Pleasant Hill, MO

Background: Most nebulizers generate aerosol continuously, resulting in the expulsion of droplets to the environment during each exhalation. Influenza virus particles attached to such droplets is a potential cause of infection for hospital staff. The influenza virus can survive up to two to three hours following droplet attachment. Transfer from continuous to breath-actuated nebulizer-based therapy might be beneficial in terms of reducing staff-acquired infections. The present study examined comparative costs associated with the care of patients in the Emergency Department of a mid-sized hospital on either continuous or BAN-based therapy **Methods:** Attendance records were examined for staff associated with the care of patients known to be carrying influenza virus and therefore isolated from the general population undergoing care in the ED. The following conditions were evaluated: (Group 1) Nov 2016–Mar 2017 for level 1 surgical procedure facemask for only the patients undergoing continuous nebulizer-based therapy (AirlifeÖ MistyMax-10^{O} disposable nebulizer, Carefusion Corp. SanDiego, CA); (Group 2) Nov 2017 – Dec 2017 for level 1 surgical procedure facemask for both staff and patients, the latter on continuous nebulizer therapy (as in (1)); (Group 3) Jan 2018 – March 2018 for level 1 surgical procedure facemask for both staff and patients, the latter on BAN-based therapy (AeroEclipse^{O}-II, MMC Corp., Plattsburgh, NY). **Results:** Table 1 summarizes the findings: While the use of facemasks by both staff and patients reduced the number of positive influenza tests, implementation of BAN-based therapy resulted in a further improvement protecting caregivers. **Conclusion:** Implementation of BAN-based therapy has the potential to reduce costs associated with acquisition of nosocomial influenza in the ED.

Sponsored Research - None

Outcomes

Outcomes	Group 1	Group 2	Group 3
Staff 'sick' days	17	8	2
Cost of 'sick' days	$4,471	$2,444	$284
Call-back pay-days	17	8	2
Cost of call-back pay days	$7,632	$3,762	$1,254
Positive influenza tests for staff	9	5	2

3025868

Could A Non-Rebreathing Mask Or Simple Mask Be Used To Deliver Inhaled Nitric Oxide During Cardiac Catheterization Vasodilator Challenges.

Matthew J. McNally, Patrick Gabert; Respiratory Care, Dartmouth Hitchcock, Sunapee, NH

Background: Inhaled Nitric Oxide is commonly used during cariac catheterization to help diagnose whether pulmonary hypertension is fixed or reactive to vasodilators. We have typically delivered Nitric Oxide in this setting via a non-reabrathing mask connected to the bagger blender with a sample line monitoring the dose delivers. The manufacturer does not recommend this. However the manufacturers recommendation is to use a fairly complex circuit with multiple parts and connectors. This somewhat takes away the time benefit of using INO in tis setting. The risk of using the non-rebreather in this setting is the potential for the build up of nitrogen dioxide in the reservoir bag. We decided to test whether NO_2 buildup occurs at the dose and flow rate that we use in our cardiac cath lab, via non-rebreathing mask and simple mask. **Methods:** The Inomax DSIR plus was used to deliver the nitric oxide. The non-rebrather was connected to the bagger via a barbed sample line adapter. The simple mask was connected in the same manner. For each mask the flow was set to 14 lpm. For the non-rebreather mask, gas was sampled at the blender, inside the mask and at the bottom of the reservoir bag. For the simple mask, the gas was sampled at the adaptoer and inside the mask. Nitric Oxide, NO_2 and and Oxygen were sampled at doses of 20, 40 and 60 ppm, the typical doses used during cardiac catheterization. **Results:** The measured Nitrogen Dioxide was less than or equal to 0.5 ppm in the simple mask. The Measured Nitrogen Dioxide in the non-rebreather was less than 0.5 ppm in the mask and in the reservoir bag at all doses except in the reservoir at 40 and 60 ppm, it measured 0.7 and 1.5 ppm respectively. It also measeured 0.8 ppm at the mask of the non-rebreaher. **Conclusion:** Based on the results of this bench test, there is a small risk using the non-rebreather at higher doses given that the NO_2 was much higher in the reservoir bag. This could become more problematic is the clinician accidentally used too low of a flow rate. We recommend changing our practice to using a simple mask to reduce the risk of NO_2 build up in the reservoir bag. More tests should be performed at different flow rates.

Sponsored Research - None

Measured Nitrogen Dioxide

Simple Mask			
	20 ppm	40 ppm	60 ppm
Blender	0.2	0.4	0.7
Mask	0.2	0.3	0.5
Non-Rebreather			
Blender	0.1	0.3	0.6
Mask	0.2	0.4	0.8
Reservoir Bag	0.3	0.7	1.5

3025909

A Comparison Of Expiratory Circuit Filters During Delivery Of Inhaled Epoprostenol.

Earl Fulcher[1], Michael Sanders[1], Brad Thompson[1], Calvin Tenort[1], Thomas Pounds[1], Paul Kappelman[1], Trenton Ridges[1], Greg Hagen[1], Jerome Isaacs[1], Cinthea Beebe[1], Boaz Markewitz[2,1]; [1]Respiratory Therapy, University of Utah Health Care, Salt Lake City, UT; [2]Division of Pulmonary and Critical Care, University of Utah School of Medicine, Salt Lake City, UT

Background: Previous publications have identified the risk of ventilator malfunction when aerosolized medications are deposited upon exhalation filters or valve assemblies[1]. Our policy based on prior testing with the Hudson RCI Isogard HEPA Lite filter was to change the filters Q2 hours during epoprostenol delivery. To determine if the frequency of change for added expiratory filters could be reduced, we tested 4 commercially available filters with large surface areas during the delivery of inhaled epoprostenol to a test lung. **Method:** The test consisted of monitoring each of the following HEPA filters for 24 hours on 2 different days with a different minute ventilation and filter each day. (See table) The filters tested were the Carefusion Airlife, Hudson RCI 2605, DAR Sterivent, and PALL BB50. The same PB 980 ventilator was used for all testing with the circuit changed and ventilator processed between testing of each filter type. A Teleflex dual heated wire circuit and Hudson RCI Neptune heated humidifier set per departmental standard were used for each testing sequence. Epoprostenol (Flolan), at a concentration of 1.5 g/50 mL with original diluent producing a pH of 10.2 – 10.8, was continuously nebulized via an Aerogen Solo nebulizer at a rate of 10 mL/hour. The nebulizer was positioned on the proximal or dry side of the humidifier chamber. The epoprostenol syringe was replaced Q5 hours to ensure continuous delivery of medication. **Results:** No significant changes in exhaled tidal volume or minute ventilation were observed over the 24 hour monitoring period. The Carefusion Airlife produced lower exhaled volumes on Day 1 as compared to the other models and the volumes remained consistently low throughout the day. In addition, no occlusion alarms occurred during testing of any filter. **Conclusion:** During testing of 4 different HEPA filters added to the expiratory circuit during continuous inhaled epoprostenol delivery, no significant change in exhaled volumes or occlusion alarms occurred within the 24 hour monitoring period. A reduction in the HEPA filter change frequency to Q24 hours will save approximately $6,500 annually. More importantly, the frequency at which the circuit must be disconnected causing a loss of circuit pressure can be significantly reduced thus lessening the risk of ventilator associated events (VAE)[2]. In an abundance of caution, and until further testing can occur, we have elected to change the HEPA filters Q12 hours.

Sponsored Research - None

Exhaled Tidal Volumes (mL) During Expiratory Filter Testing

	PALL	DAR	RCI	Carefusion
Day 1: AC/PC, f 30, Pinsp 15, PEEP 5	422.7 +/- 9.5	412.9 +/- 4.6	416.1 +/- 34.1	240.6 +/- 5.9
Day 2: AC/PC, f 15, Pinsp 20, PEEP 5	548.5 +/- 4.7	541.9 +/- 5.1	550.3 +/- 4.2	580.3 +/- 10.5

3025913

Analysis Of The Cost-Effectiveness Of Inhaled Pulmonary Vasodilator Therapy In Adults.

Andrea Gerstner; The Ohio State University, Xenia, OH

In adults, inhaled epoprostenol (iEPO) is FDA-approved to treat pulmonary hypertension, but also commonly used in other off-label clinical situations like hypoxemia. This pharmaceutical agent improves oxygenation, inhibits platelet aggregation, reduces inflammation, and decreases pulmonary vascular resistance. Currently, there are gaps in the literature regarding initiation, weaning and discontinuation criteria for hospitals that use iEPO for hypoxemia. However, the use of iEPO for hypoxemia continues to persist and this use, despite the cost, often occurs in an unregulated manner. Scientific, relevant evidence is essential in clinical care and policy-creation. The purpose of this study was to describe iEPO use through retrospective charting review of cases for which iEPO was initiated; to determine treatment effectiveness; and to determine the utility of a protocol for initiation, weaning and discontinuation of iEPO. **Methods:** Following IRB approval, a retrospective chart review was conducted for all patients who received iEPO at our institution from 2015 through 2017. Primary data points recorded to assess oxygenation were the PaO_2/FiO_2 ratio, the oxygen index, the mean airway pressure (MAP) and arterial oxygen saturation. Ventilator settings were recorded in addition to nitric oxide use, prone positioning, and the patient outcome (mortality). Weaning strategies were described and creation of an evidence- based protocol (EBP) was modeled to reveal potential cost savings. **Results:** Retrospective review of 329 patients receiving iEPO for hypoxemia revealed inconsistencies in the following: starting dose of iEPO, method of weaning and time to discontinuance when not clinically effective. Secondary to charting inconsistencies, weaning strategies could not be articulated. Application of the protocol model for cases in which the medication was not effective revealed $487,334.15 of waste in the system, which is illustrated in the figure below. **Conclusion:** A clinical practice guideline is recommended to standardize use, weaning and discontinuation. The use of a clinical practice guideline may result in eliminating unnecessary patient charges as well as expenses to our institution. Future prospective studies are needed to determine the effectiveness of applying the clinical practice guideline to iEPO use, to evaluate the standardization of care and to deliver efficient care.

Sponsored Research - None

3012759

Reducing Unplanned Extubations In The NICU.

Hank Perry, Curt Partain; Respiratory Care, Community Regional Medical Center, Fresno, CA

Background: Unplanned extubation and re-intubations are not benign events and have been well noted to increase the risk of adverse events. To reduce unplanned extubation we adopted strict care standards to be followed in order to reach our set goal in reducing unplanned extubations per patient ventilator days. Many look to the securing device for blame on unplanned extubation, however we hypothesis adopting a strict care standard would be the key in our success and not the altering of the securing the device. **Methods:** Every unplanned extubation (UE) between Jan 2013 and August 2016 was reviewed to establish the average rate of UE per patient ventilator day and to identify when and how each event occurred in order to determine root cause. Mandatory NICU RCP staff meetings were held to share analysis and to determine the root causes. Staff was tasked to identify practice variations and create standardized process improvements. A "Save My Airway" questionnaire form was created in order for every UE to be examined in real time explaining how the UE occurred and how it could have been prevented. This was then shared with all the NICU RCP's to evaluate and assess for potential solutions as a group. NICU Staff presented and evaluated each UE as a group for Performance Improvement. New Standards of Care were implemented, monitored, and modified after each UE. Each UE was analyzed by using the Pareto chart and each month was analyzed using control charts. **Results:** Baseline data showed a 3.5-year average of 56 ventilator days per unplanned extubation (UE) and the goal was set to achieve 70. During the year of the P.I. Project we were able to improve by 168% to 150 ventilator days per UE. By continuous monitoring post P.I. project, we continued to improve and make further gains and are currently at 259 ventilation days per UE, which is a 363% Improvement! **Conclusion:** The key to reducing unplanned extubations in the NICU was the implementation of the "New Standards of Care" changing the staff's awareness and bedside practice along with the reporting of each individual UE with the "Save My Airway" questionnaire. As per our hypothesis we were able to exceed our goal and continue to maintain and improve without any change to the securing device. The change in culture has solidified our practice and sustainability. When indexed to 1 UE per 100 patient ventilator days our current rate is 0.38 which exceeds the suggested benchmark rate of <1 UE per 100 patient ventilator days.

Sponsored Research - None

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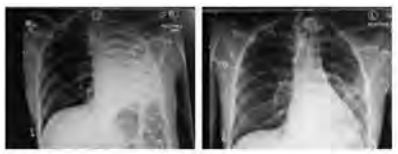
3016324

The Effect Of Intrapulmonary Percussive Ventilation Therapy On Intracranial Pressure In Neurocritical Patients.

Mutsumi K. Campbell; Respiratory Therapy Department, University of Utah Health, Cottonwood Heights, UT

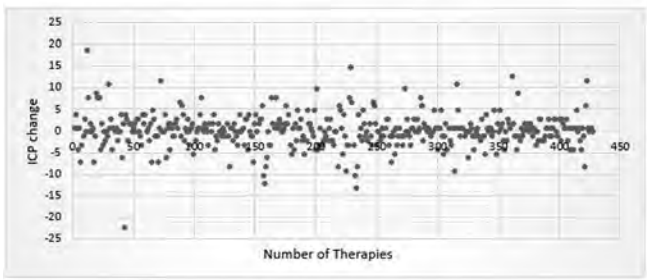
Background: To measure the effect of intrapulmonary percussive ventilation therapy (IPV) on intracranial pressure (ICP) in patients with neurological injuries and diseases. **Methods:** A retrospective study was conducted on patients (*n*=25) with ICP monitoring device who received IPV therapies (*n*=426) by respiratory therapists in Neurocritical Care Unit at University of Utah Health. Hourly values of ICP, mean arterial pressure (MAP), SpO_2 recorded by RNs in the MAR were collected to measure the effect before and after the IPV therapy. Results were expressed as the difference between pre and post values and were averaged per patient. **Results:** 25 patients were included, median age 52 (21-68) years. The average ICP changed from 9 to 8, MAP, 90 to 89, yielding no change in cerebral perfusion pressure (CPP) from 81 to 81 (CPP=MAP-ICP). The average SpO_2 remained at 97%. P-Value was 0.017 on ICP with significance level at $p < 0.05$. **Conclusion:** The IPV therapy decreased the average ICP by 1. There was no significant effect on CPP or SpO_2. DISCLOSURES: None.

Sponsored Research - None



Improvement after 2 IPV therapies

Patients (*n*)	25
Age (median and range)	52 (21-68)
Male (*n*, %)	17 (68)
Primary Problem (*n*, %)	
Traumatic brain injury	6 (24)
Subarachnoid hemorrhage	7 (28)
Hemorrhagic stroke	7 (28)
Hydrocephalus	2 (8)
Brain tumor resection	3 (12)



3023606

Comparison Of Mucus Clearance Between Biphasic Cuirass Ventilation Device And Mechanical Cough Assist Device On The Differences Of Rheological Property And Lung Mechanics.

Tetsuo Miyagawa[1], Tomomi Ichiba[2,1]; [1]Respiratpry Care, Showa University, Graduate School of Nursing and Rehabilitation, Yokohama, Japan; [2]Physical Therapy, Kyorin University, Faculty of Health Sciences, Mitaka, Japan

Background: The biphasic cuirass ventilation device (HAYEK HRTX®) and the mechanical cough assist device (Comfort Cough II®) are used to improve pulmonary function and airway clearance. The purpose of this study was to clarify differences of airway clearance efficacy in two types of airway clearance devices. **Methods:** HAYEK HRTX® and Comfort Cough II® were compared the movement distance of different viscoelastic mucus stimulants (MS) in tube length 1m internal diameter 1cm on restrictive and obstructive condition. Ten healthy volunteers (21.7±0.6y/o, %VC103±12.5%, FEV_1%92.2±4.4%) were measured on restrictive ventilatory condition (%VC65.3±6.3%, FEV_1%91.0±5.9%) by fixed chest belt and obstructive ventilatory condition (%VC91.2±8.8%, FEV_1%39.1±2.6%) by loaded airway resistance. MS were prepared using thickener 1% (purulent sputum of chronic bronchitis) and 4% (plug mucus of asthma attack). HAYEK HRTX® and Comfort Cough II® were set in the same way. After performing the vibration mode at 13 Hz and vibration pressure -5 / 5 cm H_2O for 1 minute, the inspiratory pressure / expiratory pressure was set to -40 / 40 cmH_2O, and the inspiration/pause/expiration time was set to 1.5/1/1.5 seconds in the cough mode. Measured 5 times for each condition and compared with average value. Data analysis was performed by using software SPSS version17 and JMP version12, P values <0.05 were considered statistically significant. **Results:** For normal lung and restrictive ventilatory condition, the migration distance of MS in Comfort Cough II® (Normal28.7±13.7cm, Restrictive 26.3±12.7cm)was significantly greater in 1% of MS than in HAYEK HRTX® (Normal19.6±9.0cm, Restrictive15.8±6.8cm)(P<0.01), but no difference was observed with 4% MS. For obstructive ventilatory condition, 1% MS of the migration length was significantly greater than 4% in Comfort Cough II® (1%9.0±5.4cm, 4%4.8±4.6cm) (P<0.01), but not in HAYEK HRTX®. **Conclusion:** Comfort Cough II® was more effective for sputum with lower viscoelasticity in normal lung and restrictive ventilatory condition than HAYEK HRTX®.The reason for this was that air leakage from the cuirass and actual pressure did not reach the set pressure.

Sponsored Research - None

3025771

Impact Of A Multidisciplinary Quality Improvement Project In Reducing Adverse Events Associated With Unplanned Extubations.

Srikumar Nair, Erin Mounger, Edward Guerrero, Leo Langga, Rachel Chapman, Steve Chin; Respiratory Care, Children Hospital Los Angeles, Santa Clarita, CA

Background: The Newborn and Infant Critical Care Unit (NICCU) at Children's Hospital Los Angeles is a high acuity, Level 4, neonatal intensive care unit with diverse and complex critical airway pathologies. Unplanned extubations (UE) are the 4th most common adverse events in neonatal intensive care settings in the United States. UE rates ranging from 0.14 UEs/100 ventilation days to 5.3 UEs/100 ventilation days have been recently reported at this institution. However, through a rigorous quality improvement project, we improved the UE rates from 0.77 to 0.5 UE/100ventilator days (VD) and have sustained positive outcomes. **Method:** Prospective data collection (with root cause analysis of each UE) was collected from the beginning of 2014 until February 2017 (Phase 1). In November/December 2016, a multidisciplinary UE team was created and discussed goals and interventions to address the data collected. Over the course of 2017 multiple interventions, each completed with Plan-Do-Study-Act (PDSA) methodology, were implemented (Phase 2). Interventions such as education and standardization of endotracheal tube securement, developmental tools, and infant positioning practices were developed. The leadership team comprised of physicians, a nursing manager, and respiratory mangers conducted weekly bedside audits. A rigorous automated tool was created for real time data capture and weekly audits. UE rates and the yearly mean were evaluated monthly alongside important adverse events associated with UE. Comparison of adverse events and their risk factors were done using Chi-square and t-tests as appropriate. **Results:** Over this 4-year period, there were 144 UEs with UE rates varying between 0 to 1.1 UE/100 VD (Figure 1). During Phase 2, there was approximately a 50% reduction (0.60 in Phase 1 vs 0.32 in Phase 2, p value= 0.02). The number of cardiopulmonary resuscitation events was also reduced by more than 50% (0.09/100VD in Phase 1 vs 0.04/100VD in Phase 2, *P*=0.12). Causes of UE changed over time with a reduction in unwitnessed UE and UE due to agitation (Figure 2). **Conclusion:** UE is associated with significant morbidity. Using a multidisciplinary QI project team approach, we have reduced the rates of UE and the associated adverse events.

Sponsored Research - None

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2997884

Acceptance, Adherence And Dropout Rates Of Individuals With COPD Approached In Tele-Monitoring Interventions: A Systematic Review.

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Background: To assess the benefits of Telemonitoring (TM) on decreasing exacerbations and emergency room visits with COPD, it is important to evaluate the factors that impact acceptance and successful adherence to TM. The objective of this study was to conduct a systematic review of TM studies with COPD, to evaluate the (1) acceptance, adherence, and dropout rates, and (2) identify the reasons for dropout. **Methods:** Included studies were randomized control trials and observational single arm pre-post trials that evaluated TM with COPD. A systematic search was performed in CINAHL, MEDLINE (Ovid), Cochrane library, and Embase databases. The Preferred Reporting Items for Systematic review and Meta-Analysis (PRISMA) guidelines was used to guide the selection process. Two independent reviewers retrieved titles, abstracts, and full texts, and completed data extractions. Acceptance rate refers to the number of participants who consented to enroll in TM studies over the number approached. Adherence rate refers to the total participants who completed TM over the number who started TM. Dropout rate refers to the number of participants who dropped out over the number who consented. All rates were calculated as percentages. **Results:** Among 1460 abstracts identified, 90 articles underwent full-text review and 33 articles were eligible and included. Twenty-seven were randomized controlled trials, and six were pre-post studies. Acceptance rate for all included studies was an average of 52% and ranged from 6% to 100%. The average adherence rate was 77% and ranged from 41% to 100%. The average dropout rate was 22% and ranged from 2% to 58%. Across the 33 studies, 369 participants reported reasons for dropout. TM related reasons for dropouts included technical difficulties (33%), complicated TM system (31%), and time constraints (9%). Patient-related reasons included hospitalization (37%), deceased (18%), lack of interest to continue (12%), and moved from study location (3%). **Conclusion:** The acceptance, adherence, and dropout rates of TM were variable. Most reasons for dropout were related to patient or TM features. The current review suggests optimizing the design of TM studies by considering patient-related and TM-related reasons to increase the acceptance and decrease the dropout rate in the future research. The next step will be to evaluate significant predictors of adherence and dropout rates in included studies.

Sponsored Research - None

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3008786

Adult Inhaled Medication Delivery And Inspiratory Flowrates—A Pulmonary Disease Navigator's Findings Among Medically Complex Patients.

Kimberly J. Bennion[1], Scott Daniel[2], Kyle White[2], Tammy Stucki[2]; [1]Corporate Respiratory Care, Intermountain Healthcare, Salt Lake City, UT; [2]Respiratory Care, Dixie Regional Hospital, St. George, UT

Background: Dixie Regional Medical Center is a 245-bed hospital and one of 23 acute care hospitals of the Intermountain Healthcare Corporation. To improve COPD care, we implemented a Pulmonary Disease Navigator (PDN). PDN duties include the assessment of care plans, medications and their delivery. The PDN reported trends in patient inability to generate manufacturer's recommended IFR for devices ordered. Studies have suggested that IFR will determine laminar flow and better deposition of medications[1,2]. Utilizing the InCheck Dial® assists with patient assessment of ability to generate adequate IFR. DPIs are rated based on resistance (low to high). **Method:** Between May 2017-March 2018, 127 patients were identified with COPD and followed by the PDN. **Results:** Of the 127 patients, 23 (18%) could not meet IFR device requirements. Detailed IFR outcomes are reported in Table One. **Conclusion:** It is our impression that tailoring medications and delivery devices to a patient's ability is key to disease management. Our Adult RT Evaluate and Treat process includes Asthma and COPD Exacerbation Protocols. These require IFR assessment prior to transition from nebulizer to DPI/MDI. Physicians are contacted if a patient's IFR is inadequate for the device ordered. Since PDN implementation, we report these benefits: 1) physicians requesting clinic PDNs, 2) physicians requesting RRTs as telemedicine consultants, 2) enhanced patient/healthcare team communication, 3) improved timeliness of medically necessary referrals (e.g., tobacco cessation, PFT, advance care planning), and 4) elevation of Respiratory Therapy as a profession. It is our impression that patients, families and members of the healthcare team benefit from detailed, timely, coordinated interventions that are best guided by Respiratory Therapists under the general supervision, direction and orders from physicians. [1]Kanabuchi K, Kondo T, Tanigaki T, Tajiri S, Hayama N, Takahari Y and Iwao K (2011). Minimal inspiratory flow from dry powder inhalers according to a biphasic model of pressure vs. flow relationship. Tokai J Exp Clin Med. 2011 Apr 20;36(1):1-4. [2]Mahler DA (2017). Peak inspiratory flow rate as a criterion for dry powder inhaler use in chronic obstructive pulmonary disease. *Ann Am Thorac Soc.* Jul;14(7):1103-1107. doi: 10.1513/AnnalsATS.201702-156PS.

Sponsored Research - None

Table One: Patients Unable to Meet Inhaled Medication Ordered Device IFR Requirement

Total Patients Unable to Meet Ordered Device IFR Requirement n=127 Total Patients # (%)			
< 80 LPM* # (%)	< 70 LPM* # (%)	< 65 LPM* # (%)	< 50 LPM* # (%)
23 (18)	12 (9)	13 (10)	2 (2)
23 (18%) of patients had IFR < 90 LPM			

*LPM defined as liters/minute (DPIs generally require between 30-90 LPM for adequate flow/medication delivery)

3008824

Outcomes From The Implementation Of A Pulmonary Disease Navigator For Higher Risk Patients: In-Hospital Mortality & 30-Day Readmission Rates.

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Background: Dixie Regional Medical Center is a 245-bed hospital and one of 23 acute care hospitals of the Intermountain Healthcare Corporation. To improve CMS Core Measures[1] for COPD, we instituted a Pulmonary Disease Navigator (PDN). PDN duties include but are not limited to: 1) earlier disease education, 2) creation of documented care plans, 3) transition care management, 4) timely, medically necessary referrals (e.g., PFT, pulmonary rehab), 5) post-discharge follow-up phone calls for care plan adherence, 6) medication instructs, 7) training patients on the proper use of CPAP, BIPAP and other equipment, 8) airway clearance methods, 9) breathing exercises, and 10) tobacco cessation and all aspects of symptom management, and 11) interdisciplinary pulmonary care trainings. We sought to identify what, if any, outcomes might be improved with the addition of the PDN. **Method:** Between May 2017-March 2018, 127 patients were identified as diagnosed with COPD and followed by our PDN. Of these 127, 67 (53%) were admitted with COPD exacerbation. We sought to determine what if any impact the PDN might have on COPD patient care and outcomes. **Results:** Pre- & post-PDN outcomes are reported in Table One. **Conclusion:** PDN implementation occurred Q3 2016. It is interesting to compare Q2 2016 with Q2 2017 as well as Q4 2016 with Q4 2017 outcomes for both in hospital mortality and 30-day readmission rates. While we cannot conclude an absolute cause and effect relationship solely with the implementation of the PDN implementation Q3 2017, the drop in both outcomes tends to strengthen our suggestion that employing a PDN has impacted outcomes. Detailed outcomes are reported in separate abstracts. Since initial implementation of the PDN, we report other benefits. These include but are not limited to: 1) physicians requesting PDNs in clinics, 2) physicians requesting RRTs as telemedicine consultants, 2) enhanced patient/healthcare team communication, 3) improved timeliness of medically necessary referrals (e.g., tobacco cessation, PFT, advance care planning), and 4) elevation of Respiratory Therapy as a profession. Patients, families and members of the healthcare team benefit from detailed, timely, coordinated interventions that are best guided by Respiratory Therapists under the general supervision, direction and orders from physicians. [1]https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment Instruments/HospitalQualityInits/Measure-Methodology.html

Sponsored Research - None

Table One: DRMC COPD In-Hospital and 30-Day Mortality All Payer by Quarter

Discharge Quarter	Cases #	In-Hospital Mortality #	Admission Rate %	30-Day Mortality #	30-Day Mortality Rate %
Q2 2016	42	3	7.1	7	16.7
Q3 2016	32	0	0.0	0	0.0
Q4 2016	52	2	3.9	6	11.6
Q1 2017	87	4	4.6	11	12.7
Q2 2017	73	3	4.1	6	8.2
Q3 2017	43	3	7.0	6	14.0
Q4 2017	58	1	1.7	2	3.5
Q1 2018	89	2	2.3	5	5.6
Totals	476	18	30.7%	43	72.3%

3012314

Comorbidities And Length Of Stay In COPD Patients.

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Background: Chronic Obstructive Pulmonary Disease (COPD) has a significant burden on patients and the healthcare system. There is a link between COPD and comorbidities such as congestive heart failure (CHF), fluid and electrolyte disorders, and renal failure. This adds to the complexity of healthcare in these patients. The objective of this study is to determine if certain comorbidities affect length of stay. **Methods:** A sample of 3,399 patients with COPD were assessed from the Premier© healthcare database. The cohort had a mean (standard deviation (SD)) age of 68.41 (10.85) years. The average number of comorbidities was 24.83 (10.46) with a mean length of stay (SD) of 11.64 (9.40) days. A negative binomial regression model was used to evaluate the impact that comorbidities have on the length of hospital stay. **Results:** A moderate positive correlation showed that as the number of comorbidities increases the length of stay increases (r = .4634, *P*<.0001). Having at least one comorbidity was associated with a 13% greater length of stay (IRR= 1.13, 95%CI 1.11-1.15, *P*<0.0001). CHF was associated with a 28% greater length of stay (IRR = 1.28, 95%CI 1.24-1.31, *P*<0.0001). Fluid and electrolyte disorders were associated with a 2-fold greater length of stay (IRR=2.57, 95%CI 2.52-2.62, *P*<0.0001). Renal failure was associated with a 50% greater length of stay (IRR = 1.50, 95%CI 1.45-1.55, *P*<0.0001). However, uncomplicated diabetes was associated with 13% shorter length of stay than not having uncomplicated diabetes (IRR=.87, 95%CI .82-.91, *P*<.0001). **Conclusion:** This study demonstrated that specific comorbidities have an impact on length of stay.

Sponsored Research - None

3015857

Asthma Is Associated With Restless Leg Syndrome In Females: A Retrospective Population-Based Cohort Study.

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Background: Evidence regarding the association between asthma and restless leg syndrome is limited and inconsistent. The goal of the study was to investigate whether women diagnosed as having asthma were at a greater risk of restless leg syndrome than age-matched unaffected women. **Methods:** We conducted a nationwide population-based retrospective study by using data retrieved from the Taiwan National Health Insurance Research Database during the period of 2000–2008 with follow-up through 2013. The current analysis included 33,964 women aged above 20 years with newly diagnosed asthma and using asthma-related medications and 37,220 age-matched women without asthma. A Cox proportional hazards regression model was used to estimate the risks of restless leg syndrome in women with asthma as compared with those without asthma. **Results:** The overall risk of restless leg syndrome in the asthma group was 1.40-fold higher (95% confidence interval = 1.11–1.77) than that in the nonasthma group. A stratified analysis by age and asthma comorbidity further revealed that the risk of restless leg syndrome was significantly higher, regardless of asthma status, in those aged above 60 years than in the younger age group (20–39 years old). **Conclusion:** Compared with women without asthma, women with asthma of above 65 age are at a higher risk of restless leg syndrome. Additional studies are warranted to elucidate the mechanism(s) underlying the association between asthma and a higher risk of restless leg syndrome.

Sponsored Research - None

3017468

Association Of Pulmonary Tuberculosis With Risk Of Alzheimer's Disease: A Population-Based Cohort Study.

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Background: Pulmonary tuberculosis (TB) is a serious global public health problem which involves complex host inflammatory responses. It is now believed that inflammation also plays a critical role in Alzheimer's disease (AD). However, study exploring the relationship between TB and AD is scant. In this study, we attempted to evaluate whether risk of AD is increased in patients with TB. **Methods:** We conducted a retrospective population-based cohort study by using data retrieved from the Taiwan National Health Insurance Research Database. We identified 6260 patients aged 50 y or older who were newly diagnosed with TB between 1998 and 2011 as the TB group, and 50012 enrollees without TB as the non-TB group. Both groups were followed up until the end of 2013. A Cox proportional hazards regression model was used to estimate the risk of AD in patients with TB, compared with those without TB. Comorbidities considered were atrial fibrillation, hypertension, hyperlipidemia, diabetes, heart failure, stroke, depression, and head injury. **Results:** The overall risk of AD in the TB group was 1.43 (95% confidence interval = 1.01–2.02) higher than that in the non-TB group. **Conclusion:** This study suggests that after adjustment for comorbidities, TB patients were found to be associated with an increased risk of AD. Future study are warranted to validate this observational study and elucidate the underlying pathophysiology between TB and AD. Disclosure: The authors declare no conflict of interest.

Sponsored Research - None

3018158

The Effect Of Cigarette Taxation On Smoking Consumption Among Smokers In Saudi Arabia.

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Background: Increases in tobacco taxes are widely considered as an effective strategy to reduce tobacco consumption and it is related health consequences. Therefore, this study aims to investigate the relationship between taxation and smoking consumption among Saudis. **Methods:** It is a cross-sectional research methodology. Arabic translated questionnaire were adapted from validated national tobacco use survey, which used by Centers for Disease Control and Prevention (CDC) and Global Adult Tobacco survey (GATS) that helps in determining the effect of taxation on smoking consumption. Questions consist of 3 parts. First, smoking status before and after taxation by asking "Do you smoke cigarettes every day, some days, or not at all" Second, purchasing behavior after the taxation by asking about the brands they buy before and after taxation. Finally, changes in smoking habits "How have you changed your smoking habits since taxation". The questionnaires were randomly distributed in malls, cafes and restaurants in Saudi Arabia after IRB approval was obtained. **Results:** A total of 266 individuals were included in the study. All collected data were male with mean age (25 years ±9).27% (72) of them have high school education and 22% (58) were unemployed. There were 91% (243) of the smokers consume smoking daily. After taxation, 18% (48) of the participants decrease their smoking consumption that is slightly significant. However, the major impact were in the brand they were buying, there were 46% (123) of the smokers buy Marlboro as their usual brand before taxation, whereas after taxation, it decreased to 18% (48), most of the participants who were buying Marlboro as their usual brand changed to cheaper brand (*Figure-1*). Second, "How have you changed your smoking habits since taxation" this question shows how smokers changed their smoking habits after taxation, and the result shows 27.8% (74) of participants thought seriously about quitting and reduce their consumption. Finally, the result shows that there is 97% (258 of participants) did not seek any smoking cessation clinics or programs. This reflects lack of knowledge of the effectiveness of smoking cessation programs. **Conclusion:** The study concludes that increasing both taxation and price have potential benefit to decrease smoking consumption in Saudi Arabia. Most of them react to taxation in two ways: by reducing their consumption or by seeking cheaper brands. Thus, further taxation and pricing policies can be more effective.

Sponsored Research - None

See table or figure in supplement to the October 2018 issue of Respiratory Care at www.rcjournal.com.

3022725

Bronchial Thermoplasty In Severe Asthmatics: Pre And Post Anxiety Levels.

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Background: In adult populations with asthma, the reported incidence of anxiety disorder ranges from 6.5% to 24%. In addition, 5-10% of asthmatics are considered difficult to control requiring a disproportionate high level of health care resources. For these difficult-to-control persistent asthma patients, bronchial thermoplasty (BT), an outpatient bronchoscopic treatment procedure can be performed to improve asthma. Although the prevalence of anxiety in asthmatics maybe high, contrary to what has been reported, we hypothesize that BT does not increase pre-procedural anxiety levels. To our knowledge, this study is the first to measure levels of anxiety pre-BT utilizing a validated anxiety scoring system. **Methods:** In this prospective study, subjects were surveyed using the Burn Anxiety Inventory questionnaire to measure pre-BT procedural anxiety just before each of the three sessions. Subjects rated their symptoms based on three major categories (Anxiety Feeling, Anxiety Thoughts, and Physical Symptoms) that were summed up to a score that ranges between 0-99. In addition, Asthma Control Test (ACT) were administered before BT (baseline) and after completion of all three sessions of BT. **Result:** A total of 22 subjects were enrolled in this study with mean age of 49.7 ± 15.65. 11(50%) subjects completed all 3 BT procedures. Patients anxiety level at baseline was found to be higher prior prior to BT1 compared to the last BT. ACT was also found to increase. A non-parametric test showed a significant decrease in their anxiety level (P<0.001, table 1). There was significant improvement in reported ACT tests, Pre and Post BT from 11± 6.7 to 17±5.4 (P<0.05). **Conclusion:** These findings from our ongoing study suggest that pre-procedural anxiety levels in severe asthmatics decrease as patients progress with BT procedures. Also, ACT score after the third BT procedure is significantly higher compared to the ACT Score before the first BT procedure. Improvement in asthma control could potentially affect anxiety level. A Large cohort is needed to validate these findings which may help enrich overall objective data about BT and assist clinicians in guiding evidence based practice.

Sponsored Research - None

Burn Anxiety Scale results at baseline and pre every Bronchial Thermoplasty procedure.

	Baseline	Pre-BT1	Pre-BT2	Pre-BT3
Mean ± SD	20.9 ± 26.04	17.70 ± 29.2	7.2 ± 13.7	4.4 ± 11.1
Median (Min,Max)	8 (0, 97)	3 (0, 88)	1 (0, 41)	.5 (0, 39)

BT=Bronchial Thermoplasty

3025383

Effect Of Inspiratory Muscle Training In Patients With COPD.

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Background: There is a report that improvement of shortness of breath is seen when respiratory muscle training is used in combination, but it is not clarified whether it is due to decrease of respiratory center output or increase of peripheral respiratory muscle force. Therefore, this study, using respiratory muscle training equipment for actual COPD patients, whether improvement of shortness of breath is recognized before and after training, and $P_{0.1}$ measurements as index of respiratory center output is performed, and improvement is central determine whether it is peripheral. Method: Fourteen stable outpatients with COPD participated in the study. Power Breeze® was used for inspiratory muscle training equipment. Respiratory muscle strength was measured and started from a load of 30% of PImax, and 2 sets of 30 times a day were asked to perform inspiratory muscle training every day for 2 months. We measured mouth occlusion pressure ($P_{0.1}$), respiratory muscle strength (PImax,PEmax),6MWD (6-minutes walking distance) test, spirometry, ventilatory parameters and CAT before and after inspiratory muscle training. We also measured the movement and thickness of the diaphragm by ultrasound. **Results:** There were significantly increased PImax, PIpeak and $P_{0.1}$/PImax after inspiratory muscle training (P<0.001). The walking distance was extended, and the diaphragm's extended distance also increased after training (P<0.01-0.001). However, $P_{0.1}$ did not reduced significantly after training. **Conclusion:** Inspiratory muscle training improves respiratory muscle strength and 6MWD. This is considered to be peripheral function improvement, not central output. It seemed to be effective in pulmonary rehabilitation.

Sponsored Research - None

Results of each indicator before and after inspiratory muscle training

	PImax***	PIpeak***	6MWD**	diaphragm expansion difference ***	P0.1/PImax*
before	89.8±29.1	66.4±24.0	354.7±118.6	0.03±0.02	3.7±0.6
after	115.5±18.8	84.0±21.3	384.0±119.4	0.02±0.01	4.9±0.8

* P<0.05 **P<0.01 ***P<0.001

3025600

The Effect Of Ethanolic Extract Of *Viola odorata* On Muscarinic Receptors Of Guinea Pig Tracheal Smooth Muscle.

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Background: To examine one possible mechanism for the observed relaxant effect of *Viola odorata*, in the present study the inhibitory effect of the extract of this plant on muscarinic receptors was examined. **Methods:** The effects of three concentrations of ethanolic extract, 10 nM atropine, and saline on muscarinic receptors were tested in three conditions: In non incubated tracheal smooth muscle (group I), tracheal chain incubated with propranolol and chlorpheniramine (group II), and the one incubated with propranolol (group III). The anticholinergic effect of *Viola odorata* was examined by producing the cumulative log concentration-response curve of methacholine hydrochloride (Sigma Chemical Ltd, Ltd UK) induced contraction of tracheal chains 10 min after exposure of the tissue to one solution of 10 nM atropine maleate (Sigma Chemical Ltd UK,) as well as three concentrations of ethanolic extract of *Viola odorata* (0.4, 0.8 and 1.2 mg/mL). The consecutive concentrations of methacholine were added every 2 min (range 0.1 - 1000 M); and the percentage of contraction (each concentration in proportion to the maximum contraction) obtained in the presence of saline, was plotted against log concentration of methacholine. The effective concentration of methacholine causing 50% of maximum response (EC_{50}) in each experiment was measured using the log concentration-response curve of the corresponding experiment. **Results**: The EC_{50} obtained in the presence of all three concentrations of the extract were significantly higher compared to saline in groups II and III (P < 0.001and P < 0.01 in group II and III respectively). The EC_{50} obtained in the presence of all concentrations of the extract in group II were significantly improved compared to groups I and III (P < 0.05 to P < 0.001). The maximum responses to methacholine in presence of only the higher concentration of the extract (1.2mg/ml) was significantly lower than that of saline in groups I (P < 0.05). There was neither significant difference between slopes of methacholine response curves obtained in the presence of different concentrations of the extract and that of saline nor between the three groups. **Conclusion:** The results of this study suggested a competitive antagonistic effect of *Viola odorata* at muscarinic receptors. The results also indicated a stimulatory effect for the extract at beta-adrenergic receptors and suggested a small inhibitory effect on histamine (H1) receptors.

Sponsored Research - None

Table 1: The maximum responses to methacholine obtained in the presence of only higher concentration of the extract in groups I (1.2 mg/ml) was significantly lower than that of saline (p < 0.05). There was not statistical difference in maximum response between three groups.

Solutions	Concentration	Group I	Group II	Group III
Saline		100.00±0.00	100.00±0.00	100.00±0.00
Viola odorata	0.4 mg/mL	94.11±4.70	97.08±1.64	100.00±0.00
	0.8 mg/mL	78.22±10.92	97.94±0.79	94.69±4.52
	1.2 mg/mL	67.68±8.93*	93.76±4.80	85.79±8.02
Atropine		95.24±2.55	99.30±0.50	95.48±1.67

3025963

Cow Dung Smoke Exposure Enhances non-typeable *Haemophilius influenza* Adherence To Human Airway Epithelial Cells.

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Background: Nearly half of the world's population uses biomass fuel for the purposes of cooking and heating. Smoke-derived from biomass increases the risk of the development of lung diseases, including pneumonia, chronic obstructive pulmonary disease, airway tract infections, and lung cancer. Yet, only a small number of experimental studies have been conducted on the impact of animal dung smoke on airway epithelial cells. This is in part due to the lack of a standard procedure for the preparation of, and exposure to animal dung smoke. Here, we generated cow dung smoke extract (CDSE) and investigated the effects of CDSE in PAFR expression and adhesion of nontypeable *Haemophilus influenzae* (NTHi) to human bronchial epithelial cells (BEAS-2Bs). **Methods:** Cow dung collected from a local farmhouse was sun-dried, crushed and rolled in a paper with a sterile cotton wool filter at one of the end, similar to a filtered-cigarette. The cow dung rolls were then burned in a water aspirator to collect the smoke particles. The retained smoke particles were then dissolved in dimethyl-sulfoxide to prepare cow dung smoke extract. The BEAS2B cells were exposed to different concentrations of CDSE for 4 hours at 37°C and 5% CO_2. Parallel exposures of BEAS-2B cells to CSE were also performed for comparison. The cells were then challenged with NTHi labelled with fluorescein isothiocyanate. The PAFR expression levels and NTHi adhesion were determined using immunofluorescence. Comparisons between groups were performed using one-way analysis of variance (ANOVA) with Dunnet's post-hoc test was performed using GraphPad Prism version 5.0 (GraphPad Software, La Jolla CA; www.graphpad.com). A p-value < 0.05 was considered statistically significant. **Results:** A simple and cost-effective method, using a water aspirator, was used to prepare the cow dung smoke extract. Similar to cigarette smoke extract exposure, we observed a dose-dependent increase in PAFR expression on human airway epithelial cells that were subjected to cow dung extract over a concentration range of 0.0001% to 1% (v/v). Furthermore, the CDSE exposure increased the NTHi adhesion by 1.9 times (P<0.001) *in vitro*, which was attenuated by the PAFR antagonist, WEB2086. **Conclusion:** Cow dung smoke exposure has the potential to increase the susceptibility to NTHi infection via the PAFR induction.

Sponsored Research - None

3025545

Comparison Of Treadmill And Bicycle Ergometry In Cardiopulmonary Exercise Testing In An Active Duty Military Population.

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Background: Cardiopulmonary exercise testing has been advocated to be helpful in the evaluation of exercise tolerance and discerning causes of dyspnea set forth by the 2003 ATS/ACCP consensus statement. $V0_2$ max is the most accurate estimation of functional capacity, providing an assessment of overall cardiovascular health. Common modalities for exercise testing include the treadmill and bicycle ergometer. The modality of choice is usually determined by the functional or health limitations of the patient. The question is whether the treadmill or bicycle ergometer is the best modality for evaluating a healthy, non-smoking, active military population who exercise on a regular basis. **Methods:** This is a specific aim of an IRB approved study: Determination of Reference Values for Cardiopulmonary Exercise Testing (CPET) in an Active Duty Population. The target of the cross-sectional study consists of active duty service members between the ages of 20 and 40 with no known history of cardiopulmonary disease who exercise on a weekly basis and are willing to perform two exercise tests. After informed consent is obtained, eligible participants are interviewed to ensure no past medical history of pulmonary or cardiac disease and perform and EKG, CXR and baseline spirometry. On the first session participants complete a maximal exercise test on a treadmill using a Bruce incremental protocol. The second testing session uses a braked cycle ergometer. Participants exercise for both sessions until exhaustion or symptom limited. Data analysis was performed to derive differences in measured $V0_2$ max in relation to the respiratory exchange ratio (RE) and attainment for ventilatory anaerobic threshold (VAT). **Results:** 80 subjects (58 males, 22 females) with an average age of 29 years and an average BMI of 25.1 were evaluated on both the treadmill and bicycle ergometer. The basic statistical data is as follows: See Table **Conclusion:** Basic data analysis on the comparison between to treadmill and bicycle ergometer for cardiopulmonary exercise testing suggests that, given very similar respiratory exchange ratio on both modalities, participants attained a higher V02 Max while reaching anaerobic threshold within a shorter time. These results suggest either test may be used in the evaluation of this population despite running as their most common type of exercise **Disclosures:** None

Sponsored Research - None

Comparison of Treadmill and Bicycle Ergonometry

	Treadmill (Mean)	Treadmill (Max/Min)	Bicycle (Mean)	Bicycle (Max/Min)	P value
RER Max	1.18 ± 0.10	1.42/0.92	1.18 ± 0.10	1.53/1.01	NS
V02/Kg/Min	47.4 ± 7.1	68.3/32.0	37.8 ± 7.6	58.3/21.9	< 0.001
V02 L/Min	3.63 ± 0.82	5.76/2.02	2.86 ± 0.72	4.54/1.45	< 0.001
AT Time (min)	7:49 ± 2:44	16:53/3:12	8:31 ± 2:19	15:13/1:41	0.08

3025968

Post Bronchial Thermoplasty Discharge In Severe Asthmatics.

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Background: The use of Bronchial Thermoplasty(BT) in the treatment of patients with severe persistent asthma is becoming more frequent. The manufacturer of BT recommends that patients be discharged with a Forced Expiratory Volume (FEV1) of within 80% of the day of pre- BT procedure. However, it is unclear if discharging patients below 80% of the pre-BT procedure would result in more Emergency Room (ER) admissions. This study examines the spirometry results immediately before and after BT procedure and the incidence of ER admissions after being discharged home within 48 hours and again within 7 days. **Methods:** In this prospective study, PFTs were measured pre and post BT procedure. BT procedure consists of 3 separate treatments. The following PFT tests were performed: Forced Vital Capacity (FVC), Forced Expiratory Volume in 1 second (FEV1), and Peak Expiratory Flow (PEF). Emergency room admissions and visits were collected after being discharged to monitor procedure effectiveness in all subjects. **Results:** A total of 22 subjects enrolled in the study and 11 (50%) completed all 3 BT procedures. No significant difference was seen in PFT data from baseline to BT3 (P>0.05). Average post BT FEV1% of pre-BT was (BT1= 97% (n=10), BT2= 87% (n=9), and BT3=78%(n=9). There was no complication or admissions post BT procedure seen in all subjects related to the procedure as their Fev1 was within 80%. In addition, there was no significant correlation between ER admission after BT on subjects who were discharged with an FEV1 of <80% of the day of pre-BT procedure. **Conclusion:** Our findings from this current preliminary data shows that patients being discharged with an FEV1 value of less than the recommended manufacture value does not result in an increase incidence of ER admission. Larger data are needed to provide more evidence to better determine the ideal FEV1 for discharge.

Sponsored Research - None

2960301

Pulmonary Rehabilitation Shortens Length Of Hospital Stay For Patients With Pneumonia.

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Background: A southern regional hospital in Taiwan revealed in 2015 that its mean length of hospital stay for pneumonia was 10.94 days and that it was 7.17 days at a similar hospital. According to the Health Insurance Research Database, the mean length of stay for pneumonia in 1997–2008 was 11.76 days. The average lengths of stay for bacterial pneumonia for patients aged 18–39, 40–63, and higher than 65 years were 7.91, 12.76, and 17.30 days, respectively. The average national health insurance cost of hospitalization of patients with bacterial pneumonia was 4,361 New Taiwan dollars (NTD) per day per patient; however, the cost could be as high as 64,609 NTD. The goal of this study was to shorten the length of stay of patients with pneumonia by utilizing pulmonary rehabilitation. **Methods:** By using CURB-65 to evaluate the importance of community-acquired pneumonia, 36 patients were selected for participation from July 2016 to October 2016. The patients were selected based on a score of less than 2 using the CURB-65 evaluation. The average patient age was 40 years; 32 men and 4 women were selected. A respiratory therapist used a thoracic wall vibration device twice daily (morning and night) for 30 minutes and postural drainage for 10 minutes in a defined position to induce coughing. Blood tests and a chest radiograph were taken on the third day of hospitalization. If there was an improvement, intravenous antibiotics were substituted with orally administered antibiotics and the patient was discharged on the fifth or sixth day. The average length of stay was calculated based on the number of hospitalization days/ number of hospitalizations. **Results:** From January 2015 to December 2015, using the CURB-65 evaluation, 92 patients had a score of less than 2. Their average length of stay was 11.54 days. The average national health insurance cost was 43,262.2 NTD per patient. In 2016, the average length of stay had decreased to 6.52 days and the average national health insurance cost had decreased to 23,669.83 NTD per patient. A follow-up call 30 days after discharge revealed that the patients had not been readmitted to any other hospitals. It is unclear how these 92 relate to the 36 mentioned in the methods section. Please clarify. **Conclusion:** Pulmonary rehabilitation helps treat chronic obstructive pulmonary disease and shortens the length of stay for patients with pneumonia. **Disclosures** None None

Sponsored Research - None

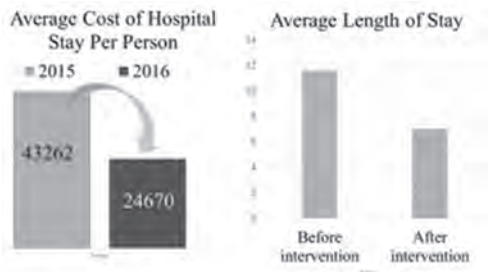

Figure 3. A: Average Cost of Hospital Stay Per Person. B: Average Length of Stay.

3001629

Effects Of Intrapulmonary Percussive Ventilation On Peak, Plateau Pressure, And Auto-PEEP: A Bench Model.

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Background: Intrapulmonary percussive ventilation (IPV) in conjunction with conventional ventilation provides benefits for secretion clearance, improved oxygenation, and atelectasis[1]. Studies have shown IPV can cause dynamic hyperinflation and lung injury in patients receiving Volume Control ventilation (VC)[2]. Riffard et al demonstrate hyperinflation and auto-PEEP to be affected by extrinsic PEEP with higher extrinsic PEEP (PEEPex) diminishing auto-PEEP[2]. The goal of this study was to determine if hyperinflation and auto-PEEP would be increased if PEEPex were set to zero. To evaluate these effects, changes in peak pressure (Ppeak), plateau pressure (Ppause), and auto-PEEP were measured with low and high frequency IPV settings using an active lung simulator with long and short time constants. **Methods:** An Avea ventilator was set to VC, f 15 bpm, Vt 500 mL, Flow 60 L/min, PT 0.50 sec, Peep 0 cmH_2O, Flow Trigger 2.0 L/min, and FiO_2 0.21. Then connected to an ASL 5000 as a passive lung (Compliance of 20 ml/cm H_2O or 50 ml/cm H_2O with resistance set at 5 cm H_2O/L/sec). After baseline measures were obtained IPV was added to the system at low and high frequency settings. Six trials with low compliance, 3 which had low frequency IPV and 3 with high frequency IPV. The same procedure was repeated with a high compliance. Driving pressure was ~27 psig and was applied for 2 mins. Measurements of Ppeak, Ppause, and auto-PEEP were collected at steady state. **Results:** Pressure and volume data +/- IPV at low and high frequency are shown in Figures A & B. Vt increased the most in conditions of high compliance. Ppeak and Ppause increased the most in conditions of low compliance. The altering of IPV frequency did not affect these pressures significantly. Altering IPV frequency increased auto-PEEP in both conditions of low and high compliance with a greater effect in the latter. **Conclusion:** The addition of IPV to a conventional ventilator increases Ppeak, Ppause, and levels of auto-PEEP in a model with varying compliance. In a patient with varying lung units of compliance and resistance the modality should be applied with caution. The observation that auto-PEEP develops with IPV warrants future studies to evaluate patient-ventilator trigger dyssynchrony when IPV is superimposed on conventional ventilation. **References:** 1. Dellamonica J, Louis B, Lyazidi A, et al. *Intensive Care Med 2008*; 34: 2035-2043. 2. Riffard G, Buzenet J, Guerin C. *Resp Care 2014*; 59 (7): 1116-1122.

Sponsored Research - None

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3007422

Respiratory Care Education: A Vital Role For Respiratory Therapists In Reducing Readmissions In COPD Patient Population.

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ABSTRACT **Background:** Readmissions for COPD patients has become an issue for hospitals with the introduction of new Healthcare Law. In October of 2012 the 2010 Affordable Care Act (P.L. 111 148) required the Secretary of the Department of Health and Human Services (HHS) to establish the Hospital Readmissions Reduction Program (HRRP) and reduce payments to Inpatient Prospective Payment System (IPPS) hospitals for excess readmissions (Hospital Readmissions Reduction Program: Fiscal Year (FY) 2018 Fact Sheet). COPD was included in this readmission oversight program effective 2015 and readmissions are calculated based on an averaged one rolling year. **Methods:** Houston Methodist Hospital initiated its COPD readmission program in stages. The first stage in 2015 began with data collection on COPD admissions by Respiratory Therapist. Lung Transplants, Lung Cancer, or Congestive Heart Failure exacerbations were excluded by physician review. The second stage was education of patients and family members on the disease process by Respiratory Therapy. In 2016, the third stage began with establishment of a hospital task force comprised of Physicians, Respiratory Therapist, Nurse Practitioners, Case Managers, Social Workers and project coordinators. A standardized care plan based on GOLD (Global Initiative for Chronic Obstructive Lung Disease) standards was established and implemented. In 2017, a weekly case based review of all COPD associated admissions by the task force was initiated; and the Houston Methodist Research Institute developed and implemented a Readmission Predictor app using a neural network drawing from the electronic medical record. Using this prediction tool, resources (including pharmacy, social service, social support groups, outpatient care centers) were engaged and focused on COPD patients most likely to be readmitted . **Results:** In 2015 the readmission of COPD patients at Houston Methodist Medical Center was 17.8%; after initiation of this staged approach to COPD in- and out-patient management, COPD readmission fell to 15.1% (2016) and 14.7% (2017) **Conclusion:** Active involvement of Respiratory Therapists in identification, education, development and implementation of a care plan coupled with a multidisciplinary task force and a reliable proprietary prediction tool for readmission appears to have been effective in reducing COPD readmissions and meeting mandates for good patient care.

Sponsored Research - None

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3019128

General Knowledge Of University Students About Recreational Use Of Marijuana And Its Health Risks: Is There A Difference Between The Students In The College Of Health Science And The General Campus Population?

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Background: Dixie State University is a public comprehensive university in St. George, Utah. Dixie State is in the top three universities in the state of Utah for its Diversity. The university offers 48 Bachelor degrees, 19 Associate Degrees, 36 Minors and 15 certificates/endorsements. Dixie had 8,993 students enrolled during the 2017-18. We chose this topic because of the growing legalization of recreational marijuana and to learn what the census on the harm of smoking marijuana is among general campus college students and health field college students. **Methods:** Received Institutional Review Board approval to distribute the survey among the college students. All the participants were students of Dixie State University. Obtained permission from professors at both the general campus at Dixie State and the College of Health Science through Dixie state, to distribute the surveys to their students. 140 were distributed to General campus students and 139 were distributed to the College of Health Science. With the intent to acquire an equal sample from each area. **Discussion** With the growing number of states legalizing the use of recreational marijuana, the questions became: 1) Is it creating a population who will develop serious respiratory diseases? 2) Will these effects be seen sooner than with smoking cigarettes? 3) Is there danger in second hand marijuana smoke? The most interesting findings from the survey were as follows: The majorities on both campuses were in agreements in their belief that marijuana causes more lung disease. When asked if they would worry about lung disease if they smoked it, both campuses agreed that they would worry. One student commented, "Not many studies on it, would like to be more informed and educated." When asked their opinion on the legal status of marijuana, both campuses disagreed that marijuana is a schedule 1 drug. Even though the FDA does classify marijuana as a schedule 1 drug.* In conclusion, it seems clear that more education is needed on University campuses before the legalization of recreational marijuana. **References** Mary P. Martinasek, PhD, MPH, RRT, RRT-NPS. A Brief History of Marijuana and its effects on the Respiratory System. AARC Times, April 2018. Drug Enforcement Administration. Drug scheduling. Available at: http://www.dea.gov/druginfo/ds.shtmlAccessed May 15, 2018 **Acknowledgement** We would like to thank Dixie State University professors.

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3019985

The Value Of Proactive Rounding By A Respiratory Care Practitioner/Registered Nurse Rapid Response Team Model On The Professional Growth And Development Of Bedside Registered Nurses.

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Background: Transdisciplinary rapid response models rests on the observation that adverse events in acutely ill patients are frequently preceded by an observable period of derangement in physiological parameters. Clinical deterioration occurs in 66–84% of patients up to 6 hours prior to in-hospital cardiac arrest. Furthermore, 60% of patients transferred urgently to intensive care units (ICU) with potentially life-threatening conditions were documented as showing worsening in vital signs during the 8 hours before their admission. RN and provider services directly involved in patient care reported that rapid response teams function well in managing patients who might be at risk for crisis, which is a critical aspect of an effective rapid response team. Many of the characteristics noted in rapid response teams are represented in our model. However our model consist of an RCP and a RN. Unlike other rapid response models, we include a proactive rounding element to assist in timely assessment of patients who are identified by the nursing and respiratory care staff as potentially unstable. Proactive rounding is also extended to patients outside of intensive care receiving noninvasive positive pressure and/or CPAP; patients receiving high flow nasal oxygen; and patients with surgical airways. Finally in our model we have included "just-in-time" coaching for our bedside nurses caring for these patients in an effort to support their professional growth and development. **Methods:** We surveyed nurses in the adult medical/surgical acute care and transitional care areas of our 600 bed academic medical center. The goal was to ascertain whether (or not) RNs found "just-in-time" coaching during rapid response team encounters effective in their growth and development as bedside practitioners. **Results:** The response rate to this survey was strong. 86% of nurses surveyed either agreed or strongly agreed that rapid response team visits were effective in their growth and development during proactive rounding as well as rapid response calls. Of those nurses completing the survey 2.8% did not find rapid response team collaborations during a call to have any impact on their growth and development as practicing nurses. **Conclusion:** These survey results are positive. And suggest that proactive patient rounding by a rapid response team on patients identified as high risk for an adverse cardiopulmonary event significantly impact growth, development and practice in our registered nurses.

Sponsored Research - None

3020072

Driving Inpatient Smoking Cessation Through Respiratory Protocols.

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Background: In 2016 the respiratory department at the University of Utah Health (RT dept) partnered with the State of Utah health department to provide an organized and effective counseling program to inpatients. These patients (pts) were identified through the use of our existing respiratory protocols (RPs). Once identified, the pts were enrolled into the smoking cessation program (SCP). Through the SCP, pts received counseling and were encouraged to enroll in the quit line (QL). The goal was to enroll 40% of the SCP patients with the QL. Method: Pts were evaluated using RPs approx 24 hrs after any respiratory therapy modality was ordered. If the pt was a current smoker or smoked in the last 6 months, they were assigned a quit score; 0) No desire to quit, do not want to talk about it, 1) Pt unavailable to answer at this time, 2) Don't really want to quit but I'm willing to talk about it, 3) Not sure if I want to quit, 4) Want to quit and interested in more information or 5) Already quit but need help to be successful. If pt scored 1-5, a SCP order was generated for the following day. Respiratory therapists trained in SCP visited with these patients and used the AAC (Ask, Advise, Connect) model with motivational interviewing. Pts were encouraged to sign up for the QL. Pt information was sent to the QL after discharge. The Utah QL faxes the results of their contact with the pt. **Results:** Jan 2017 – Apr 2018, 547 pts were identified, 309 pts were disqualified for being medically unable to participate (132), self-identifying as non-smokers (10), refusing counseling (65), or being discharged (102) prior to SCP. Of the remaining 238, 80 (33.6%) signed up for the QL with only 9 accepting services post discharge. The amount of pts who accepted services may be higher, not all states send pt. updates. **Conclusion:** Initially driving inpatient SCP with RPs provided a great way to identify potential pts for this program. However, after 15 months without many positive results an additional avenue will be explored. Starting in July 2018, current smokers upon admission will be identified and enrolled in SCP without the initial quit score. Plans are to pilot 2 acute care floors to auto populate into the SCP in addition to the current enrollment. It is possible that the percentage of pts enrolling in the QL will decrease but hopefully the number of pts accepting services once discharged will increase thus improving population health.

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3022371

Professional Impact Of Advanced Education For Practicing Respiratory Therapists.

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Background: The purpose of this study was to determine what career advantages practicing registered respiratory therapists experienced as a result of obtaining their Bachelor of Science in Respiratory Therapy (BSRT)/Bachelor of Science in Respiratory Care (BSRC). **Methods:** Surveys were administered to practicing respiratory therapists credentialed as registered respiratory therapists (RRT) who had graduated from a BSRT/BSRC program within the last five years. Exemption from continuing review was obtained from A.T. Still University's Institutional Review Board prior to enrollment or data collection. **Results:** The majority of participants indicated they, experienced more job opportunities (83.4%), had greater confidence in job performance, believe they are a better candidate for future jobs (95.5%), and their employer was pleased with their degree attainment (86.4%) after obtaining a BSRT/BSRC. However, only about a third or less of participants experienced an increase in pay, additional job responsibilities, or a new position as result of getting a BSRT/BSRC, which is a common reason for obtaining additional education. **Conclusion:** These findings support that practicing respiratory therapists experience some career benefits as a result of obtaining advanced education but may explain the reluctance in some therapists obtaining advanced education. *Keywords:* advanced education, respiratory therapy, bachelor degree, associate degree

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BSRT/BSRC Graduate Characteristics

Sex		
Male	11	25%
Female	33	75%
Job Experience		
0-5 years	33	84.6%
16-29 years	3	7.7%
20+ years	3	7.7%
Age		
19-29 years	26	59.1%
30-39 years	11	25%
40-49 years	6	13.6%
50-65 years	1	2.3%
Practicing State		
Texas	31	70.5%
Florida	5	11.4%
Ohio	2	4.5%
Georgia	2	4.5%
Other	4	9.1%

3022699

Healthcare Professional Students Knowledge Of Sleep At A Faith Based Institution.

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Background: In the general population, sleep awareness and knowledge is minimal containing many myths, misconceptions, erroneous facts, and fallacies. It follows that students entering a healthcare program or professional healthcare education would also not have an optimal level of sleep awareness or knowledge of sleep hygiene. In addition, sleep education is also an often overlooked subject in professional healthcare education programs. The purpose of this study is to measure the perceptions of students views on sleep awareness while enrolled in a faith-based healthcare education institution. **Methods:** Participants were students who are currently enrolled in a healthcare profession program. A survey was designed to collect data on demographic variables, sleep hygiene, myths, Epworth Sleepiness Scale (ESS) and a comment section where students share any cultural or religious beliefs regarding sleep. **Results:** A total of *n*=317 students participated in this study, male *n*=50 (16.9%) female *n*=246 (83.1%) from 40 different professions within 8 different schools. 72.6% of the respondents were graduate students. The mean age was 28±7.5 years old with a mean GPA of 3.65±0.38. Only 9% of participants received a formal sleep course. In addition, 13% of the respondent received sleep information from seminar/workshop, and media. 25.3% believe that daytime sleepiness is not symptom of sleep disorder, 35.9% believe they should wake up someone who is sleepwalking, and 21.8% agree that drinking a glass of wine before bedtime can help them go to sleep. The mean ESS for the participants was 8.0±3.73. 59.4% had poor to fair sleep quality, and 50.9% agree that catching up sleep over the weekend is ok. The respondent's comments were reviewed, categorized, and classified according to cultural, religious, beliefs, or beliefs in general regarding sleep awareness. Cultural beliefs, customs, or traditions ranged from 'Early to bed, early to rise' to the afternoon 'siesta' or 'riposo' or nap time. Religious beliefs or traditions ranged from 'being at peace with God and man, you will have a good sleep' to 'God's laws of health ensure a less stressful life and therefore better sleep'. **Conclusion:**The results of this ongoing study show the need for more and better opportunities for sleep knowledge, some with intentionality to accommodate better sleep habits, and those who understood that school and a busy lifestyle were stressors affecting their sleep in general.

Sponsored Research - None

3025400

The Carcinogenicity Of Caffeine And Its Impact On Lung Cancer-A Meta-Analysis.

Patrick DeSanto; American University of Antigua, Brooklyn, NY

Background: Caffeine is one of the most widely consumed chemical worldwide with its demand increasing over the past decade. The United States is the largest contributor to beverage caffeine intakes with the ever growing demand for energy drinks and turbo shots to keep us going throughout the day. Several epidemiological studies have been performed analyzing the possible association between lung cancer incidences and caffeine consumption yielding inconsistent and results. We have conducted a systematic meta-analysis of relevant population-based studies pertaining to caffeine consumption and lung cancer to investigate the possible association and provide a definitive answer based on relative data. **Methods:** A systematic meta-analysis was performed using EMBASE, PubMed and The Cochrane library to identify studies published through May 2018 that met the relevant criteria. 25 studies (10 cohort and 15 case-control studies) involving 17,878 and 156,717 controls were included. **Results:** The meta-relative risk (RR) for coffee drinking was 1.00 [95% confidence interval (CI), 1.00-1.19}. The meta-RR for 1 cup per day, was 1.03 (95% CI, 1.03-1.05). **Conclusion:** The pooled values indicated that caffeine consumption coffee does not appear to be a risk factor for lung cancer. Results have showed that the relative risk (RR) was slightly higher for those who regularly consume caffeine daily. This study illustrates that there is no association between caffeine consumption and lung cancer.

Sponsored Research - None

3025961

The Implementation Of A High Fidelity Neonatal/Pediatric Simulation Program To Improve Practitioner Competency During Advanced Life Support.

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Background: A Well-organized advanced high fidelity neonatal/pediatric simulation education (HFNPSE) will support the respiratory care student's development and retention of assessment and resuscitation skills. These skills will afford the student early recognition of a neonatal/pediatric patient who may require escalation in care as well as solidify their role as a respiratory care practitioner when advanced resuscitation measures are necessary. The purpose of this study is to provide graduating respiratory practitioner students with an effective HFNPSE model and evaluate the model's effectiveness in the areas of: team dynamics, skill, and confidence levels as compared to a traditional learning model, (lecture, hands-on practice, and mock codes with low fidelity manikins). **Method:** In fall of 2017 respiratory care students received Pediatric Advanced Life Support (PALS) and Neonatal Resuscitation Program (NRP) credentials by way of a traditional classroom learning model. In spring of 2018, the same respiratory care students were asked to complete a perception survey about their fall 2017 mock code experience. The areas examined were, team dynamics, algorithm information retention, confidence and skill levels. Then they reinstructed using advanced HFNPSE with high fidelity manikins in a simulation lab setting; followed by another perception survey. **Results:** Perception survey results revealed a 48% increase in neonatal and a 47% increase in pediatric resuscitation confidence levels. There was a 27% increase in confidence providing positive pressure ventilation for both patient populations. Neonatal intubation confidence levels increased by 36% and by 37% in pediatrics. There was well over a 50% increase in both NRP and PALS information retention. A perception survey question asked students to compare traditional vs. HFNPSE and responses favored HFNPSE on the following strengths: realism, higher level of education, increased communication and algorithm information retention. **Conclusion:** Perception survey results suggest moderately high confidence in NRP and PALS skills as well as closed loop communication. If respiratory care students can retain code algorithm information they can move beyond traditional roles and assist the entire code team with all procedures; improving team dynamics. Frequent high fidelity neonatal/pediatric mock codes can improve practitioner competency, increase survival rates and assist in advancing the respiratory care profession.

Sponsored Research - None

3022082

Use Of Ventilation And Predictors Of NIV Failure In Subjects With Sepsis And Acute Respiratory Failure.

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Background: A dearth of research exists examining NIV use in a general population of sepsis patients (pts) with acute respiratory failure (ARF). NIV studies in ARF have included heterogenous samples with some sepsis subjects but this group has not been the main focus. This study sought to review the clinical course & failure rates of pts with a diagnosis of sepsis & ARF placed on NIV. **Methods:** A retrospective analysis (IRB 2018-142) was conducted on all pts with a diagnosis of sepsis placed on NIV from July 2017-Mar 2018 using information from the EMR & other data repositories. Demographic & clinical outcome data were collected & analyzed using the chi-square test for categorical information, & Student *t* or Wilcoxon rank-sum tests for quantitative data, depending on normality results using Shapiro-Wilk. Uni- & multivariate logistic regression were conducted to determine predictive factors for NIV failure. **Results:**165 pts were reviewed with 52 excluded (OSA, extubated to NIV, palliative), leaving 113 ARF subjects with 59 in the NIV Fail group (NIVF; required intubation) & 54 in NIV Success (NIVS; no intubation). There were no statistically significant differences between groups for age (P=.22), sex (P=.90), Charleson CI (P=.26), immunosuppression (P=.94), sepsis source (pulmonary, extrapulmonary, mixed; P=.20), $PaCO_2$ (P=.75) HCO_3 (P=.65) or pH (P=.18) within the 1st 2 h post NIV, lactate or HR prior to NIV (P=.11 & P=.66, respectively), or acute on chronic RF (P=.49). However, the NIVF group had a significantly lower median P/F ratio within the 1st 2 h post NIV (186.7 [106.7-210.6] v 227.5 [168.2-347.1]; P=.02) & mean arterial pressure (MAP) at NIV start (78 [68-93] v 92 [83-108] mm Hg; P<.001). In the NIVF group, RR (32 [23-38] v 22 [20-27] breaths/min; P<.001) & WOB (P<.001) were significantly higher within the 1st 2 h post NIV & more subjects in this group had an altered mental status (AMS; 59% v 28%, P=.001), shock (P<.001), ARDS (20% v 0, P<.001) & died (P<.001) compared to NIVS. From univariate logistic regression - source, shock, AMS, MAP, lactate, age & WOB were entered into a multivariate regression model. Source (P=.036), WOB (AUC .84 [CI .78-.91]; P<.001), MAP (AUC .70 [CI .60-.80] P=.001) & AMS (AUC .65 [CI .56-.74); P=.001) were independently associated with NIV failure. **Conclusion:** MAP, AMS & WOB provided fair to good models, respectively for predicting NIV failure in subjects with sepsis & ARF. There were high NIV failure rates in these subjects.

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3023932

Ventilation For Patients With An Acute Exacerbation Of COPD And A Do-Not-Intubate Order.

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Background: In patients with an acute exacerbation of chronic obstructive pulmonary disease (AECOPD), NIV has been shown to reduce hospital length of stay, the need for intubation, and mortality. Patients with do-not-intubate (DNI) order are on the rise due to increasing awareness of advanced care planning, including those with advanced age, multiple co-morbidities and poor baseline functional status. The role of NIV in AECOPD patients with DNI order remains contentious. We aimed to find predictors of success in this group of patients treated with NIV at our facility. **Methods:** Single-center, prospective observational study of all AECOPD patients with a DNI order treated with NIV from April 2014 to December 2015, in a tertiary care teaching hospital. NIV was initiated in in patients with respiratory acidosis (pH < 7.35) based on therapist-driven NIV protocol in a high-dependency unit. Data on demographics including body mass index, co-morbidities, spirometry results, baseline functional status were collected, as well as physiologic and laboratory variables, duration of NIV, and survival to hospital discharge. **Results:** A total of 36 AECOPD patients with respiratory acidosis and a DNI order received NIV during this period. Median age was 77.0 (71.0 - 84.8) years, and 29 (80.6%) were males. Overall survival to hospital discharge was 66.7%. There was no significant difference in age, BMI, severity of airflow obstruction, and baseline function status between survivors and non-survivors. A greater proportion of survivors were on long term oxygen therapy compared to non-survivors (83.3% vs. 25%; P=0.001). Non-survivors had a higher proportion of hypertension (83.3% vs. 45.8%; P=0.04) and a lower median pH prior to NIV initiation [7.29 (7.22-7.33) vs. 7.22 (7.13-7.27); P=0.038]. There was no statistical difference in the duration of NIV between survivors and non-survivors [2 (1-4) vs. 1.5 days (1-4.8); P=0.779]. **Conclusion:** Our study shows that the survival to discharge of AECOPD patients with a DNI order was 66.7%. Conventional predictors of long-term mortality in COPD did not predict outcomes for them. Valid concerns of NIV potentially prolonging the dying process in this subpopulation are perhaps mitigated by short median duration of NIV in the study. There may be a role of NIV in DNI patients with AECOPD complicated by respiratory acidosis, but more studies are needed to elucidate the predictors of poor outcome to better select patients for this intervention.

Sponsored Research - None

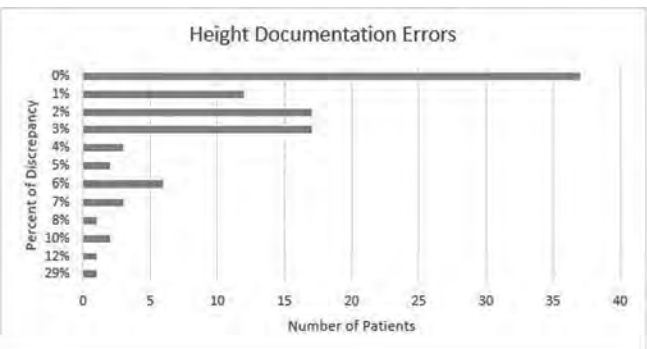
3025858

Evaluation Of Height Measurement Practice And Documentation And Potential Impact On Tidal Volume Settings And Reporting.

Brittany Crook, Amanda Richter; Metroplex Health System, Lampasas, TX

Learning Objectives: Setting appropriate tidal volumes for mechanically ventilated patients is an important factor in improving patient outcomes. Tidal volume settings are typically calculated in ml/kg using ideal body weight based on patient height. We discovered that height information recorded in the EMR is gathered inconsistently and may be collected by an actual measurement, verbally from patient and/or family member, or by estimation. We also discovered that our therapists were often using the EMR data to calculate ventilator settings. One quality metric we evaluate in our organization is adherence to lung protective ventilation strategies comparing documented tidal volumes and recommend volumes based on documented height in the patient electronic medical record (EMR). A potential issue for accurately calculating and reporting this data is tidal volume is accurate height measurement and accurate documentation in EMR. **Methods:** Single center, retrospective review of mechanically ventilated patients at a community-based hospital. Patient height was measured at bedside by a staff respiratory therapist upon initial vent setup. The measured height was recorded on a paper form and submitted to the RT supervisor to complete a chart review and record documented EMR height. **Results:** A total of 102 mechanically ventilated patients were reviewed, of these a total of 37 (36.28%) had a measured height that matched the documented height in EMR. Actual variances ranged from 1-16 inches, resulting in variances between 1-29%. 15 patients (14.71%) had a discrepancy between 1-3%, 46 (45.10%) had a discrepancy between 4-9%, and 4 (3.92%) had a discrepancy of 10% or higher. The largest discrepancy was bilateral amputee patient that had actual current length documented as height in EMR. **Conclusion:** Inconsistencies in height measurement practices, in addition to discrepancies in documented height in patient record can lead to inaccurate calculation of appropriate tidal volumes and/or inaccurate reporting and benchmarking of quality metrics. Further evaluation is needed to determine the impact on patient safety, however, there is an evident need to improve consistency in practices as well as documentation to ensure reliability of EMR data.

Sponsored Research - None



3007996

Characteristics Of Patients Who Develop Stridor Following Extubation.

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Background: The incidence of stridor following extubation ranges from 2-16%.[1] Some risk factors associated with stridor include non-iatragenic sources (e.g. inhalation injury, penetrating trauma, infection) direct injury related to clinical interventions (e.g. difficult/traumatic intubation, prolonged mechanical ventilation), and indirect (statistically associated) ones such as acute brain injury, female gender and obesity. We inquired whether risk factors identified in our subjects were consistent with those reported in the medical literature. **Methods:** In 2010 systematic screening of all mechanically-ventilated patients for stridor risk began following a sentinel event instigating a policy change and quality improvement initiative. As part of this initiative a database was developed to gather information regarding the characteristics of those who developed stridor. Risk factors were assessed both according to prevalence and as duration of intubation increased (< 2, 2-5 and 6+ days). **Results:** Between May 2010 and February 2018 we identified 115 stridor incidences out of 7,420 consecutive subjects (1.4% incidence). Eight subjects had 2 incidences each with a median [IQR] of 8.5 [5,9] days between incidences. The most salient features were age > 50 years (69%), female (65%), height < 64 inches (56%), acute brain injury (56%), intubation ≥ 6 d (37%), upper airway trauma/infection (22%), traumatic intubation (19%). When analyzed by duration of intubation, direct injury mechanisms tended to decrease with increasing intubation duration, whereas indirect factors tended to increase (Fig). Prevalance of age > 50 did not increase in a consistent manner with duration of intubation (65%,74%,67% respectively). **Conclusion:** The most prominent risk factors for developing post-extubation stridor appear to be factors not associated with direct trauma to the larynx or subglottic tissues. This suggests that while subjects with direct injury should be evaluated for stridor risk prior to extubation at any time point, the risk of stridor from direct injury appears higher when extubation occurs within a few days of intubation. In contrast, with the exception of age, indirect factors appear to become more prominent as intubation duration increases. 1. Jaber S, Chanques G, Matecki S, et al. Post-extubation stridor in intensive care unit patients. Risk factors, evaluation and importance of the cuff-leak test. Intensive Care Med. 2003; 29:69-74.

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3011529

Application Of PEEP While Using A Speaking Valve And A Sub-Acute Care Ventilator In A Simulated Infant Model.

Gerald Moody; Children's Medical Center, Dallas, TX

Background: Tracheostomies are routinely performed in children who require long-term mechanical ventilation. Language development and swallowing can be impaired when a tracheostomy tube (TT) is in place, especially in infants. Passy-Muir® Valves (PMV) enable phonation and improved swallowing skills by redirecting expiratory flow through the vocal cords. When used during mechanical ventilation, expiratory flow is prohibited from returning to the ventilator and may affect accuracy of set parameters such as PEEP, which Passy-Muir® recommends reducing or eliminating. The aim of this study was to compare set PEEP to delivered PEEP while using a PMV in-line with a Trilogy 202 ventilator and a passive circuit in a simulated infant model. **Methods:** To simulate an infant airway with a tracheostomy, a cuffed 3.0 TTS Ped Bivona was inserted into an incision made in an 11.5 cm section of elastic tubing with an internal diameter of 6 mm. The distal end was attached to a ASL 5000 lung simulator to simulate a spontaneously breathing infant (~ 5-6 kg of body weight) with age-appropriate parameters and moderately affected lungs. The proximal end was open to the atmosphere. A pressure line adapter and flow analyzer were placed between the TT hub and PMV. The Trilogy 202 ventilator was attached to the PMV via its proprietary passive circuit and was initially set in S/T mode with settings of: PS 8 cmH_2O, PEEP 4 cmH_2O, cycle off of 20%, rise time of 1 and flow trigger of 1 L/min. Prior to testing, VT and transtracheal pressures were assessed pre/post PMV placement to confirm adequate flow around the TT. PS was increased to 10 cmH_2O and simulations were run and recorded at PEEP settings from 4 to 10 cmH_2O in 1 cmH_2O increments for 2 minutes each. The first 30 seconds was discarded and the subsequent minute was used for post-run analysis of delivered PEEP. Descriptive Statistics and Mann-Whitney Rank Sum Tests were used for statistical analysis. **Results:** Data are shown below. There was a significant difference (P<0.001) between set PEEP and the median delivered PEEP at all settings. But, delivered PEEP was within manufacturer's specifications (Greater of ± 2 pressure units or ± 8% of setting). **Conclusion:** In this simulated infant model, the Trilogy 202 sub-acute care ventilator with passive circuit was able to deliver set PEEP within manufacturer's specifications while using a Passy-Muir® Valve in-line.

Sponsored Research - None

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3025272

Hand Size And Grip Strength Effects On Volume Delivery With Two Bag Valve Mask Devices.

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Background: The Bag Valve Mask Device (BVMD) plays an important role to ventilating patients in the health care setting. There are many disposable BVMD's that are marketed for their ability to produce acceptable volume ventilations. In this experimental study two bag valve mask devices will be evaluated to determine the effect of participant's hand size and grip strength on volume delivery. The hypotheses for this study are: 1. Grip strength will affect volume delivery. 2. Hand size will affect volume delivery. **Methods:** The Institutional Review Board of Youngstown State University approved this study. Senior and junior students in the respiratory care program at YSU participated in this study. Participants' hand size (hand length and width) was measured and used to determine appropriate glove size. Instructions with the BVMD were demonstrated to the participants and repeated until good technique was observed on the Quick Lung RespiTrainer by the investigator. Grip strength was measured and recorded before and after ventilation for five minutes for BVMD-A and BVMD – B. The participants rested 30 minutes before procedure was repeated with BVMD – B. **Results:** Fourteen students participated in this study. Manufacturer specifications for one handed stroke volume delivery for both BVMD's are 600ml. The volumes delivered between BVMD – A and BVMD – B did not indicate a statistical difference between the two devices. However, participants' mean volume delivery for BVMD- A was 249.78 ml and BVMD –B was 248.07 ml which is notably lower than the manufacturer's specifications. For both types of BVMD, paired t test indicated that there is a statistical difference in the grip strength for participants before and after ventilation for five minutes. For both types of BVMD, paired t test indicated that there is a statistical difference in the grip strength for participants before and after ventilation for five minutes. (P-value = .043 for BVMD – A and p-value = .023 for BVMD – B) One-way Analysis of Variance (ANOVA) indicated that the volume delivery was affected by the glove size (p-value = .001) for BVMD - B, but not for BVMD-A (p-value =.55). **Conclusion:** This research suggests that RCP's actual volume delivery may be notably lower than manufacturer's specifications and may have an impact on tidal volume delivery. This research also suggests that grip strength decreased with time.

Sponsored Research - None

3025344

Early Mobilization Applied Following A Rehabilitation Protocol In A Brazilian ICU.

Thaynara L. Cagnini, Erica F. Osaku, Marcela A. Leite, Cláudia R. Costa, Gabriela Antonelli, Andréia Tomazelli, Jaqueline B. dos Anjos, Suely M. Ogasawara, Amaury C. Jorge, Péricles A. Duarte; ICU, Unioeste, Cascavel, Brazil

Background: Analysing the effectsof early mobilization in ICU patients. **Methods:** Retrospective study with data collected from January 2013 to December 2014, in the Hospital Universitário do Oeste do Paraná (HUOP-Unioeste), Cascavel-Paraná, Brazil. This study was approved by the Ethics Research Committee from the Western Parana State University (Unioeste), protocol number 436.770/2013. Early Mobilization (EM) was considered when performed within 48 hours after ICU admission. Patients who performed mobilization after this period were classified as Late Mobilization (LM). Both EM and LM patients were allocated into three groups: Passive Group (PG), Active-Assisted Group (AAG), and Active Group (AG) according to the level of consciousness, verified through the GCS and the muscle strength with the Medical Research Council (MRC). Patients were treated according to a protocol twice a day, seven days a week, including holidays, until their discharge from the ICU. Variables with normal distribution were compared using the *Student's T-Test*, and the non-normally distributed variables were compared using the *Wilcoxon* and *Man Whitnney* tests. All analyzes were performed at 5% significance. **Results:** The sample had 617 patients. From those 617 patients, 126 were in the MT group and 491 were in the MP group. On admission, patients were allocated to the PG (n = 471), AAG (n = 42) and AG (n = 104) groups, and at their discharge from ICU, the PG was n = 275, AAG n = 124 and AG n = 218. The MV time and ICU stay were significantly lower in all EM groups when compared to LM. The time of sedation and hospitalization was significantly lower in PG and AG groups of EM when compared to LM. At the time of their discharge from the ICU, patients who performed EM had a relatively better level of consciousness compared to LM, but only PG had a significantly better level of consciousness in EM compared to LM (P=0.01). Other results are shown in the Table 1. **Conclusion:** Early mobilization showed benefits related to the reduction of sedation time, MV time, length of stay in the ICU and hospital, which minimized functional losses, proving to be feasible and beneficial for critical patients.

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3025664

Early Mobilization With Patients Receiving Mechancial Ventilation: Barriers And Self-Evaluation.

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Background: Immobility has undesirable effects on the healing process which can prolong the length of stay for being ventilated and being in ICU. Recent studies show that patients benefit from being mobilized while being mechanically ventilated and it is a feasible and an effective treatment plan. **Methods:** A survey was distributed by providing an email link to the Respiratory Therapy, Physical Therapy, and critical care nurse managers. The survey examined the use of early mobilization (EM) on the mechanically ventilated patient in the intensive care unit. **Results:** 25 participants, in the Respiratory Therapy department, Physical Therapy department and Registered Nurses in critical care, took part in the survey. The results showed that 64% of the participants received no training or education on EM, 16% had received training but no regular planned activity was being taken to institute EM, 20% received training and EM was being done by prescription, and 0% responded that training had been done and EM was being used by protocol. 52% responded that they would rate their use of EM as "Poor" or "Fair". 20% responded that their use of EM rated "Very good" or "Excellent" See Table 1 for the other perceived barriers and for the self-evaluation of the use of EM. **Conclusion:** The respondents in this survey do not have protocols in place to implement EM. Some steps are being taken to initiate EM into the health care plan for select patients but lack of full support, lack of time, training and equipment, and concern for safety present major barriers to robust use of EM.

Sponsored Research - None

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3025370

Evaluation Of Respiratory Capacity And Functionality Of Critical Illness Survivors.

Thaynara L. Cagnini, Erica F. Osaku, Marcela A. Leite, Cláudia R. Costa, Gabriela Antonelli, Andréia Tomazelli, Jaqueline B. dos Anjos, Suely M. Ogasawara, Amaury C. Jorge, Péricles A. Duarte; ICU, Unioeste, Cascavel, Brazil

Background: Comparing the respiratory, the peripheral muscle strength and the functional capacity of patients during hospitalization in the ICU and after three months of discharge from the ICU. **Methods:** Retrospective cross-sectional study with data collection in the adult ICU and in the Interdisciplinary Outpatient Clinic for ICU Care in the Hospital Universitário do Oeste do Paraná (HUOP-Unioeste), Cascavel-Paraná, Brazil, from January to December of 2013. The collected variables were Maximal Inspiratory and Expiratory Pressure (MIP and MEP), peripheral muscle strength with the Medical Research Council (MRC), and functional capacity with the Functional Independence Measure (FIM). This study was approved by the Ethics Research Committee from the Western Parana State University, protocol number 436.770/2013. The ICU data and FIM were analyzed for distribution pattern using the *Shapiro-Wilk test*. The homogeneity of the data variances in the ICU and in the Outpatient Clinic was analyzed by using the *F test*. The FIM was compared by the *T-test* for dependent samples. All analysis was performed at 5% significance. **Results:** During the study period, 472 patients were admitted, of these 110 died in ICU and 21 in the ward. A total of 118 patients returned to the Outpatient Clinic three months after discharge. From those patients, 37 were excluded because of absence data, 13 because they were bedridden or dependent, and 2 because of cognitive impairment. Therefore, 66 patients were included in the study. The admission causes to the ICU were non-neurological clinical treatment (16%), trauma with TBI (16%) and postoperative elective surgeries (12%). There was a predominance of males (66%), at mean age from 47.3 to ± 17.91, and APACHE II of 21.6 ± 7.30, MV time from 122,7 to ± 157,8 hours, and ICU length from +- 9,4 to 10 days. There was a significant improvement in the respiratory muscle strength, functional capacity, and peripheral muscle strength in outpatient evaluation compared to ICU discharge evaluation. Patients with greater peripheral muscle strength in the ICU and higher MIP values showed a lower impact in the critical illness performing daily activities three months after discharge. **Conclusion:** After three months of ICU discharge, the critical illness survivors had improved respiratory capacity and functionality.

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Table 1. Comparative data between ICU and Outpatient Clinic

Variables (n=66)		ICU		Outpatient Clinic	p-value
MIP		-31.2 ± 15.3		-68.2±27.4	<0,001
MEP		+9.9 ± 10.2		+70.0 ±31.6	<0,001
FIM		71.8 ± 32.8		116.4 ±21.9	<0,001
MRC	1stEvaluation	ICU Discharge	p-value		
	41.2±14.6	47.8 ±12.9	<0,001	50.5 ± 9.6	<0,001

3017331

The Comparison Of Cuff Pressure Between Supine And Sitting During Early Mobility Of ICU Patients.

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Background: Early Mobilization (EM) has been shown to be important for patients receiving mechanical ventilation in critical care. However, there is a risk of Ventilator Associated Pneumonia (VAP) if EM is done without proper cuff pressure management. Additionally, the measured cuff pressure during position changes has not been well documented. During EM the sympathetic nerve can be activated more than the parasympathetic nerve, causing the smooth muscle in the trachea to relax, increasing the diameter of the trachea. Given these variables, it is difficult to understand cuff pressure management during EM to prevent VAP. The purpose of this study was to investigate the cuff pressure during position changes between supine and sitting during EM. **Method** This study was approved by the IRB at Yokosuka General Hospital UWAMACHI (YGHU). The data was gathered from February – May 2018, in the intensive care unit at YGHU. Fourteen subjects were evaluated while receiving mechanical ventilation via an oral endotracheal tube; there were a total of 21 EM sessions in the 14 individual subjects. During EM, patients were ventilated with a Drager Evita XL, in CPAP with PEEP less than 10 cm H_2O and pressure support less than 10 cm H_2O. Baseline vital signs and cuff pressure were gathered with the patient supine, with the head of bed at an angle of 0-30. Cuff pressure was measured by attaching a three-way stopcock and a manometer to the pilot balloon; the stop-cock was only opened during cuff pressure measurement. After establishing baseline pressures, the patient's position was changed and the patient was sat on the side of the bed; cuff pressure and vital signs were recorded immediately, and at three minutes and five minutes after the position change. **Results:** The cuff pressure had an average variation of 1-3 cmH_2O between inspiration and expiration during EM. The cuff pressure decreased with sitting, and decreased with the amount of time that elapsed. There was a statistically significant change in the difference in cuff pressure between baseline and sitting at three minutes (P=0.009), and in baseline and sitting at five minutes (P=0.001). **Conclusion:** The findings suggest that the cuff pressure tends to decrease during mobilization from baseline to sitting, and time elapse during sitting. It is important for respiratory care practitioners to adjust the cuff pressure frequently during mobilization for safe early mobilization. **Disclosures:** none.

Sponsored Research - None

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3025695

Performance Assessment Of 5 Transport Ventilators.

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Background: Use of transport ventilators is standard practice and recommended by professional organizations. Differences in performance may affect the level of care during transport. **Methods:** Five transport ventilators (CareFusion ReVel, Newport HT70, Phillips Trilogy, Drager Oxylog 3000, and Hamilton T1) were evaluated under passive conditions, comparing set V_T to delivered V_T, and the response to simulated patient demand using 2 models: COPD and ARDS. A Michigan Instruments Training and Test Lung (TTL) compliance 20 ml/cm H_2O and resistance 5 cm H_2O/L/sec was used for passive evaluation. Ventilator settingson room air were: V_T 300 ml x 10/min, PEEP 5 cm H_2O; 300 x 10, PEEP 15; 300 x 20, PEEP 5; 300 x 20, PEEP 15; 500 x 10, PEEP 5; 500 x 10, PEEP 15; 500 x 20, PEEP 5; 500 x 20, PEEP 15. Delivered V_T were measured with a Phillips NICO monitor. An Ingmar 2000 Automated Test Lung was used for the dynamic evaluation: P0.1 3 cmH_2O, compliance 60 ml/cmH_2O, inspiratory resistance 10 cmH_2O/L/sec, expiratory resistance 20 cmH_2O/L/sec (COPD) and compliance 20 ml/cmH_2O, inspiratory resistance 5 cmH_2O/L/sec, expiratory resistance 5 cmH_2O/L/sec (ARDS). Each model was ventilated with: PSV = 5 cmH_2O, PEEP 5 cmH_2O; PSV = 5, PEEP 15; PSV = 10, PEEP 5; PSV = 10, PEEP 15. Sensitivity was set as sensitive as possible without auto-triggering. Trigger pressure (Tp) (difference between baseline and maximal pressure below baseline), time to trigger (TT) (beginning of pressure change below baseline to onset of gas delivery), and time to reach P90 (time from initiation of breath to 90% of peak inspiratory pressure). These measurements were made from the alveolar pressure tracing. Ten steady state breaths were evaluated in all V_T trials and 5 breaths in dynamic evaluations. **Results:** The V_T delivered by each ventilator differed significantly across each setting, P<0.001 and >10% difference, largest difference 74 ml (15%) ReVel ventilator, smallest difference 0.5 ml (0.1%) Hamilton ventilator. Tp achieved by each ventilator also differed across each setting, but TT and P90 were only significant, P<0.001 and >10%, for the ARDS models. The largest Tp 5.1 cmH_2O, Newport HT70, the smallest Tp 2.08 cm H_2O Trilogy, the largest TT 219 ms Newport, the smallest TT 90 ms ReVel, and the largest P90 1032 ms Drager, the smallest P90 403 ms ReVel. **Conclusion:** Differences exist among transport ventilators regarding delivery of set V_T and gas flow in response to simulated patient demand.

Sponsored Research - None

3025589

Accuracy Of Pressure Manometers On Resuscitation Devices From Various Manufacturers.

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Background: Monitoring pressure while ventilating patients using manual resuscitation devices is important to prevent lung injury and gastric inflation. Our goal for this study is to determine whether each device's pressure manometer reading is accurate when compared to what is being measured inside the lung. Our hypothesis is that there will be no difference between the pressures on the manometers and the four targeted pressures, also there will be no difference between each device. Method: A model composed of a single adult Michigan Instruments Test lung with a compliance of 0.015 (L/cmH_2O), a 22mm adapter in line, and a Michigan Instruments Pneuflo Resistor of 5 (cmH_2O/L/sec) was used to test each device. A software program called Pneuview3 was used to graph delivered pressures over time inside the test lung. A single investigator static held each device until the graph on the Pneuview3 software remained constant for two seconds, while targeting pressures of 10, 20, 30, and 40 cmH_2O with 0 PEEP. Three trials were conducted for each device at the four targeted pressures. The devices that were used include the Air Flow Manual Resuscitator/Ventilator (Vent Lab, Grand Rapids, MI), the Adult BVM, the Neo-Tee, and Resusa-Tee T-Piece Resuscitators (Mercury Medical, Clearwater, FL) and the Neo-Puff T-Piece Resuscitator (Fisher & Paykel, Tamaki, New Zealand). **Results:** All resuscitation device pressure manometers were significantly different from one another (P=.001), except the Neo-Tee and NeoPuff (P=.137). The pressure manometer on the Rususa-Tee by Mercury Medical tested to be the most accurate of all devices tested with an average of 1.01 cmH_2O difference than the targeted pressures. The Vent Lab BVM tested to be the least accurate of all devices tested with an average of 8.65 cmH_2O difference than the target pressures. In general, accuracy decreased as ventilating pressure increased. **Conclusion:** All devices tested had a less than 5 cmH_2O difference than the targeted pressure except the Vent Lab BVM. The majority of the devices manometers proved to be accurate when targeting the four specific pressures. Having an accurate pressure manometer helps clinicians insure that proper ventilation of the lungs is occurring while minimizing hazards and complications.

Sponsored Research - None

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3017361

Modeling Patient Work Of Breathing Without A Push-Pull Design Produces Data At Odds With Established Clinical Research.

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Background: For mechanical ventilation (MV) to reduce patient work of breathing (WOB) and respiratory muscle tension-time, or pressure-time product (PTP), requires the ventilator to displace the chest faster than inspiratory muscular contraction. This "push-pull" concept first proposed by Marini et al,[1] has great explanatory power in interpreting WOB study results. Modeling this interaction requires that simulated effort can potentially be overtaken by MV driving pressure (e.g. Proportional Assist Ventilation or PAV, Pressure Support Ventilation or PSV).[2] We evaluated the impact of PAV+ and PSV on WOB using the IngmarASL-5000 (Pittsburg, PA.) using a fixed breathing pattern at varying levels of simulated inspiratory muscle pressure (ΔPmus) **Methods:** The ASL-5000 was set to a compliance of 35 mL/cmH_2O, resistance of 5 cmH_2O per L/s and was connected to PB-980 ventilator (Medtronic, Minneapolis, MN.) using a 7.5 mm ID endotracheal tube. The ventilator was set to 3 levels of PAV+ (70%, 50%, 30%) and 4 levels of PSV (ΔP: 15, 10, 5 and 0 cmH_2O). End-expiratory pressure of 5 cmH_2O and trigger sensitivity of 3 L/m were used for all conditions. The breathing pattern was *f* of 20 with ΔPmus of 5,10 and 15 cmH_2O; pressure rise, sustain and decay of 20%,10%,10% respectively (inspiratory time:1.2s). Multiple linear regression was used to assess variables determining simulated WOB. Alpha was set at 0.05. **Results:** At all PAV+ and PSV settings simulated WOB paradoxically decreased with decreasing MV support (Fig). Simulated PTP was unaffected by MV support level on either mode at ΔPmus levels of 5, 10 and 15 cmH_2O (110-112, 220-224 and 334-336 cmH_2O-sec per min respectively). WOB was positively correlated with VT (t-ratio: 4.82, $P < 0.001$) but not with PTP/b (t-ratio: 0.29, $P = 0.77$) as a signifier of simulated effort. VT was more strongly correlated with peak inspiratory pressure (t ratio: 10.4, $P < 0.001$) than with PTP/b (t-ratio: 6.3, $P<0.001$) **Conclusion:** WOB is defined as the area within the Pmus-VT loop. As such when VT decreases at a constant Pmus so too does WOB. A model wherein Pmus cannot be replaced by positive pressure cannot reflect what occurs under in vivo conditions. 1. Marini JJ, et al. The inspiratory workload of patient-initiated mechanical ventilation. Am Rev Respir Dis. 1986; 134: 902-909. 2. Katz JA, et al. Inspiratory work and airway pressure with continuous positive airway pressure delivery systems. Chest 1985; 88: 519-526.

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3025759

Implementing An Automated Transport Stabilty Scale.

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Background: Intra-facility transport of patients is a common practice in most hospitals, UAB Hospital averages over 600 daily. The patient's acuity may range from low to critical; making the decision on who should transport patients is complicated and sometimes underappreciated. Low acuity patients may be transported by unlicensed transport personal, high acuity patients requires a RT and RN. Pre 2015 at UAB Hospital, the bedside RN was required to fill out a preprinted stability scale called a Paper Travel Tracker (PTT). If completed the PTT would help the RN determine who is needed to transport the patient. The decision should be based off patient's vital signs and current devices; ventilator, BiPAP, HFNC, O_2 Flow & FiO_2 (RN ≥ .40 and RT ≥ .60 or ≥10 lpm), and "Saturation Instability" (Sat < 90% in last 24 hours). **Methods:** In 2015 the Patient Safety Executive Committee created an interdisciplinary safety team that reviewed all PTTs of patients transported for two weeks to the Radiology Department. Only 16% of the PTT were completed and a review showed the RN recognized stability correctly at only 24% of the time, causing patients to be transported 76% of the time without a required RN/RT. After all RN re-education, the completed PTT went up to 25% with the RN recognizing stability correctly 24% of the time. The safety team developed an auto-generated Electronic Travel Tracker (ETT); data is pulled from the patient's EMR, look back is for 12-24 hours or if devices are present (Vent, HFNC, ICP). The ETT clearly states who is required for the transport and why. As the ETT is printed a copy is saved in patient's EMR. **Results:** Five nursing areas conducted a six month feasibility trial using the ETT with 100% compliance and with 100% identifying the staff needed for transport. The three most frequent reasons for RN/RT transport was "Increased FiO_2" at 15%, "O_2 Saturation Instability" at 13%, and "High Early Warning Scale" at 13%. The five pilot nursing units had 12 Rapid Responses Team (RRT) activations the previous six months with the PTT and zero RRT activations and zero reported adverse events in procedural areas post-ETT implementation. **Conclusion:** Automated decision tools have advantages over manual tools; easier, faster, therefore more frequently obtained, and a higher identification of required staff needed for transport. This should result in a safer transport environment, decreased patient issues, and decreased RRT activations. **Disclosures:** None

Sponsored Research - None

3006048

Effect Of Essential Oils On Growth Of A Common Respiratory Tract Pathogen.

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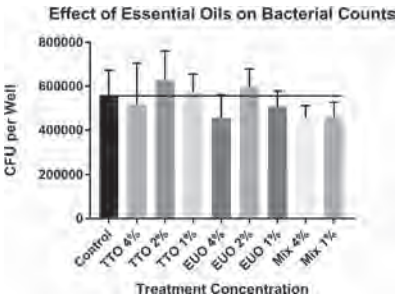
Background: Essential oils (EOs) comprise a variety of volatile aromatic compounds derived from plants and have long been used for healthcare applications. EOs induce their effects on the body either through the olfactory nerve or the bloodstream. The effects of EOs on the respiratory system, especially as they pertain to respiratory infections, have been studied in vitro and in animal models; however, data on how microbes react to EOs is minimal and more is needed to confirm EOs possess an antimicrobial effect. Tea tree oil (Carson 2006, PMID 16418522) and eucalyptus oil (Bachir and Benali 2012, PMID 23570005) are among the EOs proposed to possess antimicrobial properties in the airways, and are commonly used as alternatives to or in addition to medications used to alleviate symptoms associated with common respiratory illnesses such as colds, influenza and pneumonias. In addition to tea tree oil (TTO) and eucalyptus oil (EUO), lavender oil (LO) is thought to alleviate symptoms of bronchial asthma through attenuation of the inflammatory cell response and mucous cell hyperplasia. One group found inhalation of LO in mice reduced the number of eosinophils and total white blood cell count in bronchoalveolar lavage fluid, reduced numbers of IL-4, 5, and 13 in lung tissue, and reduced Muc5b expression in lung tissue (Ueno-lio 2014, PMID 24909715); however, this has yet to be replicated in mice models. We sought to answer if a mixture of LO, TTO, and EUO essential oils inhibit bacterial growth, and if so, at what minimum concentration? **Methods:** A dilution curve was used to estimate the number of bacteria. $1e^6$ CFU of S. pneumoniae were mixed, diluted and exposed to 4%, 2%, 1%, 0.5% and 0.25% concentrations of LO, EUO, TTO, and a mix (M) of the three for one hour. Colonies to signify inhibition were counted the next day. An initial pilot experiment showed no inhibition for LO, so it was not included in the second experiment (reported in the graph). **Results:** No inhibition was noted at 0.25% or 0.5% for all EOs tested. EUO and M showed decreased growth means at 1%, unexpected levels for 2% and all EOs had decreased means at 4%. **Conclusion:** Each EO displayed a decreased growth mean value at one or more concentrations, but EUO better demonstrated a *pattern* of inhibition with increasing oil concentration. Despite this pattern, the EOs tested produced no significant inhibition (P=0.099 by Kruskal-Wallis test). Longer EO exposure may have yielded significant inhibition.

Sponsored Research - None



3003790

Lavender Oil Bronchodilation Effect—A Pilot Study.

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Background: Essential oils (EOs) are combinations of volatile organic compounds that have been used to induce various effects on the body via neurological and pharmacological pathways (Horváth & Ács 2015), including altering respiratory infections and inflammatory response in asthma. Lavender oil (LO) is thought to alleviate symptoms of bronchial asthma through attenuation of the inflammatory cell response and mucous cell hyperplasia. One study (Ueno-lio, et al, 2014) found the inhalation of lavender oil in mice to reduce the number of eosinophils and total white blood cell count in broncholalveolar lavage fluid, reduced numbers of IL-4, 5, and 13 in lung tissue, and reduced Muc5b expression in lung tissue. However, studies have yet to replicate these results in mice models and the LO was inhaled over a period of days before data was collected (Ibid). Although human EO use is common, it is not known if LO can attenuate inflammatory and hyperreactive airway response in humans. We investigated if brief inhalation of LO produces a rapid improvement in breathing effort (e.g., less airways resistance (R_{AW}), improved FEV_1, FVC, FEV_1%) after a brief period of exercise. **Methods:** This IRB-approved study of seven healthy adults (6 female, ages 21-33 years) measured lung function via spirometry and plethysmography following ATS guidelines (FVC, FEV_1 and R_{AW}) at baseline, after a 6-minute stair climb challenge and after inhalation of LO (source: DoTERRA, Pleasant Grove, UT, USA) passively diffused from a gauze patch placed on the chin for 15 minutes. Two drops of undiluted stock solution (half the manufacturer's maximum recommended dose for diffusion) was used for each participant (one drop = 0.05 mL). **Results:** Using Friedman's Test, the only significant change detected was a decrease in FEV_1 (P <.005, reference table) when all three measurements were compared (did not meet Am Thoracic Soc. standard for bronchodilator response). **Conclusion:** A brief (15 min.) inhalation of LO post stair challenge did not improve lung function as measured by FEV_1, FVC, FEV_1% or R_{AW}. Subjects exhibited no negative effects from inhalation of undiluted LO. The FEV_1 did statistically decrease (but not clinically) from baseline to final measurement. A control comparison would be needed to determine if the decrease would have been greater without LO inhalation. A next step would be exposing known asthmatic subjects to a longer period of LO inhalation.

Sponsored Research - None

Summary Results and Statistics

	FEV_1 (L)	FVC (L)	FEV_1 %	R_{AW} ($cm\ H_2O \bullet L^{-1} \bullet sec^{-1}$)
Baseline	3.43	4.16	82.68	1.96
Post-Exercise	3.32	4.07	82.18	2.04
Post-EO	3.30	4.04	82.05	2.07
3 Measure (Baseline, Post-Exercise, Post-EO) p value*	0.004	0.163	0.772	0.368
2 Measure (Post-Exercise, Post-EO) p value**	0.463	0.753	0.600	0.612

*Friedman Test, **Wilcoxon Signed-Rank Test

3016134

Tris-Hydroxymethyl Aminomethane Is Effective In Treating Severe Acidosis During Lung-Protective Ventilation In ARDS.

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Background: We previously reported in a small case series that THAM improves acid-base balance in severe ARDS complicated by profound acidosis, whereas sodium bicarbonate therapy resulted in acute deterioration in arterial blood gases (ABG).[1] THAM's effectiveness is attributable to its high pK (7.8), direct binding of CO_2 without producing CO_2 and renal excretion that obviates increasing minute ventilation (VE); thus making THAM a useful buffer for LPV. THAM was our buffer of choice until its availability in the United States ceased in 2016. This summary describes our use of THAM during LPV over the last 10 years of the drugs availability. **Methods:** The SFGH ARDS quality assurance database tracks LPV practices and was queried to identify subjects treated with THAM. From September 2006-August 2016, 97 subjects were identified, of whom 82 met inclusion criteria: 1) standard bolus infusion of at least 1 full dose of THAM (150mmol), 2) pre/post ABGs done ≤ 4 h of therapy initiation/completion respectively, and 3) no adjustments in either VE or tidal volume (VT). Data are presented as median [IQR]. Paired comparisons were made using the Wilcoxon Signed-Rank Test. Alpha was set at 0.05. **Results:** A total of 143 discreet treatments met inclusion criteria. Infusion of THAM at 2.04 [1.61, 2.36] mmol/kg per h over 60 [60, 60] min, significantly increased arterial pH and bicarbonate (HCO3); decreased arterial carbon dioxide tension ($PaCO_2$), base deficit (BD), and anion gap (Table). These changes occurred despite extraordinarily elevated dead-space fraction of 0.80 [0.72, 0.85]. Oxygenation was unaffected. **Conclusion:** This study confirms our previous findings that THAM improves pH and lowers $PaCO_2$ without alterations in VE. Decreased $PaCO_2$ is attributable to THAM's capacity to directly bind CO_2 with subsequent renal excretion (or removal during dialysis). These properties make THAM a useful buffer to maintain LPV in ARDS complicated by severe acidosis and markedly elevated dead-space. 1. Kallet RH, Jasmer RM, Luce JM, et al. The treatment of acidosis in acute lung injury with tris-hydroxymethyl aminomethane (THAM). Am J Respir Crit Care Med. 2000; 161: 1149-1153

Sponsored Research - None

	Pre-THAM	Post-THAM	P
pH	7.17 [7.08,7.21]	7.22 [7.16,7.28]	<0.001
PaCO2 (mm Hg)	50 [39,62]	47 [38,58]	<0.001
HCO3 (mEq/L)	17.8 [13.3,22.9]	19.1 [15.5,24.8]	<0.001
BD (mEq/L)	11.5 [16.9,5.5]	8.5 [13.2,2.3]	<0.001
Anion Gap (mEq/L)	16.2 [11.8,24.9]	14.8 [10.8,20.8]	<0.001
VE (L/m)	14.5 [12.3,17.2]	14.4 [12.0,17.2]	0.86
VT (mL/kg PBW)	7.2 [6.1,8.1]	7.2 [6.1,8.1]	0.15

PBW = predicted body weight

3025939

Comparison Of Different Concentrations Of Nebulized Epoprostenol Delivery In Adult Mechanical Ventilation: A Bench Study.

Jie Li[1], Ryan Cutro[1], Keith M. Roberts[1], Edita Meksraityte[2], Lauren J. Harnois[1], Jing Liu[1], Emily L. Robichaux[1], Payal K. Gurnani[3], David Vines[1], James B. Fink[1,4]; [1]Department of Cardiopulmonary Sciences, Division of Respiratory Care, Rush University, Chicago, IL; [2]Respiratory Care, Rush oak park hospital, Oak park, IL; [3]pharmacy, Rush university, Chicago, IL; [4]Aerogen Pharma Corp, San Mateo, CA

Background: Inhaled epoprostenol (iEPO) has been described in clinical practice for patients with pulmonary hypertension or ARDS for 20 years. iEPO using a pump system with mesh nebulizer has been administered with 2 strategies: 1) Using one concentration adjusting dose with the pump rate across full range of doses; and 2) limiting the pump rate range and changing the concentration of iEPO. We wanted to determine whether a single formulation concentration could be used across prescribed dose ranges. **Methods:** A collection filter was placed between the model lung (TTL, Michigan Instruments) and a critical care ventilator (PB840, Covidien) with a heated wire circuits and humidifier (MR850, Fisher & Paykel). A mesh nebulizer (Aerogen) was placed at the dry side of humidifier. Epoprostenol (Veletri) (1.5g) was reconstituted with sterile water to concentrations of 30, 15 and 7.5 mg/ml. The solution was drawn into a 60 mL syringe and attached to a continuous tubing set, which was connected to the mesh nebulizer. Tidal volumes were set to simulate adults of 50, 70 and 90 Kg of ideal body weight. iEPO dosage was set at 50 and 30 ng/Kg/min. Aerosol was collected for 20 min. Drug eluted from the filter was assayed with UV spectrophotometry (205 nm). **Results:** In the bench study with iEPO, at 50ng/kg/min, delivered dose was similar between 30mg/ml and 15mg/ml (11676.2 ± 1093.8 vs 11201.7 ± 653.4 ng, P=0.693). However, at 30ng/kg/min: delivered dose rate for 30 mg/mL (9768.1 ± 1040.3) was greater than 15 mg/mL (7069.6 ± 686.6) which was greater than 7.5 mg (5229.5 ± 418.5 ng; P=0.003), representing delivered "lung" deposition of 23.0 ± 0.8, 16.9 ± 0.7 and 12.5±0.4 %, respectively (P<0.001). **Conclusion:** To deliver prescribed dose range of inhaled epoprostenol l in adult subjects during mechanical ventilation, one high concentration was more efficient and consistent than lower concentration with higher pump rates.

Sponsored Research - None

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3024438

Epoprostenol Delivered Via High Flow Nasal Cannula For CU Subjects With Severe Hypoxemia Comorbid With Pulmonary Hypertension Or Right Heart Dysfunction.

Jie Li[1], Lauren Harnois[1], Bethelhem Markos[1], Keith M. Roberts[1], Min Zhong[2], Salma A. Homoud[1], Fahad Alshammari[3], Jing Liu[1], Sara Mirza[1], David Vines[1]; [1]Department of Cardiopulmonary Sciences, Division of Respiratory Care, Rush University, Chicago, IL; [2]ICU, Shanghai Zhongshan Hospital, Shanghai, China; [3]Department of Respiratory Care, Hail General Hospital, Hail, Saudi Arabia

Background: Inhaled epoprostenol (iEPO) has been utilized to improve oxygenation in mechanically ventilated subjects with severe hypoxemia. However, there is no data reported on iEPO via high flow nasal cannula (HFNC). Thus, we conducted this retrospective study to evaluate the clinical effects of iEPO via HFNC on oxygenation. **Methods:** IRB approval was obtained to review subjects in the adult intensive care units (ICUs) that had received iEPO via HFNC between July 2015 and April 2018. These subjects received iEPO via HFNC for more than 30 mins to treat severe hypoxemia comorbidity with pulmonary hypertension or right heart dysfunction. Subjects' data was extracted from the electronic medical record. A patient was considered a responder to iEPO if their SpO_2/FiO_2 increased by 20% or more. Other outcome data included incidence of intubation, occurrence of systemic hypotension, ICU length of stay, and hospital survival. **Results:** A total of 11 subjects were enrolled in the study, of whom 4 were male (36.4 %), age 57.5 ± 22.1 years, and APACHE II score at ICU admission was 18.5 ± 5.7. Ten subjects had more than three chronic heart or lung comorbidities; seven of them used home oxygen. After inhaling epoprostenol, subjects' SpO_2/FiO_2 ratio improved from 107.5 ± 26.3 to 125.5 ± 31.6 (P=0.026) within 30-60 mins. Five (45.5%) subjects had SpO_2/FiO_2 improvement > 20%. Heart rate, blood pressure and respiratory rate were not significantly different. Intubation was avoided in seven subjects, and seven subjects were discharged home. **Conclusion:** This retrospective study demonstrated the feasibility and safety of iEPO via HFNC in improving oxygenation. Carefully titrating flow need and evaluating subjects' response may help identify responders and avoid delaying other interventions. This study supports the need for a larger prospective randomized control trial to further evaluate the efficacy of iEPO via HFNC in improving outcomes.

Sponsored Research - None

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3017709

Quantifying Delivered Dose With Jet And Mesh Nebulizers During Spontaneous Breathing, Noninvasive Ventilation And Mechanical Ventilation Using An In Vitro Adult Lung Model With Exhaled Humidity.

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Background: Direct comparison of aerosol deposition with jet and mesh nebulizers during spontaneous breathing, noninvasive ventilation and mechanical ventilation using an adult lung model with exhaled humidity has not been reported. **Methods:** Drug delivery with jet (Mistymax10, Carefusion) and mesh (Solo, Aerogen) nebulizers was compared during spontaneous breathing, noinvasive ventilation and mechanical ventilation using adult lung models with exhaled humidity. To simulate a spontaneously breathing adult, a manikin was attached to a sinusoidal pump via a collecting filter at the level of bronchi. An adult receiving noninvasive ventilation was simulated through a ventilator (V60 Phillips) attached via facemask to a manikin with a collecting filter at the level of bronchi connected to a passive test lung. To simulate a mechanically ventilated adult, a ventilator (Servoi, Maquet) was operated with a heated humidifier (Fisher&Paykel) and heated-wire circuit attached to an 8 mm ID ETT. The ETT cuff was inflated in a 15 mm ID/22 mm OD adapter, which was then inserted into the housing of an absolute filter (Respirgard II) fixing the tip of the ETT 1 cm from the filter media. To simulate exhaled humidity, a heated humidifier (Fisher&Paykel) was placed between the collecting filter and test lung (35±2 C, 100% relative humidity). Breathing parameters were Vt: 450 mL, RR: 20 bpm, I:E ratio 1:3. During mechanical ventilation, devices were placed in the inspiratory limb proximal to the airway; with noninvasive ventilation they were positioned between the face mask and the leak port; while mouthpiece was used during spontaneous breathing. Albuterol sulfate (2.5mg/3 ml) was delivered with jet and mesh nebulizers. Drug deposited on the collecting filter was eluted and analyzed with spectrophotometry. Factorial ANOVA was used for data analysis (P<0.05). **Results:** The table below shows mean (±SD) percent dose delivered. Drug delivery during mechanical ventilation was greater than noinvasive ventilation and spontaneous breathing used with the mesh nebulizer (P=0.0001) but not with the jet nebulizer (P=0.384). Delivery efficiency of the mesh nebulizer was greater than the jet nebulizer during mechanical ventilation, noninvasive ventilation, and spontaneous breathing (P=0.0001). **Conclusion:** Delivered dose to the adult lung model with the mesh nebulizer differs during mechanical ventilation, noinvasive ventilation and spontaneous breathing, while it is similar with jet nebulizers.

Sponsored Research - None

	Mechanical Ventilation	Noninvasive Ventilation	Spontaneous Breathing	p value
Jet Nebulizer	6.80 ± 1.55	6.10 ± 0.34	6.12 ± 0.26	0.384
Mesh Nebulizer	23.16 ± 0.67	18.36 ± 1.06	17.20 ± 1.69	0.0001
p value	0.0001	0.0001	0.0001	

3021304

Hospital Conversion Of Devices For Administration Of Long-Acting Antimuscarinic Agent Using Common Canister.

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Background: Tiotropium HandiHaler poses significant issues for both Respiratory Care and Pharmacy. Despite the HandiHaler being left in the patient's medication drawer, many times it was missing when the Respiratory Therapist (RT) went to deliver the medication. The RT would then have to retrieve another HandiHaler which comes with an additional 5 capsules. This could, at times, take greater than 15 minutes between searching for and then retrieving another HandiHaler. This results in disruption in the RT's work flow and the accumulation of extra capsules. The increased frustration on the part of the RT and the pharmacy employee grew over time regarding this issue. Tiotropium is now available in a Respimat device which is being used increasingly in the outpatient setting. There is no institutional size for the Respimat (30 doses). For the above reasons we evaluated Respimat using a Common Canister approach. **Methods:** All patients receiving Tiotropium by HandiHaler from 1/16/18 onwards were converted to Respimat administered by Common Canister. Pharmacy costs were compared with pre-intervention costs. The cost of the RT's time inefficiencies was estimated. **Results:** Costs: HandiHaler (5 capsules) $37.22, $7.44 per day; Respimat (30 doses) $333.02, $11.10 per day. Pre-intervention monthly HandiHaler cost = $3, 481. Average Respimat monthly cost = $11,375. Without Common Canister the cost for our average LOS of 5.7 days would be for HandiHaler $42.41 and for Respimat $333.02, a 7.85-fold increase. With Common Canister we had a 3.27 fold cost increase. With 100% Common Canister delivery, the cost increase would be $11.10/$7.44 = 1.49. 70% of treatments were Common Canister. With a base salary of $71,500, 15-minute interruption to replace a HandiHaler at 60 times a month, the additional RT labor cost = $515. There were no issues with delivering the Respimat by Common Canister. **Conclusion:** For in-patients, even accounting for the hassle factor and the cost inefficiencies in RT workflow the current pricing for the Respimat is cost prohibitive, even with using Common Canister. An institutional size is expected to be released soon at $39 for 14 doses. At this price the Respimat is cost neutral to the HandiHaler and a significant cost savings with Common Canister. The inability to get the Common Canister delivery closer to 100% is due to the number of isolation and flu patients which do not share canisters. Disclosures Acevedo: Sunovion Advisory Board, Monaghan Medical consultant.

Sponsored Research - None

3021746

Maximizing Deep Lung Deposition In Healthy And Fibrotic Subjects.

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Background: Inhaled Interferon-gamma (IFN-γ) may improve pulmonary function in idiopathic pulmonary fibrosis (IPF). However, the main reported side effect was coughing associated with upper and central airway deposition. To address this problem, our group developed an efficient, small particle breath enhanced jet nebulizer, designed to bypass upper and central airways on inspiration and maximize alveolar deposition on expiration. We tested this device by gamma scintigraphy in healthy individuals and subjects with IPF to determine device efficiency, upper and central airway, and lung deposition. **Methods:** Six healthy individuals and nine subjects with IPF were enrolled. Following background and transmission images, aerosol inhalation was performed. The I-neb Mini is a breath-enhanced jet nebulizer, that is, the majority of aerosol is generated during inspiration. The nebulizer was filled with 2mL of saline radiolabeled with 99m Tc bound to DTPA, and operated continuously via 3.5L/min of compressed air. MMAD measured by cascade impactor was (mean±SE) 1.08 μm±0.04. In addition, to maximize deposition in alveoli, patients were encouraged to inhale slowly via an audible inspiratory resistance (over approx 6 sec). The treatment was run to completion (10 minutes) and each subject underwent deposition imaging. Mass balance and regions of Interest determined upper airway (measured by calibrated stomach activity) and regional lung deposition as a percent of pre treatment nebulizer charge. Each individual signed a consent form approved by the University IRB. **Results:** Subjects tolerated the aerosol and device with no complaints. Lung deposition (%neb charge, mean±SE) in healthy subjects was 26.1%±1.36 and in IPF individuals 21.4%±1.6 (pNS). Upper airway deposition was 2.83%±1.11 (normal) and 3.3%±0.48 (IPF) (pNS). Deposition fraction averaged 0.57±0.05 (normal), 0.52±0.02 (IPF) (P=0.0004). Central/Peripheral ratios were consistent with peripheral deposition in both groups (1.27±0.05, vs 1.28±0.05, pNS). **Conclusion:** The I-neb Mini jet nebulizer with breath enhancement produces small particles resulting in minimal upper airway deposition. Using slow and deep breathing, approximately 55 % of the inhaled particles deposited in the peripheral lung in both normal subjects and in individuals with IPF. These data indicate that, for future clinical trials, controlled lung doses of small particles, designed to avoid coughing, are possible even in subjects with advanced disease.

Sponsored Research - Funded in part by InspiRx Inc.

3025835

Do You Know How To Wean iNO? Gauging Compliance With An Institution-Wide Inhaled Nitric Oxide Clinical Practice Guideline In Neonatal And Pediatric Populations.

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Background: Inhaled Nitric Oxide (iNO) is a costly but effective pulmonary vasodilator that can improve oxygenation in a few disorders. The off and on-label use of iNO has rapidly expanded throughout our ICUs since the FDA approved iNO for clinical use in 2001. Our Respiratory Care department did not have a process in place to manage the use of iNO. In 2016, an institution-wide Clinical Practice Guideline (CPG) was implemented with Medical Leadership support. Initial findings showed a 22% decrease in iNO utilization for the first year of CPG managed practice. The purpose of this study is to examine continued iNO utilization related to compliance with the CPG. **Methods:** Department utilization of iNO for August 2015-July 2016 prior to CPG launch was examined and compared to utilization and compliance post implementation spanning August 2016-April 2018. Monthly utilization data from August 2015 through July 2016 was obtained from department billing to determine baseline aggregate utilization. We gathered monthly data for aggregate utilization from August 2016 (CPG launch) through April 2018 for comparison. We then gathered personnel compliance with the CPG from August 2016 to the present across all ICUs. **Results:** Our institution utilized 25,120 hours of iNO in the 12 months prior to the CPG launch. After initiation of the CPG, the next 12 months' utilization hours dropped to 17,341.9, a 31.12% decrease in utilization from FY16 to FY17. Nine months of FY18 data show 12,706.4 hours of iNO utilization with projected use of 18,015.4 hours at the end of this year. iNO utilization will have decreased compared to initial FY16 data by 7,194.6 hours, or 28.54%. As part of our analysis, we found that iNO use was inversely associated with protocol compliance. In April and May 2017, iNO utilization increased with a corresponding drop in CPG compliance. This is repeated in October and November. Although RTs query attending physicians daily to trial wean the iNO dose therefore testing the iNO effectiveness, there is still reluctance to comply. **Conclusion:** Establishing an institution-wide iNO CPG has significantly decreased overall utilization. CPG compliance has an average of 82.67%; increases in compliance has shown to be beneficial in decreasing iNO utilization over time. We have not observed nor reported adverse events related to the implementation or adherence to this CPG. Ongoing vigilance for protocol compliance across all providers and units is important to our goals.

Sponsored Research - None

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3019770

Albuterol Delivery During Heated High Flow Nasal Cannula Therapy In A Pediatric Model.

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Background: Nebulized albuterol and heated high flow nasal cannula systems (HHFNC) are commonly used to treat pediatric patients in respiratory distress. Data are available with adult and infant models but not with older pediatric models. Nebulization could be given in-line with HFNC circuit or via a facemask. We hypothesize that drug delivery will decrease with increasing flow through HFNC. **Methods:** An anatomically correct oronasotracheal model of a 5 year old child (average weight = 18 kg) was connected in series to a filter, and a breathing simulator (tidal volume 200 ml, respiratory rate 20, and inspiration time 0.9s). A Fisher Paykel Optiflow Junior 2 XL cannula with heated-wired circuit (ID=13mm) was used. A vibrating mesh nebulizer (VMN) was placed on the dry side of the humidifier, and the HFNC was run at 5, 10, 15, and 20 L/min. A continuous output jet nebulizer (JN) (6 L/min) was connected to a tightly fit facemask with the HFNC was run at 0, 5, 8, 10, 15 L/min. Ten mg of albuterol were loaded in VMN (2ml) and the JN (4.5ml). 4 units of VMN and JN were used, and run till sputtering occurred. Albuterol mass was measured via spectrophotometer, and reported as percentage of loading dose. **Results:** See table. **Conclusion:** Albuterol deposition decreases with increasing flow through HFNC for both VMN and JN. Oronasal delivery of albuterol via facemask is impaired by concomitant use of HFNC.

Sponsored Research - None

Results (%lung deposition)

Flow (l/min)	0	5	8	10	15	20
VMN	--	11.9±0.8ab	--	10.6±1.2b	5.2±0.7	2.4±0.6
JN	5.9±0.5cd	2.6±0.5d	0.7±0.2			--

ap=0.08 compared to 10 L/min. bp<0.001 compared to 15 or 20 L/min. Cp<0.05 compared to 5 L/min. dp<0.001 compared to 8, 10 or 15 L/min.

3025928

Doubling Dose Escalation Of Albuterol Aerosol Via High Flow Nasal Cannula In Adult Patients With Obstructive Airway Disease.

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Background: There is increasing interest in administration of aerosol to patients requiring oxygen via high flow nasal cannula (HFNC). In vitro and radiolabeled in vivo studies concur that aerosol delivery decreases at higher flows (as low as 2.2% at 50 L/min) raising the question of what dose would achieve a clinically relevant bronchodilator response. Our objective was to administer doubling doses of albuterol to identify the maximum bronchodilator response in subjects who previously demonstrated response to bronchodilator in the PFT lab per ATS/ERS criteria. **Methods:** This study was approved by ethical committees at People's Hospital of Xinjiang, China and Rush University, Chicago and registered in clinicaltrial.gov (NCT03091504). Ambulatory subjects with obstructive lung disease who demonstrated bronchodilator response per ATS/ERS criteria were recruited to return after a washout period >24 hours to inhale doubling doses of albuterol delivered by mesh nebulizer (Aerogen Solo) via heated HFNC (Fisher Paykel) at 50 L/min. Dose of 0.5, 1.0, 2.0, and 4.0mg, diluted to 2mL, was administered at 10-15mins interval. Spirometry was performed at baseline and after each dose. Dose escalation continued until FEV1 improvement was less than 5%. **Results:** 42 subjects (15 male) with asthma (29) and COPD (13) were consented and completed study. Screening post bronchodilator FEV1 using MDI with valved holding chamber (VHC) at (mean ± SD) was 2.29±0.72 L, After inhaling 0.5mg and 1.0mg of albuterol, FEV1 increased from 2.0 ± .66 L (baseline) to 2.23 ± .67 L ($p < 0.01$) and 2.34 ± .7 L($p < 0.01$), respectively, which was greater than post MDI+ VHC (P=0.018). Eight subjects met termination criteria at 1.5mg. The remaining 34 subjects' FEV1 continued to increase slightly with cumulative 3.5mg dose, representing their max bronchodilator response (2.30 ± .68 vs 2.34 ± .69, $p < 0.01$). In a subset of COPD subjects, FEV1 stopped increasing at 3.5mg (1.99± .56 vs 2.04 ± .55, P=0.057). No serious adverse events were observed. **Conclusion:** Despite reported low inhaled dose efficiency (2.2%) with HFNC at 50 L/min, albuterol dose of 1.5 mg via HFNC produced improvements in FEV1 exceeding ATS/ERS definition of bronchodilator response in stable asthma and COPD patients. Maximal bronchodilator response occurred between doses of 1.5 and 3.5 mg.

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See table or figure in supplement to the October 2018 issue of Respiratory Care at www.rcjournal.com.

3025573

Aerosol Delivery With Two Tracheostomy Masks Using A Weighted Filter Model.

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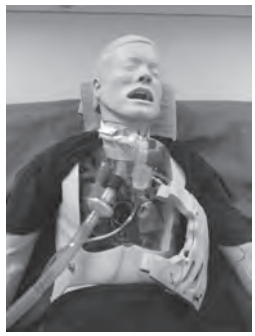
Background: Patients with respiratory complications requiring further interventions, such as tracheostomies, often also need routine medications as a part of their care plan. Many of these respiratory medications are delivered in aerosol form via small volume nebulization. The purpose of this study is to determine how the SouthMedic Oxytrach mask (Barrie, Ontario, Canada) aerosol delivery compares to the aerosol delivery of the Teleflex Hudson RCI Trach mask (Morrisville, NC, US). We hypothesized that there will be no difference in aerosol delivery between the Oxytrach mask and the Hudson mask. **Methods:** An adult model with a Medtronic 8.0 mm Shiley tracheostomy tube (Minneapolis, MN, US) was attached to a Hans Rudolph, Inc. Series 1101 breathing simulator (Shawnee Mission, KS, US) set to achieve a 500 ml tidal volume, with 16 breaths/min, Raw 5.0 $cmH_2O/L/sec$, Compliance 80 ml/cmH_2O, and 33% IT. A Teleflex Bacterial/Viral Filter (BFE: 99.999+%, VFE: 99.99+%) (Morrisville, NC, US) was placed distal to the tracheostomy tube on the right main stem bronchi of the model and proximal to the breathing simulator with the left main stem bronchi occluded. For each trial, 6 ml of 10% hypertonic saline solution was nebulized via the Vyaire Medical AirLife Misty Fast nebulizer (Mettawa, IL, US) at 8 L/min for 4 minutes. A filter was weighed prior to nebulization, the weight was recorded, and the filter was placed in line on the model. In the first three trials, the nebulizer was attached to the Oxytrach mask and after nebulization; the filter was re-weighed and recorded. In the last three trials, the Hudson masks were used. **Results:** The mean post-nebulization weight of the filters with the Hudson mask was 270 mg. The mean post-nebulization weight of the filters with the Oxytrach mask was 20 mg. There was a statistically significant difference in the amount of aerosol delivery between the two masks (P=.008). **Conclusion:** Based on the results, it was found that the Hudson mask had significantly more aerosol delivery to the filter than the Oxytrach mask. There was an incidental finding during the nebulization trials with the Oxytrach mask. The mushroom shaped Pin and triangular directional Diffuser inside the Oxytrach mask, when placed on the model, fit directly inside the opening of the tracheostomy tube, causing the potential for airway occlusion.

Sponsored Research - None



3005678

Standardizing Handoff Decreases Episodes Of Missed Care.

Angela Saunders; Respiratory Care, Cincinnati Childrens Hospital Medical Center, Williamsburg, OH

Background: Respiratory Care has their own practice for handoff, all include face-to-face communication, but many are not given bedside. No process is in place defining how to deliver handoff. This leads to avoidable errors. Moving to a standardized approach utilizing our EMR can help with consistency increase patient safety. Among hospitalized children who require respiratory therapy does standardizing handoff between Respiratory Therapists compared to non-standardized handoff affect patient safety such as episodes of missed care? **Methods:** Our initial search identified 106 articles, 89 were discarded, as they were duplicates or not related to the question based on title and abstract review. 17 articles were reviewed in full text and appraised. Keywords: handoff, missed care, respiratory therapy, end of shift, beside handoff, shift report, missed orders, handover, medical errors Databases: MedLine, Cochrane Database, CINAHL, Pubmed Filters: Publication date 2000-present, English language, Pediatric/Adult **Results:** 7 studies answered the question: 1 lesser quality systematic review, 2 longitudinal, 3 QI, and 1 cohort The evidence received a moderate grade and showed that a standardization reduced falls, medical errors, pressure ulcers, preventable adverse events, mortality, codes, infection rates, line errors, delay of care, and documentation errors. The 7 studies shared similar mnemonics none were superior to another. It is strongly recommended that health care professionals utilize a standardized handoff for transitions in patient care to reduce missed care. **Conclusion:** Implementation of standardization would need support from administration. Changing the way Respiratory Therapist's (RT) perform handoff is a culture change that will impact all RT's. Communication of perceived benefits including safety and cost perspectives will be needed. Implementing a standardized bedside handoff across the organization for the RT's needs to involve the EMR. Staff will utilize a standard patient list, handoff tool and safety check. All RT's will need access to a computer. Expectations will be defined on how to perform handoff, prior to implementation support will be needed to develop and provide RTs with education. Post implementation: audits of adherence, measured outcomes (UE, VAE, safety events, and RT satisfaction). Baseline data collected, IRB submitted, begin with one pilot unit.

Sponsored Research - None

3007462

Exploring The Development Of A Standardized Respiratory Care Language.

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Background: Standardized terminologies support unambiguous, concise descriptions of health problems and conditions to facilitate clear and consistent communication between caregivers, patients, and the public. The benefits of recording and maintaining indexed terminologies include: increased transparency regarding the association between interventions and outcomes, enhanced safety and quality of care through more effective clinical documentation, and demonstration of healthcare providers' value. It is apparent that there is an urgent need for a standardized language for the respiratory care profession. Our objective was to create a standardized terminology relevant to cardiopulmonary problems for which respiratory therapists provide diagnostic and therapeutic interventions. **Methods:** Practicing respiratory therapists and respiratory therapy students worked in small groups to develop a standardized terminology of frequently encountered problems specific to cardiopulmonary dysfunction guided by the grounded theory approach. Descriptive labels were sourced from discussions of clinical practice, experience in the clinical setting, respiratory care coursework, textbooks, peer-reviewed journals, and detailed content outlines for respiratory care licensing examinations. Each group developed a list of 20 patient problems encountered on a daily basis by respiratory therapists. Content validity of the descriptive labels and initial definition of each patient problem was assessed by expert respiratory therapists. **Results:** A fragment of a respiratory care domain ontology was generated from the finalized patient problem lists. Six categories and fourteen sub-categories of respiratory care patient problems were identified based on similarity of etiological characteristics. **Conclusion:** Standardized terminologies such as the Systematized Nomenclature of Medicine – Clinical Terms (SNOMED-CT) and the World Health Organization International Classification of Functioning Disability and Health (ICF) have improved many aspects of the healthcare process. Our work demonstrates that a respiratory care ontology can be created, validated, and expanded in the future to include additional patient problems. However, it would require testing in clinical applications before adoption and mapping to SNOMED-CT.

Sponsored Research - None

See table or figure in supplement to the October 2018 issue of Respiratory Care at www.rcjournal.com.

3007621

Interdisciplinary Approach To Improved Safety For Patient Owned NIV Devices In The Hospital.

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Background: The prevalence of obstructive sleep apnea (OSA) now afflicts at least 25M adults in the U.S., according to the National Healthy Sleep Awareness Project[1]. Many of which are receiving NIV therapy at home & frequently request permission to use their own equipment during their hospital stay. Historically it presented a bigger challenge if that permission weren't granted, because the clinical team had a difficult time determining the patient's home NIV settings that could be applied to hospital owned equipment. The development of devices that provide APAP (auto-titrating) NIV support have been critical to solving this problem. Several studies have shown that APAP is as efficient as conventional CPAP in correcting breathing disorders & cognitive impairment in sleep apnea/hypopnea syndrome[2]. In 2016 two safety reports were submitted as a result of patient owned NIV equipment failure. Clinical staff's lack of familiarity with various devices & no clear process for intake of patient owned equipment put both the patient & hospital at risk for safety events. **Method** A team of RNs, RRTs, & biomed technicians was established to develop a process to ensure that any patient requesting the use of their own NIV equipment could be properly checked in & there was an alternative procedure for conditions of failure. The EMR was utilized to support the new policy that required, upon MD order for NIV, that nursing have a waiver signed by the patient validating knowledge of device operation, respiratory would perform a visual inspection prior to use & then send notification to clinical engineering to perform an electrical safety test. If there was a failure in any of these steps then the device is removed from service & the MD order set permits the therapist to place the patient on APAP. **Results:** Since implementation in Sept 2016 there have been no safety reports as a result of patient owned equipment failure that passed inspection. Accurate reporting started in FY18. Since that time, RTs have inspected 917 devices with a pass rate of 98% (n=903 passed, n=14 failed). All failures resulted in the patient being placed on hospital owned APAP. **Conclusion:** Implementation of a procedure with the support of an EMR provides a consistent process to effectively mitigate risk of device failure &/or clinical staff's inability to troubleshoot equipment in which they've recieved no training. Using an interdisciplinary team effectively covers multiple steps in the process & improves safety.

Sponsored Research - None

Patient Owned NIV Inspections

Month (FY18)	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Total
Visual Inspection Compliance	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
N (Pass)	79	109	100	84	127	99	102	96	107	903
N (Fail)	2	1	3	2	2	1	0	1	2	14

3012875

Hospice Palliative Care Cognition And Willingness For Prolonged Mechanical Ventilation In Taiwan.

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Background: Increasing case numbers of prolonged mechanical ventilation (PMV) in Taiwan, over half of family members of PMV patients in capital city felt upset to decide prolonged mechanical ventilation. This study aims to analyze the hospice palliative care cognitions and willingness of the main caregivers of family for prolonged mechanical ventilation patients in Taiwan. **Methods:** This study used a structured questionnaire (average Content validity index value is 0.96 (0.73-1.00), Kuder-Richardson Formula (KR-20) coefficient is 0.78) as a research tool to target 601 valid questionnaires for 64 respiratory care institutions which provide prolonged mechanical ventilation care in Taiwan. Based on different stages of care unit which are intensive care unit (ICU) for acute stage, respiratory care center (RCC) for subacute, Respiratory care ward (RCW) and home care for chronic ventilatory dependent. The describe analysis to explore concerning cognitive of Hospice Palliative Care Act at each stages and the willingness to sign the acceptance of palliative care. **Results:** There were 70.55% has been heard the act of hospice palliative care, only 42.33% respondents had information from medical staff. The average cognitive score of the 601 valid questionnaires recovered was 51.35±29.50 points, the cognitive score of primary care family for awareness of the Hospice Palliative Care Act were ranked in the order of home care (56.37±24.91 points), RCW (53.92±30.79 points), RCC (48.08± 29.35 points) and ICU (47.00±31.75 points). A total of 66.22% (50.8+16.14%) of the family members accept do not resuscitation when their family (PMV patient) need life-sustain treatment. In the signing of their own "Advanced directives for hospice or palliative care" part, 67.55% of the family members expressed their willingness to accept. **Conclusion:** The result of our finding that low cognitions and high willingness for the main family of PMV with hospice palliative care but low medical staff offering these information, implement relative information is needed.

Sponsored Research - None

Cognition and willingness of family members for palliative care

Titles		N (%) or mean±SD
Have been heard the "Hospice Palliative Care Act."		424 (70.55)
Medical staff informed "Hospice Palliative Care Act."		254 (42.33)
I can accept to limit life-sustaining treatment when the patient is in an irreversible condition.		398 (66.2)
I have willing to "Advanced directives for hospice or palliative care"		406 (67.55)
Test score (0-100) mean±SD	ICU	47.00±31.75
	RCC	48.08±29.35
	RCW	53.92±30.79
	Home care	56.37±24.91

ICU: Intensive Care Unit; RCC: Respiratory Care Center (sub-acute unit); RCW: Respiratory Care Ward

3013409

Respiratory Therapist Retention And Perspectives On The Current Healthcare Climate At A Major Metropolitan Hospital.

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Background: Employee retention is imperative to healthcare success. High turnover rates are associated with increased organizational costs, including repetitive candidate searches, training time, and lost investment. The primary purpose of this study was to assess the factors related to respiratory therapist (RT) retention and perspectives on the current healthcare climate to inform retention and engagement practices. **Methods:** A survey was administered to 456 RTs currently employed (full-time and part-time) at a major metropolitan hospital in Atlanta, Georgia. The survey had a 66.2% (n=300) completion rate. Descriptive statistics were computed. This study was approved by the respective hospital ethical board. **Results:** Among RTs who completed the survey (n=300), approximately a third of participants have been practicing for over 20 years (32.7%) and 23.7% have been practicing for 5 years or less. Nearly half of RTs (47.7%) reported being satisfied as an RT, and 32.5% reported being very satisfied. The highest education level for participants included bachelor's degrees (44.7%), associate degrees (45.7%), and masters or higher (9.6%). When asked where participants see themselves in five years, 31.3% replied in their current role, 11.8% reported pursuing higher education, 23.2% reported retiring or leaving the respiratory therapy field, and 15.4% replied entering a management role. Participants were asked to specify one idea to implement for the entire respiratory therapy department, and 25.5% replied building teamwork and improving communication between staff and among leadership. Nearly 11% replied they would like to see more incentives or higher wages for staff. The other responses included more autonomy (10.4%), increased training and educational opportunities (8.0%), increase staffing (7.1%), and dedicated staff for specific areas of the hospital (9.9%). Regarding the state of RTs in the current healthcare climate, 40.0% of respondents reported positive answers, stating that respiratory therapy is an important and respected field of healthcare. However, 35.9% of respondents reported negative answers, including stating the field is underappreciated and regressing. Approximately 17% of participants stated neutral responses. **Conclusion:** Healthcare leadership should utilize responses from employee surveys to address retention and turnover rates among RTs. **Disclosures:** None; Sponsored Research-None.

Sponsored Research - None

3013629

Description Of The Practice Of Respiratory Therapists In The State Of Pennsylvania.

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Background: The Pennsylvania Respiratory Research Collaborative (PRRC) formed in January 2017 for the purpose of providing mentorship and opportunities to participate in statewide research, quality improvement, and evidence-based practice projects. The inaugural project was designed to investigate and describe the practice of respiratory therapists in Pennsylvania. **Methods:** A survey related to the practice and business of inpatient respiratory therapy departments was developed and sent to managers/directors of every hospital within the state of Pennsylvania. Survey period was October 2017 – April 2018. Survey committee members connected with Pennsylvania hospitals to determine contacts for the respiratory therapy department and to ask the manager/director to complete the electronic survey. A total of 188 hospitals with inpatient Respiratory Therapy departments were contacted and we were unable to obtain contacts for the manager/director 29 of the hospitals. **Results:** Out of 188 hospitals in the state, 101 (53.7%) responded. Of the hospitals that responded, 52% were academic centers. Clinical ladders are utilized in 29% of hospitals, 72% of which are academic centers. For staff positions, 50% prefer BS degree and 78% prefer RRT. Protocols are utilized in 74% of hospitals with the most common being: Ventilator (92%), Bronchodilator (79%), Airway Clearance (56%), Hyperinflation (41%), and Disease-Specific (23%). Nontraditional procedures are performed by respiratory therapists in 84% of the hospitals. The most common being: EKG's (35%) and advanced procedures including Intubation (20%), Arterial Lines (14%), Blind BAL's (14%), and EEG's (12%). Respiratory Therapists are utilized in 42% of hospitals. The most common alternative roles are: Patient Educator (29%), Outpatient clinics (21%), Patient Navigators (19%), Transport (14%), ECMO (6%), Case managers (5%), Research (5%), and Telehealth (2%). **Conclusion:** The practice of respiratory therapists in the state of Pennsylvania varies greatly with a small number of hospitals practicing at the apex of the profession. Additional research is needed to understand variations in practice.

Sponsored Research - None

3019759

Onboarding Experiences For New Respiratory Care Services Leadership.

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Background: A large percentage of leadership in management and education is expected to retire within the next decade therefore, there is a need to have a formal onboarding and succession plan in place for all levels of leadership in order to maintain positive growth and continued success. The purpose of this project was to identify current resources available to new leaders in respiratory care departments of large academic centers and to identify perceptions of current onboarding practices. **Method:** A nonexperimental research survey was distributed electronically consisting of ten questions that focused on the orientation resources, educational training and organizational preparedness. The survey was distributed to the directors of all University of California Medical Centers who were to share with their leadership team. **Results:** 27 participants responded to the survey. The findings showed an overwhelming agreement in lack of resources and formal onboarding procedures. A lack of a formal structure in orientation and mentorship has made transitions into new roles difficult and caused a delay in production. Findings also include that the continuation of training and support is inadequate for all levels of leadership. The current state of succession planning and organizational preparedness of the organizations within the survey pool is non existent or in its infancy at best. **Conclusion:** From the results of this study, respiratory care directors and administrators may better understand the challenges and needs of new leadership. Improved orientations and formal onboarding procedures may support those in management and education who are preparing to exit and those who are just entering.

Sponsored Research - None

See table or figure in supplement to the October 2018 issue of Respiratory Care at www.rcjournal.com.

3021398

Comparison Of Global Initiative For Chronic Obstructive Lung Disease (GOLD) Severity Classifications In A Lung Partners Population.

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Background: Lung Partners is an in-patient Primary Respiratory Care COPD Disease Management program. Patients were enrolled during an admission for a COPD exacerbation. All patients had spirometry and GOLD staging. Screening for anxiety, depression, sleep disorders, Literacy, and functionality among others were performed. We wanted to learn how the original or revised GOLD staging compared in our more severe population. **Methods:** All Lung Partner screening data and spirometry were downloaded into a database. Patients were staged both by original and current criteria. We had a population of patients with clinical diagnosis of COPD that had no obstruction (NO) on spirometry. Data tables were created for Stages III, IV, C, D, and NO for comparisons. **Results:** The number of patients in Stages III, IV, C, D, and NO were 176, 147, 33, 462 and 73. There was a significant difference in both anxiety and depression average scores between C and D patients. Anxiety and depression scores at or above 10 require intervention. Average anxiety scores: C=4.0 D=8.18, % of patients requiring intervention: C=9.1% D=30.7%. Average depression scores: C=4.59 D=8.98, % of patients requiring intervention: C=9.1% D=37.9% (all P<.001). NO group's anxiety and depression scores were similar to the D group. COPD Assessment Test (CAT) scores correlated with anxiety and depression scores: Spearman Correlation Coefficients, anxiety vs Cat: r=0.39220, P<0.0001, depression vs CAT: r=0.38483, P<0.0001. Sleep score triggers for the NO group were lower than the other groups: NO=37.3%, C=60.6%, III=56.1%, IV=53.9% (P<.02), D=50.1 (P=NS). C patients tended to have better Karnofsky performance scores. There were no differences in Literacy scores. NO patients had the following stages: I=2.8%, II=61.1%, III=30.6%, IV=5.6%, C=10%, D=90%. **Conclusion:** Anxiety and Depression are more pronounced as symptoms increase. A high CAT score can be used as an indicator to look for underlying depression and anxiety. Patients with clinical COPD without obstruction on spirometry have significant anxiety and depression. Both GOLD staging criteria are useful in evaluating our population. Disclosures Acevedo: Sunovion Advisory Board, Monaghan Medical consultant.

Sponsored Research - None

3022890

Creation And Validation Of A Hybrid Assignment Tool That Meets Budgetary Requirements While Accurately Reflecting Workload Reality.

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Background: Meeting patient care needs and labor budget should be synonymous in nature. In fact, many respiratory care departments struggle with aligning these two necessary metrics. The AARC created the Uniform Reporting Manual (URM), an evidence-based benchmark to reflect the productivity of therapist time spent at the bedside performing care. Yet, many hospitals do not incorporate these standards to create labor budgets. This study analyzed the use of a hybrid assignment tool to bridge the gap between therapist workload reality and a commercially available labor management/budget program. **Method:** A thorough analysis was conducted comparing and matching the 2012 URM to the procedural charge master for Levine Children's Hospital. All procedures were broken into 15-minute increments for ease of use and assigned based on the time standard provided by the URM. Example: SVN is assigned 15 minutes = 1 point, a ventilator is assigned 60 minutes = 4 points. This accounts for the acuity of each patient as they are different. Respiratory therapists work 12 hours which equates to 10.5 hours of value-added bedside care. This means that every therapist can perform 42 points worth of work safely. Our established target assignment is 36 points to allow for a 10-15% "pick up" of unaccounted work. The assignment tool, created in Excel, was posted to our SharePoint site for ease of use. Training was completed to ensure standard work. The effectiveness of the assignment tool was measured from 7/1/17 to 5/28/18 and compared to the daily Premier® productivity report. **Results:** Comparison of the assignment tool and the daily productivity report yielded only a 3.9% difference (Assignment tool 102.77% YTD, Premier 106.67% YTD). Also, no change was noticed in January when our standard comparison group changed from all procedure count to billable only procedure count. The assignment tool also identified, in real time, the need/opportunity to flex staff to volume. This resulted in an estimated cost savings of $57,249.92 (or roughly 1 FTE). The tool is easily adaptable to meet future budgetary and acuity demands. **Conclusion:** Bridging the gap between commercially available labor management tools and workload reality is not impossible, it is simply an exercise in translation. Development, creation, and validation of a live, working assignment tool is an opportunity to bridge that gap to ensure optimal patient care while meeting budget.

Sponsored Research - None

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3024932

Metered-Dose Inhaler Extra Dispenses: Oh, the Horror!

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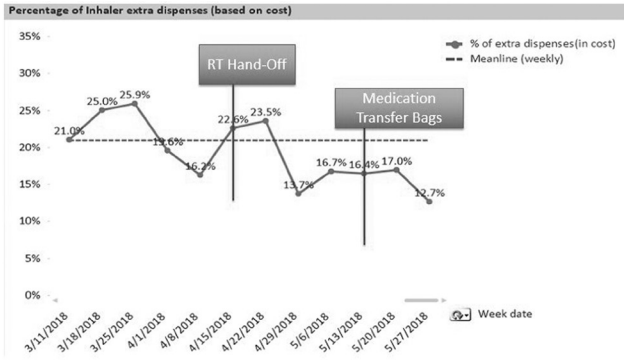
Background: Metered dose Inhaler (MDI) is one of the most common methods for inhalation medication administration in pediatrics and adults. The total annual spend associated with inhalers dispensed at our institution is $1,380,000 of that approximately 21% is due to replacing missing inhalers at the point of care. Upon investigation it was discovered that routine instances of missing inhalers were due to unstandardized storages areas, patient transfers, and change of shift. To decrease cost and improve efficiency, a team was established to verify and evaluate the problems and come up with solutions to improve practices around MDI administration. **Methods:** During the fall of 2017 a multidisciplinary team of respiratory therapists, pharmacists, pharmacy technicians, nurses, data analyst, and a process improvement advisor experts were brought together to evaluate the workflows around MDI administration throughout the hospital. The team developed a charter using the CHOP Improvement Framework to identify the biggest problem areas and develop actions for improvement. A series of PDSA cycles in three clinical areas targeting patient transfers, change of shift, and medication storage areas were introduced to test process improvement work. **Results:** Figure 1 illustrates the mean cost of having to dispense additional MDIs equals 21% of the total cost associated with MDI therapy. Creating a general awareness to the team before improvement work started, led to an initial 9.7% reduction from the previous high of 25.9%. The first PDSA cycle focusing on hand-off and transfer communication led to a cost drop of 13.7% of the total cost. The second PDSA cycle focused on the use of medication bags to standardize storage during patient transfer, this decreased the cost another percent to 12.7% of the total cost. **Conclusion:** Inhalation administration is a costly expense in healthcare organizations. Implementing simple systems aimed at improved communication around patient transfers and change of shift as well as standardizing storage methods can improve efficiency and decrease cost of delivering MDI therapy.

Sponsored Research - None



3025051

Secondary Traumatic Stress In Respiratory Therapists.

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Background: Secondary traumatic stress (STS), also known as compassion fatigue, is described as a syndrome of symptoms, such as avoidance, intrusions, or arousal, that occur due to having indirect traumatic exposure such as having interactions with persons or patients who are having direct traumatic exposure. Secondary traumatic stress can lead to physical, emotional, and work-related symptoms that can affect patient care and relationships with coworkers and patients. The indirect traumatic exposure is often linked with negative consequences such as higher compassion fatigue, increased negative cognitions about the self and the world, higher job burnout, and lower job satisfaction. Professionals that experience this may believe they can no longer serve their clients or patients and leave their job. The hypothesis for this study is that the Secondary Traumatic Stress Scale score will be in the high to severe range for Respiratory Therapists. **Methods:** The Institutional Review Board of Youngstown State University approved this study. Respiratory Therapists voluntarily took the "Secondary Traumatic Stress Scale" (STSS) in which consisted of 17 statements. The STSS was used with permission obtained from Brian E. Bride. This STSS was presented to the voluntary participants on a Facebook page called "Respiratory Therapy Breakroom" which is a private Facebook group for future, present, and past Respiratory Therapists. **Results:** The hypothesis was rejected. The results indicated that majority of Respiratory Therapists did not have high or severe STS. There were 432 responses to this survey, and 13 surveys were omitted due to unanswered questions. Forty-five of those participants had a score of <28 resulting in little to no Secondary Traumatic Stress (STS), 110 participants had a score of 28-37 resulting in mild STS, 86 participants had a score of 38-43 resulting in moderate STS, 60 participants had a score of 44-48 resulting in high STS, and 118 participants scored 49 or more resulting in severe STS Additionally, the results indicated that a Respiratory Therapists total STSS score, intrusion average, avoidance average, and arousal average did not increase when compared to the number of years worked. Bride, B.E., Robinson, M.R., Yegidis, B., & Figley, C.R. (2004). Development and validation of the Secondary Traumatic Stress Scale. Research on Social Work Practice, 14, 27-35.

Sponsored Research - None

3025347

Show Me The Money! Decreasing Incremental Overtime.

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Background: Incremental overtime was identified as having a major financial impact on a respiratory department. Incremental overtime (IOT) is defined as 15 to 30 minutes beyond a 12 hour shift. During the second half of fiscal year 17/18, the total hours of incremental overtime resulted in a financial impact of $6,000 dollars per month. A goal of IOT reduction by 50% was established. **Method**: To identify the primary causes of IOT, a sign-off tool was developed to complete when IOT was accrued. This allowed the supervisory team identify opportunities to reduce IOT. Analysis of data found three primary reasons for IOT: Barriers to giving and receiving report, clocking in late and therapist arriving to the unit for report late. Obstacles for giving and receiving report were: geography of institution, reporting to multiple therapists and having a completed hand-off. By providing coverage to therapists that were assigned to multiple areas, a reduction in late reports were seen. The second barrier, clocking in late, had a strong correlation to IOT accrual. Consistent reminders to staff of work time attendance policy and providing verbal feedback to repeat offenders had a significant impact. The third identified barrier was therapists arriving late to assigned units. Resolution of the two above causes directly affected this 3rd area, by correcting the first two causes staff were able to arrive to their assigned areas on time. **Results:** By identifying the most impactful causations, incremental overtime was reduced by 75% in the first half of the fiscal year. The three barriers impacting staff were identified as receiving/giving report to multiple therapists, clocking in late and arriving to assigned work areas late. Solutions were developed to reduce these barriers resulting in exceeding the goal. **Conclusion:** The goal was to decrease the frequency of IOT accrued by 50%. An action plan was made to; identify the root causes for the incremental overtime and made a resolution plan for the causes. For fiscal year 17/18, we have seen a reduction of incremental overtime by 75%. This equates to $8K a month. The overtime tool is an effective tracking mechanism which has helped narrow the reasons for overtime accrual. Due to the work environment, there will remain a percentage of unavoidable incremental overtime that is deemed acceptable if related to patient care. It is vital for leadership to follow through with staff who are repeat offenders of IOT to maintain these results.

Sponsored Research - None

3025431

Lateral Violence In A Respiratory Therapy Department.

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Background: Lateral violence (LV) happens in many different areas of the workforce and is prevalent in the medical field. LV can be seen on all levels impacting all health care providers. The Joint Commission (TJC) defines lateral violence as "repeated, health harming mistreatment of one or more persons by one or more perpetrators". Abusive conduct can be verbal abuse; threatening, intimidating or humiliating behaviors. This behavior can interfere with work productivity and have an effect on workers. In health care, this can be a patient safety issue. TJC states that 38% of health care workers reported psychological harassment. LV has been researched in nursing, however it has not been investigated in Respiratory Therapy. **Method:** An anonymous survey on LV, exempt by the Children's Hospital of Philadelphia (CHOP) IRB, was sent to all respiratory therapists employed to the inpatient respiratory therapy department. **Results:** 87 of 233 therapists responded to the survey (37%). Participants had 1-20+ years of experience and had been employed at CHOP for > 1 yr. 86% work in the ICU, 2.8% on general pediatric floors, 2.8% in long term care, and 8.3% in leadership. 42% had been a victim of lateral violence. 91% felt bullying is present in the department and 9 % felt they were a victim of LV. The most common form of LV (61%) within the department was found to be bullying from a peer. 77.8% believed bullying was not gender specific. When asked about the tactics of the bully, 44.4% believed humiliation was the main form of LV. Verbal abuse and shouting tied with slander at 22.2% and 75% believed the bully do not work alone. 83.3% believed staff sometimes tolerated the behavior and 16.7%s believed it was always tolerated. However it is believed that leadership is sometimes tolerating the behavior 75% of the time and 25% all of the time and 63.9% of participants believed that behavior has never been addressed. When asked if LV can have a negative effect on patient care, 55.6% responded with sometimes, 41.7% with always, and 2.8% with never. 52.8% responded they had been a victim or witnessed bullying by someone in a different department. Results on beliefs of how the company handles LV can be seen in table 1. **Conclusion:** This survey indicates that LV is believed to be present within the respiratory therapy department and the organization as a whole. Further inquiry should be initiated to gain a better understanding of the current issue and how to combat it.

Sponsored Research - None

Table 1. Summary of department beliefs on lateral violence

Question	Yes	No
Have you ever reported the bullying you witnessed or were a victim to?	69.4%	30.6%
Do you know your companies policy on bullying and disruptive behavior?	55.6%	44.4%
Do you know where to find your companies policy on bullying and disruptive behavior?	63.9%	36.1%
Do you think a zero-tolerance policy would decrease lateral violence?	69.4%	30.6%
Do you think lateral violence has an impact on employee retention?	91.7%	8.3%

3026007

Respiratory Therapist-Led COPD Education And The Impact On 30-Day Readmission Rates.

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Background: How can COPD patients be more empowered and become more proactive in maintaining their COPD treatment/medication compliance, reduce 30-day readmissions and help improve quality of life by avoiding hospitalization due to COPD exacerbations? Can pre-discharge COPD education led by a respiratory therapist (RT) help reduce 30-day readmission rates? We hypothesized: 1) that with one-on-one COPD education, provided by RTs, there will not be a significant change in 30-day readmission rates, and 2) there will be no significant difference between three RT educators and the effect on 30-day readmission rates among COPD patients. **Methods:** IRB approval was received (CPS18-03-09). This is a retrospective study of patients who received COPD education from October 2016 to September 2017. Three RTs performed pre-discharge COPD education on a total of 927 patients. For each patient educated, the patient's electronic chart in Meditech and COPD assessment spreadsheet were evaluated for inclusion. Demographics, smoking history, completion of post-discharge follow-up phone call and readmission rates 60 days prior and 60 days post COPD education was collected. Data was listed under the educating RT, for included subjects. A three-way ANOVA with a post hoc Tukey's HSD and Bonferroni test was used to compare the three RT educators. A t-test was performed for the pooled data, from all three RT educators, for pre- and post-education readmission rates. An alpha of <0.05 was considered significant. **Results:** Of the 927 patients educated 593 where included in the study. Table 1 provides overall pre- and post-results and Table 2 compares the three educating RTs. Therefore, rejecting the first hypothesis. However, when comparing each COPD RT educator there was no significant difference between them and the second hypothesis was accepted. **Conclusion:** Patients who receive pre-discharge COPD education provided by a RT demonstrated an increase in 30-day readmission rates. Further research is needed on this subject, including how a more thorough follow-up post discharge can affect readmission rates.

Sponsored Research - None

RT Educator 30-day Readmission Comparison

	Therapist A n=228	Therapist B n=238	Therapist C n=127
Readmissions: No Education	.20(.402)	.15(.359)	.22(.416)
Readmission: With Education	.31(.462)	.21(.411)	.30(.460)

*Mean(SD)

3019825

Respiratory Therapy Protocol Use To Drive Appropriate Resource Utilization And Decrease Hospital Length Of Stay.

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Background: As the landscape of healthcare reimbursement has changed, there is an increased emphasis on lowering costs and decreasing length of stay (LOS). As Respiratory Therapists (RT), our value is increasingly measured not by daily procedures performed but by our overall impact on LOS and quality metrics. Literature supports the use of respiratory protocols to decrease LOS and improve patient outcomes with appropriate resource utilization by ensuring treatments have established indicators. A quality improvement project to increase respiratory therapy protocol (RTP) usage on patients receiving scheduled respiratory therapy should decrease LOS while better utilizing resources and lowering costs. METHOD Utilizing the electronic medical record's embedded RTP order set, subjects were assessed by respiratory staff and placed on an appropriate therapy regimen determined by the scoring tool and therapy algorithms. For the RTP, subjects who scored ≤ 8 did not receive therapy and were placed on PRN therapy with daily assessments for 3 days. Subjects who scored 9 > received scheduled therapy based on therapy algorithm. To ensure RTP orders were placed on appropriate patients, a process was implemented to prompt providers to activate the RTP order set. Pre-intervention time was July 2016- April 2017 and Post-intervention period was July 2017- April 2018. **Results:** The LOS for our non-ICU COPD patients decreased from 4.16 in our pre-intervention period (Jul 2016-Apr 2017) to a post-intervention (Jul 2017-Apr 2018) average of 3.72 days, for a total reduction of 205 patient days and approximately $269,166 in cost savings. This was based on 350 unique patient admissions for a total of 1305 patient days for COPD LOS. The number of therapies per net equivalent patient day decreased by 11519 for the 10 month post-intervention period and was based on ALL patients with RTP order and therapy modification. The reduction in therapy allowed the RT staff to conduct the increased number of RTP's without adding additional staff. It was also noted the number of missed treatments decreased by 73% from July 2017 to April 2018. **Conclusion:** Utilization of a RTP showed a trend of decreased patient LOS for our patients with a primary COPD admission diagnosis. The implementation of RTP's decreased the number of treatments per net equivalent patient day. By better targeting appropriate therapy, we achieved more efficient staff utilization, while reducing missed therapies. DISCLOSURES None

Sponsored Research - None

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3025605

Using The DMAIC Process To Examine Variability In Extubation Practices In Different Intensive Care Units Relating To Management Teams.

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Background: In our Intensive Care Units (ICU) there was a perception of a delay between a successful Spontaneous Breathing Trial (SBT) and the time to which the patient is extubated. An SBT is used to predict a mechanically ventilated patient's ability to breathe on their own and is our standard of care for assessment in the process of extubation. Evidence suggests using a protocol to assess a patient's readiness for extubation. In our ICUs, a Ventilator Liberation Guideline (VLG) was used daily to assess the patient's readiness for extubation. SBT practices were reviewed in three Medical ICUs (MICU) and two Surgical ICUs (SICU), primarily managed by either Advanced Practice Practitioners (APP) or Medical Resident (MR) during the first phase of the DMAIC (Define, Measure, Analyze, Improve, and Control) process. The goal of the study was to examine variability in SBT practices across different ICU management teams. **Methods:** SBT practices from 12/1/17 - 4/30/18 were reviewed. Data points included start time of ventilation, time of successful SBT, time of extubation order entry, and time of extubation. Inclusion criteria were patients with the following characteristics: orally intubated, charted successful SBT, extubation order entry, and charted extubation time. A total of 487 intubations were examined. Patients were excluded if inclusion criteria were not met, the patient self-extubated, care was withdrawn, or if the patient had a tracheostomy. Data was entered into SPSS 24.0 and analyzed using analysis of variance (ANOVA) with Tukey's post-hoc analysis. **Results:** Table 1 below lists each unit's mean times for each process in the extubation process. The greatest mean difference was from a successful SBT to order entry. The results of the ANOVA indicate differences within the units for each of the measurements. Tukey's post-hoc analysis indicated that the MICU and SICU unit's mean time differences for all measured time points were statistically significant (P<0.05). Further analysis indicated there were no statistically significant differences in times in management team. **Conclusion:** The DMAIC process is used for operational improvement, identifying root causes, and proposing solutions. Variability in practices suggests room for improvement in the extubation process and investigating causal factors for length of time from a successful SBT to order entry. **Disclosures:** There is no financial interests or potential conflicts of interest.

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3004880

Comparative Study On Measured Volumes And Pressures For 2 Pediatric Ventilator Circuits.

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Background: This study was undertaken to determine if there were any functional differences between two pediatric ventilator circuits. An in vitro study was performed to examine compressible volumes and volume accuracy in 2 pediatric ventilator circuits, looking at differences in measured peak inspiratory pressure (PIP), and inspiratory and expiratory tidal volumes (V_{TI} and V_{TE}). **Methods:** Two pediatric ventilator circuits: Fisher/Paykel (F/P) and Intersurgical (I/S) were studied comparing compressible volume variances and the effect the different circuits had on PIP, V_{TI}, and V_{TE}. Four of each ventilator circuit types were used. The Servo *i* (PRVC, rate-20, PEEP-8, circuit compliance-on, I-time-0.75, IRT-0.15, and FiO_2-.21) was used to ventilate a test lung in both a normal lung model (Resistance = 5 cmH_2O; Compliance = 20 mL/cmH_2O) and an "injured" lung model (Resistance = 20 cmH_2O; Compliance = 10 mL/cmH_2O) with set V_T of 20mL, 50mL, 100mL, and 150mL. Flow and pressure waveforms were acquired utilizing a pneumotachograph (PNT) and a computerized digital recorder over 30 seconds. Five breaths were analyzed for each circuit and PIP, V_{TI}, and V_{TE} for both normal and "injured" lung models. Results are shown as mean ± SD. The circuit types were compared using t-tests with significance set at p <.05. **Results:** The measured mean compressible volumes for each circuit type were different: F/P (0.935 ± 0.005 mL/cmH_2O) and I/S (1.003 ± 0.023 mL/cmH_2O); p < .001. Overall, there were no significant differences in PNT measured PIP, V_{TI} and V_{TE} in either the normal lung model (p = .98, >.99, and .82; respectively) or the "injured" lung model (p = .88, .81, and .94; respectively). **Conclusion:** The compressible volumes for each circuit type were significantly different, although there would be a small difference clinically. With the circuit compensation mode engaged, no significant differences were noted in PIP, V_{TI}, or V_{TE} between the circuit types. This reinforces the practice of utilizing the circuit compensation mode and translates to accurate volumes being delivered even with small V_T utilized in the pediatric population. Although this in vitro study provides valuable information showing little difference between the circuit types, a thorough clinical evaluation in patients should also be conducted to validate overall performance.

Sponsored Research - None

3025865

Effect Of Changing Apnea Time In Premature Neonates Ventilated With NIV Nava.

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Background: Neurally Adjusted Ventilatory Assist (NAVA) provides proportional ventilatory support based on the patient's respiratory drive using a specialized catheter to measure the electrical activity of the diaphragm (Edi). Respiratory variability and apnea are challenges when treating the premature infant. With NAVA, if the neonate has a respiratory pause lasting more than a predetermined time (apnea time), back up pressure control ventilation is provided until an Edi is detected and NAVA ventilation resumes. In theory, this allows the clinician to set a minimum spontaneous respiratory rate. Short apnea times provide backup ventilation during periods of normal physiologic respiratory variability potentially resulting in over ventilation and suppression of spontaneous respiratory drive. Longer apnea times may allow more spontaneous ventilation but potentially result in clinical deterioration from insufficient respiratory support because of longer periods without ventilation. The objective of this study is to determine the effect of changing the apnea time in neonates on non invasive NAVA (NIV-NAVA). **Methods:** Two center, prospective, one-factorial, interventional study of neonates on NIV-NAVA. Apnea time was randomly set at either 2 or 5 seconds for two hours and then interchanged. Clinically significant events (CSE), Edi Peak/Min, and switches/minute to backup (switches/min) and %/minute in backup (%/min) were collected. Statistics were paired t-tests. IRB approval obtained. **Results:** Fifteen neonates 26±1.6 weeks gestational age weighing 893±202 grams at birth were studied at 15±16 days. Diagnoses included respiratory distress syndrome, apnea of prematurity. All neonates received caffeine. At 2 versus 5 second apnea time, switches into back up decreased from 2.5 to 0.5 switches/min (p < 0.000003) and time spent in back up decreased from 9 to 2%/min (p < 0.00002). There was an increase from 2 to 7 CSE/hour (p < 0.0003). Edi Peak and Min were unchanged. **Conclusion:** Neonates on NIV NAVA have fewer CSE while on a shorter apnea time, although they spend slightly more time in back up ventilation. Over 90% of ventilation was spontaneous in NAVA for both groups. Edi Peak and Min remained similar despite changes in apnea time, therefore neonates were not over supported during periods of normal respiratory variability. This suggests short apnea times should be utilized for patients ventilated with NIV NAVA to promote clinical stability and decrease CSE.

Sponsored Research - None

3010596

Transition From An Acute Care Ventilator To A Home Ventilator In Children Post-Protocol Initiation.

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Background: Transitioning to a home ventilator can present many challenges and may not always be accomplished initially. A previous study of changing to a home ventilator for long term ventilation revealed several attempts in some cases before successful transition was achieved.[1] As a result, a protocol was developed to standardize the process for trialing the home ventilator in efforts to reduce the number of failed transitions which may impact length of stay (LOS). The protocol includes a readiness assessment, stepwise approach for transition to the home ventilator and criteria for unsuccessful transition and return to the acute care ventilator. **Methods:** This study was approved by the local Institutional Review Board. A retrospective analysis was conducted to evaluate transition from an acute care to a home ventilator following protocol initiation. Medical records were reviewed for children with a tracheostomy requiring ventilation who were changed to a home ventilator after the protocol was implemented. Age, diagnosis, ventilator settings, LOS and number of transition attempts to a home ventilator were reviewed. **Results:** A total of 27 ventilator dependent patients with chronic respiratory failure were included in the study. The mean age at the time of the initial home ventilator trial was 14 months. The majority, 78%, were preterm infants with bronchopulmonary dysplasia. Following initiation of the protocol, 52% were successful on the first attempt to transition to a home care ventilator while 33% required a second attempt. In 15%, a third or fourth trial was necessary before transition was sucessful. The maximum number of attempts was 4 and the mean was 1.8. Mean LOS was 9.1 months. Prior to the protocol, the mean number of attempts was 3.8, 18% were successful on the first trial with a home ventilator, and the mean LOS was 14.5 months.[1] **Conclusion:** Children requiring long term ventilation have complex medical needs. Many factors including disease process and social determinants can impact the transition from an acute care to a home ventilator. A protocol to establish readiness to transition and standardize the approach to transition from an acute care to a home ventilator may assist in decreasing the number of attempts to change devices and reduce LOS. **References** 1. Lowe G, Cockerham J, Willis R, Carroll J, Agarwal, A. Transitioning Chronically Ventilated Pediatric Subjects from the Servo *i* to a Home Care Ventilator. Respir Care 2015;60(10):OF40.

Sponsored Research - None

3018357

Is A Lung Protective Strategy Routinely Used For Pediatric Patients In The ICU?

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Background: Tidal volume (VT) selection for pediatric patients undergoing mechanical ventilation continues to be a controversial issue. While ideal body weight (IBW) has been recommended to select VT, actual body weight (ABW) is often used. The purpose of this study was to determine if tidal volume selection was based on IBW or ABW, and if selection was based on using a lung protective strategy. **Methods:** Retrospective chart review of patients less than 18 years of age, admitted to a pediatric ICU in an academic-affiliated institution. Subjects receiving mechanical ventilation during general anesthesia for surgery or anticipated mechanical ventilation to be less than 48 hours were excluded. Demographic information, vital signs, arterial blood gases, and ventilator parameters upon admission to ICU (FiO_2, VT, PEEP) were collected. Lung protective strategy, in regard to VT selection, was defined as 6-8 mL/Kg. **Results:** Data was collected from 30 patients admitted to a PICU between Jan of 2017 and March of 2018. Mean age 7.3 years (+/-5.8). SIMV VC was selected in 97% of the patients included for analysis. The mean VT selected in this group of patients was 7.65 mL/Kg (+/-2.55; range: 2.78-12.08; IQR 5.3-8.2) when ABW was used. Mean VT in mL/Kg (IBW) was 7.04 (+/-2.36; range 4.0-18.37; IQR 6.5-8.2); *P*=0.24. Mean ventilator length of stay was 4.1 days (range: 0.13-25; IQR 0.9-5.7). PEEP level was 5.9 cm H_2O (+/-1.7) and FiO_2 was 0.65 (+/-0.26). On 21 patients, where ABG were available, the P/F ratio was 309.3 (+/-188) and oxygen index 5.2 (+/-5.7). When IBW was used, 26.6% of the patients where set on a VT <6 ml/Kg while in 30% VT was set > 8ml/Kg. **Conclusion:** Most pediatric patients in the ICU receive a mean VT between 6 and 8 mL/kg despite the weight scale selected. Although VT selection in these pediatric patients was not significantly different if IBW or ABW is used, there is still a large percent of patients for whom VT is selected outside the range considered as lung protective.

Sponsored Research - None

3012714

Bench Evaluation of 2.0 Endotracheal Tubes With High-Frequency Jet Ventilation.

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Background: Recently there has been some discussion on using 2.0 Endotracheal Tube(ETT) in the neonatal patient population. Recent advances in technology and the medical community has expanded resuscitation to smaller patients that require smaller ETT's. Very little data on performance of 2.0 ETT in conjunction with the High Frequency Jet Ventilator(HFJV). We developed a bench testing strategy to evaluate the 2.0 ET tube and Bunnell LifePulse 204 (HFJV) ventilator (Salt Lake City, Utah) in our test lung (TL) model. Method: A HFJV and Drager Evita XL (XL) (Coppell, Texas) were prepared. A 2.0 ET tube was fitted with a 2.5 LifePort ETT adaptor. The ETT was connected to a TSI certifier FA Plus (Shoreview, Minnesota) and imtmedical Smartlung Infant (Buchs, Switzerland). The TL was set on a compliance of 1.02 ml/cmH_2O and resistance of 5. PIP and PEEP measurements were taken when stable. Changes to various settings were made on the HFJV and XL. Setting used were: Itime of .02, .03, .034 and PEEP of 5, 8, 10, 12, 14 and PIP 25, 35, 45, 50 and Rate of 300, 360, 420. **Results:** Across all values: PIP minimum average (min) 13.1, maximum average (max) 21.3 and PEEP min 10.7, max was 19.3 and Delta P min .2, max 3.2. TL PEEP average 62% higher than set. TL PIP average 67% lower than set. **Conclusion:** In our TL model significant attenuation and inadvertent PEEP was identified. Inadvertent PEEP increased as PIP increased, and Delta P decreased as PIP increased. Attenuation also increased with PIP increase. Further research with other lung models may be indicated as our results were limited to a fixed compliance with no leak.

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3025821

Using A Multi-Disciplinary Team To Optimize Initiation And Management Of Early Respiratory Strategies For Patients At Risk For Chronic Lung Disease.

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Background: Akron Children's Hospital (ACH) NICUs' chronic lung disease (CLD) rate increased despite continued efforts to concentrate work in this area. We hypothesized that membership in the Vermont Oxford Network Minimizing Lung Injury Homeroom with a more collaborative, multi-disciplinary direction could improve outcomes. **Method**: A pilot process and algorithm was designed within the multi-disciplinary group to address ventilation and surfactant strategy from intubation to extubation. An intense weekly meeting schedule was designed with medical providers, nursing, family representatives and respiratory therapists. The key drivers of change included the application of an updated ventilator algorithm, education to the staff, and several PDSA (plan do study act) cycles. These were implemented to standardize a respiratory strategy including the use of early nasal continuous positive pressure (NCPAP), earlier surfactant administration with more precise intubation criteria, and timely extubation to non-invasive ventilation (NIV). The primary goal of decreasing intubated time on the ventilators was reflected by comparing the VON data of conventional ventilation at 36 weeks gestation age. Statistical tests used were T-test and Z-test. **Results:** Data was analyzed for infants ≤29 weeks pre-implementation in 2016 (n=25) and in 2017 (n=19) after implementation of the algorithm. The primary goal of decreasing time on the ventilator trended toward improvement with extubation time from 34 to 21 hours after implementation of the algorithm (p = 0.09). Timing to administration of surfactant was 64 minutes pre-implementation and trended downwards to 36.5 minutes (P=0.06) after implementation of the process. The primary goal of decreasing intubation time was demonstrated with 26% of the infants in 2016 compared to 7.2% in 2017 (P=0.013). There was no difference in the pneumothorax rate which was used as a balancing measure. **Conclusion:** Use of the multidisciplinary team, frequent education forums and algorithms has trended towards less intubation time, less time to surfactant administration, and fewer patients on ventilators at 36 weeks gestational age. We anticipate that with larger numbers of patients and the continued efforts of this multi-disciplinary collaborative effort in the NICU, patient outcomes will continue to improve.

Sponsored Research - None

3012008

Management And Correlation Of Transcutaneous Monitoring With Blood Gases In Extremely Premature Infants On Invasive Mechanical Ventilation.

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Background: Carbon dioxide (CO_2) is a potent regulator of cerebral blood flow (CPF). Preterm infants are particularly vulnerable to changes in CBF, due to impaired autoregulation of arterial vessels. The regulation of CO_2 levels is important during the management of invasive mechanical ventilation in infants with RDS, as this value frequently changes. Hypercarbia, hypocarbia, & fluctuations in PCO_2, are all associated with a variety of adverse events (AEs), many of which occur during the first 72 h of life. However, blood gases cannot be used for continuous monitoring, therefore we implemented a pilot of transcutaneous (Tcom) CO_2 monitoring to improve management of this variable. **Methods:** We prospectively studied infants ≤28 weeks gestation on invasive mechanical ventilation with Tcom CO_2 monitoring. Demographic information was collected along with blood gas results extracted from the medical record. Data downloaded from the Tcom, including monitoring time (MT), CO_2 values, date/time, heating power (HP; perfusion measure) & drift were matched with corresponding arterial or capillary blood gas results. Descriptive statistics were used to summarize patient characteristics & management issues, while the Pearson correlation coefficient was calculated to determine the strength of the linear relationship between blood gases & Tcom values (n=250 matched pairs). **Results:** The median age of all infants (n=12) was 24+4 d (23+6 – 25+6 d), with median weight 622.5 g (IQR 460-840 g), and 7 were male. Data show that the Tcom was ordered immediately post birth in only 2/12 infants. Two infants were placed on the Tcom ≤ 2 days post birth; 3 at 3 days post birth; & 5 infants 4-days post birth. Data show above-average technical drift (4-6 mmHg) during extended monitoring with the Tcom (average 25% of MT). In addition, all subjects experienced significantly high relative HP values (< -10 mW; average 30% of MT) without troubleshooting of probe placement. All subjects also experienced extended periods with the probe removed (average 30% of MT). The Pearson correlation coefficient results (r) = .74 (P < .001). **Conclusion:** There were important issues related to sensor management which could have affected the bias of displayed Tcom to blood gas results. While the correlation between blood gases and the Tcom monitor was good, better management may improve this value as there were many outliers. Tcom monitoring is feasible in ELBW infants, but few were placed promptly on the monitor.

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3023093

Influence Of Neonatal Side Stream End Tidal CO_2 Adaptor On Breathing/Ventilation In Infant Olive Baboons.

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Background: Neonatal end tidal CO_2 adaptors for side stream air sampling have been introduced into practice with the assumption that the very small instrumental dead space of the adaptor does not influence ventilation of infants. We wished to test this assumption in an animal model. **Methods:** 7 infant olive baboons (*Papio anubis*) were sedated with a ketamine/acepromazine mixture, intubated with a cuffed endotracheal tube and allowed to breathe spontaneously while been attached to AVEA ventilator. We used the FilterLine® adaptor (A) for the experiment. The ventilation parameters were recorded as follows: spontaneous breathing with no A, with A placed between ETT and ventilator's hot wire flow sensor (but with no air sampling), and with A sampling air at 50 ml/min. The statistical analysis was performed using ANOVA. **Results:** Average weight of baboons was 1.9 kg. Placement of A without sampling the air decreased respiratory rate (RR) from 45 at baseline to 42.9 (by 4.7%) breaths per minute (P<0.01), increased tidal volume (V_T) from 7.6 at baseline to 8.2 mL/kg (by 7.9%, P<0.01) and increased minute ventilation (MV) from 466 at baseline to 502 mL/kg/min (by 7.7%, P<0.01). Running the CO_2 sampling device increased air leak from the circuit from 1.4 to 7.2%. Active sampling of the air from A mitigated the effect of A placement: RR was minimally increased, V_T decreased to 8.0 mL/kg (P=0.1) but significantly reduced MV to 497 mL/kg/min (by 1%, P<0.01). The difference was non-significant for all parameters when baseline was compared with A in actively sampling mode. **Conclusion:** Contrary to initial assumption, the adaptor showed small but statistically significant influence on the ventilation parameters. The changes are physiologically expected in this kind of intervention. Increasing MV in response to the increase in instrumental dead space and in response to the increase in resistance, the RR decreased while the V_T increased. Sampling the air from the circuit mitigated the influence of A mainly on MV, but not RR. This is not surprising, taking in consideration that the sampling did not change resistance of the system, but reduced effective dead space by removing void air from the instrumental dead space. The results of this study could be confidently extrapolated to premature infants. The clinical significance of the changes in ventilation, imposed by the end tidal CO_2 adaptors, needs to be evaluated.

Sponsored Research - None

3021584

Implementation Of A Ventilator Weaning Pathway Reduces Length Of Mechanical Ventilation.

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Background: The CHOP pediatric intensive care unit (PICU) mechanically ventilates approximately 500 patients for greater than 24 hours each year. Mechanical ventilation, while a life-saving therapy, introduces potential for infection, lung injury, and increased sedation. Prolonged intubation can also unnecessarily extend ICU and hospital length of stay. Ventilator weaning protocols and protocolized extubation readiness testing shorten the length of mechanical ventilation and ICU stay when applied to appropriate patients. **Methods:** In 2015, a multidisciplinary PICU team of respiratory therapists (RTs) and physicians developed and implemented a ventilator weaning protocol. The team reconvened in July of 2017 to increase pathway utilization with a SMART aim: To increase pathway utilization from 35% to above 50% by December 2017. With increased utilization, the team hoped to reduce duration of mechanical ventilation and ICU length of stay. Multidisciplinary educational interventions and clinical supports using the electronic health record (EHR) were utilized to increase pathway use. RTs, Physicians, and nurses were educated through screensavers, and presentations at monthly division meetings. An EHR workbench report was developed to provide RTs with a list of eligible pathway patients to discuss on rounds. New flowsheet rows were added to RT documentation to identify reasons for delaying ventilation weaning and help initiate conversations about appropriate ventilation weaning decisions. **Results:** These interventions increased pathway utilization to above 50%, which has been sustained since December 2017. The mean time from criteria for pathway enrollment to extubation was shorter in those placed on the pathway (101 hrs vs 147 hrs). In addition, the total length of mechanical ventilation for patients on the pathway was lower (5.2 days) compared to those who qualify but were not enrolled on the pathway (6.8 days). Despite this reduction, reintubation rates have remained unchanged.**Conclusion:** We demonstrate increased utilization of the Ventilator Weaning Pathway through iterative improvements in pathway education and utilization of EHR tools. Increased utilization of the pathway also led to decreased length of mechanical ventilation without increasing reintubation rates. Ongoing work is necessary to continue to further decrease length of mechanical extubation, time from extubation readiness to actual extubation, and ICU length of stay.

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3014721

Reducing Unplanned Extubations In Pediatric And Cardiac Intensive Care Units.

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Background: Unplanned Extubations (UPE) can lead to increased mortality, morbidity, and length of stay. In 2016 UPEs in PICU (0.41) and CVICU (0.34) met or exceeded the national average of 0.42 and 0.2 per 100 ventilator days in our hospital, leading to this project. In pediatric and cardiac intensive care units does endotracheal tube taping standardization, landmark documentation, and tape integrity assessments, compared to current practice decrease the rate of unplanned extubations? **Methods:** A collaborative, multidisciplinary UPE Taskforce was formed. Solutions for Patient Safety initiatives shown to be effective in reducing UPEs were adopted. A pre- and post-intervention data review was conducted, suggesting several areas for improvement. Three interventions adopted: a standardized four-hour tape integrity assessment; a single method of tube securement; and documenting measurement from an anatomical reference point via staff education. **Results:** Rate of UPE per 100 ventilator days for April 2017-September 2017 were 0.463 for PICU and 0.595 for PICU. After intervention of standardized tape method, staff education, and standardizing anatomical reference points the rate from October 2017-March 2018 for PICU per 100 ventilator days was 0.472 (2.068% change) and for CVICU was 0.664 (11.569% change). **Conclusion:** UPE reduction was not achieved through standardized taping technique, establishing anatomical reference point, and tape integrity checks. Upon review of causative agents, patient repositioning and tube re-taping are commonplace. Future projects should include: longer data collection period, Risk Assessment Scoring for high risk patients, and additional support clinician during high risk procedures to maintain airway. These suggestions are consistent with new Solutions for Patient Safety recommendations. **Disclosures:** None.

Sponsored Research - None

3017210

Inclusion Criteria For Extubation Readiness Testing In The Pediatric ICU—Too Exclusive?

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Background: Extubation Readiness Testing (ERT) is a respiratory therapist (RT)-driven and monitored protocol of minimal ventilator support to test readiness for ventilator discontinuation. A protocol was developed and implemented as a quality improvement initiative in our pediatric intensive care unit in March 2017. Upon QI implementation, we observed ERT completed on patients who did not meet inclusion criteria, as decisions were made by the medical team on a case-by-case basis. The objective of this study was to determine if meeting inclusion criteria for ERT is predictive of ERT success. **Methods:** ERT data from March 2017-May 2018 was included (IRB approval). ERT was completed by the bedside RT at the direction of the medical team. Documentation, including ventilator settings and baseline and post-ERT physiologic parameters were entered into the electronic medical record by the bedside RT. Additional data extraction by the research team included demographics (age, sex, days of mechanical ventilation), information about screening and inclusion criteria. Patients receiving ERT were divided into 2 groups for data analysis: those who met inclusion criteria for ERT and those who did not. **Results:** During the study period, ERT was completed 158 times in 121 patients aged 5 days-24 years. Of these tests, 56% did not meet inclusion criteria. In patients who met inclusion criteria, 55% passed ERT, while 42% of those patients who did not meet inclusion criteria passed their ERT (P=0.15). After adjusting for age and ventilator days, meeting inclusion criteria was not significantly associated with passing ERT (OR 1.54;CI:.0.71-3.3). Primary reasons for not meeting inclusion criteria among those who passed ERT was a recent increase in ventilator support 48% and a blood gas outside the desired pH 36%. Among all tests where extubation occurred within 24 hours, only one child who passed ERT required reintubation within 48 hours. In contrast, 6 of 51 (12%) children who failed ERT were reintubated within 48 hours of extubation (P=0.046)-none of these patients had met the inclusion criteria for the ERT. **Conclusion:** Our data suggests meeting inclusion criteria is not consistently predictive of ERT success, however failure is associated with reintubation if extubation is performed. Further investigation is needed to determine ideal inclusion criteria to streamline patient selection for ERT and optimize respiratory outcomes for a heterogenous population of PICU patients. ***Disclosures*** None.

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3017643

Impact Of Neonatal Airway Emergencies In A Large Children's Hospital.

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Background: Children's hospitals often care for highly complex infants with severe rare birth defects including airway abnormalities that make standard airway management challenging. Our hospital has established a specialized multidisciplinary airway program that cares for these infants with difficult/critical airways including an emergency airway response team consisting of anesthesia and ENT providers. We also have an ongoing quality improvement database: National Emergency Airway Registry for Neonates (NEAR4NEOS) to capture safety data on all tracheal intubations (TIs) in the Special Delivery Unit (SDU) and neonatal intensive care unit (NICU). We sought to evaluate the current status of emergency airway management in these high risk difficult/critical airway infants in our hospital. **Methods:** Retrospective review of the all emergency airway activation in NICU and SDU at the Children's Hospital of Philadelphia from January 2016 – April 2018. Both Emergency Airway Response Database and the NEAR4NEOS database were reviewed by a content expert (NN) to describe the safety and outcomes. **Results:** Of the 1,009 intubations that occurred during the study period, 33 (3%) airway emergences were activated. Of these 33 activations (31 in neonatal ICU, 2 in SDU), 14 had existing endotracheal tube (8 unplanned extubations), 6 had existing tracheostomies, and 11 had natural airway. 25 required TI, 6 had re-insertion of tracheostomy cannula, and 2 had confirmation of airway placement with no need for adjustment. Of the 22 TIs (3 excluded, 1 taken directly to operating suite and 2 did not have NEAR4NEOS data), 20 were successful (90%), with median 4 (IQR 1-11) attempts and 2 (IQR 1-5) providers. Table 1 shows the advanced resources used for TI. Adverse tracheal intubation associated events occurred in 41% of the cases with 4 having dysrhythmia, 3 having cardiac arrest with return of spontaneous circulation, and 1 died due to failure to establish airway. 77% (17/22) had more than 20% of decline in oxygen saturation level during the intubation procedure. **Conclusion:** Activation of the emergency airway team is uncommon. In patients when it is activated, a high percentage are able to be intubated. However this requires expertise with a number of advanced airway devices and is still associated with a high rate of adverse events. Ongoing hospital wide difficult airway system with multidisciplinary teams and expertise are necessary to continue to improve our current practice.

Sponsored Research - None

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3006440

Noninvasive Ventilation Device-Related Pressure Injury In Pediatrics: A Correlation Study.

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Background: Non-invasive positive pressure ventilation (NPPV) contributes to the development of Pressure Injury (PI) in a significant number of hospitalized pediatric patients. PIs contribute to higher costs for the hospital, patient pain and suffering, increased infection rate, disfigurement, and length of stay. While skin contact pressure has been investigated for correlation with pressure injury, there is very little information about the amount of leak acceptable for maintaining NPPV. This study aims to examine the relationship between NPPV device related PIs, mask leak, and other risk factors. **Method:** An IRB approved observational retrospective chart review was conducted on all pediatric patients on NPPV with Respironics BiPAP ST machine at a 551 bed Pediatric Hospital from July 1, 2013-June 30, 2015. Patients who use NPPV at home and CPAP only were described as a separate group for review. Patients off NPPV > 24hrs, and restarted within the same admission, were assigned as an additional NPPV event. PIs were described using NPUAP scale. The following variables were collected for correlation: Braden Q scores, days in hospital, time on NPPV, presence/absence of PI, PI severity, time to PI formation, style of mask, frequency of mask alternating/repositioning, amount of leak, PIP, presence of chronic diagnosis, age, and gender. Data analysis was completed using descriptive statistics for all outcome and predictor variables. **Results:** 255 subjects age 2 months–35 years (mean 11.25) with 343 events were enrolled. Of these events, 7.2% (25/343) developed PIs. One patient had PI during the same admission, but seperate NPPV event. The correlation of Max Leak (P=0.005), Min Leak (0.001), and Leak 9th percentile (<0.01) were statistically significant with the development of PIs. Other variables that significantly correlated with PIs include age (P=0.008), time on NPPV (P=0.002), Braden Q (P=0.011), and max IPAP level (<0.001). There was no correlation between patients who use NPPV and PI versus those who do not. **Conclusion:** Identifying the primary factors that correlate with NPPV device related hospital acquired PIs promotes frequent monitoring of skin integrity, especially in those with correlating risk factors. Having identified minimum and maximum leaks as statistically significant in pediatric patients provides us with new knowledge that can help us in assessing proper fit of our interface. **Disclosure:** Ellen Browning Scripps Foundation Research Scholarship
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3008897

A Respiratory Therapist-Driven Asthma Pathway Reduces Hospital Length Of Stay In The Pediatric Intensive Care Unit.

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Background: Asthma is a common reason for pediatric intensive care unit (PICU) admission. Since June 2014, our institution has used a pediatric asthma management clinical pathway for all patients, including those in PICU. The pathway promotes respiratory therapist driven bronchodilator weaning based on the modified-pulmonary index score. This pathway was associated with decreased hospital length of stay (LOS) for all pediatric asthma patients; however the effect on PICU patients was unclear. We hypothesized that the implementation of a pediatric asthma pathway would reduce hospital LOS for asthmatics admitted to the PICU. **Methods:** Following IRB exemption as quality improvement, the medical records of all pediatric asthma subjects aged 2 to 17 years of age admitted to our PICU between June 2013 and November 2017 (before and after pathway initiation) were retrospectively reviewed. Subjects were identified via ICD9 and ICD10 codes. Primary outcome was hospital LOS. Secondary outcomes were PICU LOS and time on continuous albuterol. Data were analyzed using the Chi-squared test for categorical data, t-test for normally distributed data, and Mann-Whitney test for non-parametric data. **Results:** We identified a total of 203 eligible subjects (49 in the pre-pathway group and 154 in the post group). There were no differences between groups for age, weight, gender, home medications, cause of asthma exacerbation, medical history, or route of admission. There were significant decreases in median (interquartile range) hospital LOS 2.7 (1.6-4.0) vs. 4.4 (2.9-6.6) days, P<0.001, median PICU LOS 1.6 (0.8-2.4) vs. 2.1 (1.3-4.0) days, P=0.003, and median time on continuous albuterol 27 (13-42) vs. 39 (25-85) hours, P=0.001. Significantly more subjects in the post-pathway group were placed on high-flow nasal cannula (32%, vs. 6% P=0.001) or noninvasive ventilation (10%, vs. 4% P=0.03). Subjects in the post-pathway group had lower mean admission heart rate (152 ± 19 vs. 160 ± 18 bpm, P=0.006) and respiratory rate (39 ± 13 vs. 45 ± 12 bpm, P=0.006). There were no significant differences between groups for SpO_2, FiO_2, or temperature. **Conclusion:** The implementation of an asthma pathway was associated with decreased hospital LOS, PICU LOS, and time on continuous albuterol. There was also an increase in HFNC and NIV use post-pathway.
Sponsored Research - None

3009531

Novel Endotracheal Tube For Monitoring Static Lung Compliance In Real-Time.

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Background: Ventilated patients in ICUs are susceptible to alveolar barotrauma due to unrecognized alterations in lung compliance. In order to evaluate lung compliance accurately, clinicians must conduct inspiratory holds and prevent spontaneous inspiration to determine airway plateau pressure (P_{Plat}) and static lung compliance (C_S). Although monitoring C_S is advised for optimal lung-protective ventilation strategies, it is rarely done due to the patient burden of inspiratory holds. We hypothesize that a novel endotracheal tube (ETT) with a distal airway pressure (P_D) sensor that bypasses flow-dependent airway resistance can report P_D equivalent to P_{Plat} for the real-time monitoring of C_S. **Methods:** The prototype ETT has an embedded P_D sensor (MS5637-30BA) and was tested within an artificial trachea connected to a test lung. Control tests were conducted using a mechanical ventilator under volume control (VC) from 100-1000 mL tidal volumes (V_T) with no mucus. To evaluate device performance, VC tests were conducted from a V_T of 100-300 mL with varying levels of airway resistance/obstruction, which were simulated by distributing 5, 10, and 15 mL of 3% Sentry™ POLYOX™ WSR Coagulant NF Grade synthetic mucus within the ETT. For each trial, the P_D, peak inspiratory pressure (PIP), and P_{Plat} were recorded, and the corresponding compliances were calculated. A t-test was performed on compliance averages from 100-200 ml V_T with 10 ml and 15 ml mucus. **Results:** The trends between the obtained pressures during VC testing can be visualized in Fig. 1. Compliances calculated at a V_T of 100-200 mL at varying mucus levels demonstrated no statistically significant differences between C_S obtained from P_D and P_{Plat} (8.85 & 9.01 and 9.05 & 9.01 mL/cmH_2O at 10 & 15 mL mucus, respectively), but showed statistically significant differences ($p < 0.05$) between these two values and compliances obtained from PIP (5.81 & 5.12 mL/cmH_2O at 10 & 15 mL mucus, respectively). **Conclusion:** During testing, differences in P_D and PIP increased in correlation with mucus levels, while P_D and P_{Plat} differences remained similar (Fig. 1). At 10 and 15 mL of mucus, the P_D peaked at P_{Plat} with no statistically significant difference between the C_S obtained from these readings, demonstrating that the device can accurately monitor P_D as a surrogate for P_{Plat} with no need for inspiratory pause. Therefore, this device allows for breath-to-breath evaluation of C_S without interruption of mechanical ventilation.
Sponsored Research - None

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3011132

A Randomized Controlled Trial Comparing The Effectiveness Of Lung Expansion Therapy Following Upper Abdominal Surgery In Adult Human Subjects.

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Background: Lung expansion therapy (LET) is often ordered after surgery to improve alveolar ventilation and reduce risks of postoperative pulmonary complications (PPC). The impact of LET at altering distribution of ventilation in nonintubated patients has not been described. The primary purpose of this study is to determine if there is a difference in dorsal redistribution of ventilation and incidences of PPCs when comparing Incentive Spirometry (IS) to EzPAP LET after upper abdominal surgery. Our a priori null hypotheses is that there are no differences. **Methods:** This IRB approved prospective randomized controlled trial enrolled adult human subjects who underwent upper abdominal surgery from January 2017 to April 2018. Subjects were allocated to receive LET with IS targeting predicted inspiratory capacity or EzPAP targeting 15 cmH_2O TID on postoperative days (POD) 1-5. An electrical impedance tomography (EIT) device (Pulmovista 500; Dräger) was connected to subjects for a single LET session on POD 1, 3, and 5 to measure baseline changes in post-LET dorsal end-expiratory lung impedance (ΔEELI %). LET sessions with EIT included 2-min normal breathing, 3 breath cycles x 10 breaths, and 2-min normal breathing after breath cycle 3. The EIT device was removed after POD monitoring sessions but LET continued as scheduled. PPCs were screened until hospital discharge. Mann-Whitney U, χ^2, and Fisher's exact tests were applied as appropriate. Data is reported as count (n), percent, and median [IQR]. Alpha (2-tail) is < .05. **Results:** 81 subjects were enrolled to receive IS (n=41) or EzPAP (n=40) LET. Groups were equal for descriptive characteristics such as age (62 [52-71]), sex (57% female), BMI (28.1 [24.7-33.6]), ARISCAT PPC risk index (Score=41; intermediate risk) and comorbidities (P > .05). Whipple (38%) and hepatic resection (30%) accounted for the majority of surgical procedures. Protocol adherence (93% vs 89%, P = .39) and study dropout (4% vs 1%, P=.37) was similar between groups. Post-LET dorsal ΔEELI % increased for both groups, but median dorsal ΔEELI % for IS and EzPAP on POD 1 (16% vs 13%, P=.42), POD 3 (5% vs 6%, P=.42), and POD 5 (12% vs 9%, P=.95) was not significantly different. Hospital length of stay (4 days, P=.79) and incidence of PPCs (1% vs 4%, P=.19) was also similar. **Conclusion:** There is no difference in post-LET dorsal redistribution of ventilation or incidence of PPCs among adults who receive IS or EzPAP TID after upper abdominal surgery.
Sponsored Research - Drager provided the electrical impedance tomography device that was necessary to complete this study. No financial contributions were received.

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3013546

Does Acetic Acid Solution Decrease Trach Stoma Site Infections Compared To Sterile Water When Used As A Daily Cleaning Task For Patients With Tracheostomy Tube Under One Year Of Age?

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Background: Procedures for cleaning pediatric tracheostomy stoma sites vary. The solution used often varies based on surgeon preference. Surgeons were asked why they preferred a particular solution and indicated it was often based on the guidance of a mentor during their training. Complications of stoma site infections cause increased discomfort, possible longer length of stay, increased medication use, additional consults, and possible respiratory tract infections. To determine best practice and standardize care around cleaning solutions, Google Scholar, CINAHL, and Cochran were searched and no relevant publications were found. Practice guidelines based on consensus statements and expert opinions were available, but no research studies within the last five years were found. **Method:** A research study utilizing a retrospective chart review was completed. Inclusion criteria were children under one year of age who had a tracheostomy tube placed in the last five years at our institution. The age limit narrows the study to the most common patient population who receive a trach tube. Data were collected from the first 30 days after a tracheostomy procedure to limit extraneous variables. This included 102 patients. Children's Minnesota IRB approval was obtained. Initial orders for trach site cleaning were reviewed. Nursing narrative notes, Progress notes from providers, along with nursing descriptions of the stoma site during cleaning were reviewed for signs of infection. The symptoms searched for included redness, rash, odor, increased secretions, and any other unusual tissue observations. **Results:** There was a statistically significant increase of infections to the patient if 25% acetic acid was not used as the daily stoma cleaning agent. Barriers to data collection were inconsistent nursing narrative notes. Other factors that could have contributed to infection include improper hand washing, and frequency of tube changes. **Conclusion:** 25% Acetic acid significantly reduces infection at trach stoma sites when compared to using sterile water or saline. The research showed about a 30% higher chance of infections if not using acetic acid as daily cleaning agent. The cost of using acetic acid is the same as using sterile water or saline. No negative side effects were seen by using 25% acetic acid daily in this study.

Sponsored Research - None

• Table 1-Distribution of infections by solution

			Stoma Solution			Total
			25% Acetic Acid	Saline	Sterile Water	
DOCUMENTED INFECTION	No	Count	22	30	20	72
		%	91.7%	61.2%	69.0%	70.6%
	Yes	Count	2	19	9	30
		%	8.3%	38.8%	31.0%	29.4%
Total		Count	24	49	29	102
		%	100.0%	100.0%	100.0%	100.0%

3015573

Sustained Effectiveness Of Aerosolized Prostacyclin In ARDS.

Gregory S. Burns[1,2], Travis J. Summers[1,2], Grey T. Wedeking[1,2], Richard Kallet[1,2], Antonio Gomez[3], Michael S. Lipnick[2]; [1]Respiratory Care Services, San Francisco General Hospital, San Francisco, CA; [2]Anesthesia, UCSF, San Francisco, CA; [3]Pulmonary & Critical Care Medicine, UCSF, San Francisco, CA

Background: Inhaled nitric oxide (iNO) improves arterial oxygen tension-to inspired oxygen fraction ratio (PaO_2/FiO_2) and reduces the "intensity" of ventilator therapy over 4 days without further improvements in PaO_2/FiO_2.[1] This implies the presence of a therapeutic plateau versus diminished effect (although enhanced sensitivity paradoxically reduces iNO effectiveness after 4 days).[2] Because AP improves PaO_2/FiO_2 through a similar pathway we inquired whether AP has a similar response profile. **Methods**. Using data from a previous study,[3] we examined 14 AP responders (defined as increased PaO_2/FiO_2 ≥10 mmHg) with lung injury score of 3.2±0.5 who had: 1) AP therapy > 48 h, 2) arterial blood gas and ventilator data available pre therapy: within 2.2 ±2.0 h post initiation (H-0) and at 24, 36, 48 and 60h (±4.0 h) thereafter, 3) no recruitment maneuvers or prone positioning. AP was initiated at 50 ng/kg per min. Data were expressed as either mean (± sd) or median [IQR] for normally and non-normally distributed data respectively. Paired comparisons used Wilcoxon Signed Rank tests; multiple comparisons used either ANOVA:Tukey-Kramer post-tests or Kruskall-Wallis and Dunn's post-tests. Alpha was set 0.05. **Results:** AP initially increased PaO_2/FiO_2 by 34 mmHg, (P < 0.001) and decreased oxygenation index (OI) by 8 (P = 0.001) at the same FiO_2 and PEEP. After H-0, FiO_2 decreased significantly without corresponding changes in PEEP, PaO_2/FiO_2 or oxygenation index (OI) (Table). **Conclusion:** The oxygenation profile of AP in ARDS was similar to that reported for iNO,[1] suggesting the absence of tachyphylaxis within 60h. Rather, a therapeutic plateau likely exists due to local endothelial receptor site saturation in limited aerated lung tissue. 1. Dellinger RP, et al. Effects of inhaled nitric oxide in patients with acute respiratory distress syndrome. Crit Care Med 1998;26(1):15-23. 2. Gerlach H, et al. Dose-response charcateristics during long-term inhalation of nitric oxide in patients with severe acute respiratory distress syndrome. Am J Respir Crit Care Med 2003;167:1008-15. 3. Kallet RH, et al. Severity of hypoxemia and other factors that influence the response to aerosolized prostacyclin in ARDS. Respir Care 2017;62(8):1014-22.

Sponsored Research - None

	Post Rx or H-0	Post 24h	Post 36h	Post 48h	Post 60h	P
Dose (ng/kg per m	50 [50,50]	50 [50,50]	50 [50,50]	50 [50,50]	50 [50,50]	0.55
FiO2	1 [0.9,1]*	0.7 [0.6,0.8]	0.7 [0.6,0.8]	0.7 [0.6,0.9]	0.7 [0.6,0.8]	<0.001
PEEP (cmH2O)	15.7±3.8	15.2±3.5	14.9±4.0	14.6±4.1	15.0±3.6	0.95
PaO2/FiO2 (mmHg)	117 [95,123]	144 [131,258]	110 [93,310]	103 [91,198]	115 [90,138]	0.43
OI	20.3±7.7	15.6±7.7	18.3±7.8	19.0±6.3	19.8±5.6	0.43

*P< 0.001 vs. FiO_2 at 24,36,48 and 60h post therapy initiation

3016944

Characteristics Of Unplanned Extubation Events In The Critical Care Setting.

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Background: Unplanned extubation (UE) is associated with heighten care activity,[1] and insufficient intravenous sedation.[2] We evaluated UE characteristics in our patients managed by daily sedation interruptions (DSI) targeted light sedation and spontaneous breathing trials (SBT). **Methods:** UE monitoring began in 2014 as a quality of care concern. Data collection included timing (Day: 07:00-15:00, Evening: 15:01-23:00, Night: 23:01-06:59), sedation and mechanism. Sedation was evaluated using Richmond Agitation and Sedation Score (RASS). Data is presented as median [IQR] and analyzed using Mann-Whitney U-tests or Fisher Exact test. Alpha was set at 0.05. **Results:** From January 2014 to December 2017 there were 96 UEs (2.3% incidence): 95% were subject-initiated, 80% were males, 77% had restraints in place and 49% occurred during care activities (43% during SBT/DSI, 6% bedside procedures). Intravenous sedation was used in 71% of subjects: 33% propofol (30 [20,50] mg/kg per min), 27% Precedex (1.00 [0.60,1.50] mcg/kg per h),10% dual agents; whereas 33% received Fentanyl of 50 [50,138] mcg/h. Pre-UE RASS was 0 [-1, 1]. UE's occurred at 2 [1,5] days of mechanical ventilation(MV); with 39% on day and night shifts, and 22% on evening shift. The 48h reintubation rate was 38%. At the time of UE most subjects met weaning readiness criteria; only positive end-expiratory pressure (PEEP) distinguishing those requiring reintubation (Table). Post-UE incidence of cardiovascular or respiratory instability was 8% and 19% respectively, yet these subjects accounted for only 44% of reintubations. Hospital mortality was 8% and did not distinguish those requiring reintubation from those who did not (11% vs. 6.6%; RR: 1.69 (0.45-6.4) P = 0.46). **Conclusion:** In 63% of our subjects UE occurred during periods when sedative effects were minimal or absent, 87% met weaning readiness criteria and 62% did not require reintubation and MV. More than half (56%) of those experiencing cardiorespiratory instability following UE also did not require such support. 1. Tindol GA, et.al Unplanned Extubations Chest1994;105:1804-07 2. Boulain T, et al. Unplanned extubations in the adult intensive care unit. AM J Respir Care Med 1998;157:1131-1137.

Sponsored Research - None

	Re-Intubated (48h)	Not Re-Intubated	P
Mode (PSV/CMV)	53% / 47%	53% / 47%	1
FiO2	0.40 [0.40, 0.50]	0.40 [0.40, 0.40]	0.06
PEEP (cmH2O)	8 [5, 8]	5 [5,8]	0.012
VE (L/m)	9.3 [6.6, 11.1]	7.3 [6.2, 9.9]	0.07
SpO2%	97 [95, 99]	100 [97, 100]	0.67

Key: PSV = pressure support ventilation, CMV = continuous mechanical ventilation, FiO_2 = inspired oxygen fraction, SpO_2 = pulse oxygen arterial saturation.

3020444

Changes In Respiratory Parameters After Caffeine Administration In Mechanically Ventilated Premature Neonates.

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Background: Caffeine is an established treatment for neonates in the prevention and treatment of apnea of prematurity. A recent investigation demonstrated a reduction in ventilator days in neonates who receive early caffeine administration. Caffeine is known to stimulate breathing and increase sensitivity to carbon dioxide in non-ventilated infants possibly reducing the need for invasive ventilation. We sought to identify the respiratory effects of caffeine during ventilation in mechanically ventilated premature neonates. **Methods:** Data files of neonates < 32 weeks gestational age enrolled in clinical trials at the Neonatal Research Institute at Sharp Mary Birch Hospital for Women & Newborns were searched to identify infants who received pressure controlled mechanical ventilation and caffeine in the first 72 hours of life. Mother and infant demographics and ventilator downloads were prospectively collected. Infants with major congenital anomalies were excluded from the primary studies. The ventilator internal clocks were synchronized with the electronic medical record (EMR) and routinely checked. Caffeine administration times were collected from the EMR. The peak inspiratory pressure and corresponding exhaled tidal volume of a mechanical breath every 5 minutes was converted to mL/kg using birth weight. The infants' spontaneous respiratory rate and fraction of inspired oxygen was collected at the same time point. All the breaths in the hour prior to caffeine administration were compared to all the breaths at each time point of 1-4 hours after caffeine administration was completed and analyzed with a paired students t- test with significance set at P<0.05. Parents of the infants gave consent for the primary trial. The Sharp Institutional Review Board approved the primary trials and the secondary data analysis. **Results:** Sixty-seven infants with ventilator data and caffeine within the first 72 hours of life were included. The mean gestational age was 27 ±2 weeks with birth weight of 1059 ±360 grams. Caffeine infusion started at 5.10 ± 8.65 hours of life. A total of 2,493 breaths were analyzed (Figure 1). **Conclusion:** There was an increase in spontaneous respiratory rate and a decrease in tidal volumes, peak inspiratory pressure, and delivered oxygen after caffeine administration.

Disclosures: None
Sponsored Research - None

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3023491

Success Of A Tobacco Cessation Program For Parents At A Children's Hospital.

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Background: Secondhand smoke (SHS) has the same harmful chemicals that smokers inhale and there is no safe level of exposure. Children are most affected by SHS and least able to avoid it. The Tobacco Dependence Program (TDP) was developed to help reduce first, second, and third hand smoke exposure to our patients while they are admitted to the hospital. **Methods:** The TDP consists of a director, 3 coordinators, and 15 team members certified as Tobacco Treatment Specialists. The program is offered to any admitted patient or caregiver who lives in the patient's home. We support participants whether their goal is to quit smoking or to abstain during the hospitalization. We provide weekly counseling and free over the counter nicotine replacement therapy for the entire duration of the hospitalization. The inclusion criteria for caregivers is a 7 day minimum stay. Inpatients are automatically eligible. Prior to discharge we refer them to an outside program. **Results:** As of April 2018, we have enrolled 106 participants. 5% were inpatients. 93% were ready to quit. 69% have children who are critically ill and in ICU: PICU 28%, NICU 19%), CICU 15%). The ethnicity of participants is predominately Caucasian (55%) followed by African American (35%), Hispanic (7%), and Asian (<1%). 57% of participants are female. 59% of participants began smoking between the ages of 12-18 years, 21% began between the ages of 18-25 years, 9% began before the age of 12, 7% between the ages of 25-35, and 4% in the past 5 years. Education level of participants include: 47% are high school graduates/GED, 23% have some college education, 15% have a college degree, 14% did not graduate high school, and < 1% have a graduate degree. Traditionally tobacco companies market their products towards adolescents, low income individuals and minorities. This data does not consistently represent these perceptions. 28% of participants responded to a discharge survey with 50% of respondents stating they were able to quit before discharge. **Conclusion:** The Tobacco Dependence Program offers support to families as they begin the quitting process and provide the tools to continue a smoke free lifestyle after discharge. Our belief is that this reduction in second hand and third hand smoke will also reduce admission rates for our patients. More research needs to be done to prove the long-term benefit of the program.

Sponsored Research - None

3025854

Impact Of A Respiratory Therapist Home Visit Program Post Hospitalization To Decrease Readmission And ER Visits For COPD Patients In A Primary Care Network.

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Background: COPD is now the 3rd leading cause of death in the U.S. The 30 day readmission rate for acute exacerbation of COPD (AECOPD) is approximately 20%. The Signature Partners Network (SPN) wanted to improve the quality of care for their COPD population by reducing emergency department (ED) visits and hospital AECOPD admissions and readmissions. SPN developed a COPD Home Education Initiative to determine ways to track COPD hospitalized case findings and increase appropriate management of the COPD population. This led to a strong collaboration between SPN and the Inova Fairfax Hospital Pulmonary Rehabilitation Department. The Pulmonary Rehabilitation (PR) Respiratory Therapist (RRT) Home Visit Pilot program was developed to follow SPN COPD patients. The RRT Home Visit is free to the patient and the staff time is paid from the SPN budget. **Methods:** Hospitalized SPN COPD patients upon discharge were referred for a RRT home visit by their primary care physician. The patient had to agree to have the home visit and PR RRT would then schedule the patient. The Home visit commenced within 11.8 days of the Referral. The RRT evaluated the patients in their home setting and provided education regarding COPD care management to prevent exacerbations and improve quality of life. The Respiratory therapist provided their recommendations to patients' PCP for co-ordination of care. Below is the one year data: Admissions Before Home Visit Program is 62 and After Home Visit Program is 34 COPD Admission Before Home Visit is 44 and After Home Visit is 13 Non-COPD Admissions Before Home Visit is 18 and After Home Visit is 21 ED Visits Before Home Visit Program is 29 and After Home Visit Program is 16 COPD ED Visits Before Home Visit is 17 and After Home Visit is 3 Non-COPD ED Visits Before Home Visit is 12 and After Home Visit is 13 Chi-Square Test: Admission was P=0.0018 & ED Visits P=0.0100 **Conclusion:** The impact and success of the SPN COPD Home Education Pilot Initiative has shown a significant reduction in both AECOPD hospitalizations and ED visits. The team did a great job in identifying appropriate COPD patients. Challenges were getting referral orders from the primary care providers for the home visits. The SPN leadership plans to continue to determine ways of identifying and referring patient's into the RRT home visit program, even before the patient is discharged from the ED or hospital and increase the use of this program. **Disclosures:** none

Sponsored Research - None

3009976

Respiratory Therapy Career Satisfaction.

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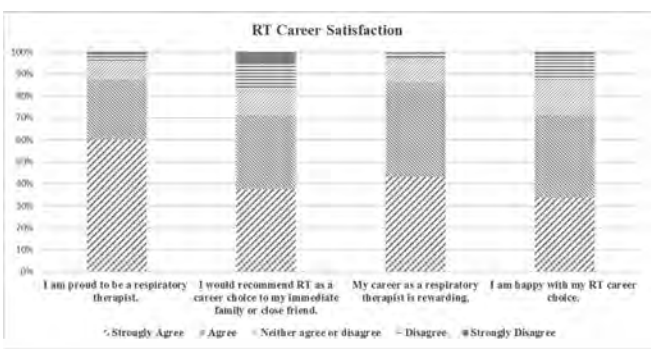
Background: In the last decade, healthcare has changed dramatically resulting in both challenges and opportunities for respiratory therapists (RTs). While some changes have been positive, RTs working in healthcare face long shifts and a stressful work environment. Many RTs have expressed a desire to leave the profession or change careers. Educational programs and managers must work together to recruit and retain qualified individuals within the profession. The purpose of this study was to determine career satisfaction of RTs as well as identify positive and negative aspects of the profession. Information gained from this study may help RT managers attract and retain highly skilled professionals. **Method:** RTs from a metropolitan area were invited to complete a web-based survey via word of mouth, social media, and advertisements. Institutional Review Board approval was obtained. Referral sampling was used with an email invitation going to hospital managers and educators, who were then asked to send the web link to their staff. The instrument contained 28 items including demographic data, as well as 13 Likert-type items regarding career satisfaction. Participants identified (through open-ended questions) both positive and negative aspects of the profession as well as suggested interventions, which might improve the work environment. **Results:** Eighty-three RTs completed the survey. Approximately one-third of participants had less than five years' experience and another one-third had over 20 years' experience. The majority of participants were female RRTs, who entered the profession with an associate's degree. While few participants earned a specialty credential, 23% of participants had a graduate degree. Over 40% of the participants plan to retire or change careers within the next 10 years. Entry-level, mid-career, and experienced professionals felt similar regarding RT being a rewarding career and their willingness to recommend the profession to others. Data related to RTs' satisfaction with the profession are expressed in the graph below. **Conclusion:** While the sample size was small and drawn from one geographic area, the information gained from this study provides insight into RTs' view of the profession. While only 33% of the sample had practiced for more than 20 years, over 40% plan to retire or change careers. Managers, educators, and leaders of the profession must look for ways to retain skilled RTs within the workforce.

Sponsored Research - None



3019750

Employee Engagement And The Value Of High Fidelity Simulation Problem Based Learning Scenarios During Annual Skills Review.

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Background: Employee engagement relates to the level of an employee's commitment and connection to an organization. High levels of engagement encourage retention of top talent and higher levels of productivity. Employees want to feel they are continuously growing and developing while working in an environment that promotes trust and cooperation. Establishing clinical competence is a foundation of staff development and provides a means to employee engagement. Annually, we provide a Skills Review to promote and improve clinical competency. The purpose of this study was to explore attitudes surrounding participation in an Annual Skills Review (ASR) using high fidelity simulation scenarios; and its association with employee engagement. **Methods:** Over the course of three years, our ASR moved from the large group, didactic and discussion, to small group simulated problem based learning scenarios. We arranged three skills stations, forty-five minutes each, to reinforce infrequently implemented respiratory care techniques. Each station was limited to no more than three Respiratory Care Practitioners (RCPs) in an effort to replicate actual staff to work-flow ratios in the ICU. Reducing the number of participants in the groups also allowed for full participation at each station. Following the 2017 ASR, we administered a survey to seek RCP feedback. The goal was to determine how well the ASR met their needs. The survey also allowed RCPs to comment on their experience. **Results:** The survey response rate was overwhelmingly positive. 83% of RCP respondents found that the ASR met their needs extremely well or very well. Also included in the survey, was the opportunity to write comments answering the open ended question "What was the most positive aspect of the ASR?" Overall, the survey results demonstrated approval for the ASR and the open-ended question provided more insight related to employee engagement. **Discussion:** Our RCPs felt that the learning environment was safe to make mistakes while still learning from their peers. The ASR afforded RCPs opportunity to ask questions and clarify practices that may have been unclear. While in the groups, they were able to appreciate the decision making process of their colleagues, further reinforcing their own critical thinking. Everyone working together in a relaxed, stress free environment, sharing skills and knowledge was a positive and engaging experience for our employees.

Sponsored Research - None

3021241

The Trend Of Receiving Palliative Care In Patients With Prolonged Mechanical Ventilation In Taiwan.

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Background: According to the World Health Organization, palliative care # (PC)is an indispensable part of continuing care at the end of life that emphasizes the importance. Patients can have dignity and quality at the end of life, not extend the dying process. Patients on prolonged mechanical ventilation (PMV) not only have a low quality of life, but also create a burden on the health insurance system. Therefore, it is important to understand the current status of these patients receiving PC and make improvements accordingly. **Method:**We used a healthcare database consisting of a 100 million person sampling file from the Ministry of Health and Welfare in Taiwan. We screened for PMV patients who were >17 years of age between 2011 and 2013. The target patients were intubated with ventilator support for >21 days, including invasive ventilators, non-invasive ventilators, and patients from 2010 were excluded. Data analysis was performed using a simple random sample with SPSS 20. One-way ANOVA was used to analyze the numbers, ratios, and disease types among the PMV patients who received PC during the period 2011-2013. A p <0.05 was considered statistically significant. **Results:** Among the 79,399,61,232 and 63,192 patients on PMV, there were 226(0.28%),133(0.22%) and 479 (0.76%)who received PC in 2011,2012, and 2013, respectively(P<0.05; Fig.1). The proportions of the PMV patients who received PC were low, but the number of patients was increasing. Among the PMV patients who received PC in 2011,2012 and 2013, there were 11(4.9%),5(3.8%) and 22(4.6%) patients diagnosed with sepsis (P=0.47);150(66.4%),88(66.1%) and 325(67.8%)patients diagnosed with malignant tumor (P=0.68);56 (24.7%),33(24.8%) and 110(23.1%) patients diagnosed with chronic illness(P=0.45);9(4%),7(5.3%) and 22(4.5%) patients diagnosed with late effects of motor vehicle accident (P=0.76)(Fig.1). **Conclusion:**This study showed there to be an increasing proportion of patients on PMV who received PC. The trend in providing PC can be attributed to promotions involving ineffective medical treatment and PC for critically ill and PMV patients since 2011 in Taiwan. The promotions not only increased the number of patients with malignancies, but also different groups of disease types. This indicates a need to promote PC for patients receiving PMV to improve the quality of life, as well as reduce the burden on the health insurance system. We believe that increasing the use of PC will reduce suffering in end-stage PMV patients.

Sponsored Research - None

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3025445

Accountable Care Clinical Pathway Standardizing Airway Clearance And Lung Expansion In Efforts Of Reducing Nonproductive Respiratory Care.

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Background: There is considerable overlap in the array of techniques offered by Respiratory Care Practitioners when managing clinical disorders resulting from poor airway clearance and/or poor lung expansion. To date, there remains insufficient evidence to suggest that one technique is superior to another, however ordering practices are for the most expensive techniques at a frequency and duration that creates unprecedented cost in respiratory care services. In one fiscal year, more than $800k was spent delivering airway clearance and lung expansion techniques. Respiratory Care Service believes that individualizing the administration of an airway clearance technique and/or lung expansion technique will increase communication between Respiratory Care Service and Hospital Medicine/Surgical Services; thereby reducing cost associated with those airway clearance and/or lung expansion techniques that are expensive. Individualized respiratory care will promote timely initiation and follow-up assessments in patients ordered for an airway clearance and/or lung expansion technique. **Methods:** Using a collaborative evidence-based algorithm that empowers Respiratory Care Practitioners (RCPs) in providing individualized and cost-effective care, the goals of this project is to implement a combined airway clearance and lung expansion (ACT/LET) pathway driven by respiratory care practitioners at a large academic medical center. This project is also intended to increase respiratory care service's staff engagement and physician collaboration. **Results:** The ACT/LET Pathway has been successfully adopted by the Medicine/Surgical (Med/Surg) Services prescribing respiratory care techniques to hospitalized patients with a target of reducing the total number of techniques by 10% in efforts of reducing unnecessary techniques. The ACT/LET Pathway exceeded expectations by reducing the total number of airway clearance and/or lung expansion techniques between April 2016 and June 2016 by 17.3% as compared to the same time period in the year prior. The ACT/LET Pathway also improved RCP and Med/Surg collaboration as well as increased Respiratory Care Service's staff engagement. **Conclusion:** This project underscores the importance of evidence-based practice and clinical pathways in reducing medical cost during patient care. It also suggest that transdiscipinary collaboration promotes staff engagement.

Sponsored Research - None

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3021713

Impact Of Starting A Successful Out-Of-Hospital Refractory Ventricular Fibrillation/ Ventricular Tachycardia Extracorporeal Life Support Protocol To Patients And A Respiratory Therapy/Extracorporeal Membrane Oxygenation Department.

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Background: In December of 2015, the University of Minnesota – M Health changed our out-of-hospital (OH) refractory VF/VT protocol. Along with specific inclusion criteria, the VF/VT protocol change utilizes local EMS for early transport to M Health's CCL. The protocol inclusion criteria are assessed before implementation of ECLS. Increased patient survival rates utilizing this protocol has significantly increased our number of annual ECLS patients and hours. We report the impact to Respiratory Therapy due to increased patient survival rates in the VF/VT population; including increased equipment, personal resources, and financial implications. **Methods:** This is a retrospective review of our ECLS patient data from 1/1/2014 – 5/15/2018, with the protocol data from 12/1/2015 – 5/15/2018. Data analyzed includes the total number of ECLS patients compared to the number of protocol patients, the rate of ECLS survival and survival to hospital discharge specific to the protocol; the annual growth due to the protocol; the annual increase in number of ES, RN's and MD's; and the financial impact to the RT department. Patients with an OH VF/VT arrest and arriving at M Health as part of the EMS early mobilization protocol were included in specific survival analysis and comparative analysis to overall ECLS patient and departmental data. Approval from the IRB has been obtained (STUDY00003576). **Results:** M Health has cared for an additional 106 ECLS patients as a result of the protocol change. 45% survived ECMO and 30% survived to hospital discharge. The RT department also adjusted their staffing model, implemented mandatory call, and increased annual ES requirements. The ES may be pulled from a prescheduled RT shift or pick up bedside hours for premium pay. Additional financial implications include increasing the ECLS equipment fleet available for use and the increased amount of disposable supplies used. ECLS operating expenses include salaries, benefits and supplies. The increase in bedside hours forced a staffing model change. Previously, all patients were staffed 1:1 with an ES and RN. In 1/2016, stable adult patients were paired for the ES (1:2) and remained 1:1 nursing. **Conclusion:** A successful OH refractory VF/VT early mobilization protocol has increased annual ECLS volume. It has had a significant impact on the RT department requiring staffing model changes, increased training requirements and increased financial obligations. References available upon request

Sponsored Research - None

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2986231

Comparative Suction Efficiency Of Two Systems For Subglottic Secretion Clearance.

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Background: Micro-aspiration of bacteria-laden secretions into the lower respiratory tract is a key aspect in the pathogenesis of VAE. SSD-ETTs have been developed with a small lumen above the cuff, connected to a suction line, allowing for removal of secretions accumulating over time. However, reported rates of SSD-ETT clogging have been as high as 48%. Tri-Flo subglottic suction system is a new subglottic suction device that includes a larger, 14Fr suction line. We evaluated comparative performance in 30 patients to determine the relative suction efficiency of a SSD-ETT to this novel device. **Methods:** This is a retrospective, chart review in the MICU at a large community regional medical center. IRB approval was obtained. Patients orally intubated were included. Upon admission to the ICU unit, a Tri-Flo subglottic suction line was placed in each patient. The majority of patients were intubated with a SSD-ETT. Intermittent suction 60-120, was alternately connected to the SSD-ETT and Tri-Flo approximately 4 hours of every 12 hour shift. **Results:** 30 patients were included in the evaluation. Data was collected in 20 patients for both SSD-ETT and Tri-Flo. Comparative data was unable to be collected on the remaining 10 patients due to placement of a standard ETT (3 patients), inability to place the Tri-Flo subglottic suction system (3 patients) and inadequate time prior to extubation (4 patients). Information was collected over a total of 57 ventilator days for the 20 patients with comparative data. Tri-Flo removed more secretions than SSD-ETT in 16 patients, the same amount (±10%) in 2 patients and the SSD-ETT removed more secretions in 2 patients. In total, across all 20 patients, Tri-Flo removed more than twice as many secretions as SSD-ETT (1496mL vs. 725mL). SSD-ETT removed zero secretions in 6/20 (30% of patients) versus 1/20 (5% of patients) for Tri-Flo. 17 patients were on the ventilator for >48 hrs. Of these patients, 1 had a reported VAC. This is notably lower than our baseline rate with SSD-ETT alone. **Conclusion:** Tri-Flo is a new tool that enables effective removal of secretions above the cuff. In 80% of patients Tri-Flo removed more secretions than the SSD-ETT. SSD-ETT removed zero secretions in 30% of patients, indicating the device was clogged or otherwise non-functional, versus 5% for Tri-Flo. Tri-Flo subglottic suction system removes more secretions than SSD-ETT on average, providing increased protection against micro-aspiration. Disclosures: None

Sponsored Research - None

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3008804

Cuff Pressures.

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Background: To determine areas for clinical improvement associated with cuff pressure. Data collection of cuff pressures were conducted on patients in different hospital units. As there are no set guidelines on the frequency of cuff pressure checking and some literature suggesting potential for slight cuff deflation post cuff pressure check, checking cuff pressures were limited to times when clinically indicated. Method: Cuff pressures were collected over an eight week period by designated senior Respiratory Therapy Students and categorized into five reasons for completing cuff pressure checks. During the collection process a sixth (sub-category) was identified during the collection process. After checking the cuff pressure, it was then set to an acceptable pressure range according to facility guidelines. Facility guidlelines noted an "acceptable range" of 25-30 cmH_2O. SOIRB#: 18-001 Approved by the Southern Oregon IRB Chair on January 24, 2018 **Results:** 98 cuff pressures were documented and identified as one of the following categories: Routine Check (RC), Inner Facility Transport (IFT), Post Intubation (PI), Out of Faciltiy Transfer (OFT), and Additional Information (AI). The sub-category identified within in IFT was Open Heart surgery patient. Of 98 cuff pressures checked only 10 were within in acceptable limits (25-30cmH_2O) according to hospital guidelines. Of 68 RC only 7 were in acceptable range, and 1 RC pressure was documented to be >30cmH_2O for cuff seal to prevent air leaks. IFT noted 17 cuff pressure checks, 11 of those were Open Heart patients, and 0 cuff pressures were within acceptable limits for either IFT or Open Heart Patient. PI consisted of 11 cuff pressures checked with 2 being in acceptable range. AI provided 1 cuff pressure check below acceptable range and OFT provided 1 cuff pressure check within acceptable range. **Conclusion:** Collection of cuff pressure data was completed to recognize or identify trends in cuff pressure and if these trends could be correlated to a specific source. It was hypothesized that out of acceptable range cuff pressure data would be identified in OFT, the data collected did not support this hypothesis. Cuff pressure data indicated that most of the time cuff pressure did not meet acceptable range, falling both above and below the 25-30cmH_2O facltity guielines. The brand or type of tube placed was not taken into account. Disclosures: No relations to industry.

Sponsored Research - None

Cuff Pressure

	Total	Acceptable Range	Unacceptable Range	Other	
RC	68	7	60	1	Documentation to have cuff pressure >30cmH2O
IFT	17	0	17	Open Heart 11	Open Heart Acceptable Range 0
PI	11	2	9		
AI	1	0	1		
OFT	1	1	0		

3013129

The Impact Of Age And Gender On Cuff Leak Volume Tests.

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Background: Although a cuff leak volume(CLV) test has been proposed as an approach to predicting the occurrence of post-extubation sridor, the volume below 110ml of tidal volume(a quantitative cuff leak test) is highly likely to cause laryngeal edema or upper airway obstruction and subsequently result in re-intubation. The factors that age and gender affect its severity and specificity are still unknown. Due to the fact that the aging community is a global concern, the issue of limiting CLV to no more than 110ml as a positive threshold is worthy of discussion. We hypothesized that(1)among the medical ICU population, there is a significant difference between male and female in the CLV test and(2)there is a significant relationship between the CLV and the patient's age. METHOD: This is an exploratory study on mechanically ventilated patients after at least 48 hours or more planned extubation. They passed the following weaning profiles: RSBI, PIMax, PEMax, and CLV. The patients needed to meet the three criteria. To get its mean value, the test was measured three times and recorded. Patients were observed for 72 hours after planned extubation. During this period of time, the ICU ventilators with NIV mode were utilized in case of respiratory failure. If reintubated patients met at least one of the following criteria:lack of improvement in the $PaCO_2$, decrease in SpO_2 less than 88%, changes in mental status, sighs of respiratory muscle fatigue, they were treated with mechanical vetilation. **Results:** The patients undergoing scheduled extubation after 48 hours and 119 patients from April 2015 to March 2016 received NIV mechanical ventilation. They were 68 males and 51 females, whose general clinical characteristics and physiologic parameters did not differ significantly at the beginning of the study and the data served as the baseline. Their mean age of male and female patients was 69.5 ± 6.1years and 75.7 ± 6.5years respectively. The CLV below 110ml for male and female was in turn 102ml ± 5.8ml and 94ml ± 4.6ml. There was no significant difference in gender and age brackets except the CLV below the reference value. Moreover, the overall re-intubation rate was 13%. **Conclusion:** Results show that the success rate is high when the CLV is lower than 110ml prior to extubation owing to re-intubation rate 13%. The data also suggests that age and gender may affect the CLV. A low value is a good predictor of successful extubation. However, it should be used with caution when delaying extubation in this regard.

Sponsored Research - None

3024582

Decreasing Total Blood Gases In Neonates Following Low Risk Cardiac Surgery.

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Background: We hypothesized that implementation of end tidal carbon dioxide ($ETCO_2$) continuous monitoring did not change the number of blood gases obtained after low risk cardiac surgery. In 2015, we implemented $ETCO_2$ monitoring in our Cardiac Intensive Care Unit (CICU). Implementation included education about use of $ETCO_2$, calibration and physiologic circumstances associated with differences between blood levels of carbon dioxide and $ETCO_2$ monitoring. **Methods:** Retrospective chart review of neonatal patients U30 days who underwent lateral thoracic coarctation repair before and after implementation of continuous $ETCO_2$ monitoring. Inclusion criteria included: Patients mechanically ventilated who had >3 postoperative blood gases. Patients who had >2 comorbidities involving >1 organ system, emergent surgery, diagnosis of pulmonary hypertension or need for inhaled nitric oxide post-procedure were excluded. **Results:** A total of 26 patients were identified (13 pre, 13 post-intervention). Patients were similar in age, gender, prematurity, presentation, hospital and CICU length of stay. A total of 98 blood gases were performed postoperatively in the pre-$ETCO_2$ group (average 8/patient) and a total of 57 blood gases in the post group (average 4/patient). When the cohort was limited to patients with a hospital stay of U15 days, the total number of postoperative blood gases in pre-$ETCO_2$ group (n=10) was 61 (average 6/patient) and post (n=12) 51 (average 4/patient), P=0.006. **Conclusion:** In a matched cohort, the presence of continuous $ETCO_2$ monitoring and education about use of monitors decreased the total number of blood gases obtained, thus leading to a decrease in patient cost, blood loss and potential risk of line infection.

Sponsored Research - None

Demographics	Pre-ETCO2 (n=13)	Post-ETCO2 (n=13)	P
Age (days) median (IQR)	5 (4, 13)	5 (5, 8)	0.76
Female n (%)	7 (54)	3 (23)	0.11
Prematurity n (%)	3 (23)	3 (23)	1.00
Prenatal diagnosis n (%)	5 (39)	2 (15)	0.34
Symptomatic n (%)	1 (8)	2 (23)	0.59
Other cardiac findings n (%)	10 (77%)	10 (77%)	1.00
Ventilation time (minutes) median (IQR)	1460 (1132, 2080)	1395 (1267, 1535)	0.69
CICU LOS (days) median (IQR)	3 (3, 5)	4 (3, 5)	0.14
Hospital LOS (days) median (IQR)	11 (7, 17)	6 (5, 11)	0.13
Total blood gases median (IQR)	7 (6, 8)	4 (3, 6)	0.001

n= total patients, IQR= interquartile range, LOS= length of stay

3004910

Comparison Of SpO_2/ FiO_2 Ratio To PaO_2/FiO_2 Ratio In Pediatric Patients As A Tool To Determine Rds Severity And Extubation Readiness.

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Background: PaO_2/FiO_2 (PF) ratio has been used as an effective means to assess both oxygenation status and respiratory distress syndrome (RDS) severity among pediatric patients as first noted in 1994 with Berlin criteria for RDS classification. However, PF ratio requires an arterial blood gas in order to complete this calculation requiring sample collection by an invasive method to measure PaO_2. With the emergence of noninvasive methods to measure oxygenation (i.e. pulse oximetry) and a decrease in amount of arterial blood gasses drawn when compared to 20 years ago, this study was conducted to assess using SpO_2/FiO_2 ratio (SF) as an option measure of oxygenation status to assess RDS severity and extubation readiness. However, definitive SF ratio criteria has not been established for RDS severity category as is seen with PF ratio and Berlin criteria. **Methods:** 718 pediatric arterial blood gas samples from 32 PICU patients ranging in age from infant to 17 years of age were reviewed in this IRB approved study and PF ratio was calculated for each sample. The average blood sample per patient was approximately 22 samples (n = 22.44) with a range of 1 to 59 samples per patient. Only collected SpO_2 and SaO_2 data values that were within +/-3% of each other from the electronic health record were used. All calculated values were entered into a spreadsheet and separated into RDS categories according to Berlin Criteria. Samples with PEEP were separated into 2 groups of PEEP < 7 and PEEP ≥ 7. Linear regression analysis was completed among RDS groups and also with samples that included PEEP. **Results:** SF ratio showed the strongest positive relationship to PF ratio when PF ratio is <300 (r= 0.76). Using a 95% CI, SF ratio increases, on average, 86 units for every 100-unit increase in PF. In the two PEEP data groups, there was not a statistically significant difference in the slope of the best-fit lines (0.27 vs 0.25, p = 0.75). However, a high degree of overlap among RDS categories in SF ratio exists when compared to PF ratio suggesting that it is possible to have the same SF ratio in all PF ratio RDS categories. **Conclusion:** SF ratio may be used as an effective measure of oxygenation in moderate to severe RDS categories. However, clinicians should exercise caution due to overlap across RDS categories. Since SF ratio overlap is high in mild RDS to normal categories, it may not be an ideal assessment tool for assessing extubation readiness.

Sponsored Research - None

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3009435

Use Of A Pressure Injury Bundle In A 101 Bed, Level IV NICU To Decrease Respiratory Device Related Pressure Injuries.

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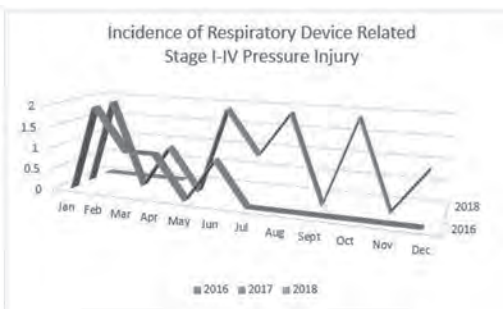
Background: The incidence of Hospital-Acquired Pressure Injuries (HAPIs) are a national concern due to patient morbidity, treatment cost, and reimbursement issues. Stage III, IV and unstageable pressure injuries that occur during hospitalization are among the conditions considered preventable by the Centers for Medicare and Medicaid Services (CMS). Pressure injuries in total effect 2.5 million patients annually. **Methods:** In 2016 Norton Children's Neonatal Intensive Care Unit and Respiratory Therapy department began collaboration as part of our medical center's "Reaching For Zero" campaign to eliminate preventable harm to our pediatric patients. With a focus on reducing the incidence of respiratory device related pressure injuries, a multidiscpinary approach was utilized. Education was provided to RT and RN staff regarding early recognition and treatment of pressure injuries. This education also included and focused on a NICU specific HAPI prevention bundle. Clinical staff were empowered to evaluate, monitor and institute preventable measures at the earlist stage. Bundle compliance, strengths, weaknesses, and "days since" last pressure injury were displayed and discussed in both daily nursing and multidisciplinary huddles. Components of the bundle include but are not limited to: padding under the respiratory device, frequent repositioning of the patient and assessment of proper fit of respiratory device every 3-4 hours. **Results:** To date, Norton Children's Hospital NICU has effectively reduced patient harm and prevented Stage III, IV or unstageable pressure injuries from a respiratory devices. Focus on increased awareness with regular monitoring and assessment has proved beneficial in reducing our overall incidence of pressure injuries resulting in 790 days without a Stage III, IV or unstageable injury. **Conclusion:** Use of a care specific bundle has decreased respiratory device related pressure injuries which contribute to the majority of overall NICU pressure injuries. Utilizing a multidisciplinary team to raise awareness and regularly monitor incidence of respiratory device related pressure injuries has proven effective in reducing patient harm and the overall incidence of pressure injuries. Our work continues to further reduce and sustain zero stage III, IV and unstageable pressure injuries with development of a respiratory device pressure injury bundle. This specific bundle will further aid us in achieving our overall goal of "Reaching for Zero".

Sponsored Research - None



3016543

Comparison Of Noninvasive Ventilation Delivered By Nasal Prongs In A High Fidelity Mannikin.

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Background: RAM cannula proper fit is 60-80% occlusion of the nares. Our goal was to see how different size RAM cannulas and nasal prongs compare on a high fidelity manikin, utilizing simulated lung pressure monitoring. If the leak around the prongs or cannula is too large, there would be ineffective transfer of pressure from the ventilator to the simulation lungs. Therefore, the ventilator could possibly deliver enough flow to create back pressure at the interface to achieve its desired pressure. **Methods:** A Servo-I Ventilator was used in non-invasive PCV mode thru multiple interfaces on Gaumard's Super Tory model S2220 manikin. The setting used was NIV PCV with a set RR 24, PIP 17cmH_2O, PEEP of +5 cmH_2O and Ti 0.5 seconds. The manikin was intubated with a 3.0 cuffed ET tube to get baseline data. After gathering the data, the manikin was extubated. The mouth was then closed using a chin strap. The anterior portion of the nares measured at 4.2mm in diameter. Data was collected from Servo-I's measured values as well as Super Tory's lung pressure using Fisher & Paykel prong sizes 3520 (outer diameter 3.5mm) and 4030 (outer diameter 4.0mm). The same was done using the RAM cannula sizes Micro Preemie (outer diameter 3.0mm), Preemie (outer diameter 3.0mm) and Newborn (outer diameter 3.5mm). **Results:** The cuffed ET tube showed translation of pressure from the Servo-i to the Super Tory's lungs. The F&P size 4030 prongs, occluding 95% of the nares, maintained the desired PIP and PEEP, with a ventilator detected leak of 29%. The F&P 3520 prongs, which occluded 83% of the manikins nares, delivered pressures close to the set PIP (94% of desired) and PEEP (80% of desired) with a ventilator leak of 64%. The RAM Cannula newborn size, which occluded 83% of the nares, delivered 88% of set PIP and 80% of set PEEP with a ventilator leak of 61%. The RAM Cannula Preemie size, which occluded 71% of the nares, delivered set PIP (between 23-70% of desired) and PEEP (0% of desired), with ventilator leak of 78%. The RAM Micro Preemie occluded 71% of the nare, but had a shorter nasal septal distance and poor fit, therefore unable to deliver any detectable PIP or PEEP to the simulation lungs. **Conclusion:** The Servo-I did not see a drop in measured PIP, PEEP or volumes delivered that would alert caregivers of ineffective support with any interface used. 60-80% occlusion of nares with RAM cannula in simulation manikin did not translate adequate pressure to lungs.

Sponsored Research - None

Interface used	Vent PIP	Vent PEEP	Vti	Vte	Servo-i leak%	Vent MV	Tory	Tory	Chest rise
3.0 ET tube cuffed	17cm H2O	5cm H2O	21ml	21ml	1%	0.6L/M	18cm H2O	5cm H2O	yes
4030 F&P prongs	17cm H2O	5cm H2O	26ml	25ml	29%	0.6L/M	18cm H2O	5cm H2O	yes
3520 F&P prongs	17cm H2O	5cm H2O	27ml	25ml	64%	0.6L/M	16cm H2O	4cm H2O	minimal rise
RAM Newborn	17cm H2O	5cm H2O	26ml	23ml	61%	0.6L/M	15cm H2O	4cm H2O	minimal rise
RAM Premie	16cm H2O	5cm H2O	23ml	20ml	78%	0.5M/L	4-12cm H2O	0cm H2O	none
RAM Micro Premie	16cm H2O	5cm H2O	17.9ml	16.5ml	89%	0.36L/M	0cm H2O	0cm H2O	none

3016876

Comparison Of NIV CPAP Delivery Between A Disposable Cpap Device And An Intensive Care Ventilator In A Simulated Infant Model.

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Background: Disposable CPAP devices, like the Boussignac® valve, are increasingly being utilized in the pre-hospital and emergency department settings. In adult studies, the Boussignac® has been found to be ineffective at maintaining stable CPAP, especially during periods of high flow demand. However, the effect in pediatrics is unknown. The aim of this study was to compare NIV CPAP delivery between an intensive care ventilator (Servo i) and the Boussignac® CPAP valve in a simulated infant model. **Methods:** A size 2 infant nasal/oral mask was secured to an infant airway manikin (Laerdal Medical) and connected to a ASL 5000 lung simulator to simulate a spontaneously breathing infant with bronchiolitis. Compliance and resistance were set at 10 mL/cm H_2O and 60 cm H_2O/L/s, RR at 36 breaths/min, Ti of 500 ms. Each device was tested at CPAP levels of 5 & 7 cmH_2O with inspiratory efforts (P_{MUS}) of -5, -7.5, & -10 cmH_2O. The Boussignac® valve was attached to the nasal/oral mask with the main line tubing attached to an oxygen flowmeter. A manometer was attached to the secondary pressure port. Flow was adjusted for until the desired CPAP level was obtained. The Servo i was set in its respective NIV CPAP mode and attached to the nasal/oral mask with a Fisher & Paykel infant circuit. Scenarios were run for a minimum of 2 minutes. The first 30 seconds was discarded and the subsequent minute was used for post-run analysis. Pressure swing between peak inspiratory and expiratory pressures were used to assess pressure fluctuation throughout the breathing cycle. MAP was used as an indicator of delivered CPAP. Comparisons were performed by Student *t* test or Wilcox rank sum test, when appropriate. **Results:** Data are shown below. While there were statistically significant differences in pressure swings between devices, clinically, they are probably irrelevant. MAP was significantly less with the Boussignac® compared to the Servo i under all tested scenarios (P <0.001). MAP averaged 81% & 89% of set CPAP (5&7 cmH_2O) with the Boussignac®, compared to 101% with the Servo i regardless of set CPAP. **Conclusion:** In this simulated infant model, the Boussignac® valve was able to maintain CPAP throughout the breathing cycle similar to an intensive care ventilator and may be an effective alternative in the pre-hospital and emergency department setting. But, clinicians should be aware that set CPAP may be less than delivered CPAP.

Sponsored Research - None

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3019396

Rescue Inhaled Nitric Oxide In Extremely Low Birth Weight Infants: An Exercise In Futility?

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Background: Despite the use of surfactant, antenatal steroids, and optimized ventilation, Extremely Low Birth Weight (ELBW) infants face significant morbidity in the form of bronchopulmonary dysplasia (BPD). The use of prophylactic inhaled nitric oxide (iNO) in these patients has been studied in several trials and is not recommended. However, iNO is used as a rescue therapy for hypoxic respiratory failure when other treatment options have failed. Our objective was to compare the respiratory outcomes of ELBW infants who received rescue iNO during admission to similar patients who did not. **Methods:** With Institutional Review Board approval, data were retrospectively extracted from the medical records of all infants with birth weight less than or equal to 1000g admitted to the Rush University Children's Hospital NICU from January 2015 to December 2017 who survived greater than 72 hours. Patients with major congenital malformations were excluded. 150 patients were identified, of which 15 received iNO. 3 patients were excluded as iNO was discontinued quickly within 72 hours for absence of a clinical response and no evidence of pulmonary hypertension on echocardiogram. 12 patients, who received rescue iNO for hypoxic respiratory failure were compared to the remaining 138 patients. Death and tracheostomy rates were compared using Fisher Exact/Chi-Square and Odds Ratios. Demographic data and other clinical markers were evaluated by t-test or Fisher Exact to assess similarity of the groups. **Results:** iNO recipients had lower birth weight (645 +/- 175g vs 778 +/- 142g, *P*=0.02) with similar birth gestational age (25.5 +/- 1.6 weeks vs 25.6 +/- 1.6 weeks, *P*=0.82) with lower weight for gestation z-scores (-0.94 +/- 1.34 vs 0.06 +/- 1.14, *P*=0.03). iNO recipients had a significantly higher rate of death (92% vs 4%, *P*<0.0001, OR 242, 95% CI 26.7-2194) and tracheostomy (17% vs 1%, *P*=0.01, OR 13.6, 95% CI 1.72-106.9) compared to non-recipients. The combined outcome of death or tracheostomy was 100% vs 6% (*P*<0.0001, OR 306, 95% CI 16.9-5537). **Conclusion:** Use of Rescue iNO in ELBW infants was associated with significantly worse mortality and respiratory outcomes compared to non-recipients, with 100% of recipients dying or requiring tracheostomy. Given these poor outcomes, use of rescue iNO in this population for hypoxic respiratory failure cannot be recommended. Additional studies may identify a specific subset of patients with reversible pulmonary hypertension who may benefit from iNO.

Sponsored Research - None

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3022024

Reduction In Nasal Airway Pressure Injuries Related To Noninvasive Respiratory Support.

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Background: Noninvasive ventilatory (NIV) respiratory support, including CPAP and BiPAP, is being used more frequently as an alternative to invasive ventilation in patients with acute and chronic respiratory failure. While there have been significant improvements in nasal and oronasal mask designs and fixation techniques, patients continue to be at risk for developing pressure injuries on the face and nose, especially those using support over longer periods. As part of a quality improvement (QI) initiative, we sought to track our incidence of noninvasive support-related pressure injuries and evaluate the effect of several interventions intended to reduce these injuries. **Methods:** Patients receiving CPAP and BiPAP were identified on a monthly basis as part of our hospital's QI process. Using a bedside computerized tool, clinical staff reported all pressure injuries related to noninvasive support in an electronic form. Pressure injuries were reported as rate of pressure ulcers/100 NIV days. Several interventions were staged over a two year period to prevent pressure injuries, including: 1) bubble CPAP (B-CPAP; prevalent use of Neotech RAM cannula) in Q4 of 2015 and 2) a novel standardized noninvasive skin barrier policy in Q3 of 2016. **Results:** We observed a total of 10,405 patient NIV days and 14 noninvasive pressure related injuries from 2015-2017. Following implementation of B-CPAP and the skin barrier policy, we observed a 68% reduction in mean Rate of Pressure Ulcers/100 NIV Days related to these interventions (see Figure). **Conclusion:** We were able to decrease our rate of NIV associated pressure injuries over a 2-year period. We speculate that the largest reduction in pressure injuries is related to the increased use of Neotech RAM cannulas with B-CPAP, which may apply less pressure to the skin due to simplistic fixation and reduced weight from a pressure generator located distal to the patient (water-seal). **DISCLOSURES**: Mr. DiBlasi has received funding from Chiesi, Draeger, Neotech, Aerogen Pharma, Mallinckrodt Medical, and Vapotherm.

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3024343

Reducing Unplanned Extubations In The Neonatal Intensive Care Unit: A Retrospective And Prospective Qualitative Analysis.

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Background: Unplanned extubations is a reoccurring issue in the neonatal intensive care unit. An unplanned extubation event is defined as any unplanned loss of an endotracheal tube. These events are the fourth leading causes of an adverse event in this patient population. The team has set a goal to reduce these events to less than 1 per 100 ventilator days to meet benchmark criteria. **Methods:** This study received IRB approval from Carolinas Healthcare System, using retrospective data on unplanned extubation rates, then compare prospective data on the use of audit tools, and implementation stages, we will do a qualitative analysis of these results. The respiratory task force team at Levine Children's Hospital developed a PDSA cycle to assist in the reduction of unplanned extubation. There were 2 bundles of changes that were implemented from May 2016-November 2017. These bundles included: (1) standard practice of having 2 care providers (licensed professional staff) at the bedside with any procedures, documentation of the depth of the endotracheal tube (ETT) position by nursing and respiratory staff during routine cares, (2) real time event analysis review with care team and, visual display of days since last unplanned extubation. A third bundle was implemented March 2018, with the use of hand mittens for patients at high risk, bedside cards for quick visual of ETT size and placement, and "Not on my watch" campaign. **Results:** The implementation of the first bundle of changes was May 2016, it was noted to reduce unplanned extubation rates by 5%. The second bundle reduced unplanned extubation events by 20%. There has been a 25% reduction of unplanned extubation events with the bundles implemented noted from January 2017 thru January 2018. Our goal is to reach <1 per 100 ventilator days. **Conclusion:** A steady decline in events were noted with each bundle implemented. Further evaluation and establishment of hard wiring bundles, will need to occur for sustainability and improvements. The "Not on my watch campaign" was to provide ownership to the care provider, to sustain positive results and to attempt to change the culture of "it's going to happen, no big deal". This campaign created an ownership to care providers for the ETT. Further evaluation and data collection is needed for a good measure of the changes implemented.

Sponsored Research - None

3025024

Extubation Readiness Assessment Testing In Intubated Pediatric Subjects Within A Cardiovascular Care Unit—A Comparison Study.

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Background: Our objective was to compare outcomes of Extubation Readiness Assessment (ERA) protocol-directed weaning by Respiratory Therapists (RTs) with traditional Physician-Directed (P-D) weaning from mechanical ventilation (MV) on Ventilator Days, MV >21 days, Unplanned Extubations (UPE), and Ventilator Associated Pneumonia (VAP) in Pediatric Cardiovascular Care Unit (CVICU) subjects. Minimizing MV days reduces the risk of VAP, morbidity and mortality. Extubation readiness is traditionally based on subjective information; extubation failure is not. A review of the literature reveals that extubation failure occurs due to: apnea, poor cough/gag, escalating support, Oxygen Index>6 on non-cyanotic heart, PEEP>5 on cyanotic heart, frequent suctioning, CO_2 retention, or FiO_2>50%. **Method:** An IRB approved prospective observational cohort design study was conducted on all intubated CVICU subjects from 11/01/16-10/31/17 who met objective inclusion criteria. Subjects were assigned to ERA or P-D based on physician preference. ERA subjects were assessed daily for eligibility, and if eligible were placed on CPAP/PS. ERA failure was defined as not consistently maintaining respiratory and cardiovascular goals. Subjects on MV<12 hours were factored out of MV time because they were not on MV long enough to be assigned to ERT or P-D group. **Results:** Of 481 intubation events, 122 were enrolled in ERA (median STAT score 2.94 and Max OI 14.66). 122 (100%) were extubated within 0-23 (mean 6.03) hours of passing the ERT, including 112 (91.80%) who were extubated for more than 72 hours. Time on MV until successful extubation ranged from 0.04-63.83 days. The median duration of MV was 7.8 days for subjects on MV > 12 hours. 8 subjects had MV>21 days. 1 UPE occurred that did not require reintubation. Of 483 intubation events, 359 were enrolled in P-D weaning (median STAT score= 2.90 and max OI= 14.01). Of these 330 (91.90%) were extubated for more than 72 hours. Time on MV until successful extubation ranged from 0.01-103 days. The median duration of MV was 10.12 in subjects on MV >12 hours. 17 subjects required MV>21 days. 5 had UPE (1.4%), with 3 requiring reintubation. **Conclusion:** ERA protocol performed by Respiratory Therapists to assess extubation readiness in pediatric CVICU led to less median duration of subjects on MV >12 hours, less subjects on MV >21 days (P=0.089), and less UPE than P-D weaning (0.621), but did not reach statistical significance **DISCLOSURES:** None

Sponsored Research - None

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3025655

Agreement Between Pediatric ICU Providers And Software Recommendations Regarding Ventilator Weaning In Pediatric Patients With Acute Hypoxemic Respiratory Failure.

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Background: There is evidence for ventilator weaning protocols providing benefit to children receiving mechanical ventilation but many protocols do not include explicit instruction to decreasing ventilator support from maximal settings. We evaluated provider and respiratory therapist (RT) opinion on ventilator weaning recommendations from a computerized decision support tool that could be used to predictably wean the ventilator. **Methods:** Institution Review Board approval was received for this study. Pediatric ICU attendings, fellows, nurse practitioners (collectively ICU providers), and RTs answered a brief survey about recommendations from a computer decision tool based on the ARDSnet protocol and modified for children. Data entered by RTs into the software from patients currently receiving mechanical ventilation for acute hypoxemic respiratory failure. The survey asked how reasonable the recommendations were and if recommendations could be implemented. **Results:** RTs completed 99 surveys and ICU providers completed 96 surveys based on data from 10 patients. RTs found 63.9% of recommendations reasonable. ICU providers found 65.3% of recommendations reasonable. There were 5 instances of disagreement between RTs and ICU providers. The percent of recommendations RTs thought could be implemented was 29.9% and ICU providers 26.3%. There was 1 instance of disagreement. Free text responses indicated that many RTs and ICU providers were concerned about patient stability and low tidal volumes. **Conclusion:** We did not find the computer decision support tool highly acceptable to RTs and providers in our pediatric ICU. The main barriers to use of this computer decision support tool were ease of data entry, familiarity with the intricacies of computer software algorithm, and perception of stability.

Sponsored Research - None

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3025924

Interdisciplinary Scoring Tool For Placement Of Tracheostomy In Severe Bronchopulmonary Dysplasia Patients To Optimize Best Outcomes.

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Background: The Comprehensive Center for Bronchopulmonary Dysplasia (CCBPD) is a referral center for term and post-term patients with severe BPD. The CCBPD strongly promotes family centered care. The focus of this population of patients has allowed for successful long term NCPAP. There is little data regarding the optimal timing for the decision of a tracheostomy in this patient population. To standardize decision making, the team identified key concepts that would be evaluated and scored. An objective scoring tool of important factors was created in 2015 that reflect three areas of concern: factors likely to prolong the need of ongoing positive pressure, exposure to negative metabolic influences to achieve respiratory stability, and direct restrictions of developmental progress or experiences. Infants are scored monthly from 44 weeks corrected gestational age onward. Scoring includes 16 factors for infants on mechanical ventilation and CPAP. The total score is evaluated by zones: green for low risk, yellow for caution, and red reflecting likely need unless progress occurs soon. Scores and concerns are shared with family of infants whom score in the yellow or "caution" zone, as well as progression to the red zone. **Methods:** The goals for this tool was to decrease variation in the decision making for tracheostomy and to aid parents in understanding the factors that are considered for this decision. Members of the CCBPD team from each discipline were asked to respond to a survey regarding this scoring tool. **Results:** 81.25% of the team agreed that the tracheostomy scoring tool is easy to calculate. 87.50% agreed that the tracheostomy guidelines are helpful in presenting the concerns of needing and benefiting from tracheostomy placement as an interdisciplinary team. 68.75% agreed that the guidelines make the decision making for family easier and less controversial. 68.75% agreed that the guidelines have improved overall best outcomes. **Conclusion:** The interdisciplinary team developed a scoring tool to reflect the three major concerns for need of a tracheostomy. The team provides an objective assessment determining the best timing for the decision of tracheostomy placement that provides a standardized approach to help parents understand why a tracheostomy might be recommended. Utilization of this scoring tool has helped decrease variability of decision making, anticipate discussions with family, and follow our outcomes over time for the severe BPD population.

Sponsored Research - None

2982990

Comparison Of Carbon Dioxide Rebreathing During Application Of CPAP With 2 Types Of Interface-Helmet.

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Background: The interface-helmet has been used as a novel interface to deliver noninvasive ventilation without applying direct pressure on the face. However, due to its large volume, the helmet may predispose to CO_2 rebreathing. Purpose: The purpose of this study was to compare the gas flow rates and CO_2 rebreathing of the two types of interface-helmet on continuous positive airway pressure (CPAP). **Methods:** We evaluated the interface-helmet Caster R NEXT (StarMed, Mirandola, Italy) and the Caster R NEXT with the high flow nasal cannula (HFNC) Optiflow (Fisher & Paykel Healthcare Ltd, Auckland, NZ) that dead-space washout can be expected. Breathing was simulated using an LUNGOO (Air Water Safety Services, Japan) lung simulator; Pmus 20 (tidal volume 500 ml), frequency = 20/min, lung compliance 80 ml/cmH_2O, airway resistance 5 cmH_2O/L/s, EtCO_2 = 40mmHg. The upper respiratory tract model created on a 3D printer was connected to the LUNGOO and was covered with the Caster R NEXT. PEEP valve(5 and 10cmH_2O) was attached to left port of the Caster R NEXT and source gas flow was set at 30 L/min to 60 L/min on right port or the Optiflow through closed port (right port was closed on this occasion) of the Caster R NEXT. Tidal volume was measured by the LUNGOO. EtCO_2 and FiCO_2 were measured by the Capnostream™ 20 p (COVIDIEN) at three points: The oral cavity, nasopharynx and trachea. **Results:** Although in each interface-helmet a progressive reduction in EtCO_2 and FiCO_2 (oral cavity < nasopharynx < trachea) was observed with increasing gas flow, the effect was greatest with the Caster R NEXT with the Optiflow at all points. The FiCO_2 obtained with the Caster R NEXT with the Optiflow (PEEP 5, gas flow 30, nasopharynx) was almost at the same level as FiCO_2 obtained with the Caster R NEXT (PEEP 5, gas flow 60, nasopharynx). Tidal volume decreased in both interface-helmet (up to 10% on PEEP 5 and up to 29% on PEEP 10.). **Conclusion:** The lower concentration of nasal CO_2 obtained using the Optiflow suggests that it causes less rebreathing.

Sponsored Research - None

3004913

Noise Levels With Different High-Flow Nasal Cannulas.

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Background: High levels of ambient noise are associated with sleep disturbance, the risk of delirium, and exacerbation of cognitive dysfunction. We have reported how to digitize the noise levels of high-flow nasal cannula (HFNC) systems at the AARC meetings and in the article in 2015 to 2017. However, there are still some other HFNC systems, which we have not been yet reported on comparison. Digitizing the noise levels of the Venturi-effect-typed HFNC (HFNC/Venturi) with or without a filter, and a muffler, and the turbine-typed HFNC (HFNC/turbine). **Methods:** The noise levels were measured the HFNC systems while alternating the total flow and FiO_2. We measured the noise level of the HFNC/Venturi (MaxVenturi; Maxtec) with a filter (Maxtec) and a muffler (Maxtec) while alternating each parameter and settings. The noise level of the HFNC/turbine (AIRVO$_2$, Fisher&Paykel) was measured. **Results:** Without a filter and a muffler on the HFNC/Venturi, the noise level was high when the total flow and FiO_2 increased. It became 60.2dB when FiO_2 was 0.4 with the total flow of 30LPM. It became 74.1dB when FiO_2 was 0.9 with the total flow of 60LPM. In the HFNC/turbine, the noise level was high when the total flow and FiO_2 increased. It became 45.1dB when FiO_2 was 0.4 with the total flow of 30LPM. It became 69.7dB when FiO_2 was 0.9 with the total flow of 60LPM. In contrast, in the HFNC/Venturi with a filter and a muffler, the noise level increased in proportion to the total flow. However, the noise level remained the same even when FiO_2 increased, while the total flow was constant. It became 50.9dB when FiO_2 was 0.4 with the total flow of 30LPM, 51.2dB when FiO_2 was 0.9 with the total flow of 30LPM, 57.4dB when FiO_2 was 0.4 with the total flow of 50LPM, and 57.5dB when FiO_2 was 0.9 with the total flow of 50LPM. The noise level of the HFNC/Venturi with a filter and a muffler became lower than that of HFNC/turbine when FiO_2 was 0.9 in all the flow parameters. Our study was based on keeping noise levels lower than 59dB for night-time and 63dB for daytime in hospital rooms, which are the noise levels reported to prevent sleep. **Conclusion:** The noise level of the HFNC/Venturi with a filter and a muffler significantly decreased in comparison with the HFNC/Venturi without a filter and a muffler, and when with only a filter attached. The noise level of the HFNC/Venturi with a filter and a muffler was significantly different from that of the HFNC/turbine.

Sponsored Research - None

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3014874

Feasibility Of Adding A Heated Humidifier To An Air Entrainment Venturi Mask.

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Background: The air entrainment Venturi mask (VM) is a widely used oxygen administration device. Along with VM, the manufacture (Everestmed-equip, Taiwan) also provides collars, which can be combined with large volume nebulizers (VMLVN) to decrease nose and mouth dryness. However, the cold and moist mist can cause the side effects of bronchoconstriction. Previous studies were all unable to provide a standard method for using VM combined with a heated humidifier (VH-1500, Taiwan) ;(VMH). Therefore, this study aimed to analyze and compare changes in the oxygen concentration and total flow between VMH and VMLVN using an oxygen analyzer and examine the feasibility of VMH. **Methods:** This study uses VMs manufactured in Taiwan. Twenty-one samples were randomized into two groups, namely VMH and WMLVN. Under seven FiO_2 concentrations and flow conditions (24% 3L, 26% 3L, 28% 6L, 30% 6L, 35% 9L, 40% 12L, and 50% 15L), an oxygen analyzer was used to repeatedly monitor changes in the FiO_2 concentrations in the first 1, 5, and 10 min and the mean values were calculated. The total flow formula $(79 \times O_2 \text{ flow})/(O_2\% - 21)$ was used to obtain the total flow. Repeated measurements were used to identify dependence, and the Mann–Whitney U test was used to compare differences between the two groups. **Results:** Table 1and 2 shows the seven oxygen concentrations and total flows measured in the VMH and VMLVN groups. Results showed no significant differences in the FiO_2 concentrations measured in the first 1, 5, and 10 min between the groups ($P > 0.05$). The mean and standard deviations of the VMH and VMLVN groups were 41.0% ± 2.0% and 29.2 ± 1.7 LPM and 33.5% ± 1.9% and 54.2 ± 2.3 LPM, respectively. The FiO_2 concentration of VMH was significantly higher than that of VMLVN ($P < 0.05$), whereas the total flow of VMLVN was significantly lower than that of VMH ($P<0.05$). **Conclusion:** Our study found that the oxygen concentration of VMH was higher than that of VMLVN, whereas the total flow of VMH was lower than that of VMLVN, which suggests that an increase in the oxygen flow decreases air entry and, thereby, affects the total flow. Therefore, in clinical practice, a patient's flow demand may not be fulfilled, which affects the patient's inhaled oxygen concentration. Therefore, we recommend that patients' respiration pattern and inhaled oxygen flow should be re-evaluated when using VMH to fulfill their flow demand.

Sponsored Research - None

3025319

Evaluation Of A Pediatric Respiratory Assessment Tool: Inter-Rater Agreement And Correlation To Duration Of Heated High Flow Nasal Cannula Therapy.

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Background: We implemented a Heated High Flow Nasal Cannula (HHFNC) protocol utilizing a respiratory assessment-scoring tool to guide interventions in therapy. Providers from two different disciplines used the respiratory assessment-scoring tool. We sought to characterize the interrater agreement between nursing and respiratory therapy assessments when using a pediatric respiratory scoring tool for infants with bronchiolitis and explore if a higher score obtained on the first day of use was associated with a longer duration of HHFNC use. **Methods:** All subjects that qualified for the HHFNC protocol were included in the study. A total of 28 infants with uncomplicated bronchiolitis were admitted to the acute care pediatric unit and placed on the HHFNC protocol. A respiratory assessment utilizing the scoring tool was performed independently every four hours by a respiratory therapist (RT) and registered nurse (RN). The nurse and therapist were not allowed to compare scores. The first assessment for each patient was placed in a binary classifier of a high (>8) or low (≤8) score and this was examined for differences in regards to duration of HHFNC using the Mann-Whitney U test. **Results:** A total of 319 simultaneous assessments were compared between providers. Percent agreement is shown for each element of the scoring system in the table as well as the average score for each element per provider when a disagreement was present. The highest percent agreement was found with respiratory rate. The lowest agreement was found for auscultation and retractions. For the element with the lowest percent agreement (retractions) RNs tended to assign higher scores than that the RTs when disagreements were present. When looking at a binary classifier for the score, a high score from the RTs on the first day was associated with a longer median duration of HHFNC use, 75 vs. 51 hours ($P < 0.05$). An assessment from the RN yielded a similar trend but was not statistically significant ($P = 0.09$). **Conclusion:** Elements from the scoring tool involving objective measurements such as respiratory rate resulted in strong agreement but elements involving subjective measurements such as auscultation and retractions resulted in weaker agreement. Higher rated respiratory scores assessed on the first day were associated with a longer duration of HHFNC use.

Sponsored Research - None

	Percent Agreement	RT median score when disagreement	RN median score when disagreement
Respiratory Rate	92.8	2	1
Retractions	85.0	1	0
Auscultation	79.3	1	1
Retractions	74.9	1	2

Percent agreement between RN and RT for each element of the score, and RT and RN median scores using only data obtained when assessment scores differed for each element.

3007912

Acute Effects Of Transcutaneous Electrical Diaphragmatic Stimulation In Patients With Prolonged Mechanical Ventilation.

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Background: Diaphragm dysfunction is one of common complication in patients with prolong mechanical ventilator (PMV) and is often associated with increased rate of weaning failure and days of hospitalization. Electrical stimulation (ES) has been shown to be beneficial in the improvement of muscle strength in patients with COPD. The purpose of this study is to examine the acute effects of transcutaneous electric diaphragmatic stimulation(TEDS) on pulmonary function in patients with PMV. **Methods:** Patients who have been ventilated for>21 days were recruited from respiratory care center. Subjects were randomly assigned into TEDS group (n=12) or control group (n=11). The TEDS group received muscle electrical stimulation for 30 min/session. Before and after intervention, subjects were assessed weaning parameters (tidal volume (Vt), minute volume (MV), respiratory rate (RR), and rapid shallow breathing index(RSBI)) and respiratory muscle strength. The vital sign during intervention was also recorded. This study was approved by the Institutional Review Board of Chang Gung Memorial Hospital (201700096A3). A Wilcoxon rank signed test was used to examine the effects of the interventions on weaning parameters within group. **Results:** There was no significant difference at pre-measurements (0 min) between TEDS and control groups. After 30 min TEDS, subjects in TEDS group have significant improvement in Vt (391.0(343.0-459.0) ml vs 444.0(344.0-485.0) ml, P<0.05), whereas no significant changes was found in control group (346.0(330.0-460.0) ml vs 380.0(341.0-471.0) ml, P>0.05). In TEDS group, subjects demonstrated no significant changes in HR (82.0(74.00-94.0) bpm vs 82.0(69.0-97.0 bpm, P>0.05) and blood pressure (systemic blood pressure: 129.00(110.0-148.0) vs 132.0(116.0-147.00mmHg), P>0.05). **Conlcusion:** In patients with PMV, the application of TEDS results in a immediately increase f tidal volume. This application did not induce any significant changes of vital sign and may consider as one of the supplement treatment for ventilated patients who has diaphragm dysfunction.

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3021027

Effects Of Walking Program With Pedometer On Quality-Of-Life Among Obstructive Lung Disease Patients.

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Background: Patients with chronic obstructive pulmonary disease (COPD) are suffered from impaired pulmonary function and dyspnea which result to limited level of physical activity, and impaired quality of life. Exercise and regular physical activity have been proven to break the vicious circle. The aim of this study is (1) to investigate the effects of a walking program on exercise capacity and quality of life; (2) the relationship of daily steps and quality of life in patients with COPD. Method: Patients with COPD were randomly assigned to pedometer group (PG) or control group (CON). Subjects in PG walked to target daily steps with pedometer for 8 weeks. During the program, the target of daily steps increased progressively (10% per week) in PG. Before and after the program, the following measurements were performed: Six-Minute Walk Test (6MWT), pulmonary function test (PFT), modified medical research council (mMRC), COPD Assessment Test (CAT), quality of life questionnaire (SF-12) and daily steps. Wilcoxon Rank Signed test were used for comparison within groups. Institutional Review Board (IRB) approval was obtained from Taoyuan General Hospital No. TYGH106081. **Results:** Fourteen patients with COPD were randomly assigned to pedometer group (n=8) or control group (n=6). After 8 weeks training, subjects in PG showed significant improvement in pulmonary function. The FVC significant increased (from 2.7 [1.9-3.2] to 3.3[2.0-3.6], P<0.05); FVC% significant increased (from 88.2[72.0-98.8] to 101.8[75.1-115.9], P<0.05). The daily steps also showed significant improvement (from 5674.3[3115.6-7912.2] to 8101.5[3034.5-11249.7], P<0.05) in PG. No significant change was found in SF-12, 6MWT, and symptoms (CAT) in PG after training. In CG, subjects showed no improvement in the measurements of pulmonary function, quality of life, 6MWT and daily steps. In addition, the CAT score significantly increased (from 14.0[9.5-17.8] to 21.0[15.8-28.3], P<0.05) in CG. **Conclusion:** For patients with COPD, a daily walking program with target may be beneficial in the improvement of pulmonary function and daily steps. Disclosures: None of the authors have conflict of interest regarding the pedometer devices used in this study. No research funding, sponsorships, provision of equipment, or other financial support.
Sponsored Research - Non

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3023541

Effects Of Sitting Position On Volumes Of Hemithoraces Of Healthy Men And A Patient Who Underwent Thoracotomy With A Midline Incision.

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Background: Post-thoracotomy patients may acquire restrictive lung expansion due to poor posture. It is important to understand thoracic configuration and chest movement. **Method:** One post-thoracotomy patient with a midline incision and 11 men were tested in upright and stooped sitting positions during quiet and volitional deep breathing. A total of 84 infrared reflective markers were placed on the anterior and posterior aspects of the trunk to record thoracic volume. The positioning for these markers was from 6 midline markers placed in a vertical line on 6 levels. This was repeated on the posterior aspect of the trunk. The anterior half was encompassed within the upper thorax demarcated by the sternal notch and 3rd rib, and the posterior half within the lower thorax demarcated by the xiphoid process and 10th rib. A 3-dimensional motion analyzer measured the difference in volume within the upper and lower hemithoraces through change of movement of the markers. For calculation of thoracic volume, 6 imaginary hexahedra were visualized for the upper thorax and lower thorax. Each imaginary hexahedron was divided into 3 imaginary triangular pyramids to calculate positional vectors using data obtained from each marker's position. Finally, volume for the hexahedra and triangular pyramids was calculated. To measure for changes in right and left hemithoraces' volume imaginary midpoints were established between the ventral and dorsal markers. The upper and lower thoraces encompassed the anterior and posterior spaces between the ventral and dorsal markers and their respective midpoints. Bunkyo Gakuin University Medical Ethics Review Board approved this study (No. 2016-0024). **Results:** For all participants in stooped sitting for both breathing patterns, the left upper hemithorax showed significantly greater change in upper thoracic volume and significantly greater change in thoracic configuration on termination of inspiration and expiration. For the healthy men, the left lower hemithorax showed significantly greater change in thoracic configuration and lower thoracic volume on termination of inspiration and expiration. For the patient in the right lower hemithorax, there was a significantly greater change in thoracic configuration and lower thoracic volume on termination of inspiration and expiration for both breathing patterns. **Conclusion:** Correction of stooped posture may facilitate an improvement in breathing. **Disclosures:** Authors report no conflicts of interest.
Sponsored Research - None

2970168

Ventilator Alarms In Intensive Care Units: Frequency, Duration, Priority And Relationship To Ventilator Parameters.

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Background: We evaluated the frequency, duration, and type of ventilator alarms occurring in adult intensive care units (ICUs) and examined determinants of alarm settings. **Methods:** This was a prospective observational study conducted in three ICUs – cardiovascular surgical (CVSICU), medical (MICU), and neurosciences critical care unit (NCCU) in a U.S. tertiary care university teaching hospital. **Results:** During 18 consecutive days, alarms were triggered 10,933 times over 1,555 ventilator-hours, averaging 7.0 alarms per ventilator-hour. Each alarm resulted in up to 8 notifications depending on alarm duration and acknowledgement by personnel. In the CVSICU and NCCU, initial alarm notifications via ventilator were duplicated via nurse call system, whereas in the MICU, a 60-second delay reduced duplicate notifications to 2.5%. Initial alarm conditions that did not resolve in ≤15 seconds triggered an additional notification cascade to respiratory therapists and nurses via hospital middleware. Forty percent of the alarms triggered such notification cascade, leading to 2.8 additional notification sequences per ventilator-hour for a total of 9.8 per ventilator-hour. The most common alarms were high inspiratory pressure (34.2%), high respiratory rate (17.7%), and low expired mandatory tidal volume (12.9%). Alarm settings were independent of corresponding ventilator parameters for respiratory rate and minute volume in all ICUs. **Conclusion:** Ventilator alarms are highly prevalent, and notification systems amplify alarm burden by generating a cascade of messages about the same alarm. Prioritization of alarms varies between ventilator types owing to a lack of standardized classification. Alarm limits are arbitrarily set and not individually adjusted.
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3009766

The Predictive Effect Of The Modified Predictors Of Weaning From Mechanical Ventilation In Tracheostomized Patients With Prolonged Weaning: A Retrospective Study.

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Background: Weaning from mechanical ventilation(MV) is a prominent process in patients with acute respiratory failure when their cause of respiratory failure begins to reverse or stabilize. The rate of patients in weaning success after the first spontaneous breathing trial(SBT) is about 31-40%. Furthermore, there is still about 15% of patients who are prolonged weaning or ventilator dependent. Tracheostomy is an alternative way to promote weaning from MV because of the benefits of decreasing airway resistance and improving patient comfort. Meanwhile, it is crucial to determine the time of weaning from MV by weaning parameters. Rapid shallow breathing index(RSBI) has been thought as an accurate predictor of weaning from MV for decades. In recent years, there are studies that are determining the better predictive effects on modified RSBI and weaning index(WI) than the traditional RSBI in orotracheally intubated patients before weaning from MV. To the best of our knowledge, there is no study to determine the predictive effect of the modified predictors of weaning from MV in tracheostomized patients with prolonged weaning. To determine predictive effects of the modified predictors of weaning from MV in tracheostomized patients with prolonged weaning. **Methods:** This retrospective study was researched the electrical chart database at the intensive care units and respiratory care center in a medical center in a 5-year period. Weaning parameters, body mass index (BMI), ventilator parameters, arterial blood gas (ABG), and the outcome of weaning from MV were recorded. The receiver-operating characteristic(ROC) curves, thresholds, area under the curves(AUC), PPV, NPV, specificity, and sensitivity of RSBI, the modified RSBI and WI were analyzed. We also used univariate and multivariate logistic regression model to determine different predictors in weaning success. **Results:** Among three indicesnRSBI(sensitivity 69%, specificity 84%, PPV 90%, NPV 56%, AUC 81.5%) and WI(sensitivity 73%, specificity 86%, PPV 91%, NPV 60%, AUC 84.5%) had higbetter predictive power than modified RSBI(sensitivity 71%, specificity 78%, PPV 87%, NPV 56%, AUC 78.4%). The significant predictors in weaning success in tracheostomized patients with prolonged weaning were neurologic disease, RSBI and WI. **Conclusion:** The traditional RSBI and WI had good and the same predictive effects in weaning from MV in tracheostomized patients with prolonged weaning.
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3015769

Ability Of ICU Practitioners To Recognize Patient-Ventilator Asynchrony (PVA) Using Waveform Analysis In Saudi Arabia: An Observational Study.

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Background: The study aims to assess the ability of ICU practitioners to identify different common types of patient-ventilator asynchronies according to their profession, years of experience, and prior training on mechanical ventilation by using waveform analysis. **Methods:** We used an evaluation tool designed and validated by (Ramirez et al., 2017). This tool consisted of 3 videos of common asynchronies (double-triggering, auto-triggering, and ineffective effort). The data was collected by evaluation sheet that was distributed to different hospitals in Saudi Arabia among different ICU practitioners, including physicians, respiratory therapists (RTs), and nurses. Each video was recorded from a SERVO- I ventilator, and showed 3 scalars: pressure versus time, flow versus time, and volume versus time wave forms. We used descriptive analysis, the Chi-square and Fisher exact tests. The experience and prior training on MV were classified as >5 years, <5 years' experience, trained and non-trained. We used a binary multiple logistic regression to find the association between years of experience, prior training on MV and profession and the ability of ICU practitioners to recognize ≥2 asynchronies correctly. Institutional Review Board (IRB) approval was obtained. **Results:** Fifteen centers participated. A total of 152 ICU practitioners including 51 RTs (33.5%), 48 physicians (31.6%), nurses 53 (34.9%), completed the evaluation. Only 18 of ICU practitioners (11.8%) recognized the 3 types of asynchrony correctly, whereas 40 (26.3%) recognized 2 types of asynchrony correctly, and 65 (42.7%) recognized 1 type of asynchrony. 29 (19.1%) did not identified any type of asynchrony. Double-triggering was identify by 82 of ICU practitioners (53.9%), auto-triggering was identified by 62 (40.7%), ineffective effort was identified by 55 (36.1%). There were significant differences in term of training and experience among the ICU practitioners (see table 1). The RT profession was found to be significantly associated with the ability to identify 2 or more asynchronies after applying a binary multiple logistic regression model (An odds ratio of 0.429 (95% CI 0.185-0.997) with (P=0.04). The most recognized asynchrony by the RT's was double-triggering (28 of 51, 50%). **Conclusion:** The results show that ICU practitioners in general have limited ability to recognize the most common types of PVAs. The profession of RT was found to be more associated factor to recognize types of asynchronies correctly.

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3017673

Could The Loss Of Diaphragm Thickness Measured By Computer Tomography Predict The Rate Of Reintubation?

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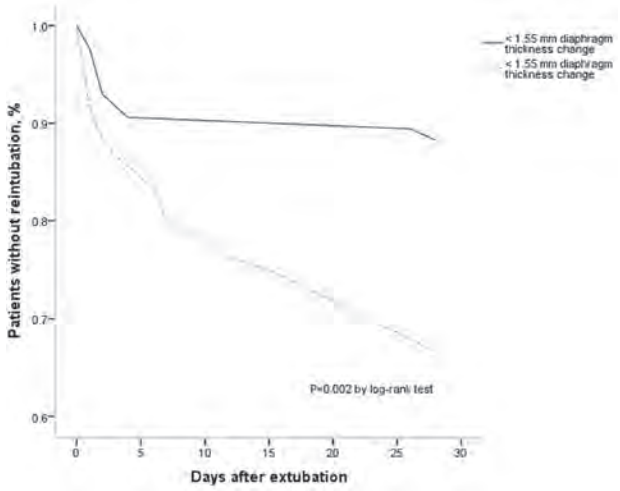
Background: Diaphragm function loss was very common in the intensive care unit (ICU) and could predict the success of weaning. However, whether diaphragm thickness loss during mechanical ventilation (MV) measured by computer tomography (CT) scans could predict the rate of reintubation remains unclear. **Methods:** A retrospective study was performed on patients received MV in the ICU of West China Hospital, Sichuan University. Diaphragm thickness of each patient on the CT scans within 48 hours after MV and 24 hours before weaning were measured by at least two independent investigators. The primary outcome was the rate of reintubation, and the second outcomes included the hospital mortality and length of ICU stay (ICU LOS) after extubation. **Results:** A total of 145 patients were included in the analysis. According to the Receiver Operating Characteristic curve, all the patients were divided into two groups (less or more than 1.55mm diaphragm thickness loss in reintubation). As a result, less loss of diaphragm thickness was a protective factor of the rate of reintubation (33% vs. 12%; adjusted odds ratio [aOR] 0.23; 95% confidence interval [CI] 0.10-0.56; P<0.01) and hospital mortality (18% vs. 4%; aOR 0.11; 95%CI 0.03-0.45; P<0.01). But no significant difference was found in the ICU LOS after extubation between the two groups. **Conclusion:** Less diaphragm thickness loss was related to lower rate of reintubation and hospital mortality.

Sponsored Research - None



3024877

The Effects Of Using Respiratory Clinical Specialists To Drive SBT Compliance On Mechanically Ventilated Patients.

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Background: The implementation of clinical specialists to help improve processes and drive evidence-based practices has been shown to have positive outcomes in several different settings and disciplines. In this study the implementation of respiratory clinical specialists (RCS) into the intensive care units (ICU) setting to improve the compliance of assessing for appropriateness of spontaneous breathing trials (SBT) and the completion of SBTs when deemed appropriate. It is our belief that the implementation of RCS into the ICU setting can be used to drive outcomes of SBT compliance. **Method** Data is extracted daily from a specific field on every patient requiring mechanical ventilation. The field is addressed by respiratory therapists (RT) selecting "Yes" or "No" in the appropriateness for performing an SBT. If the field is addressed before 1400 that day the software counts the first section of SBT compliance, or performing the safety screen, as compliant. The second part of SBT compliance is the performing of SBTs when appropriate. To track this the software looks at all patients in which the RT answered "Yes" to passing the safety screen, and then looks for a time in which SBT was initiated. If the SBT is charted as being completed by 1400 the software counts the second part of performing SBT as compliant. This data was tracked prior to the implementation of RCS into the ICUs and then continued to be tracked once they were put into place. **Results:** In January of 2017, prior to implementation of RCS, compliance with SBT safety screening was approximately 50% and performing of SBTs even less, at 20.5%. From January to April of 2017 SBT safety screen compliance remained between 46% and 50%, and SBT compliance between 20.5% and 35.5%. In April 2017 RCS were assigned to the ICUs, and in May of 2017 SBT safety screen compliance was 73.5% and SBT compliance 70.4%. That is an increase of approximately 23.5% and 38% in just the first month. Continuing to rise over the last year our most recent results show compliance of safety screens at 90.5% and SBT performance 79.3%. **Conclusion** The implementation of RCS into the ICU setting showed an immediate impact in SBT compliance. Compliance of SBT safety screens has increased by 40.5% and SBTs performed by 43.8% from that of the same time period one year prior. This study concludes that the implementation of RCS into the ICU setting can be used to drive outcomes of SBT compliance.

Sponsored Research - None

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3018163

Is APRV Set According To Current Recommendations For Adult Patients At A Large Regional Community Medical Center?

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Background: Airway Pressure Release Ventilation (APRV) is an alternative mode of ventilation for patients with severe hypoxemic failure. There is little evidence on how best to titrate APRV settings based on each patient's disease process, and thus limited consensus among practitioners for appropriate APRV settings. The purpose of this retrospective review was to determine if APRV is set according to recommendations established by a previously published protocol in adult patients admitted to the ICU. Such protocol recommends setting a Pressure High (Phigh) equal to the plateau pressure on conventional ventilation or less than 35 cm H_2O, Pressure Low (Plow): 0 cm H_2O, Time High (Thigh): ≥ 4.0 seconds, and initial Time Low (Tlow) between 0.5-1.0 second but titrated to keep at least 50% expiratory flow air trapping measured on the flow vs. time waveform. **Methods:** Electronic medical records (EMR) from 89 patients admitted to ICUs at a a 496-bed university-affiliated institution in San Antonio, TX between January of 2014 and March of 2018. Ten patients were placed on APRV during that time and they were selected for analysis. The information obtained included the ventilator settings and clinical status of each patient. The four main APRV parameters were analyzed to determine if APRV was used as recommended. **Results:** The mean age of the patients selected for the study was 56.6 years (+/-12.1). Most patients (40%) were transitioned to APRV from AC/VC with AutoFlow from a mean FiO_2 of 77.5% (+/-21.8%), P/F ratio 121.5 (+/-74.4), OI 22.2 (+/-12.5), Ppeak of 27.8 cm H_2O (+/-7.03), PEEP of cm H_2O (+/-3.9), and MAP 18.6 (+/-4.3). Pplat was not recorded in the majority of patients prior to APRV. The mean values for APRV parameters obtained were P High 29.8 cmH_2O (+/-2.8; range 30.5-28.5), P low 0.55 cmH_2O (+/-1.57; range 0-5), T High: 3.71 sec (+/-0.92; range 2.5-4.7), and T Low: 0.65 sec (+/-0.23; range 0.25-1.0). The average I:E ratio selected was 6.3:1. After 24 hours, only 5 patients remained on APRV but the reasons for switching back to other modes were not documented. **Conclusion:** This preliminary evaluation of patients admitted for respiratory failure to these ICUs showed that, when selected, most APRV parameters were set in a similar fashion to recommended protocols. A larger number of patients and evaluation at different institutions is necessary to evaluate how consistently a protocol for this very unique mode is utilized.

Sponsored Research - None

APRV Parameters

PARAMETER	Phigh	Plow	Thigh	Tlow
MEAN (SD)	29.8 (+/-2.8)	0.55 (+/-1.57)	3.71 (+/-0.92)	0.65 (+/-0.23)

3025539

Impact Of Plow On Flow, Tidal Volume And Inspiratory PEEP In APRV.

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Background: In Airway Pressure Release Ventilation (APRV), there have been questions about whether increases in pressure low (P-low) will impact flow characteristics while maintaining a time low (T-low) of 75%. We hypothesize that the addition of P-low will not change the flow characteristics. **Method:** Utilizing the Hamilton G5 (Bonaduz, Switzerland) and Drager V500 (Lubeck, Germany) mechanical ventilators, we created a baseline with the following settings: High pressure(P-high) 20cmH20, low pressure (P-low) 0cmH_2O, time high(T-high) 6 seconds, time low (T-low) 75% of Peak Expiratory Flow Rate (PEFR). Intrinsic Peak End Expiratory Pressure (iPEEP) and the change in pressure from P-high to iPEEP (ΔP) were measured and the Phigh was adjusted with increases in set Plow to maintain the same ΔP. Plow was increased in increments of 5 cmH_2O up to 20 cmH_2O. The T-low was adjusted to as close to 75% of PEFR as possible. A T-High of 6 seconds, and ΔP of 12 cmH_2O was maintained for the Hamilton G5 and a ΔP of 11 cmH_2O for the Drager V500. The Active Servo Lung(ASL 5000) was set to passive breathing, Peak Expiratory Flow Rate (PEFR), Vt, intrinsic PEEP and T-low were recorded every 5 breaths. **Results:** The addition of P-Low resulted in a expiratory flow rate decrease of 12 L/min on both ventilators from a Plow of 0 to 20 cmH_2O. the tidal volumes increased by almost triple even while maintaining the same ΔP. Additionally, the increases in PEEP did not simply increase by the same number in Plow. **Conclusion:** With the addition of P-low, flow characteristics did change, the iPEEP increased by unpredictable values, and the VT increased by almost triple despite maintaining the same ΔP. The addition of Plow does impact the flow, VT, and iPEEP in patients and caution should be taken when applying it to APRV.

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3005166

Autorelease Ensures Consistent Total PEEP With APRV.

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Background: A common method to maintain lung volume during the release period of APRV is to set P_{low} at 0 cm H_2O and titrate T_{low} to create intrinsic PEEP. T_{low} should be set to transition to T_{high} when the expiratory flow is at 50-75% of PEF. A potential issue is that as airway mechanics change, total PEEP (PEEPtot) may also change. A possible solution is a feature on the Dräger Infinity V500, AutoRelease, which allows the user to set the percentage of PEF at which to transition to P_{high}. The aim of this study was to determine whether AutoRelease maintains a more consistent PEEPtot when compared to a fixed T_{low} in the context of changing lung compliance. **Method:** A V500 ventilator was attached to an ASL Breathing Simulator. The ASL was set to: inspiratory resistance 5 $cmH_2O/L/sec$, expiratory resistance 10 $cmH_2O/L/sec$, and a passive model (P_{musc} 0 cm H_2O). Compliance settings were 10 (C10), 30 (C30), and 50 (C50) mL/cm H_2O. Ventilator was set to: P_{high} 30 cm H_2O, P_{low} 0 cm H_2O, T_{high} 4 sec, and Slope 0.2 sec. For the AutoRelease (AR) group, AutoRelease was set to 75% of PEF. The set T_{low} (TL) group, the T_{low} was set to 0.38 sec, which was associated with 75% of PEF at C30 and a release rate of 14 br/min. For both groups, PEEPtot and release volume were measured from the ventilator nine times at each compliance level, allowing 60 sec to pass between measurements. Data was summarized in SPSS. **Results:** Mean ±SD PEEPtot (cm H_2O) for TL vs AR at C10: 3.5 ± 0.1 vs 11.2 ± 0.2, P< 0.01; C30: 14.7 ± 0.1 vs 14.0 ± 0.2, P< 0.01; and C50: 19.4 ± 0.1 vs 15.3 ± 0.1, P< 0.01. The release rate for AR ranged from 13.2 br/min at C50 to 14.4 br/min at C10. Release volumes increased as compliance increased. Mean release volumes (mL) for TL vs AR at C10 mL/cm H_2O: 366 vs 277; C30: 542 vs 542; and C50: 613 vs 789. **Conclusion:** A more consistent PEEPtot is maintained during APRV with AutoRelease compared to a set T_{low} in the setting of changing compliance. PEEPtot for AR and TL was statistically significant at all three compliances, but at a compliance of 30 the PEEPtot is essentially the same by design. Release rate variation may have influence on results when a T_{high}/T_{low} ratio or release rate is ordered. Release volume variation is expected as compliance and PEEPtot change. A clinical trial should be conducted to determine whether these results are clinically important. **Disclosures** We have no financial or other conflicts of interest to disclose.

Sponsored Research - None

3006361

An Evaluation Of Various Inspiratory Times And Inflation Pressures During Airway Pressure Release Ventilation.

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Background: There are few recommendations on how best to apply certain modes of mechanical ventilation, and the application of Airway Pressure Release Ventilation (APRV) in particular requires strategic implementation of specific inspiratory times (I-times) and particular mean airway pressures (MAWP) neither of which is standardized. We sought to identify whether an ideal I-time or MAWP could be identified to favor positive clinical outcomes. **Methods:** Institutional Review Board approval was obtained. A retrospective analysis of archived electronic health record data was assessessed to evaluate the clinical outcomes of adult patients that had been placed on APRV for a target of at least 8 hours. Sixty-eight adult subjects were evaluated as part of a convenient sample. **Results:** All outcomes of interest (surrogates) for short-term clinical outcomes to include the PaO_2/FiO_2 (P/F) ratio, Oxygen Index (OI), Oxygen Saturation Index (OSI), and Modified Sequential Organ Failure Assessment (MSOFA) scores showed improvement after approximately 8 hours on APRV. There was significant improvement in P/F ratio (p = .012) and OSI (p = .000). Results of regression analysis showed MAWP as a significant positive predictor of post-APRV OSI and P high as a significant positive predictor of post-APRV MSOFA score. **Conclusion:** It was found that settings for P high, Plow, and T low in addition to overall MAWP and Body Mass Index (BMI) had significant correlation to impact at least one of the short-term clinical outcomes measured and a lower setting for both P high and MAWP was predictive of a better post-APRV OSI and MSOFA score.

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Clinical Outcomes

Change Score: Pre-Post APRV	n (x, SD)	p-value
P/F ratio	18 (-44.28, 66.42)	.012
OI	18 (8.77, 20.44)	.086
OSI	63 (6.34, 9.50)	.000
MSOFA	52 (.096, 2.45)	.778

Paired t-test performed

3025068

The Use Of High Frequency Percussive Ventilation In Postoperative Cardiac Surgery Patients Significantly Improves Gas Exchange Without Impairment Of Hemodynamics.

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Background: Our objective was to determine if HFPV improves gas exchange in postoperative open heart cardiac surgery patients. **Methods:** Patients were ventilated after surgery with HFPV for 2 hours, then switched to a conventional ventilator, using the Adaptive Support Ventilation (ASV) mode for weaning. ABGs were performed for the first and second hour on HFPV, and for the first hour on conventional ventilation, FiO_2 was maintained at 70% on both VDR and conventional ventilator. Invasive hemodynamic data was collected utilizing right heart pulmonary catheter and arterial lines. After arrival from the OR the patients were on the VDR-4 ventilator. ABGs were monitored Q1H until patients were weaned and extubated. After 2 hours patients were transferred to a conventional ventilator for weaning and extubation. The mode used was Adaptive Support Ventilation (ASV), 22 patients were included in the study data for analysis. **Results:** First hour mean P/F ratio was observed on HFPV, being significantly higher than the first hour mean P/F ratio on conventional ventilation (mean difference 162.29 mmHg, 95 % CI 97.07-240.99, P<0.001). This difference was increased when comparing the second hour mean P/F ratio on HFPV with the first hour mean P/F ratio on conventional ventilation (mean difference 205.39 mmHg, 95% CI 143.14-267.63, P<0.001). **Conclusion:** There was a statistically significant difference in P/F ratio between the first hour on HFPV and conventional ventilation, as well as the second hour respectively (P<0.001). Thus, gas exchange based on P/F ratio at similar MAP and pulmonary artery wedge was significantly improved with HFPV compared with conventional ventilation, and improved further over the second hour of HFPV compared to conventional ventilation. The significant gains in P/F ratio were lost over one hour when switched to conventional ventilation. HFPV provided significantly better gas exchange and thus may have reduced shunting induced by open heart cardiac surgery. In this population of postoperative open heart cardiac surgery patients, HFPV was able to significantly improve gas exchange, as reflected by P/F ratio and $P(A\text{-}a)O_2$ without any hemodynamic consequence. References: 1. Esan A, Hess D, et al: Severe Hypoxemic Respiratory Failure. *CHEST* 2010; 137(5) 2. Chung KK, et al: HFPV and low tidal volume ventilation in burns: *Crit Care Med* 2010 3. Lucangelo U, et al: Effects of mechanical load on flow, volume, and pressure delivered by HFPV. *RespirPhysiolNeurobiol* 2004

Sponsored Research - None

3012830

Comparison Of The Rate Of Improvement In Gas Exchange By High Frequency Oscillatory Versus Percussive Ventilation In A Newborn Piglet Saline Lavage Lung Injury Model.

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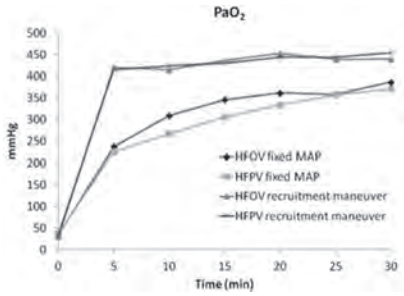
Background: High frequency oscillatory ventilation (HFOV) and high frequency percussive ventilation (HFPV) are both used effectively in neonatal patients but investigation of the gas exchange they provide on comparable settings has been limited. Previous study in a piglet saline lavage injury model found no overall difference in oxygenation or ventilation. However, post hoc analysis suggested a hypothesis that HFPV improved oxygenation more quickly than HFOV. Our objective was to test the hypothesis that oxygenation improves at a different rate on HFOV vs. HFPV in a prospective, randomized, crossover experimental animal model. **Methods:** Sixteen 3-7 day old, 2-4 kg neonatal piglets were studied in a saline lavage lung injury model. After injury each animal was randomized to be ventilated on HFOV or HFPV for 30 minutes then, after re-injury, switched to the other HF ventilator for 30 minutes, in both cases on a matching fixed mean airway pressure (MAP) and matching frequency and tidal volume (Vt). The process was then repeated with each ventilator using a recruitment maneuver prior to the fixed MAP. Blood gasses were measured every 5 minutes. Data were analyzed using repeated measures ANOVA. **Results:** There were significant improvements (P<0.001) in oxygenation and ventilation over time during all four 30 minute experimental periods. No differences were found between ventilators in the rate of improvement in oxygenation (P=0.46 on fixed MAP, P=0.63 after recruitment maneuver), however the rate of improvement was greater after a recruitment maneuver than on fixed MAP for both HFOV (P<0.017) and HFPV (P<0.004) (Fig. 1). Also, no differences were found between devices in the rate of improvement in ventilation (P=0.65 on fixed MAP, P=0.18 after recruitment maneuver), nor any differences based on using a recruitment maneuver on either ventilator (P=0.13 on HFOV, P=0.71 on HFPV). The peak-to-trough pressure difference (ΔP) required for matched Vt was significantly higher on HFPV (P<0.001), while the ΔP readings on the HFPV's mechanical gauge were far below the electronically measured pressures on either device. **Conclusion:** No difference could be detected in the rate of improvement in gas exchange between HFPV and HFOV when initiated following an acute lung injury, with or without a recruitment maneuver. With both ventilators oxygenation but not ventilation improved more rapidly using a recruitment maneuver than on a fixed MAP.

Sponsored Research - None



3025579

Empirical Probability Of Positive Response To Peep Changes And Mechanical Ventilation Factors Associated With Improved Oxygenation.

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Background: Positive end-expiratory pressure (PEEP) is titrated to improve oxygenation during mechanical ventilation. PEEP may ameliorate or exacerbate lung injury. It is clinically desirable to identify factors that are associated with a clinical improvement or deterioration following a PEEP change. However, these factors have not been adequately described in the literature. Therefore, we quantify the empirical probability of PEEP changes resulting in positive effects on oxygenation, pulmonary mechanics and dead-space fraction and identify clinical factors associated with positive response in children receiving mechanical ventilation. **Methods:** A retrospective analysis of continuous data was conducted in mechanically ventilated pediatric subjects admitted to the intensive care unit. During a $PEEP_{increase}$ ($PEEP_{increase}$), a responder was defined as anyone who exhibited an improved SpO2/FiO2 (S/F); non-responders demonstrated a worsening S/F in the hour following. For cases where PEEP was decreased ($PEEP_{decrease}$), a responder was anyone who maintained or increased S/F; non-responders demonstrated a worsening S/F. Features from continuous mechanical ventilation variables were extracted and differences in these features between responders and non-responders were tested using a generalized estimating equation to account for repeated measures. **Results:** A total of 286 PEEP change cases were eligible for analysis in 76 subjects. Of the $PEEP_{increase}$ cases, the empirical probability of positive response was 56%, 67% and 54% for oxygenation, mechanics and dead-space fraction respectively. The median S/F increase was 13. For $PEEP_{decrease}$, the empirical probability of acceptable response was 46%, 53% and 46% for oxygenation, mechanics and dead-space fraction respectively. $PEEP_{increase}$ responders had higher FiO2 requirement (70.8 versus 52.5%; P<0.001), mean airway pressure (14.0 versus 12.9 cmH2O; P=0.029) and oxygen saturation index (9.9 versus 7.5; P<0.01) versus non-responders. For $PEEP_{decrease}$, no statistically significant differences in demographic or ventilator parameters were observed. **Conclusion:** In children requiring mechanical ventilation, the responder rate was modest for both $PEEP_{increase}$ and $PEEP_{decrease}$ cases. These data suggest PEEP titration often does not have the desired clinical effect and predicting which patients will manifest a positive response is complex, potentially requiring more sophisticated means of assessing individual subjects.

Sponsored Research - None

See table or figure in supplement to the October 2018 issue of Respiratory Care at www.rcjournal.com.

3021907

Proportional Ventilatory Support: A Comparison Of Proportional Assist Ventilation, Proportional Pressure Support And Proportional Pressure Ventilation

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Background: Proportional ventilatory support (PVS) refers to modes of ventilation that provide support that is proportional to the patient's inspiratory effort. Research has shown that PVS improves patient ventilator synchrony. Several ventilators are now available that provide a type of PVS. The purpose of this study was to evaluate Proportional Assist Ventilation (PAV+) on the PB 840 and PB 980, Proportional Pressure Ventilation (PPV) on the Respironics V60, and Proportional Pressure Support (PPS) on the Drager V500, using the IngMar Medical ASL 5000 (ASL) at three different inspiratory efforts (Pmus). **Methods:** The ASL was set to simulate a COPD lung model: compliance 59 mL/cmH_2O; resistance in 22 cmH_2O/L/s; resistance out 18 cmH_2O/L/s; respiratory rate 14 bpm; Pmus 12 cmH_2O. Ventilator settings: PAV+ % Supp 25%, 45%, and 65%, Esens 3 LPM; PPV 25%, 45%, and 65%, Max E 17 cmH_2O/L, Max R 20 cmH_2O/L/s; PPS flow assist 25%, 45%, and 65% of the averaged resistance, volume assist 25%, 45% and 65% of the elastance, inspiratory termination 25%; PEEP 7 cmH_2O. Each ventilator was connected to the ASL using a 7.5 mm ETT. After the ventilator was connected, the mode was run at ventilator support (VS) 25%. The ventilator was given one minute after the change had been made to stabilize; data was gathered for an additional minute using the automated ASL software. Next VS was increased to 45% and 65%, following the same procedure. Then, Pmus was increased to 18 and 24 cmH_2O, gathering data as described, at each level of VS. **Results:** As VS increased, tidal volume (VT) and peak inspiratory pressure (PIP) increased on all ventilators. As VS increased, time to trigger (TT) decreased on all ventilators. As Pmus increased, TT increased. On the PB 840, PB 980 and V500, as VS increased, inspiratory time (Ti) increased; conversely, on the V60 as VS increased, Ti decreased. The PB 980 had the highest average Ti, VT, PIP, and TT. Ti on the PB 980 increased due to multiple inspiratory pauses, which resulted in AutoPEEP. The V60 had the shortest TT. **Conclusion:** This study demonstrated that PAV+, PPV, and PPS each provide an increase in VT and PIP as patient effort or VS increases. Using PPV and PPS requires the clinician to know the resistance and elastance of the lung. Clinicians need to be careful to input the value for elastance, not compliance. Further research needs to compare PVS in patients to determine the clinical benefit of each mode.

Sponsored Research - None

Pmus 18 cmH_2O

	% Support	PB 840	PB 980	Phillips V60	Drager V500
I-Time (sec)	25%	1.12	1.19	1.09	1.07
	45%	1.13	1.22	1.07	1.13
	65%	1.18	1.3	1.05	1.19
Insp VT (ml)	25%	425	447	450	432
	45%	528	544	539	553
	65%	676	707	681	703
Time to Trigger (msec)	25%	747	713	640	678
	45%	370	545	178	461
	65%	302	465	171	372

3020675

Expiratory Pause Maneuver To Assess Muscle Pressure (Pmus) During Simulated Assisted Mechanical Ventilation (AMV). Part 1: Feasibility.

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Background: Patient effort during AMV is measured by esophageal pressure change (ΔPes) as a signifier of Pmus. Proper esophageal balloon placement requires close correspondence between ΔPes and airway pressure change (ΔPaw) during an occlusion test (i.e. Baydur Maneuver). Because ΔPaw is the gold standard for estimating ΔPmus, we reasoned that introducing an airway occlusion at end expiration to measure ΔPaw during the subsequent patient-triggered inspiration might be a practical, non-invasive way to assess inspiratory effort. We evaluated how closely clinician Pmus measurements using EMP reflected that generated by a breathing simulator under various conditions of inspiratory effort and breathing modes. **Methods:** Spontaneous breathing was simulated using an Ingmar ASL-5000 (Ingmar, Pittsburgh, PA) with a compliance of 80 mL/cmH_2O and resistance of 5 cmH_2O per L/s. The breathing pattern was *f* of 20 at 3 ΔPmus levels reflecting mild, moderate and high effort (5,10,15 cmH_2O) using a 20% pressure rise, 10% hold and 10% decay (inspiratory time or Ti: 1.2s). The test series consisted of 15 breaths/Pmus. A PB-980 ventilator (Medtronics, Minneapolis, MN) was used with 3 modes: continuous positive airway pressure (CPAP: 5 cmH_2O), pressure support ventilation (PSV: Δ15/5 cmH_2O), and volume control ventilation (VCV: tidal volume: 500mL, *f*:15, peak flow: 60L/m, Ti: 0.9s, positive end-expiratory pressure: 5 cmH_2O). Trigger sensitivity was set at 3 L/m. For each condition (and after allowing 5 minutes of practice), 5 clinicians measured Pmus using the ventilator's Negative Inspiratory Force function during expiration and releasing the pause-hold as soon as a negative deflection in ΔPaw was observed on the scalar waveform. An average of 24 breaths/per observer was used for each condition. Multiple comparisons used one-way ANOVA and Tukey Kraemer post-test. Bland Altman analysis was done during passive VCV comparing plateau to lung pressure with a 1.5 s pause. Alpha was set at 0.05. **Results:** EPM closely approximated simulated Pmus for all mild and moderate Pmus conditions for CPAP and PSV (Table). Under VCV at moderate and high effort EPM estimates of Pmus deviated from measurements made on CPAP and PSV. However, most comparisons were within parameters suggested by Bland-Altman analysis (ie. PB-980 Pressure bias -1.7 cmH_2O (95% CI: -1.5 to -1.8 cmH_2O). **Conclusion:** EPM is a feasible, noninvasive technique to assess breathing effort during AMV.

Sponsored Research - None

ΔPmus (set)	CPAP	PSV	VCV	P (ANOVA)
5 cmH2O	4.0 ± 0.2†	4.0 ± 0.2†	4.2 ± 0.4	< 0.001
10 cmH2O	8.9 ± 0.4†	8.9 ± 0.3†	7.5 ± 0.8	< 0.001
15 cmH2O	13.3 ± 0.5†	13.3 ± 0.6†	12.1 ± 0.8	< 0.001

† *P*<0.001 compared to VCV.

3020719

Expiratory Pause Maneuver To Assess Muscle Pressure (Pmus) During Simulated Assisted Mechanical Ventilation (AMV). Part 2: Intra- And Inter-Observer Reproducibility.

Lance Pangilinan[1,2], Justin S. Phillips[1,2], Earl Mangalindan[1,2], Travis J. Summers[1,2], Vivian Yip[1,2], Richard Kallet[1,2]; [1]Respiratory Care Services, San Francisco General Hospital, San Francisco, CA; [2]Anesthesia, UCSF, San Francisco, CA

Background: In Part 1 of our study we demonstrated that simulated breathing effort (i.e. inspiratory muscle pressure or ΔPmus) during AMV could be measured accurately by introducing an airway occlusion at end expiration to measure ΔPaw during the subsequent patient-triggered inspiration. In Part 2 of this bench study we examined the variability of Pmus measurements by EPM made by individual clinicians and between clinicians. **Methods:** Spontaneous breathing was simulated using an Ingmar ASL-5000 (Ingmar, Pittsburgh, PA) with a compliance of 80 mL/cmH_2O and resistance of 5 cmH_2O per L/s. The breathing pattern was *f* of 20 at 3 Δ Pmus levels reflecting mild, moderate and high effort (5,10,15 cmH_2O) using a 20% pressure rise, 10% hold and 10% decay (inspiratory time or Ti: 1.2s). The test series consisted of 15 breaths/Pmus. A PB-980 ventilator (Medtronics, Minneapolis, MN) was used with 3 modes: continuous positive airway pressure (CPAP: 5 cmH_2O), pressure support ventilation (PSV: Δ15/5 cmH_2O), and volume control ventilation (VCV: tidal volume: 500mL, *f*:15, peak flow: 60L/m, Ti: 0.9s, positive end-expiratory pressure: 5 cmH_2O). Trigger sensitivity was set at 3 L/m. EPM measured Pmus by using the ventilator's Negative Inspiratory Force function and releasing the pause-hold as soon as a negative Paw deflection was observed. There were 45 observation periods (ie. 9 Pmus and mode conditions and 5 clinicians). For each test condition intra-individual measurement variability was assessed by the magnitude of the standard deviation (SD) whereas measurement variability between clinicians was assessed by one-way ANOVA and Tukey Kraemer post-test. Alpha was set at 0.05. **Results:** In 37 of 45 (82%) observation periods the individual observer SD ranged from 0 to 0.5 cmH_2O (ie. upper 95% of measurement variation of 1 cmH_2O). In only 2 observation periods (4%) the SD was 1 and 1.3 cmH_2O (upper 95% of measurement variation of 2 and 2.6 cmH_2O) that occurred during VCV. Measurement comparisons between observers although statistically significant were in general clinically insignificant (Table). In only 3 instances were these differences ≥ 1 cmH_2O. **Conclusion:** With a minimum practice period (approximately 5m) clinicians are able to produce highly consistent measurements of Pmus during simulated AMV using the EPM technique.

Sponsored Research - None

Mean Pmus Measurements by EPM Technique

Mode/ΔPmus (cmH2O)	Obsv-1	Obsv-2	Obsv-3	Obsv-4	Obsv-5	P (ANOVA)
CPAP/5	4.0	4.0	4.0	4.0	4.0	0.27
CPAP/ 10	8.9	8.9	9.0	9.0	8.6	0.01
CPAP/ 15	13	13.2	13.9	13.5	12.6	0.001
PSV / 5	4.0	4.0	3.9	4.1	4.0	0.26
PSV / 10	8.9	8.9	9.0	9.0	8.6	0.01
PSV/ 15	13.0	13.2	13.9	13.5	12.6	0.001
VCV/ 5	4.2	4.1	4.2	4.2	4.3	0.80
VCV / 10	7.2	7.6	7.9	7.5	8.2	0.01
VCV / 15	11.9	12.3	12.3	12.1	12.4	0.47

3020779

Expiratory Pause Maneuver To Assess Muscle Pressure (Pmus) During Simulated Assisted Mechanical Ventilation. Part 3: Effects Of Chest Mechanics.

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Background: In Part 1 of our study we demonstrated that simulated breathing effort (i.e. inspiratory muscle pressure or ΔPmus) during AMV could be measured accurately by introducing an airway occlusion at end expiration to measure ΔPaw during the subsequent patient-triggered inspiration. In Part 3 of this bench study we examined Pmus measurements by EPM under varying conditions of chest mechanics. Our assumption was that under isovolumetric conditions Pmus should transmit to the ventilator circuit with little or no energy dissipation. **Methods:** Spontaneous breathing was simulated using an Ingmar ASL-5000 (Ingmar, Pittsburgh, PA). Simulated chest mechanics were set as follows: Condition A: Resistance (R) and Compliance(C) 5 cmH_2O per L/s and 80 mL/cmH_2O; Condition B: R of 15 cmH_2O per L/s and C: 80 mL/cmH_2O; Condition C: 5 cmH_2O per L/s and 30 mL/cmH_2O. The breathing pattern was *f* of 20 at 3 Δ Pmus levels reflecting mild, moderate and high effort (5,10,15 cmH_2O) using a 20% pressure rise, 10% hold and 10% decay (inspiratory time or Ti: 1.2s). The test series consisted of 15 breaths/Pmus. A PB-980 ventilator (Medtronics, Minneapolis, MN) was used with continuous positive airway pressure (CPAP: 5 cmH_2O). Trigger sensitivity was set at 3 L/m. Six clinicians measured Pmus using the ventilator's Negative Inspiratory Force function during expiration and releasing the pause-hold as soon as a negative deflection in Paw was observed on the scalar waveform. An average of 10 breaths/per observer was used for each condition. Multiple comparisons used one-way ANOVA and Tukey Kraemer post-test. Alpha was set at 0.05. **Results:** There were minor, statistically significant but clinically unimportant differences in Pmus measurements by EPM technique (Table). **Conclusion:** As would be anticipated, under conditions of no volume change, whereby energy is not dissipated in distorting the respiratory system, differences in chest mechanics have a negligible impact on Pmus measured during EPM. Therefore, EPM should accurately reflect Pmus regardless of pathological alterations in R or C.

Sponsored Research - None

Δ Pmus (cmH2O)	Condition A (Low R, Normal C)	Condition B (High R, Normal C)	Condition C (Low R, Low C)	P (ANOVA)
5	4.0 ± 0.2	3.8 ± 0.4†‡	4.0 ± 0.2	<0.001
10	8.9 ± 0.4‡	8.1 ± 0.4 †‡	8.6 ± 0.7	<0.001
15	13.4 ± 0.6	12.3 ± 0.6†§	12.7 ± 0.5†	

†*P*<0.001 vs. Condition A, ‡ P < 0.01 vs. Condition C, § P < 0.005 vs. Condition C

3025389

Comparison Of State Compliance Readings On Four Different Ventilator Platforms.

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Background: Bench studies reported as abstracts in 2006 and 2010 demonstrated that not all ventilators report accurate lung compliance measurements. The purpose of this study was to compare a set compliance (Cs) on a Michigan test lung to the measured Cs on four new generation ventilators not previously studied. **Methods:** The ventilators tested were the Drager v500, ServoU, PB 980, and Hamilton G5. The ventilators were set to volume control mode with a tidal volume of 500 ml, respiratory rate of 12 bpm, PEEP of 0 cmH_2O, and an inspiratory time of 1 second. The ventilators were individually attached toa single lung Michigan test lung (Grand Rapids, Michigan). Compliance on the test lungs were set to 30, 60, and 90 ml/cmH_2O respectfully and verified with a Med Graphics 3L Syringe per manufacturer's guidelines. Each time the compliance was changed the setting was verified per manufacture guidelines. Each ventilator was attached to the test lung at the different Cs settings and the ventilators reported Cs value were recorded three different times, 2 min apart. The reported values from the ventilator were then compared to the set values of the test lung. **Results:** All of the ventilators reported lung compliances within 2 cmH_2O of set and verified compliances **Conclusion:** In this bench test, we found that all new generation ventilators reported accurate lung compliances. This is different than prior abstracts that found that some ventilators were not as accurate on their reported Cs values.

Sponsored Research - None

Mean Cs Readings

	30 ml/cmH2O	60 ml/cmH2O	90 ml/CmH2O
Hamilton	29.67	60.30	87.80
Drager V500	29.90	60.00	91.67
PB 980	31.00	62.00	91.33
ServoU	28.13	61.33	91.83

3010426

Ventilator Automated Displayed Respiratory Mechanics Are Not Accurate In The Passive And Active Patients.

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Background: New generation ventilators display dynamic measures of respiratory mechanics: Compliance (Cstat), Resistance (Rinsp), Auto-PEEP (PEEPt). Those measurements are obtained automatically using the "least square fitting method" of the equation of motion. The accuracy of those measurements in static and dynamic conditions hasn't been validated. **Methods:** Bench study using lung simulator (ASL) to compare the automated measurements during passive condition using muscle pressure (Pmus) of zero cmH_2O, and active condition using incremental Pmus of 5, 10, 15 cmH_2O in different clinical situations: Normal (compliance 50 cmH_2O and resistance 10 cmH_2O//L/s), COPD (50 cmH_2O and resistance 20 cmH_2O//L/s), and ARDS (30 cmH_2O and resistance 13 cmH_2O//L/s using the Adaptive support mode (ASV) mode in Hamilton G5 ventilator (Hamilton Medical AG, Switzerland). **Results:** Comparisons between Test lung and passive and active conditions in the three different scenarios were done using paired T test of equal variance. Correlation of Pmus with compliance and resistance in the three different scenarios were done using the Pearson correlation coefficient. There were statistically significant differences between the compliance and resistance in all the three conditions between the test lung and both passive and active patients. There is a strong positive correlation between Pmus and calculated compliances. There is a strong negative correlation between the Pmus and the calculated resistances. **Conclusion:** Automated displayed measurements of respiratory mechanics are not dependable or accurate in active patients. Though statistically different, the measurements were clinically more reliable in passive patients. The effect of muscle pressure is ignored in the automated calculation and has to be measured and incorporated for accurate measurements. Ventilator manufacturers should put a warning to alert clinicians of those inaccuracy to avoid misinterpretation and mistreatment. Disclosures: none

Sponsored Research - None

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3024874

Can A Novel In Vivo And Hands On Learning Experience On Lung Protective Ventilation Modify Clinical Practice?

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Background: Identification of the optimal mechanical breath profile (MBp) is one of the most significant challenges clinicians encounter when managing patients with ARDS. Our Individualized Mechanical Ventilation (IndiVent) Work Group convened for the third year in a row to discuss current approaches to applying lung protective strategies in ARDS and apply these principles during an in vivo workshop of a surfactant deactivated porcine ARDS model. One of the goals of this project was to evaluate the novelty of this teaching strategy and its potential impact to change current practice. **Methods:** Forty-eight health care professionals (MD 5; PA 1; RT 42) from the US (*n*=41), China (*n*=5), and Canada (*n*=2) discussed concepts related to the optimal MBp over 3 days and participated an in vivo study of four adult surfactant deactivated porcine ARDS models. A 15 item questionnaire was designed to evaluate the perceived value of the overall learning experience and its potential to change current practice. Animal Institutional Review Board approved the study. **Results:** Thirty six percent of the work group had at least a previous opportunity to participate in studies of mechanical ventilation (MV) using an animal model, but less than 50% were familiar with alveolar physiology during MV, the differences between macro and micro ventilation, the myths and misconceptions of APRV, and the preemptive use of APRV. Majority (96%) considered very likely to suggest or modify current lung protective strategies based on the educational and hands on experience. Thirty nine participants (87%) considered the in vivo lab experience very valuable and that their understanding of MV and modes improved. Twenty six participants (58%) considered that the gross anatomy (excised lung) provided important information regarding the effectiveness of the strategy used during the experiment. Ninety six percent (*n*=43) of the participants would suggest to colleagues to participate in a similar educational summit and 98% agreed that this experience should be presented as a mini symposium at a conference. **Conclusion:** The results of this survey suggest that the method of teaching that encompasses an in vivo model could impact the way a lung protective strategy could be implemented in the clinical setting.

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2967124

Comparing Respiratory Pathogen In Patients With Non-Cf Bronchiectasis During Clinically Stable And Exacerbation.

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Background: Exacerbations of bronchiectasis are associated with increased airways and systemic inflammation and progressive lung damage therefor in time proper antibiotics during exacerbation are very important. Find the association of pathogen in bronchiectasis patient between clinically stable and during exacerbation for answering the question whether using the previous clinically stable sputum culture results are able to predict the exacerbation pathogen or not. Retrospective Cohort study. **Methods:** Reviewing good quality and significant sputum culture results in clinically stable and during exacerbation in 98 non-cystic fibrosis bronchiectasis patients who were not exposed to inhaled or oral antibiotic for 3 months before collecting the sputum. **Results:** Most of bronchiectasis patient in this study were diffused lesion (68.6%). Previous tuberculosis infection (50.3%), idiopathic (24%) and rheumatoid arthritis (5.1%) were the three most common causes of bronchiectasis. First three commonly pathogen being found in clinically stable sputum results were non-mycobacterium tuberculosis (30.61%), *Pseudomonas aeruginosa* (29.59%), *Hemophilus influenza* (25.51%) and during exacerbation were *Pseudomonas aeruginosa* (50.98%), *Klebsella pneumoniae* (28.43%), *Hemophilus influenza* (4.9%). Agreement for detection of bacteria by culture during clinically stable or exacerbation was good for *Pseudomonas aeruginosa* (84.8%) but poorer for other genera. (sensitivity 75% specificity 75.6% PPV 54.5% NPV 88.6%). **Conclusion:** Collecting sputum when clinically stable may helpful for sputum guidance for exacerbation if the colonized sputum pathogens were *Pseudomonas aeruginosa*. **Disclosures:** no relations with industry for the previous 2 years

Sponsored Research - None

Pathogens during colonization and exacerbation

Pathogen	Colonization		Exacerbation	
	NUMBER	%	NUMBER	%
NTM	30	30.61%	3	2.94%
P. aeruginosa	29	29.59%	52	50.98%
H. influenza	25	25.51%	5	4.90%
K. pneumoniae	7	7.14%	29	28.43%
S. Pneumoniae	1	1.02%	5	4.90%
S. Aureus	3	3.06%	5	4.90%
M. catarrhalis	1	1.02%	1	0.98%
MRSA	1	1.02%	0	0.00%
TB	1	1.02%	0	0.00%
ESBL	0	0.00%	2	1.96%

3004942

M-Mode Ultrasonography Is A Useful Tool To Identify Diaphragmatic Mobility Impairment In COPD Subjects.

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Background: The chronic obstructive pulmonary disease (COPD) causes, other than a not fully reversible airway obstruction, changes in the thoracic conformation and respiratory muscle structure, causing functional inefficiency. More specifically the diaphragm undergoes a progressive process of muscle fiber shortening that follows lung hyperinflation and dead space increase, resulting in a chronic mechanical disadvantage impairing its mobility. M-mode ultrasonography can measure directly the dome craniocaudal displacement. It can be a useful and safe tool to assess the diaphragmatic impairment in COPD subjects and verify the impact of lung hyperinflation and airway obstruction in the muscle mechanics. Our objectives we to correlate the diaphragmatic mobility impairment to lung function loss according to COPD severity using M- mode Ultrasonography in moderate to very severe COPD subjects. **Methods:** We used M-mode ultrasonography to access diaphragmatic mobility during rest breathing and deep inspiration on 46 COPD individuals and 16 healthy subjects. Lung function tests were correlated to the diaphragmatic mobility during pulmonary rehabilitation. **Results:** The mean anthropometrics, lung function and diaphragmatic mobility in healthy individuals and COPD subjects are presented in the table. The diaphragmatic mobility during *Rest Breathing* and *Deep Inspirations* were correlated to FEV_1 decrease (r=-0.74; *P*<0.01 and r=0.8; *P*<0.01, respectively). And the FEV1 % predicted (r=-0.74, with a p <0.001 for *Rest Breathing*) and (r= 0.796 with a *P*<0.001 for *Deep Inspirations*), *n*=45. The correlations were also positive between the *Deep Inspiration* and the IC (r= 0.64 with *P*<0.001) and the Expiratory Reserve Volume (r= 0.63 with *P*<0.001), *n*=45. (figure 4). The diaphragmatic mobility correlations between *Rest Breathing* and *Deep Inspiration* and the IC/TLC were both moderate and respectively negative (r=-0.51 with *P*<0.01) and positive (r=0.50 with *P*<0.01). **Conclusion:** M-mode ultrasonography showed that diaphragmatic mobility impairment correlates to lung function loss in COPD subjects.

Sponsored Research - None

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3008010

An Alternative Volume-Based Method To Assess Stridor Risk In Mechanically Ventilated Patients.

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Background: Cuff leak tests are done to evaluate the risk for post-extubation stridor. Miller and Cole reported that differences between inspired-expired tidal volume (ΔV_T) during cuff deflation while on volume control ventilation produced high positive predictive value (0.80) and specificity (0.98) using a cut-off of <110 mL in a medical cohort.[1] However, ventilators differ in reporting inspired and expired V_T because they vary in compensating for the effects of heated humidification and circuit compression.[2] Therefore, we simplified Miller and Cole's method by only monitoring differences in expired ΔV_T between conditions of cuff inflation and deflation and using a similar cuff-value (100 mL). We speculated that this variation would still produce useful information in assessing stridor risk. **Methods:** In 2010 we initiated this procedure as part of systematic screening of all mechanically-ventilated patients at high risk for stridor. Test ventilator settings were standardized (Volume Control, V_T: 8-10 mL/kg, constant flow: 50-60L/m, inspiratory time: 1-1.5s). Subjects had their upper airways suctioned prior to cuff deflation and were sedated for the procedure. Expired V_T was recorded beginning 6 breaths after cuff deflation; the subsequent 3 breaths were averaged. Extubation trials occurred within 1-12 h following the test. Data was analyzed using Fisher Exact test with alpha set at 0.05. **Results:** Between May 2010 and February 2018, 756 cuff leak tests were performed; followed by a trial of extubation. The majority (73%) were either trauma/surgical or neurocritical care subjects. A cut-off for expired ΔV_T of < 100 mL had a high likelihood of association with subsequent stridor despite a moderate positive predictive value (Table). The incidence of post-extubation stridor was 57/756 (7.5%); similar to that reported by Miller and Cole. **Conclusion:** A simplified volume-based cuff leak test using only expired ΔV_T and a cut-off value of 100 mL was very reliable in predicting the absence of post-extubation stridor. Although leaks of < 100 mL were associated with a much higher likelihood for developing stridor, the condition was absent in 55% these subjects.

1. Miller RL, Cole RP. Association between reduced cuff leak volume and postextubation stridor. Chest 1996;110(4):1035-1040. 2. Phillips J, Pangilinan L, Mangalindan E et al. Ventilator compression volume compensation does not maintain pre-set tidal volume (V_T). Respir Care 2016;61(10):OF-9,2527102.

Sponsored Research - None

Sensitivity [95% CI]	0.47 [0.34-0.61]
Specificity [95% CI]	0.95 [0.93-0.97]
Positive Predictive Value [95%CI]	0.45 [0.32-0.58]
Negative Predictive Value [95%CI]	0.96 [0.94-0.97]
Likelihood Ratio	10.0*

Key: CI = confidence interval, **P*<0.0001

3009200

Neurologic Dysfunction Is Associated With Syndrome Severity At The Onset Of ARDS.

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Background: Multi-Organ Dysfunction Syndrome (MODS) is common in ARDS. "Cross-talk" injury between the brain and the lungs has been described,[1] but the mechanisms by which brain injury causes secondary lung injury appears better established compared to lung injury resulting in brain dysfunction. There is speculation that ARDS may cause secondary brain injury similar to what occurs during sepsis.[1] We inquired whether neurologic dysfunction, as measured by Glasgow Coma Scale (GCS), is present at ARDS onset in those without apparent neurologic injury, and whether it is related to ARDS severity or lung injury etiology. **Methods:** This retrospective study examined 1,176 ARDS cases wherein GCS was measured within 24 hours prior to intubation and ARDS onset. Cases associated with primary neurologic injury or drug overdose were excluded. Subjects were classified by Berlin definition and primary ARDS etiology. Sequential Organ Failure Assessment (SOFA) scoring criteria was used to categorize neurologic dysfunction (GCS = 15, 14-13, 12-10, 9-6, <6). Data were expressed as median [IQR]. Continuous data were assessed using Kruskall-Wallis and Dunn's post-tests. Categorical variables were compared using Fisher Exact test. Alpha was set 0.05. **Results:** Less than 50% of subjects had a GCS of 15 within 24h prior to ARDS recognition. The incidence of GCS <6 increased as ARDS severity increased from mild to severe (8,10 and 19% respectively) (**Fig**). However, this was significant only between severe vs. mild (OR 3.25 [1.64-6.43], P = 0.0002) and severe vs. moderate (OR 1.94 [1.37-2.74], P < 0.0002). GCS was lowest in those with aspiration and highest in those with pneumonia: 11 [3,15] and 15 [13,15] respectively P <0.01. These etiologies represented 32% and 6% respectively of those with a GCS <6 compared to 9% when sepsis was the primary etiology. Moreover, GCS was not different in those with sepsis as a co-diagnosis versus without (14 [10,15] and 14 [11,15] P = 0.51 respectively). **Conclusion:** GCS was lowest in those with aspiration suggesting that neurologic dysfunction likely caused many ARDS cases via loss of upper airway reflexes. Contrary to speculation,[1] sepsis-induced ARDS was not associated with increased incidence of neurologic dysfunction. Mrozek S, Constantin J-M, Geeraerts T. Brain-lung crosstalk: implications for neurocritical care. WWJCCM 2015;4(3):163-178.

Sponsored Research - None

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3010837

Comparison Of Reflectance Pulse Oximetry And Finger Pulse Oximetry To Blood Co-Oximetry.

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Pulse oximetery is used to measure oxygen in blood. It uses either transmittance on fingers or reflectance on the forehead. Practitioners often assume equal readings between sites, and will switch probes and locations to obtain SpO_2. Accurate estimation of patient's oxygen status is critical during patient care and testing to assess oxygen needs. This study evaluated the finger probe to the forehead probe to determine which has greater accuracy when compared to the arterial blood gas-the gold standard for determining the actual amount of oxygen circulating in blood. We hypothesized the finger probe was more accurate than the forehead probe when compared to arterial blood gas due to clinical experiences of the staff. **Method** 50 patients were consented following IRB approval. Inclusion criteria included, a practitioner ordered arterial blood gas (ABG), age greater than or equal to 18 years old, and good hand circulation as assessed by temperature and color. Once the patient was consented, the forehead and finger probes were placed simultaneously, ensuring a regular pulse waveform prior to blood draw. The respiratory therapist then drew the blood sample and at that time, the oxygen saturations were recorded. After the sample was analyzed, the fraction of oxygen attached to hemoglobin (FO_2Hb) was also recorded. Data analysis included student's t-tests comparing the finger probe to FO_2Hb, forehead probe to FO_2Hb, and finger probe and forehead probe to each other as well as calculations of percent difference from standard device error. **Results:** The t-tests showed that each comparison (finger probe vs. blood gas, forehead probe vs. blood gas, and finger probe vs. forehead probe) was statistically significant (p-values of 0.00073, 2.9*10-9, and 0.0022 respectively). Due to the p-values being below the standard 0.05 p-value we chose, the p-values indicate the finger probe and forehead probe differ significantly from the blood gas and from each other. **Conclusion:** There was statistical significance in the difference found between each probe and the blood gas, when compared to the forehead probe. The relatively low percentage of error greater than 2% for the finger probe combined with the precision of the finger probe seems to indicate that the finger probe is clinically superior to the forehead probe in the outpatient setting. Therefore, the finger probe should be used over the forehead probe.

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3015237

Comparison Of Chest Radiograph To Electrical Impedance Tomography.

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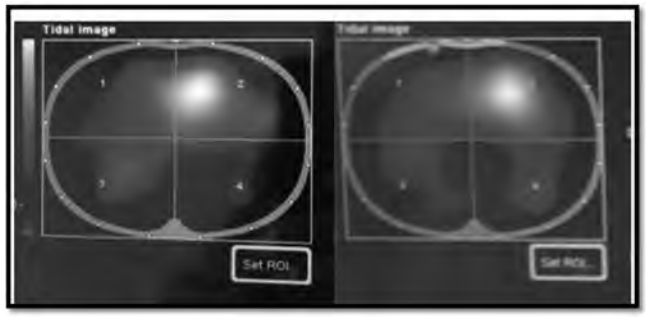
Background: In today's medicine, patients must be exposed to radiation in the form of a chest radiograph (CXR) to determine lung volume or distribution of ventilation. With advanced technology, Electrical Impedance Tomography (EIT) has been used in a wide spectrum in medicine ranging from gastric emptying, brain function and breast imaging to lung function. EIT technology provides a non-invasive and radiation-free medical imaging. Additionally, EIT offers regional information of changes in ventilation and gas exchange, which could help with gaining information on the regional distribution of ventilation without exposing the patient to a CXR. We proposed an observational study to collect data comparing gas/volume distribution in EIT versus CXR in ICU patients on either Pressure Support (PSV), Continuous Positive Airway Pressure (CPAP) or Proportional Pressure Support (PPS). **Methods:** This is an observational study, approved by the University of Maryland, Institutional Review Board (IRB), using the PulmoVista 500 EIT device by Draeger Medical (Lubeck, Germany). The patients enrolled in this study were ICU patients requiring mechanical ventilation with recent CXRs for comparison. EIT information of the distribution of ventilation was reviewed in the lung quadrants, and lung regions were compared to the information provided by CXR. **Results:** 18 patients consented to the observational use of EIT. Data demonstrate 75% of the EIT results correlated with the CXR displaying lack of gas exchange or over-distention. We hypothesized EIT would reflect a more accurate description of ventilation distribution at that particular time versus the CXR that was a snapshot in time completed several hours earlier. **Conclusion:** This study suggested the EIT device may be as accurate as a CXR in the distribution of ventilation.

Sponsored Research - None



Before and after a bronchoscopy. According to the EIT the patient had minimum gas distribution in the LLL. EIT repeated post-bronchoscopy.

3015557

Comparison Of 6-Point Versus 12-Point Lung Ultrasound For The Diagnosis Of Bilateral Lung Infiltrates In ARDS.

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Background: Lung ultrasound is important for evaluating critically ill patients. For the identification of acute respiratory distress syndrome (ARDS), it has used as an alternative to chest radiography and computed tomography (Kigali Modification of the Berlin Definition). However, it is unknown if an abbreviated 6-point lung ultrasound scan will perform as well as a more comprehensive 12-point lung ultrasound scan. **Methods:** Observational study of patients who required non-invasive ventilation or invasive ventilation for hypoxemic respiratory failure, on ICU admission, from August 2014 to March 2017. Only the first admissions to ICU during the study period, for patients whose diagnosis of respiratory failure was within one week of a known clinical insult or new/worsening respiratory symptoms, not fully explained by heart failure or fluid overload were included for analysis. Lung ultrasound was done at 6 points per hemithorax for the 12-point lung ultrasound scan. Of these 6 points, the findings of 3 points (anterior-superior, anterior-inferior, and lateral-inferior) were used to constitute a 6-point lung ultrasound scan. A diagnosis of bilateral lung infiltrates could be made if at least one point on each hemithorax had more than 2 B-lines or any consolidation. **Results:** 229 patients (ICU mortality 22.7%, hospital mortality 34.5%) had bilateral infiltrates using 12-point lung ultrasound. Of these patients, 142 (62.0%) patients had bilateral infiltrates using 6-point ultrasound.

Sponsored Research - None

3020139

Exhaled Nitric Oxide Before And After Spirometry.

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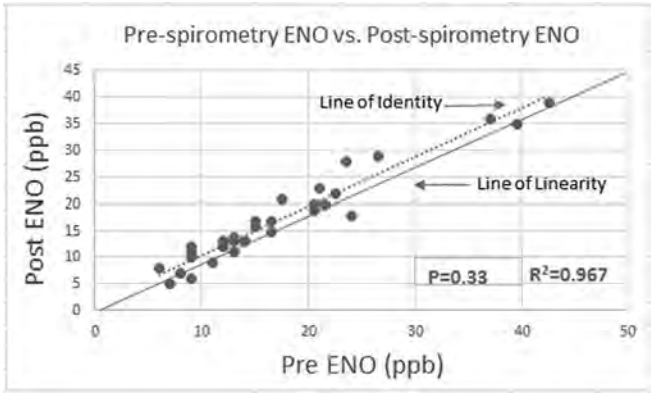
Background: It has been described that individuals with hyperreactive airways disease and/or airway inflammation have higher concentrations of exhaled nitric oxide (ENO) than healthy individuals. The American Thoracic Society (ATS) and the European Respiratory Society (ERS) have published guidelines on test performance. The guideline states that ENO be performed before spirometry because spirometric maneuvers have been shown to transiently reduce exhaled NO levels. This recommendation is based on limited evidence and in particular cites an article where they observed the ENO response in 10 health subjects. The cited study measured ENO 15 minutes before and after an FVC maneuver was performed. However the small number of subjects and the fact all the subjects were normal healthy volunteers limits the studys' ability to predict test behavior in patients. In our study we performed a clinically ordered ENO test in 33 patients after IRB consent was obtained. The subjects performed an ENO according to standard laboratory procedures before and 15 minutes after spirometry. Our goal is to further define the effect of spirometry on the ENO result and determine appropriate pre-test sequence. **Question:** Does performing spirometry before performing an exhaled nitric oxide (ENO) test decrease the results of an ENO? **Hypothesis:** Performing spirometry before completing an Exhaled Nitric Oxide (ENO) test will decrease the results of an ENO. **Conclusion:** In the pateints we tested there is no statistical difference between the ENO results obtained before or after spirometry.

Sponsored Research - None



3021417

Bench Evaluation Of Two Methods Of Ventilation During Rigid Bronchoscopy.

John S. Emberger, Kyle Hitchens, Brett Booker; Respiratory Care, Christiana Care Health System, Newark, DE

Background: Rigid bronchoscopy yields a unique challenge for mechanical ventilation. An uncuffed and rigid bronchoscope requires mechanical ventilation strategies not often used. Manual jet ventilation is the most common approach and gold standard. At our hospital, we previously used either manual jet or an LTV-1200 ventilator during rigid bronchoscopy. We recently started using the Philips Respironics V60 ventilator because of it's capabilities to ventilate with a leak. The rigid bronchoscopy cases subjectively had better and more stable ventilation. The purpose of this study was to perform a bench evaluation of various leak conditions comparing the V60 to the manual jet for ventilation during simulated rigid bronchoscopy. **Methods:** We performed a bench evaluation of rigid bronchoscopy with an intubation manakin airway attached to the Ingmar ASL-5000 test lung with a Novametrix NM3-NICO flowsensor between the manakin airway and the ASL-5000. Normal apneic adult settings were used on the ASL-5000. The manual jet was tested at 40 and 60 PSI with two breath types, "Burst" - shortest but full actuation of the jet valve and "Hold" - full actuation until inspiration ended. The V60 was tested with I-Times of 0.6 seconds and 1 second, with a delta pressure of 20cmH_2O and 30 cmH_2O. Two different leak scenarios were tested: "Low Leak" - typical setup of the rigid bronchoscope with the silicon cap in place. "High Leak" - setup without silicon cap in place. Inspiratory tidal volume was collected with each of the different scenario combinations with the NM3 device. **Results:** See graphic for the results of the inspiratory volume delivered with each device for the different scenarios. **Conclusion:** While the manual jet produced similar results regardless of leak it also produced the widest variation in tidal volumes: volumes that would be too low to maintain stable gas exchange ("Burst" breaths) and large tidal volumes that could cause lung injury ("Hold" breaths). This is dependent on the duration of the actuation of the manual jet with no user feedback for breaths that are too large. The V60 produced reasonable breaths during "low leak" (~300 to 500 ml) and dropped to ~100ml during "high leak". The results of this bench show that the V60 may be better from a lung injury standpoint and should support the patient through rigid bronchoscopy if "high leak" situations are kept short.

Sponsored Research - None

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3021448

Bench Evaluation Of Oropharyngeal Packing To Reduce Leak During Rigid Bronchoscopy.

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Background: RB creates unique challenges for ventilation of the patient. While manual jet ventilation is the gold standard, we have also used an LTV-1200 or a Respironics V60 ventilator. A common and recommended practice during RB is packing the oropharynx with guaze to reduce the leak and improve ventilation to the patient[1]. The purpose of this study was to perform a bench simulation of RB to evalute if packing the oropharynx with gauze improves ventilation. **Methods:** We performed a bench study of RB with an intubation manakin attached to the Ingmar ASL-5000 test lung with a Novametrix NM3-NICO flowsensor between the manakin airway and the ASL-5000. Normal apneic adult settings were used on the ASL-5000. The manual jet was tested at 40 and 60 PSI with two breath types, "Burst" - short i-time and "Hold" - long i-time. The V60 was tested with I-Times of 0.6 seconds and 1 second, with a delta pressure of 20 cmH_2O and 30 cmH_2O. Two different leak scenarios were tested: "Low Leak" - typical setup of the RB with the silicon cap in place. "High Leak" - setup without silicon cap in place. All of the above variables were tested either with the manakin's oropharynx packed with gauze as is typical during RB or not packed with gauze. Inspiratory tidal volumes were collected with each of the different scenario combinations with the NM3 device. Minitab 18 was used for statistical analysis. **Results:** See graphic for the results of the inspiratory volume delivered with various representative devices and settings with or without gauze packing or no gauze packing. Pearson correlation coefficient between both paired groups of tidal volumes (packed paired with unpacked) was 0.994 (P=0.000). **Conclusion:** Regardless of the ventilation device and settings used during RB, there is no difference in the tidal volume delivered if the oropharynx is packed with gauze or if it is not packed with gauze. The only values that differ with and without packing is during large tidal volumes of the manual jet, but the results are opposite of the purpose of packing. The tidal volume is greater without packing and may be associated with extra entrainment when packing is not present. The results of this study show that packing the oropharynx solely to maintain better ventilation is not necessary, packing does not improve ventilation during rigid bronchoscopy. **REFERENCE:** 1 - Ann Am Thorac Soc Vol 11, No 4, pp 628–634, May 2014. "Ventilation and Anesthetic Approaches for Rigid Bronchoscopy"

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3025368

The Use Of Indirect Calorimetry To Improve Malnutrition In Pediatric Post-Operative Lung Transplant Patients.

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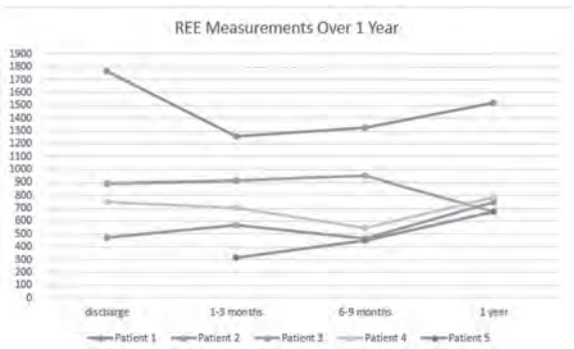
Background: When there's an inability to correctly estimate a pediatric lung transplant patient's caloric needs using predictive equations, there can be an inadequate clinical response due to overfeeding or under-feeding. Measuring oxygen consumption (VO_2) and carbon dioxide (VCO_2) production to assess resting energy expenditure (REE) can help in determining a customized nutritional plan for this specific patient population; as this population typically has a decline in their nutritional status as evident by body mass index (BMI) z-scores/weight for length pre-transplant. The purpose of our study was to utilize indirect calorimetry to obtain REE measurements with the hope to improve the nutritional status of pediatric post-operative lung transplant (PLT) patients. **Method:** The Vmax Encore was used to do metabolic testing in patients via a canopy or in-line with the ventilator. Testing protocol includes: pre-transplant period during initial evaluation (if meets inclusion criteria), prior to discharge after transplant, 1-3 month follow-up visit, 6-9 month follow-up visit, and 1 year post-transplant. **Results:** A total of 11 patients were transplanted from 12/2014- 05/2018 that were less than 15 years of age. Six patients were excluded from the results due to not meeting inclusion criteria or completing the testing protocol. Data was collected from 5 patients that showed there was an increase in BMI z-score over 1 year. One of the patients did not receive a discharge PLT study due to a prolonged admission after transplant. A total of 24 studies were administered over a 4 year period which includes: 2 pre-transplant tests, 4 discharge tests, 8 tests at 1-3 month PLT, 5 tests at 6-9 months PLT, and 5 tests were administered at 1 year PLT. The average BMI z-scores were as follows: -2.43 at discharge, -0.33 at 1-3 months, 0.388 at 6-9 months, and -0.65 at 1 year. See table 1 for REE trends over 1 year. **Conclusion:** At discharge, pediatric lung transplant patients were moderately malnourished and with the use of indirect calorimetry, a specific dietary plan was developed for each patient within the protocol that resulted in no indication of malnutrition at each of the protocol time periods. **Disclosures:** The authors have no disclosure.

Sponsored Research - None



3025622

Comparison Of Quality Of Pediatric Spirometry Via Telemedicine And In-Person Modalities.

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Background: Quality spirometry testing depends upon maximal patient technique and can be particularly challenging for children. The telemedicine asthma clinic at Arkansas Children's Hospital (ACH) offers pediatric spirometry with an experienced respiratory therapist (RT) operating from ACH (distant site) via telemedicine technology using a spoke and hub model (Berlinski et al. J Allergy Clin Immunol Pract. 2018;6(3):1042-1044). The RT at the distant site controls the spirometer at the originating site (where the patient and telepresenter are located) via a remote desktop connection and provides testing instructions in real time via two-way technology with the help of a telepresenter. We hypothesize that the quality of in-person spirometry and testing via telemedicine modalities will be similar. **Methods:** As part of our quality improvement process (not deemed human research by the IRB), we identified children who had completed spirometry via telemedicine for the first time and compared their technique to their previous spirometry done in-person. Demographic data were collected. Using a classification system developed by the ACH Pulmonary Lab (based on 2005 ATS/ERS statements), the RT assessed patient technique on all spirometries for acceptability and usability criteria according to one of these: 1) Full report (all values acceptable or usable), 2) FEV1 Only (usable peak flow and FEV1), and 3) Unusable (values do not meet criteria for interpretation). Proportions of tests in each category in both modalities were compared with Fisher exact test. A p value < 0.05 was considered statistically significant. **Results:** Fifty-four children (mean/95%CI age in-person study and age difference between last in-person and first telemedicine tests were 11/10-12.1 and 0.5/0.4-0.6 years old respectively; 77% male, and 77% Caucasian) were included. Pairwise comparison showed a 3.7, 85.2, and 11.1% improvement, no change, or worsening of technique respectively between the in-person and telemedicine modalities. (See Table) **Conclusion:** The quality of pediatric spirometry obtained via telemedicine and in-person modalities is similar.

Sponsored Research - None

Classification of Technique

	Full Report	FEV1 Only	Unusable
In-person study	45 (83.3%)	5 (9.3%)	4 (7.4%)
Telemedicine study	44 (81.5%)	1 (1.8%)	9 (16.7%)
p values between modalities	0.99	0.21	0.24

3025856

Implementing A Linear Ramp Treadmill Exercise Protocol.

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Background: Cardiopulmonary exercise tests (CPET) provide valuable information regarding cardiac and pulmonary function during exercise. Treadmill protocols progressively increase speed and elevation over time, but the increase in work rate is almost always non-linear. Because of arbitrary increases in speed (1 mph) and incline (4% grade) in our prior protocol, the responses were non-linear and showed an uneven distribution of exercise tolerance. We implemented a linearized treadmill protocol[1] that is designed to provide even increments in work rates for all patients. **METHOD:** Based on the protocol developed by Porszasz et al[1], we developed 63 distinct exercise protocols, corresponding to weight increments of 5 kg starting from 50kg to 150kg and three estimated exercise tolerances: low (50W), medium (100W), and high (150W). The work rate is increased linearly with time by changing both speed and incline. We used a uniform increase in speed up to a max of 5.7 mph in all protocols and the incline depended on the body weight of the subject. We choose the protocol to be used based on the estimated peak work rate and the body size of each subject. Protocols were programmed into Cardiosoft (Version 6.73, GE Healthcare Milwaukee WI) that was connected to the TrackMaster (TMX428CP, Full Vision Inc. Newton KS) treadmill in two laboratories. **Results:** Ten healthy employee/student volunteers were tested (5 Female/5 Male). Their age range was 26-65 yr (Mean: 40±12.6 yr). Protocol was chosen based on the person's weight (rounded up to the nearest 5kg) and the estimated peak work rate (50, 100 or 150 W). The protocol chosen resulted in test durations of greater than 10 min. Subjectively, persons tested felt the linear ramp protocols transitioned smoother/easier compared to the previous protocol. We observed that our new treadmill protocol gave us to the ability of individualizing work rate increments to produce optimal/near optimal duration (at least 10 minutes) based on specific patients and exercise tolerance. **Conclusion:** With our previous fixed protocol, patients with low exercise tolerance (such as heart failure) often yielded a short exercise duration limiting the evaluation. With the newly implemented linear ramp protocols we have more flexibility (compared to our previous protocol) in testing a variety of patient populations. With this new approach we expect to continue optimal test durations, giving the clinician/physician sufficient data for analysis.

Sponsored Research - None

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3025946

Observational Use Of Electrical Impedance Tomography During A Spontaneous Mode Of Mechanical Ventilation.

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Background: Pressure Support Ventilation (PSV) is a spontaneous mode that is patient triggered and flow cycled. Spontaneous breaths on PSV are triggered, which alters spontaneous breaths from sinusoidal to decelerating assisted mechanical breaths. Because PSV breaths are assisted, they may be under-compensated or overcompensated for the artificial airway resistance based on the amount of support set at the ventilator. Alternatively, Continuous Positive Airway Pressure (CPAP) with the use of automatic tube compensation (ATC) provides dynamic inspiratory flow in proportion to the pressure drop across the artificial airway size (length and diameter). As a result, the sinusoidal flow pattern of spontaneous breathing is preserved with an unassisted breath. Electrical Impedance Tomography (EIT) technology provides non-invasive and radiation-free medical imaging. In addition, EIT provides regional information of changes in ventilation, which could help with gaining information on where a regional distribution of ventilation occurs during spontaneous modes of ventilation such as PSV and CPAP. We chose to use EIT to observe patients in various spontaneous modes. **Methods:** This observational study, approved by the University of Maryland Institutional Review Board (IRB) enrolled ICU patients receiving mechanical ventilation set in either PSV or CPAP. The PulmoVista 500 EIT device by Draeger Medical (Lubeck, Germany) was used to visualize regional distribution of ventilation. **Results:** Four patients were observed during PSV that were transitioned to CPAP or proportion pressure support (PPS) per physician orders. After transitioning from an assisted mode (PSV) to an unassisted mode (CPAP or PPS), dorsal and mid-dorsal ventilation was seen to have increased in each patient. The gas distribution to the mid-dorsal and dorsal increased by an average of 9.25% in all four patients. Two of the patients did see an increase in gas distribution by 13% and two by 4% and 7% within minutes of transitioning to the unassisted mode of ventilation. **Conclusion:** This small observational study demonstrated the benefit of preferential volume distribution with unassisted breathing. Further research in comparing assisted versus unassisted ventilation is warranted.

Sponsored Research - None

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3025974

Trascutaneous PCO_2 Is Nearly Identical To Arterial CO_2 In Adult Outpatients.

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Background: In patients with pulmonary disease there is value in determining a patient's carbon dioxide (CO_2) level. Arterial CO_2 ($PaCO_2$) levels are often used to determine if a patient has hypercarbia, as part of UNOS guidelines for lung transplantation, and it can be used to determine physiologic dead space (V_D/V_T ratio) at rest and during exercise. Obtaining direct measurement of $PaCO_2$ requires an arterial blood gas sample, which is expensive, painful, and with potential risks. Our pulmonary function and exercise lab evaluated a non-invasive method of estimating the $PaCO_2$ using a transcutaneous monitor (TCM) to measure $PtcCO_2$. We were particularly interested in using these devices during our cardiopulmonary exercise testing to aide in calculating V_D/V_T ratio during rest and exercise. The first step was to evaluate how well the non-invasive $PtcCO_2$ correlated to the $PaCO_2$ at rest. **METHOD:** Adult patients presenting to the outpatient pulmonary lab to have an arterial blood gas sample collected were placed on a COMBI M54 (TCM 4 series) transcutaneous CO_2 monitor (Radiometer Medical, Denmark) prior to arterial puncture. The patients were measured at rest. We set the TCM metabolic correction factor setting at 4 and set the probe temperature to 42C for all measurements. The probe was placed on the skin just below the clavicle using the Radiometer fixation ring. The monitor was kept in palce for 10 minutes to ensure a stabilized reading prior to arterial puncture. We compared $PaCO_2$ values to simultaneously recorded $PtcCO_2$ values using a Bland-Altman plot. **Results:** We measured 110 $PaCO_2$ levels with simultaneously recorded $PtcCO_2$ levels. A Bland-Altman plot of the comparison is represented in the figure. The mean $PaCO_2$ - $PtcCO_2$ difference (bias) was -0.01 Torr and the standard deviation for the difference was 1.44 Torr. There appeared to be no relationship between the $PaCO_2$ values and the $PaCO_2$ - $PtcCO_2$ difference. **Conclusion:** $PtcCO_2$ matched $PaCO_2$ almost identically in patients at rest. We will testing $PaCO_2$ - $PtcCO_2$ difference while patients are undergoing exercise testing with arterial catheters in place to determine if the values match under those conditions as well. $PtcCO_2$ is an accurate, non-invasive way to estimate $PaCO_2$. $PtcCO_2$ could facilitate measurement of complex parameters such as V_D/V_T without the need for arterial puncture.

Sponsored Research - None

3010626

A Bench Study Evaluating Gas Temperature And Absolute Humidity During Pediatric Airway Pressure Release Ventilation.

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Background: Heated humidifiers (HH) optimally operate with continuous or near-continuous flow. Standard HH performance requires gas temperatures (GT) 34°C - 41°C and absolute humidity (AH) 33 - 44 mg H_2O/L. APRV incorporates a prolonged inspiratory phase creating no-flow conditions. Adjunct techniques used with APRV including external flow bled-in at 2 L/min or humidification augmentation with maximum humidity compensation may influence GT or AH. We sought to determine if APRV settings would provide acceptable levels of GT and AH using a pediatric ARDS lung model. Our null hypothesis is that during pediatric APRV, there is no difference in GT or AH when comparing PC-CMV with APRV, APRV using external flow (APRV-EF), and APRV with humidity compensation (APRV-HC). **Methods:** A conventional ventilator (Servo-i, Maquet) was equipped with an adult heated circuit (RT280, F&P) and connected to a HH (MR850, F&P). The ventilator was calibrated to the circuit with a pre-use check. A Hygro-Thermometer (Humidity Alert II, Extech) calibrated to NIST standards was placed at the circuit wye. The ventilator circuit was connected to a test lung (ASL 5000, Ingmar Medical) set to simulate a 10 year-old with ARDS (compliance 13 cmH_2O L/s, resistance 30 mL/cmH_2O, 6.0 ETT). Targeted lung protective ventilation settings are as follows: PC-CMV (rate 20 b/min, PC 20 cmH_2O, PEEP 12 cmH_2O) and APRV (P_{High} 30 P_{Low} 0 T_{High} 4 sec T_{Low} 0.2 sec). PC-CMV was initiated with heated humidity for 1 hour. After each intervention change (PC-CMV→APRV→APRV-EF→APRV-HC) a 10 minute stabilization period preceded temperature and relative humidity measurements (every 5 minutes for 30 minutes) and AH was calculated from these measurements. Analysis was performed with a one-way ANOVA and post-hoc Tukey, as appropriate (SPSS, v24, IBM, Armonk, NY). Data was normally distributed for both GT and AH. Alpha (2-tail) set at .05. **Results:** There was a statistically significant difference in GT ($P < .001$) and AH ($P < .001$) between all interventions. The magnitude of the effect size was large for GT ($\omega^2 = .92$) and AH ($\omega^2 = .91$). Post-hoc analysis revealed a significant difference between all interventions in GT ($P < .001$) and AH ($P < .001$), except APRV-EF and APRV-HC groups in both GT ($P = .51$) and AH ($P = .57$). **Conclusion:** During APRV with low lung compliance, heating and humidification of inspired gas may not meet recommended standards for invasive mechanical ventilation regardless of adjunct techniques.

Sponsored Research - None

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3025402

The Effect Of Bubble Bottle Humidifiers On Absolute Humidity When Using Low Flows In Neonates In Critical Care Settings: A Bench Study.

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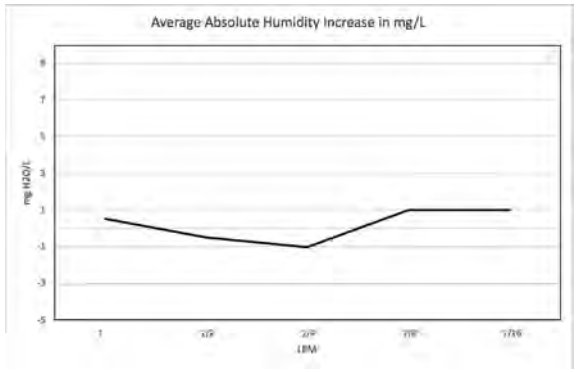
Background: Humidification to the neonate is a critical part of quality care. However, there is a lack of research on the effectiveness of non-heated nasal cannula humidifiers at flowrates less than 2 LPM. This bench study evaluated the amount of absolute humidity potentially delivered to the neonate at five commonly-used low flowrates in the neonatal patient population. **Methods:** A Salter Labs 1601-7 infant cannula was connected to a Hudson RCI AquaPak 340 ml humidifier; an inline CEM DT-321 hygrometer assessed the humidity at the distal end of the cannula. The following flowrates were selected: 1, 1/2, 1/4, 1/8, and 1/16 LPM. Each flowrate ran continuously for 24 hours with a humidifier inline. Before each test was run, the temperature and relative humidity were measured with the hygrometer and recorded, at the following locations: 1) ambient, 2) at the end of the cannula prior to humidifier being connected, and 3) at the end of the cannula after the humidifier was connected. After each test was completed, the ambient relative humidity and temperature were recorded at each location; the absolute humidity was calculated from the results. The humidifiers were each weighed before and after each test with an AND EJ-610 scale and results recorded in order to determine the total amount of water displaced from the bottle over 24-hours. Each trial was repeated twice, at each flow rate. **Results:** As the flowrate decreased the weight loss from the humidifier decreased. The absolute humidity prior to the connection of the humidifier and after the connection to the humidifier changed very little, regardless of the flow rate, averaging between -1 mg/L and 1 mg/L. **Conclusion:** Insensible water loss can vary widely in infants and neonates, but is estimated to average between 15 ml/kg/day and 170 ml/kg/day. Based on the results of this study, there is minimal increase in absolute humidity delivered to the neonate at the low flowrates relative to expected insensible water loss. The cost and infection risk associated with running a humidifier is likely unnecessary, due to the lack of absolute humidity delivered to the neonate. **Disclosures:** None **Sponsored Research:** None

Sponsored Research - None



3025206

Providing Humidity During HFV Infant Transport Using Low Flow Humidified Medical Gas.

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Background: The TXP-2D and Sinusoidal are routinely used to deliver high frequency ventilation (HFV) during infant transport. The complex flow dynamics within the Phasitron challenges the location for introducing humidified gases into the patient circuit with these ventilators. As such, many infants are transported using dry medical gases, which may increase the risk for mucous plugging, mucosal and alveolar damage, and hypothermia. We hypothesized that humidified low flow medical gas applied proximal to the Phasitron Connector Tee with a specialized adaptor would provide greater relative humidity (RH) levels than without humidity and without impacting delivered pressures and volumes during simulated infant HFV. **Methods:** Two test lungs were configured based on RDS and MAS lung mechanics. The Sinusoidal was adjusted based on clinical settings used during infant transport. Pressures and volumes were obtained from the lung models and RH measurements were obtained with a hygrometer (Fisher Scientific). Each model was supported at different mean airway pressures settings with/without humidified gases and at flows ranging from 0.5-4 L/min. Humidified gases (40°C; Fisher & Paykel: 850) were directed toward the ET tube using a Neo-Verso (Carefusion) ancillary port/check-valve. We determined *a priori* that acceptable relative humidity output should be ~100%. Differences in RH, pressure and volumes at different settings were compared using ANOVA. **Results:** Flows (>2 L/min) resulted in mean airway pressures that exceeded the pre-set pressures by ~1-1.5 cmH_2O and were reflected in the Bronchotron digital pressure display. No differences in delta-P or volumes in lung models between no flow and different humidified flow settings were observed. We observed greater relative humidity levels in all models between no flow and at each of the humidified flow settings (Figure, $P<0.05$). Optimal humidity levels (99.9%) were obtained at flows of 1 L/min and 2 L/min for RDS and MAS lung models, respectively (see Figure). **Conclusion:** We found that optimal humidification can be obtained during HFV transport using this novel system without having a significant impact on simulated ventilation. Based on our findings, this can only be accomplished using a specialized adaptor and check-valve to prevent pressure and humidity loss into the delivery tubing.

Sponsored Research - None

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3025632

Impact Of A Tube Securement Standard On Unplanned Extubation In A Pediatric Intensive Care Unit.

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Background: Unplanned Extubation (UE) in pediatric patients can increase length of stay by 6.5days/case and cost on average $36,692/case. Risk factors, such as age, gender, increased oral secretions, intubation duration, nursing ratios, ETT fixation method and sedation have all been referenced in the literature. Harm caused by UE can be catastrophic and sometimes result in death. Reintubation after UE can also cause a higher incidence of ventilator-associated pneumonia (VAP) and a 3-21% higher mortality rate. In an effort to reduce VAP and the potential of harm caused by UE in the PICU, we began to monitor our UE rate and compared our performance with comparable pediatric facilities. After observing that our UE rate was higher than the national average of 0.74 per 100 ventilator days, we decided to implement clinical standardization to minimize the risk. During our investigation, it was noted that most of our UE events were possibly related to the securement device. We focused on efforts on standardizing a process for tube securement, based on the ETT size. **Method:** Phase 1 included an IRB approved retrospective data analysis from 7/1/2016 to 6/30/2017 of UEs per 100 vent days. Phase 2 included implementing a standard ETT securement method within the Pediatric Intensive Care Unit (PICU). Education for Respiratory Therapists and nurses on the securement devices was performed formally. For all patients with ETTs ≤ 4.0mm a CooperSurgical™ NEO-Fit securement device was utilized, and for ETTs ≥ 5.0mm, a Hollister Anchorfast© securement device was utilized. ETTs = 4.5mm were taped using our previous standard taping method due to lack of securement devices available on the market approved for use with that size. Phase 3 included prospective data collection from 7/1/2017 to 5/30/2018 of UEs per 100 vent days. **Results:** The UE rate from 7/1/2016 to 6/30/17 of UEs was 0.82 per 100 ventilator days (11/1327). After initiation of a standardized securement device usage, the UE from 7/1/17-5/30/18 decreased to 0.50 per 100 ventilator days (5/992). The total number of UEs in year one was 11, compared to 5 UEs in year two, post standardization securement methods. See graph for detailed month-to-month data. **Conclusion:** In conclusion, the rate of UE decreased from 0.82 to 0.50 incidences per 100 ventilator days in an approximate 2-year period. Based on these data, the implementation of a standard process for ETT securement has a positive impact on UE rate.

Sponsored Research - None

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3025674

Lab Evaluation Of Pulse Dose Oxygen Concentrators In Simulated Pediatric Lung Models.

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Background: An efficient method for delivering O_2 via nasal cannula is needed in patients with chronic respiratory insufficiency. Liquid and compressed gas cylinders have several limitations, including: 1) portability; 2) cost; 3) ability to provide sufficient O_2 duration outside of the domicile setting; and 4) space and safety considerations. Manufacturers now offer an array of commercially available portable oxygen concentrators (POCs) that provide a patient-triggered bolus of O_2 to the nasopharynx. The objective of this bench study was to evaluate triggering and F_DO_2 with POC systems. We hypothesized that there would be no differences in F_DO_2 in spontaneously breathing lung models between standard O_2 cannula and POC at different settings. **Methods:** Neonatal, toddler, small child, and adult 3D printed upper airway models were affixed to the Ingmar ASL 5000 via a series of one-way valves. A standard O_2 cannula, seven POC systems and one OCD (Oxygen Conserving Device) were applied to the airway models using a range of settings. F_DO_2 measurements (n=20) were acquired from within the lung model following a brief stabilization period. We recorded triggering based on a digital indicator on the POC that coincided with lung model inhalation. **Results:** POC devices allowed consistent triggering of O_2 boluses across all of the testing conditions and models, except for one, which triggered boluses every other breath in the term newborn model. This manufacturer chose not to include this device in our post-analysis report. F_DO_2 measurements between standard O_2 cannula and POC devices was different (Figure, P<0.05) and dependent upon the specific lung model and POC bolus size. F_DO_2 was consistently greater with some POC devices than O_2 cannula (P<0.05) in the newborn model. **Conclusion:** The major finding from this study is that all simulated patient models were able to trigger all POC devices. Special consideration for use of POCs in the newborn must be given as bolus sizes are not specifically tailored to be used in patients with smaller airways and tidal volumes. Care must be taken in selecting POCs and titrating doses based on individual patients' oxygenation needs. Future studies are needed in order to determine whether POC devices are able to support patients with different lung diseases.

Sponsored Research - None

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3025908

Occupational Radiation Exposure Of Respiratory Therapists During Manual Ventilation In The Neonatal Intensive Care Unit.

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Background: Radiation exposure and associated cancer risk have been studied since the mid-1900's. Cancer risk and increased mortality are well-documented in the literature throughout a variety of professions. Respiratory Therapists (RTs) commonly provide manual ventilation to neonates during imaging following surfactant administration or endotracheal tube placement / manipulation. Providers are encouraged to wear protective lead whenever risk of occupational exposure is present. Dose used for neonatal images is significantly less than adults, which may provide a false sense of security to providers leading them to forego protective wear. This bench study measured radiation exposure using a phantom model to simulate the provider's hand, thyroid, and chest using standard dose and distance measurements. **METHOD**: A dosimeter was used to measure radiation dose in milliroentgens (mR). A standard source to image distance (SID) of 101.6 cm (40 in) and standard technique for the neonatal population of 0.8 milliamperage-seconds (mAs) and 55 kilovoltage peak (kVp) was used. Average provider distance was estimated at 38.1 cm (15 in) at a right angle from the neonatal phantom. A dosimeter was used to measure direct patient dose from the primary beam through the phantom to the image receptor (101.6 cm). Scatter radiation from the patient to the provider was measured using the same dosimeter affixed to the phantom hand (16 cm distance from phantom neonate), chest (42 cm distance), and thyroid (57 cm distance). Scatter dose to palm of hand, chest, and thyroid were recorded over two exposures and averaged. **Results:** Dose to hand was 0.315 mR. Dose to the thyroid and chest were 0.0 mR as the dosimeter could not read negligible scatter. **Conclusion:** Though this is a relatively small exposure in a single episode, it's not unusual for the NICU RT to be exposed to an average of 10 images per week which, over the period of one year, would total 160 mR to the provider's hand. This is not an insignificant overall exposure and requires further study. For added perspective, a single lumbar spine CT scan provides a dose of approximately 150 mR. Repeated doses to RTs choosing not to wear protective apparel can be harmful over time. Without adequate protection, RTs who provide manual ventilation during imaging may significantly increase their radiation exposure and potential cancer risk, even when the dose may seem insignificant.

Sponsored Research - None

3025933

Effects Of Nasogastric Tube Placement, Head Position And Nostril Choice On Clinically Significant Events In Preterm Neonates.

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Background: Preterm neonates commonly require nasogastric tubes (NGT), which cause a significant increase in airway resistance likely increasing the number of clinically significant events (CSE). Head position also effects nasal airflow. The purpose of this study was to identify the effect of NGT placement and head position on CSE in preterm neonates. **Methods:** Prospective observational study of preterm infants off all respiratory support requiring an NGT and having CSE. Caregivers recorded dependent variables NGT position (upper or lower nostril or midline), and body position (prone, supine, sidelying) and the independent variable, number of CSE. Statistics were 2-sample z-test for percentages. IRB approval was obtained. **Results:** 27 neonates were enrolled in the study. Birth weight was 1463.6±419.7 grams. Gestational age was 30.4±2.7 weeks. Weight when entering the study was 1651.7±324.7 grams and age was 21.1±17.7 days. There were 39.5±31.5 CSE recorded per neonate. 38% of the total number of CSE occurred when the NG tube was in the upper nostril, 34% in the lower nostril, and 28% when head midline (P=0.006 upper nostril versus head midline). 12.7% of total CSE occurred when the neonates were prone, 35.9% when supine, and 51.4% when sidelying. There were more CSE when positioned sidelying compared to both prone (P<0.0001) and supine (P<0.0001) and more CSE when positioned supine versus prone (P<0.0001). When both prone and sidelying there were less CSE with the NGT midline compared to both in the upper (P=0.04 prone and P<0.0001 sidelying) and lower (P=0.001 prone and P=0.004 sidelying) nostril. When supine, there were more CSE with the NGT midline compared to both in the upper (P<0.0001) and lower (P<0.0001) nostrils. **Conclusion:** Least CSE occurred with the neonate prone or the NGT midline. Most CSE occurred when sidelying or with the NGT in the upper nostril.

Sponsored Research - None

3026663

A Survey Of Respiratory Therapist Preparedness For End Of Life Care.

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Background: End of life care (EOL) is often a difficult time for medical professionals. Respiratory therapists (RTs) are often called upon to stop treatments or life support for patients who are near death. Like all professionals, RTs struggle with emotions in EOL. These issues are further magnified when the patient dying is a child. Most RTs have not had specific training in dealing with EOL issues and have entered EOL situations without any training. This has forced the RTs to encounter EOL situations ill prepared. The lack of preparation may add anxiety to an already tense and stressful situation[1]. **Methods:** The study was approved by the local IRB. Using an interpretive phenomenological approach, the research was conducted at a large pediatric hospital. RTs that were in clinical settings and were performing EOL were recruited by email. Interviews were conducted with 1/3 of the participants. The remainder of the participants submitted their answers using an online survey. **Results:** Online participants (n=39), 42% (15/39) cited ineffective hospital orientation about EOL and 44% (16/39) cited no hospital orientation about EOL. When asked about EOL training in RT school, 50% (18/39) responded with ineffective training and 36% (13/39) stated that they did not get any training in RT school. Regarding the interviews (n=13), there were 84% (11/13) female participants, 77% (9/13) had bachelor degrees and 77% (9/13) had NPS certification. All the participants (13/13) stated that they did not receive any EOL training in hospital orientation. With respect to EOL training in respiratory school, 15% (2/13) recalled receiving EOL training in respiratory school. Both participants are female. One is over 40 years old, has a bachelor's degree and less than 10 years of experience. The other is over 50 years old, has an associate's degree, NPS certification and over 20 years of experience. **Conclusion:** RTs are a required participant in all areas of this institution during EOL. However, they consistently lack structured training specifically in EOL. Based on the survey results from this institution, more training and discussion on EOL should be conducted in both RT schools and during hospital orientation. More research needs to be conducted specifically with RTs concerning EOL.

References 1. Brown-Saltzman, K., Upadhya, D., Larner, L., & Wenger, N. (2010). An intervention to improve respiratory therapists' comfort with end-of-life care. *Respir Care* 2010;55(7),858-865.

Sponsored Research - None

3024435

Eliminating Device Related Hospital Acquired Pressure Injuries In The Neonatal Intensive Care Unit Through Quality Improvement Methods.

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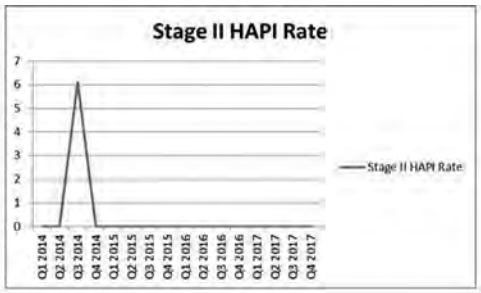
Background: CPAP is used as a method to support ventilation and oxygenation in pre-term infants. In addition to having an immature respiratory system, pre-term infants also have very immature and fragile skin. The interfaces most commonly used with CPAP devices are known to cause pressure injuries in this patient population. The aim of this quality improvement project was to develop a multidisciplinary team to reduce the incidence of device related hospital acquired pressure injuries (HAPI) in the NICU due to Q3 of 2014 presenting with an increased Stage II rate. **Methods:** A multidisciplinary team formed and evaluated risk factors for pressure injuries. A key driver diagram (see fig. 1) was created with the following primary drivers: 1. Skin integrity by providing education to identify pressure injury, applying skin protectant, and introducing an RT/RN coordinated skin assessments. 2. Evaluation of interface by alternating the interfaces of mask and prongs, adopting Bubble CPAP (BCPAP), encouraged a decreased usage of mask (due to fixation limitations), changing interfaces only as needed due to skin protectant. 3. Developed the team by creating a core RT/RN group, encouraged collaboration with wound ostomy service, and provided re-education on the usage of BCPAP and skin protectant. 4. Event review, communication, and awareness by implementing reporting process for skin concerns, reviewed events at multidisciplinary meetings, and displayed "I'm bubbling" sign outside of patient's room. The outcome measure is the rate of HAPI per NICU patient census. Plan-Do-Study-Act (PDSA) cycles to test and learn from change were utilized. After the first PDSA cycle was complete HAPIs were continued to be noted. Upon completion on the second PDSA cycle HAPIs were eliminated; therefore, the team maintained the current assessment and patient care routine. **Results:** Quarter 3 of 2014 had an increase in device related HAPI in the NICU with a rate of 6.12. All subsequent quarters have maintained a HAPI rate of zero. It was noted that with over 3100 BCPAP days per year, there was no increase in HAPI. **Conclusion:** Based on the above mentioned interventions our team has eliminated device related HAPI. We continue to monitor skin integrity with RT and RN simultaneously; assessing includes in and around nares, behind and in ears, and entire head. We continue to review literature and develop a best practice guideline for the utilization of BCPAP in premature infants.

Sponsored Research - None



3008012

The Accuracy Of Delivering Ventilation Pressures To A Neonatal Lung Model Using A Flow-Inflating Resuscitation Bag.

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Background: Learning how to provide PPV is the foundation of neonatal resuscitation. Variable inflation pressures may lead to ventilation-perfusion mismatch, hypoxemia, poor alveolar recruitment, air leak, alveolar cellular destruction, and volutrauma. Currently manual ventilation of the newborn is accomplished by use of a flow-inflating resuscitation bag at our facility. The purpose of this study is to evaluate the accuracy of maintaining consistent airway pressures with the use of a flow-inflating resuscitation bag. **Method:** The study population comprised of 30 critical care professionals (e.g., RNs, RCPs, and physicians) who actively participate in high risk delivery and demonstrate competence of newborn resuscitation with current NRP certification. Individuals were instructed to ventilate an intubated, newborn lung model, for a 2 minute duration with targeted ventilation pressures of 25/5 cmH_2O at a rate of 40-60 breaths per minute. This exercise was completed a second time targeting ventilation pressures of 30/5 cmH_2O. Ventilation pressures were recorded and documented for each participant's manual inflation in both trials. **Results:** There were significant variations in delivered pressures by manual inflation when using a flow-inflating resuscitation bag. Results revealed excessive PEEP delivered as high as 20 cmH_2O in trial 1 and 24 cmH_2O in trial 2. Maintaining PEEP with manual ventilation was difficult with levels of 0 cmH_2O frequently recorded in both trials. Results also showed inconsistent PIP delivery. Excessive PIPs of 40 cmH_2O were recorded in both studies. A minimum PIP inflation of 8 cmH20 was recorded in trial 1 and a minimum PIP of 16 cmH_2O was noted in trial 2. 5,270 inflations were measured in both trials. 83% of the inflations delivered by the healthcare team fell outside of the targeted range. Only 17% of the resuscitation breaths were within the projected parameters (Refer to Figures 1-3). **Conclusion:** It is difficult to maintain consistent airway pressures when ventilating a newborn with a flow-inflating resuscitation bag. Because the need for ventilation assistance cannot always be predicted, teams need to be prepared to provide lifesaving interventions quickly and effectively. Therefore, it is critical to adopt a resuscitation device that can be used universally by the healthcare team that can offer both precision and ease in use.

Sponsored Research - None

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3025853

Novel Method Of CPAP Delivery In Neonates With Apnea Of Prematurity Using NIV NAVA.

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Background: Premature neonates often fail Nasal Continuous Positive Airway Pressure (CPAP) due to prematurity of apnea (AOP). When the neonate is apneic, CPAP provides inadequate additional support and neonates decompensate clinically. Current CPAP modalities do not allow backup ventilation that occurs only with the apneic event. Neurally Adjusted Ventilatory Assist (NAVA) provides support in proportion to the electrical activity of the diaphragm (Edi). The NAVA level converts the Edi into a proportional pressure that varies breath to breath. When there is no Edi for a set amount of time the ventilator goes into pressure control (backup) ventilation at a preset rate providing support until spontaneous respiration resumes. **Methods:** Retrospective single center study of neonates having clinically significant events (CSE) due to AOP while on CPAP. At the discretion of the treating physician, they were placed on non-invasive NAVA with NAVA level of 0 cmH20/mcV (NIV NAVA 0) and PEEP equal to the previous CPAP level. A pressure of 0 above PEEP (= CPAP) was delivered during spontaneous breathing and backup ventilation was provided when the infant became apneic for longer than a preset time until the infant resumed breathing. Demographics and number of CSE on 24 hours of CPAP followed by 24 hours on NIV NAVA 0 were collected. Statistics were paired t-test. IRB approval was obtained. **Results:** 16 neonates qualified for the study. All were on CPAP, had AOP and were on Caffeine. Birth weight was 882±164 grams, gestational age was 26±1.7 weeks, weight at study was 917±224 grams and age at study was 20±12 days. CSE decreased from 17.9±7.8 on CPAP to 10.6±8.1 events on NIV NAVA 0 ($p = 0.0008$). **Conclusion:** NIV NAVA 0 reduced the number of CSE compares to CPAP in premature neonates with apnea. This may decrease the need for intubation in neonates failing CPAP due to malignant apnea.

Sponsored Research - None

3020733

The Variability Of Tidal Volume During Pressure Controlled Mechanical Ventilation Of Premature Neonates.

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Background: Premature lungs are at a high risk of injury from mechanical ventilation. Pressure controlled ventilation, where respiratory therapists monitor and titrate peak inspiratory pressure to keep tidal volume within 4-7 mL/kg, is widely used in the neonatal intensive care unit. However, pressure controlled ventilation may expose the lung to volutrauma with changes in lung compliance and hypo or hyperventilation can increase the risk of injury to the premature brain. We sought to identify the variability of tidal volume during pressure-controlled ventilation in mechanically ventilated premature neonates.**Method**: Data files of neonates < 32 weeks gestational age enrolled in clinical trials at the Neonatal Research Institute at Sharp Mary Birch Hospital for Women & Newborns were searched to identify infants who received pressure controlled mechanical ventilation in the first 72 hours of life. Mother and infant demographics and ventilator downloads were prospectively collected. Infants with major congenital anomalies were excluded from the primary studies. The ventilator internal clocks were set and routinely checked to synchronize with the electronic medical record. The exhaled tidal volume of a mechanical breath every 5 minutes was converted to mL/kg using birth weight. Parents of the infants gave consent for the primary trial. The Sharp Institutional Review Board approved the primary trials and the secondary data analysis. **Results:** Sixty-nine infants with ventilator data within the first 72 hours of life were included. The mean gestational age was 27 ± 2 weeks with birthweight of 1069 ± 378 grams. A total of 1,533 hours of data or 18,397 breaths were analyzed and 11.9% of breaths were < 4 mL/kg, 31.6% were > 7 mL/Kg, 10% > 9 ml/Kg, and just 56.5% fell within the targeted 4-7 mL/kg (Figure 1). **Conclusion:** In this cohort 43.5% of the pressure control breaths were outside of the targeted volume range of 4-7 mL/kg. **Disclosures**: None

Sponsored Research - None

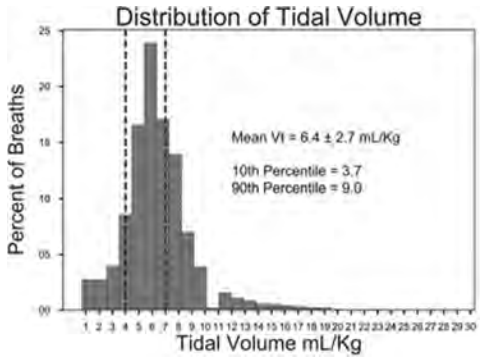

Figure 1 Distribution of Tidal Volume During Pressure Control Ventilation

3025561

Compariosn Of Tidal Volume Delivery During T-piece Pediatric Resuscitation At Different T-piece: A Bench Study.

Nancy Johnson; Pediatric Respiratory Care, UHHS/Rainbow Babies & Children's, Medina, OH

Background: A Resusa-Tee T-piece Resuscitator (Mercury Medical, Clearwater, FL) provides consistent pressure and tidal volume for pediatric to adult patients when applied at suggested respiratory rates, I:E ratio and flow rate. Tidal volumes at flows of 5 lpm, and 17 lpm have been validated in previous studies.[1] The purpose of this study is to determine the precision of measured tidal volumes delivered at clinician selected and frequently-used flow rates. **Methods:** A Resusa-Tee Pediatric T-piece resuscitator circuit was attached to a BC Biomedical LS-20001 Infant Lung Simulator with set lung compliance of 3 ml/cm/H_2O and 5 ml/cm/H_2O. Using a PEEP of +5, RR of 20/min, I:E 1:2 and PIP's of 20, 25, and 30 and flows of 10 lpm and 15 lpm, tidal volumes were recorded from a pediatric-adult flow sensor attached to a NICO monitor (Respironics, Wallingford, CT) Values were recorded every two minutes at each setting. Mean values and standard deviations for each flow rate and pressure are displayed in the table below. Data were analyzed using the student's t-test with a clinical significance set at $P<0.01$. Variances in rate of tidal volume change was determined between pressures and the two flowrates. **Results:** There was a statistically significant difference and greater variability in delivered tidal volume change as pressure and flow rates were increased. Accuracy and precision in tidal volume delivery can be achieved at 10 liters.min and 20 and 25 cm H_2O pressure at both compliances. There is increased variability at higher flow rates and pressures at higher compliance. **Conclusion:** The pediatric t-piece resuscitator delivers precise tidal volumes at lower pressures and compliances. A clinical study is necessary to validate this and determine the impact on patient outcomes. [1]Weagraff, CE, Deakins K. Evaluation of the Accuracy for Tidal Volume PIP and PEEP using a novel t-piece resuscitator for pediatric and adult patients. AARC International Congress 10/5/2017
Sponsored Research - None

5 ml/cm H2O	20 cm H2O	25 cm H2O	30 cm H2O
10L	43 (1.12)	78 (1.06)	85 (1.54)
15L	55 (2.52)	85 (1.45)	101 (1.65)
3 ml/cm H2O	20 cm H2O	25 cm H2O	30 cm H2O
10L	21 (0.68)	32 (0.57)	44 (1.09)
15L	36 (2.98)	39 (1.24)	49 (1.02)

3025307

Effect Of Leak On The Accuracy Of Negative Inspiratory Force Measurements In A Simulated Infant Model.

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Background: Respiratory muscle weakness characterized by a low negative inspiratory force (NIF) is a risk factor for extubation failure in children. Obtaining accurate NIFs may aid clinicians in deciding appropriate timing of extubation, but uncuffed endotracheal tubes may result in an airway leak and potentially inaccurate pressure measurements. We sought to investigate the accuracy of assessing a simulated NIF in a laboratory environment across a range of leak percentages. **Methods:** A 3L plastic chamber was used to house an infant test lung that was connected to an airway leak apparatus outside the chamber. The adjustable leak apparatus was arranged with two three-way stopcocks in series that terminated into a 3.5 ETT that was occluded and proximal airway pressure continuously sampled. Leak percentage was recorded by connecting an AVEA ventilator set to standardized ventilator settings to the test lung prior to each test and recording the calculated leak percent. Negative pleural pressure was simulated inside the chamber by connecting a 500ml syringe through a second opening and withdrawing 160ml which resulted in a negative pressure approximating 47 +- 1.6 cmH_2O. For each test the difference between airway pressure at the proximal end of the ETT and chamber pressure at the most negative point of the breath after correcting for elastance of the test lung was termed the total error. Leak percentages of 0, 10, 20, 30, 40, and 50 were tested and each test was performed three times. **Results:** The mean and range total error for each leak percentage is shown in the Figure. As leak percentage increases, total error increases. Tests performed with a calculated leak percentage > 20% all had a total error that exceeded 10 cmH_2O. **Conclusion:** Total error between simulated pleural pressure and airway pressure increases as a function of leak at the airway and may result in an inaccurate assessment of negative inspiratory force when leak is elevated. When leak is minimal (< 20%) the total error is less than 10 cmH_2O in an infant bench model. Future work is needed to characterize this error as a function of absolute NIF values, and should consider alternative, dynamic models to characterize leak.
Sponsored Research - None

See table or figure in supplement to the October 2018 issue of Respiratory Care at www.rcjournal.com.

3022129

The Trilogy: Determining Delivered Tidal Volumes In Pediatrics.

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Background: The use of ventilators without tubing compensation is abundant within the hospital and home care settings. Tidal Volume (VT) displayed on these ventilators is often an estimate and does not account for volume lost within the tubing. An external monitoring device can be added to a circuit for accurate volume measurements but this can be cumbersome for infant and pediatric patients. We trialed a simple equation to estimate VT delivered to the patient with the Trilogy 202s© non-compensated, single limb circuit. **Method:** A Philips Trilogy 202 ventilator© and Fisher & Paykel 202 circuit (F&P) © with Philips Whisper Swivel© was connected to a Michigan Instruments® Test Lung. Test lung setting were at BTPS with the resistance RP50, and compliance 0.005L/cmH20. The tubing compliance factor (TCF) of the F&P was determined using a Maquet Servo-I® pre-use check at 37 degrees C and humidified. The TCF determination was done 3 times and values averaged. We simulated 4 scenarios using the following Trilogy and Test Lung settings. Ventilator Settings were as follows for trial 1; PIP 15 PEEP 5 RR 30, Trial 2; PIP 25 PEEP 5 RR 20, Trial 3; VT 50 RR 30 PEEP 5, Trial 4; VT 200 RR 15 PEEP 10. 10 trials were performed for each setting. Data was collected using the Michigan Instruments PneuView 3.2 software®. A novel equation was utilized to estimate delivered VT loss: 1. PIP-PEEP=Delta P 2. Delta P x TCF (1.5)= Volume Loss 3. Set Vt- Volume Loss=Calculated VT The results from the Trilogy displayed VTe, the equation above and from the PneuView software were then compared. **Results:** See table for details. All simulated trials displayed consistency in measured and monitored values. On average, the displayed VT was inaccurate and was 27% more than the measured volumes. The calculated VT was on average more precise, within 5% of the measured volumes. **Conclusion:** Using a novel bedside calculation, providers can better estimate actual tidal volume delivered to the patient that accounts for volume loss in uncompensated circuits. While this equation is specific to the Fisher & Paykel 202 Circuit, it can be replicated for virtually any other circuit available. This calculation negates the need for additional equipment and dead space to be used to obtain the same values. Opportunity exists to program EMRs to perform this calculation at the bedside automatically.
Sponsored Research - None

Average Diaplayed, Measured and Calculated Tidal Volmes

Trial	Trilogy Settings	Average Displayed VT (A)	Average Measured VT (B)	Average Calculated VT (C)	% Change (A to B)	% Change (B to C)
1	PC 15, PEEP 5, RR 30, Ti 0.5s	55.5 mL	40.5 mL	40.7 mL	27.0%	.5%
2	PC 25/5 RR20 Ti0.8s	125.7 mL	101 mL	112.2 mL	19.6%	9.9%
3	VC VT50 RR30 Ti0.3 PEEP5	48 mL	30.5 mL	33.9 mL	36.5%	10.2%
4	VC VT200 RR15 Ti1.0 PEEP10	181.9 mL	136.5 mL	135.6 mL	24.9%	.6%

This table shows the average VT values form 4 trials, along with their correlating ventilator settings, as well as the percent change from the disaplyed and calculated VT in related to the measured VT.

3025586

Comparison Of Tidal Volumes Delivered With Three T-piece Resuscitators For Use In Newborns And Infants.

Nancy Johnson, Kathleen Deakins; Pediatric Respiratory Care, UHHS/Rainbow Babies & Children's, Medina, OH

Background: Manual ventilation can result in complications caused by under or over ventilating by improper use of manual resuscitators.[1,2] T-piece resuscitators have been used in neonates and infants in a variety of settings. While there is a proposed crossover between several types of infant and pediatric resuscitator use at lower flows, a comparison between devices has not been explored to indicate if they can be used equivocally. The purpose of this bench evaluation is to determine if resuscitators deliver similar tidal volumes at the same settings and if all types can be used in this population of patients. **Methods:** A Resusa-Tee, Neo-Tee (Mercury Medical, Clearwater FL), and Neopuff (Fisher/Paykel, Auckland, NZ) circuits were independently attached to an IngMar Medical (Pittsburgh, PA) Neonatal Lung Model with set lung compliance of 1 and 2 ml/cm/H_2O, and a BC Biomedical LS-20001 Smart Lung Infant Simulator with a set lung compliance of 5 ml/cm/H_2O. Using a PEEP +5, RR of 20/min, I:E 1:2 and PIP at 20 cm H_2O at a flowrate of 10 lpm. Tidal volumes were recorded using a pediatric-adult flow sensor attached to a NICO monitor (Respironics, Wallingford, CT) every two minutes at each setting. Tidal volumes for each resuscitator were analized using a paired t-test with a statistical significance set at $P<0.01$. A comparison between resuscitators was done using Kruskal-Wallis rank sum test. Mean values and standard deviations (SD) are displayed in the table below. **Results:** There was a statistically significant difference in tidal volumes delivered at the same resuscitator settings used at compliances of 1, 2, and 5 ml/cm H_2O, The Neopuff provided lower mean values (and SD) compared to the Neo-Tee and Resusa-tee at lower flows and compliances. At higher compliance, tidal volumes increased with the Resusa-Tee. **Conclusion:** Despite consistent pressure and flow settings used with t-piece resuscitators, delivered tidal volumes vary between resuscitation devices. Evaluation of clinically important differences and outcomes need to be determined. [1]American Academy of Pediatric, American Heart Association: Textbook of neonatal resuscitation, sixth edition. American Academy of Pediatrics: Elk Grove Village, Ill., 2011 [2]Roehr CC, Kelm M, Fischer HS, et al. Manual ventilation devices in neontal resuscitation. Tidal volume and positive pressure-provision. Reuscitation. 2010;81(2):202-205.
Sponsored Research - None

10 lpm 20/5 x 20 Ti 1 sec I:E 1:2

	Neopuff	Neo-Tee	Resusa-Tee
NeoLung 1 ml/cmH2O	14 (1.25)	24 (1.89)	20.4 (1.5)
NeoLung 2 ml/cm H2O	24.8 (1.75)	35 (3.99)	35.6 (2.24)
Pediatric Lung 5 ml/cm H2O	NA	56.9 (2.34)	71.4 (1.69)

3008748

Effects Of CPAP Compliance In Obstructive Sleep Apnea Patients At Victory Health Partners.

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Background: Obstructive sleep apnea (OSA) is the most common cause of nocturnal apnea. Continuous Positive Airway Pressure (CPAP) is an effective first-line therapy for OSA. Patient compliance with CPAP remains an issue. This study was done to quantify CPAP compliance, the factors contributing to CPAP use and compliance, and to determine if CPAP has made a change in the variables used to determine the presence of OSA (Berlin questionnaire data) in a sample of uninsured patients at the Victory Health Partners (VHP) clinic in Mobile, Alabama. We hypothesized that there would be a reduction in symptoms with CPAP compliance. **Methods:** All patients treated with CPAP for OSA at the VHP clinic were available for study. After IRB approval, patients who remained in the VHP system were identified for inclusion. An 18 question phone survey was used to gather data about CPAP compliance and symptoms. Responses were quantified using descriptive statistics. Changes in subjects' Berlin Questionnaire Sleepiness score were evaluated using a two-tailed Fisher's Exact test. A p value < .05 was considered significant. **Results:** Out of 170 patients who have been treated for OSA at VHP clinic, 77 continue as patients and 28 were located and consented to this study. Twenty (71%) of subjects were compliant. Pre-CPAP Berlin questionnaire data were available from 15 patients. Of those patients, snoring, apnea, and daytime tiredness and fatigue were significantly reduced (P=<0.0001, P=0.0169, P=0.0063, respectively). No significant changes in blood pressure or sleeping while driving were found. The reasons reported for noncompliance by those subjects were equipment failure (1), mask discomfort (5), lost weight and no longer have symptoms (1), claustrophobia (2), could not sleep due to system discomfort (2) and dry nose/throat (1). **Conclusion:** When patients with obstructive sleep apnea were compliant with CPAP therapy, symptoms (snoring, apnea, and daytime tiredness and fatigue) were decreased. Noncompliance in patients was primarily caused by mask or system discomfort. Nothing to disclose.

Sponsored Research - None

3012006

When To Initiate Pulmonary Rehabilitation Program For COPD Patients.

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Background: Pulmonary rehabilitation (PR) has a positive effect on COPD patients. The response to PR demonstrates positive impacts on daily life activities and exercise tolerance. However, the referral criteria to PR program for COPD patients do not mention anything about the time factor or the stage of the disease. The recommended stage of starting the program should be included in the acceptance guidelines. More studies are needed to examine which COPD stage will benefit more than the others. The purpose of the study is to determine the most optimal time to start pulmonary rehabilitation for COPD patients. **METHOD:** A retrospective study was utilized, and the data were collected from an urban hospital for the last five years (2013 to 2017). This retrospective was approved by the university IRB. Patients were divided into four groups using the GOLD classification guideline for COPD patients. Every group represents a different FEV_1 range and includes pre- and post-PR program variables. The measured variables were 6MWT and Chronic Respiratory Questionnaire(CRQ). The evaluation focused on the comparison between the groups, not within the groups. The analysis was conducted by SPSS version 24.0. Descriptive statistics, dependent sample t-test, and ANOVA were utilized. **Results:** comparison between groups ANOVA results were Six-minute walk difference F (3.65) =1.3, P=.281. Dyspnea difference F (3.65) =.155, P=.926. Fatigue difference F (3,65) =.640, P=.592. Emotional difference F (3,65) =.221, P=.881. Mastery difference F (3,65) =.363, P=.780. **Conclusion:** There was a significant difference between pre- and post-pulmonary rehabilitation results and all the groups responded positively to the program. There were no significantly different responses to the program between the four groups. As a result, there is no specific preferred stage to start a PR program. **Disclosures:** None; Sponsored Research-None.

Sponsored Research - None

3024192

Harmonica Playing Improves Outcomes In Patients With COPD.

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Backgound: Primary interventions in COPD include smoking cessation, appropriate inhaler therapy and pulmonary rehabilitation (PR). PR requires a multidisciplinary approach of exercise and education, with instruction in breathing retraining exercises such as pursed-lip and diaphragmatic breathing. Pursed lip breathing may reduce alveolar collapse during exhalation and diaphragmatic breathing may work to improve inspiratory pressures, even at the higher lung volumes seen in COPD. Harmonica playing requires the practice of a similar expiratory maneuver as taught in pursed lip breathing (PLB); diaphragmatic breathing generates adequate force to create musical tones. The purpose of this study was to determine if patients with COPD would benefit from a 12 week program of harmonica playing with improved respiratory muscle strength, ambulation and quality of life. **Methods:** COPD patients who had completed our formal pulmonary rehabilitation program (PR) at least 6 months prior were eligible for this trial. After obtaining informed consent, patients attended 12 weeks of harmonica training for two hours, one day per week and were instructed to practice at home for at least 30 minutes a day, 5 days a week. Participants completed spirometry testing, maximum inspired and expired pressure (MIP, MEP) testing and Six Minute Walk test pre- and post- program in addition to recording pre- and post-program St. George Respiratory Questionnaires. We performed paired t-tests and Wilcoxon Signed-Rank Tests, as appropriate. **Results:** Of the 14 participants upon entry, 11 completed this trial. 3 subjects were male. The average age was 72.5 years. All had been smokers previously with a median 40 [quartile 1 = 30, quartile 3 = 40] pack-year history. Maximal inspiratory pressure (MIP) and maximal expiratory pressure (MEP) increased by an average of 15.36 ± 12.04 (P=0.0017) and 14.36 ± 13.76 (P=0.0061), respectively. Additionally, the distance walked in 6 minutes (6MWD) increased by nearly 60 meters (60.55 ± 78.18, P=0.0280). Median distance improved by 48 meters. Full study outcomes are provided in Table 1. SGRQ improved slightly, but not statistically so. **Conclusion:** In this small pilot trial, we found that a 12-week harmonica program significantly improved MIP, MEP and 6 MWD in a group of post-PR COPD patients. Larger scale harmonica studies are warranted to evaluate this program's adjunctive potential benefit to formal pulmonary rehabilitation.

Sponsored Research - None

Table 1. Study Outcomes (n=11) Mean standard deviaiton; median [quartile 1, quartile 3]

Measure	Baseline	End	Paired Difference (End-Baseline)	p-value
MIP	56.45 ± 18.93	71.82 ± 24.07	15.36 ± 12.04	0.0017
MEP	61.64 ± 19.1	76 ± 25.23	14.36 ± 13.76	0.0061
FEV1	0.75 [0.58, 0.8]	0.71 [0.61, 0.86]	0.03 [-0.04, 0.13]	0.4268
FVC	1.64 ± 0.39	1.65 ± 0.54	0.09 [-0.25, 0.25]	0.5342
FEV1/FVC	46.36 ± 9.74	44.45 ± 13.16	-1.91 ± 8.49	0.4730
6MW	209.09 ± 75.67	269.64 ± 105.22	60.55 ± 78.18	0.0280
SGRQ	37.3 ± 15.48	39.07 ± 14.13	1.77 ± 6.5	0.3947
COPD Exacerbation	1 [1, 2]	1 [0, 2]	-0.91 ± 1.97	0.1574

MIP=maximum inspiratory pressure, MEP=maximum expiratory pressure, FEV1=forced expiratory volume in 1 second, FVC=forced vital capacity, COPD=chronic obstructive pulmonary disease

3025301

An Intensive Adherence Protocol To CPAP Therapy During Acute Stroke Rehabilitation Is Successful Even With More Severe Stroke Disability.

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Background: Obstructive sleep apnea (OSA) is associated with worse functional outcomes after stroke. Continuous positive airway pressure (CPAP) may improve stroke recovery but has been limited by poor adherence. In a single-arm study, we sought to evaluate an intensive CPAP adherence protocol during and after inpatient rehabilitation on CPAP adherence and stroke recovery. **Methods:** The adherence protocol included OSA education and an iterative process of CPAP adjustments and feedback by respiratory therapists (RT) and nurses. A 3-night run-in period of auto-titrating CPAP 4-20 cm H_2O was utilized as proxy diagnostic testing for OSA and to assess for CPAP tolerance. Qualifying patients were asked to continue CPAP for 3 months. We assessed for factors associated with 3-month CPAP adherence, defined as ≥ 4 hours on ≥ 70% of nights, using logistic regression. The University of Washington Human Subjects Review Committee approved the study. **Results:** During the run-in, 74 of 90 (82%) subjects experienced problems with CPAP, most commonly mouth dryness (41%), nasal symptoms (48%) and mask fit or leak problems (49%) [figure]. The most common adjustments were switching the mask type (28%) and adjusting the humidity (30%). Sixty-two of the ninety (69%) participants qualified after the run-in, and 32 of the 52 (62%) who continued CPAP after discharge from rehabilitation were adherent with average of 4.9 ± 2.6 hours per night over 3-months. Predictors of adherence included more severe stroke [NIH Stroke Scale ≥ 5: OR 9.7 (1.6-60.7), P=0.015] and white race [OR 9.1 (1.7-48.3), P=0.009]. Patients with any aphasia were more likely adherent (14/15, 93%) than those without (18/37, 49%), P=0.005. Adherence to CPAP did not differ by baseline sleepiness or body mass index. **Conclusion:** A RT-led intensive CPAP adherence protocol beginning with a short run-in period led to 3-month adherence among nearly two-thirds of stroke patients. Stroke severity, including disability with aphasia, was a significant predictor of adherence, possibly related to a symptomatic benefit in stroke recovery with CPAP or from intensive support. RT can play a critical role in improving early CPAP acceptance even among severely disabled stroke patients through a process of close supervision with adjustments of mask fitting and machine settings. Further randomized controlled trials with adequate CPAP adherence are needed to further assess the effectiveness of intensive CPAP interventions on stroke recovery.

Sponsored Research - None

See table or figure in supplement to the October 2018 issue of Respiratory Care at www.rcjournal.com.

3006958

Improvement To Patient Retention And Experience Of Asthma Education Using Visual/Audio Tools Appropriate For Learners With Diverse Levels Of Health Literacy.

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Background: The primary goal of asthma management is to achieve and maintain control of the asthma condition. Respiratory Therapists (RT) partner with the patient and family to achieve self-management through education. It is essential to maximize every learning opportunity and to engage patients and families in a way that supports retention and motivation. The newly adopted tools included interactive color videos, a color comic book, character stickers, and trading cards given for enhanced learning and incentive. The videos were shown during the wait of the visit, prior to the physician encounter when clinic flow allowed. The RT educator reviewed the video and other details after the physician visit. The new tools in this study have been evaluated using health literacy and plain language best practices. **Methods:** This study was not deemed human subject testing by the local IRB. Using a survey, participants were requested to rate the quality of the education tools presented during asthma education. Responses were collected using a Likert Scale to assess the impact on patient experience. In addition, this survey evaluated the patient/family's ability to recall information presented during asthma education. The first question was a health literacy screener. The health literacy question was presented to families/caregivers of asthma patients. **Results:** The new tools were introduced to 100 families and surveys were administered. Ninety surveyed felt extremely or quite a bit comfortable with reading and understanding asthma. Only 3 reported a little comfortable or not at all. The new tools were rated by 87 families as good or loved it. Only 3 reported they did not like it. Compared to past education, 84 rated it better or somewhat better. No ratings for somewhat worse or worse. Eighty five families could verbalize understanding of bronchodilators and controller medications after education. **Conclusion:** As the association between literacy and health outcomes have become more apparent over the last two decades, it is an ethical obligation and best practice to seek ways to provide clear, concise communication with patients and families dealing with complex chronic disease processes. Adopting asthma tools that address diverse health literacy, that are appealing and engage families, and provide clear and concise communication produce improved results in families' feedback and retention of asthma information.

Sponsored Research - None

3011250

Management Of Exercise-Induced Asthma Exacerbations In NCAA Athletic Programs.

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Background: Exercise induced asthma (EIA) is a common health concern among active individuals. The prevalence of bronchoconstriction during physical activity is significantly higher in college athletes. The EPR-3 Asthma guidelines emphasize the importance of asthma education and protocols to help manage and control asthma symptoms. The specific aim of this study was to evaluate the knowledge of National Collegiate Athletic Association (NCAA) athletic trainers and athletes on the methods of diagnosis, education, and management of asthma based on the EPR-3 guidelines. **Methods:** Institutional IRB approval was obtained. A survey was developed using the key components of EPR-3 on the diagnosis, education, and management of severe asthma symptoms. The two surveys (one for athletic trainers and one for college athletes) were almost identical so that the responses could be compared within each college. Fourteen NCAA colleges (Divisions I-III) gave permisson for this online survey. Electronic surverys were sent to the athletic trainers and athletes of all sports programs at each college. The survey results were compared by individual questions using the frequency count method. **Results:** After 2 separate attempts to solicit survey returns (one original and one reminder), a total of 11 surveys (10 athletic trainers and 1 athlete) were received. The key results are shown in the Figure and they include: (1) 70% of athletic trainers reported that the college did not have an asthma management protocol, (2) 35% of the athletic trainers did not have formal education in the management of asthma, (3) As reported by all survey respondents, college athletes were not tested for EIA before joining the team, (4) 25% of athletic trainers could not recognize the signs and symptoms of EIA. **Conclusion:** Screening for EIA before joining the team should be a protocol for the identification and mangement of unexpected asthma sypmtoms among college athletes. Asthma education should be in place for each athletic department for trainers and athletes. The low survey return rate is a limitation of this study.

Sponsored Research - None

See table or figure in supplement to the October 2018 issue of Respiratory Care at www.rcjournal.com.

3012833

Timing Is Everything.

Beatrice Norton, Amanda Roby; Health Professions, Youngstown State University, Girard, OH

Background: Pulmonary rehabilitation is typically done on patients with stable lung diseases like COPD, but research is now supporting that pulmonary rehabilitation is beneficial for patient's days after an acute exacerbation of COPD. T The purpose of this research was to investigate pulmonary rehabilitation patient charts to see if there is a lag time between order dates and the dates that patients start pulmonary rehabilitation. **Methods:** The research design used to complete this project was by collecting historical data by chart review. The information that was collected were ages, sex, insurance company, order date for pulmonary rehabilitation, date starting pulmonary rehabilitation, how many sessions they attended pulmonary rehabilitation, patient's insurance companies and how many visits the insurance would allow for pulmonary rehabilitation, how many days/weeks between order date and start of rehabilitation, and hospital admissions after pulmonary rehabilitation if applicable. Permission was granted by the University Institutional Review Board (IRB), as well as the hospital prior to data collection. **Results:** Fifty patient charts were reviewed, the average timeline between the dates that the pulmonary rehabilitation was ordered till the time that the patient started rehabilitation was 6.6 weeks. This result shows that there are some large waiting period patients are waiting to start treatment. The least amount of time that a patient waited was 2 weeks and the longest amount of time that an individual waited to start rehabilitation from the time it was ordered was 31 weeks. Seven of the 50 patients never started pulmonary rehabilitation. Insured patients on average waited 4 weeks between the order dates till the start of pulmonary rehabilitation, while patients that were uninsured/self-paid waited 4.5 weeks on average. Of the fifty patient's charts that were reviewed, six of them had been readmitted to the hospital for an exacerbation of COPD while waiting to start pulmonary rehabilitation. **Discussion:** The limitations in this study was the inability to know why there is the long period of time between patients receiving the order to be treated at a pulmonary rehabilitation facility and the time they start. Finding the reason or reasons for this prolonged time will only help health care professionals to help patients faster and give them the confidence they need to manage their disease and reduce the amount of readmission to the hospital.

Sponsored Research - None

3025241

Asthma Education Simulations Impact On The Educator's Self-Confidence And Self-Perception Of Efficiency Regarding The Use Of Learning Strategies.

Kimberly Cobb, Pamela Leisenring, Sandy King, Gary Lowe, Kelly Patrick; Respiratory Care Services, Arkansas Children's Hospital, Little Rock, AR

Background: Asthma education is the gateway to improve patient adherence to self-management and improve outcomes. Educators should impart knowledge using evidence-based learning strategies that impact behavior and empower self-management. Learning strategies include teach-back method (TBM), teach-to-goal (TTG), and motivational interviewing (MI). Practicing MI within a controlled environment with observation is crucial to ongoing development. Asthma education simulations that focus on learning strategies have not been routinely used during educator training. **Method:** This study was not deemed human subject testing by the local IRB. A comprehensive education program for respiratory therapists (RT) educators who provide asthma education was implemented. The program consisted of e-learning, interactive classroom time, and simulated education sessions. Twenty- one RTs provided individual asthma education to a simulated family (SF). Participants observed each other's interactions via live feed and were provided feedback from a facilitator, peers, and the SF. RTs were given a questionnaire and asked to rate, pre/post simulation, their self-perception of efficiency related to assessing patient adherence to medications, discussing barriers/intervention strategies to adherence, and the use of elements of MI. RTs were also asked to rate their self-confidence in the use of MI pre/post simulations. **Results:** The mean score for self-perception of efficiency increased from 34.1 (SD = 6.5) to 41.5 (SD = 7.6) post simulation. The mean score for self-perception of confidence increased from 11.6 (SD = 3.0) to 18.5 (SD = 3.8) post simulation. **Conclusion:** Simulated asthma education sessions as part of a comprehensive education program appear to increase RT educator's self-perception of efficiency and self-confidence.

Sponsored Research - None

3024888

End-Of-Life Education Experiences Of Respiratory Therapists: Implications For University Leadership.

Ralph D. Zimmerman; Respiratory Therapy, Georgia State University, Fayetteville, GA

Background: The study addressed the problem of the implications surrounding a lack of end-of-life education in the respiratory therapy curriculum. Respiratory Therapy programs need to integrate therapists' lived experiences with palliative care into their educational programs in an effort to facilitate an improved level of end-of-life care and teach future therapists how to better deal with the stress associated with witnessing death in the clinical setting (Giordano, 2000). **Methods:** Using the qualitative approach of interpretive phenomenological analysis, the research was conducted at a large public university. Subjects who had graduated within the past three to 5 years were recruited by email and recorded interviews were transcribed, analyzed, and coded. Superordinate, sub-superordinate, and emergent themes were defined and used to analyze the transcribed interviews. **Results:** The researcher identified three superordinate themes that addressed the research question: (a) Needs for the Patient (b) Needs for the Family (c) Needs for the Care Provider. Sub-superordinate themes included Suffering, Time, and Honesty (under needs for the patient); Support, Compassion, and Engagement (under needs for the family); Memorable Experiences, Coping, Stress, and Education (under needs for the care provider). **Conclusion:** Results of the study show that a lack of end-of-life education in the respiratory therapy curriculum can impact therapists, patients, and family members. Practicing respiratory therapists desire more education on how to care for dying patients in order for this impact to be lessened. Recommendations for further study include expanding the size of the study to include other regions of the country and surveying programs to ascertain the amount of end-of-life education students are receiving during their education. Disclosures The author received no funding for this study, and has no relevant or material nterests to disclose, financial or otherwise.

Sponsored Research - None

Master Table of Themes

Superordinate Themes	Sub-Superordinate Themes (Interpretation)	Emergent Themes (Codes)	Number of Participants with Sub-Superordinate Themes
Needs for the Patient	Suffering	Comfort Quality of Life Futility	7
	Time	Time to Prepare Time to Say Goodbye Educate Early Timeliness of death	7
	Honesty	What to Expect Discussion Avoidance	6
Needs for the Family	Support	Support for Family Support for Patient	5
	Compassion	Calm Environment Respect for Patient	4
	Engagement	Knowledge of Patient's Wishes Allowed to Participate	6
Needs for the Care Provider	Memorable Experiences	Positive Negative Difficult Appreciation	8
	Coping	Friends Retreats Self-Elec Chaplain	7
	Stress	Burnout Emotional Impact	5
	Education	Definition of End-of-Life Care Prior End-of-Life Education Need for More	8

3025851

The Spotlight is on YOU: Gauging the Sustainability of a Continuing Professional Development Pilot Program.

Lama Atari[1], Sarah Parker[1], Renee Uchtorff[1], Catherine Galura[1], Lindsey Borock[1], Rebecca Vartanian[2], Teresa Keppler[1]; [1]Respiratory, university of michigan, Toledo, OH; [2]Neonatology, C.S. Mott Children's Hospital, Ann Arbor, MI

Background: Respiratory therapists across the country are expected to maintain their continuing education units (CEU) to retain credentialing through the National Board Respiratory Care. Additionally, most hospital departments also require yearly CEUs as a job expectation. Provision of educational opportunities can be difficult due to assignments, varying shift times, and patient acuity. To address these challenges, we aimed to design a program that would run on staff's scheduled shifts and be a sustainable and effective active learning tool. In addition, we aimed to demonstrate competency in the use of patient equipment and procedures. **Methods:** We designed a pilot program called "Spotlight" in an effort to educate and document competency. Spotlight was mandatory for therapists employed less than two years at our institution and was optional for all therapists. The average time employed for Phase I was 1.5 years while Phase II was 1.35 years. Each phase was slotted to run for two weeks every two months. During each phase, a group of two to four staff members was released from patient care to attend an educational talk and hands-on session. Each session was designed to take one hour. Initial data has been collected over a nine-month span with ongoing phases occurring. **Results:** Phase I ran from August 14th- August 30th and spanned 480 minutes, averaging 20 minutes of education time per therapist. A group of two averaged 40 minutes, a group of three 60 minutes, and a group of four 80 minutes. Phase II ran from December 30th- January 17th and spanned 340 minutes, averaging 15 minutes of education time per therapist. Groups of two averaged 30 minutes, a group of three 45 minutes, while a group of four 60 minutes. Phase I required more total time due to hospital acuity resulting in additional sessions. After each session, individual check-offs were conducted to gauge the effectiveness of the sessions; 100% competency in the designated procedures and equipment was achieved in the targeted staff. **Conclusion:** It was increasingly difficult to conduct Spotlight sessions during the high acuity viral season. Short-staffed days and attempting to release therapists from assignments became taxing. The next phase is scheduled for the end of May 2018; four months after the last phase, lying outside our goal. The strength of the CE tool lies in the ability to have assessments completed in a timely manner so therapists remain competent in their skills, equipment, and procedures.

Sponsored Research - None

Figure 1: Breakdown of total time per phase and average time per therapist spent during the two phases of Spotlight

3019624

Developing Smartphone Applications To Improve Communication Between Respiratory Therapists And Spanish Speaking Patients.

Isaac Zamora; Respiratory Care, UC San Diego, Fallbrook, CA

Background: UC San Diego serves a community which is 35% Latino/Hispanic, many of which do not speak English. It is critical that our staff be able to effectively communicate with these patients. Finding no respiratory care specific translation tool, we decided to create a point of care translation tool to help respiratory therapists better communicate with their Spanish speaking patients and their families. Since the majority of the clinicians in our facility own a smartphone, we opted to create a mobile application that could function throughout the hospital without a WiFi signal. **Methods:** Development of "RT Assist" was guided by our bilingual staff respiratory therapists, ICU nurses, a critical care pulmonologist and community members. Our focus was specific to translating the terms that respiratory therapists use in the clinical setting. Common questions, instructions and phrases used were identified by respiratory therapist and each of those phrases translated. We enlisted the use of an expert in smartphone applications to develop the tool with the characteristics and specifications defined by our team. We organized our app into independent sections, based on the type of encounter that was expected. For example, we have a dedicated section to communicate with intubated patients, especially guiding spontaneous breathing trials. Other sections guide patients through medication administration, arterial blood gases, chest physiotherapy or incentive spirometry. Lastly, we have included phrases that allow clinicians to assess pain, neurological status and the comfort level of their Spanish speaking patients. **Results:** This application was published and made available free of charge to staff, as well as the online community in late 2013. Staff are currently using the application in the clinical setting. When the user clicks on a phrase or command written in English, the app will then replay that exact phrase in Spanish through the external speaker that is standard on modern smartphones. We have strong feedback and praise from multiple reviewers. The initial response has been significant, with downloads approaching 1000. **Conclusion:** Mobile applications are rapidly evolving and helping to shape the future of healthcare. By embracing technology, and using it to our advantage, we can help improve patient outcomes. Keeping this in mind, we have released Andriod and iPhone platforms. Disclosures The author has no relationships or conflicts of interest to disclose.

Sponsored Research - None

3012126

2018 Breathe-zy Community Education Program Outcomes.

Kimberly J. Bennion, Amanda Bodily; Corporate Respiratory Care, Intermountain Healthcare, Salt Lake City, UT

Background: An AARC/USRC member created/implemented a community education program since 1995. The key objective was lung health awareness among school-aged students. The program occurs in 1-3 hour blocks with an overview of lung anatomy/physiology, basic gas exchange, asthma pathophysiology, interactive exercises & bovine/porcine lung dissection. The program was awarded $5000 initially by Intermountain Healthcare for the Utah Society (RTs) to become community partners. Materials/supplies were purchased for ≈ $1500 including: inflatable, porcine lungs (normal/diseased), scalpels, gloves, sanitizing wipes, posters/ teaching aids, storage bins, colored t-shirts, rope & batting, and purchasing porcine lungs from local butchers. Volunteers attend Super User Training sessions led by RT student representatives from BSRT offering universities working closely with the program's creator. Seven courses were completed between January-April 2018. One course was excluded for wrong testing. A total of 106 elementary, 7 middle and 165 high school students participated. **Methods:** Pre-/post-program, grade tailored exams were given. **Results:** Not all students attended all courses. Some may/may not have completed both exams, thus the break out of those taking pre-/post exams are reported. Full results are reported in Table One. **Conclusion:** Through the *Breathe-zy* program, we have appreciated: 1) increased youth/adult awareness of the impact of tobacco on lung & overall health, 2) awareness of RT as a profession, 3) appreciation for RTs as community partners, & 4) improved RT student engagemrent in professional initiatives. RT students are mentored as leaders since they were responsible to schedule courses, coordinate volunteers, assist with data input, analysis and outcomes reporting. It is our impression that improving professional impact occurs when we create strong community partnerships. It is our impressino this will be required if we are to reach the AARC's 2015 & Beyond initiatives. When Utah legislators failed to pass e-cigarette legislation in 2014, youth education about the harm of all lung inhalants became vital. Since 2014, we report that active lobbying has resulted in Utah's e-tobacco legislation resoution passing, being signed into law and enforcement in 2018 being scheduled. When RTs unite with clearly defined objectives to offer high quality care and services, we can make impactful changes.

Sponsored Research - None

Table One: 2018 Breathe-zy Program Pre- & Post-Assessment Exam Outcomes

School Type	Students Participating Pre/Post #	Total Exam Questions #	Total Students x Number Possible Correct Answers Pre/Post #	Pre-program Exam Question Accuracy # (%)	Post-Program Exam Question Accuracy # (%)	Pre- vs Post-Exam Accuracy Improvement %
Elementary School	106/90	11	1166/990	693 (59)	817 (83)	24
Middle School	7/5	14	98/70	61 (62)	52 (74)	12
High School	165/156	17	2805/2652	1100 (39)	1885 (71)	32

*28 pre- and 20 post-exams by middle school students excluded from data as they were given the high school exam.

* Special thanks to Intermountain Healthcare, Inc, SelectHealth, and the Super Users comprised of Utah Respiratory Therapy professionals and Weber State University student volunteers for support of these courses.

3003357

Advanced Degrees And Professional Development: Assessing The Attitudes And Beliefs Of Respiratory Care Practitioners At Three Academic Medical Centers.

Sally Whitten[1], Sally Brewer[1,4], John Dziodzio[1], Deborah Igo[1], Kyle Reed[1], Steven McGrath[1], Bradley Holcomb[2], Christopher Chambers[2], Elizabeth Denton[2], Emily Parent[2], Ryan Kessler[2], Matthew McNally[3], Patrick von Kannewurff[3]; [1]Maine Medical Center, Portland, ME; [2]University of Vermont Medical Center, Burlington, VT; [3]Dartmouth Hitchcock Medical Center, Lebanon, NH; [4]Southern Maine Community College, South Portland, ME

Background: Addressing increasing demands for improved quality and safety with evidence-based care, the American Association of Respiratory Care (AARC) convened a task force to determine future educational needs for the respiratory care (RC) profession, recommending 80% of the RC workforce be baccalaureate-prepared by 2020. There is little literature available on respiratory care practitioners' (RCP) feelings, attitudes, and perceptions regarding these recommendations. **Method** A survey was prepared with questions assessing RCPs' current educational levels, opinions regarding advanced education, their understanding of the AARC's recommendation and the impact on our profession's growth. Following multi-center IRB approval, the survey was distributed to 242 RCPs via their association with three regional academic medical centers- Maine Medical Center, Dartmouth-Hitchcock Medical Center, and University of Vermont Medical Center. Our minimum return rate goal was 50% ($n \approx 121$). **Results:** Of the 242 sent, 150 respondents (62.0%) returned surveys, with each institution similarly apportioned: MMC 56/96 (58%), DHMC 37/62 (60%), and UVM 57/84 (68%). In aggregate, respondents reported that 89% currently held an AS while 11% held Bachelor's degree in RT. 75% were current members of the AARC, but only 37% were aware of the AARC's recommendation. Respondents agreed (58%) an AS degree is adequate for an entry level RCP, with 29% agreement that requiring an advanced degree would elevate the profession. Interest in obtaining a BSRT suffered a net negative agreement of 8% generally. Those in the 21-30 age group discounted a need for education in critical thinking skills (38.5%) while those over age 50 believe (85%) that these skills were important. Primary barriers to obtaining an advanced degree were no compensation or recognition (42%), and the cost of education (32%). **Conclusion:** Although most respondents were AARC members, under half (37%) were aware of their recommendation that 80% of the RCP be BSRC-prepared. Furthermore, 58% of respondents felt an AS is adequate for entry into the profession. As leaders and educators within academic medical centers, we have an obligation to prepare our RCPs for the future of this profession. The AARC's recommendations are laudable, but our results suggest without a greater understanding and communication on the value and benefit of obtaining an advanced degree, progress on this goal may be slower than anticipated. **Disclosures** None to report.

Sponsored Research - None

See table or figure in supplement to the October 2018 issue of Respiratory Care at www.rcjournal.com.

3005242

Measured Improvement In The Competency And Comfort Level Of Respiratory Therapists Obtained Through The Implementation Of A Program Of Independent Ventilator Study, Review And Practice.

Shawna Murray[1,2]; [1]Respiratory, Intermountain Healthcare, Taylorsville, UT; [2]Learning and Development, Intermountain Healthcare, Salt Lake City, UT

Background: Respiratory Therapists in a small community Hospital need to maintain mechanical ventilation skills including accurate initial set up even though they may not regularly use mechanical ventilation. A unit of instruction including independent study modules, review of basic mechanical ventilator set up according to facility approved protocols and practice scenarios with rationale was developed to assess whether comfort and competency of the RT staff could be improved with participation. Method: Pre and post participation comfort (using a likert scale) and competency (using a timed assessment of initial ventilator settings according to approved facility protocols) by respiratory therapists in a small community hospital was measured. A unit of instruction including seven independent study modules, scenarios for practice with associated correct answers and rationale was developed. Participants completed the independent study modules and practiced equipment set up according to facility specific protocol parameters. A co-worker measured the time to complete set up and assessed the accuracy of settings for each module according to given parameters and answers/rationale. Comfort and competency of initial ventilator set up was measured following completion of the instruction and practice. **Results:** Prior to the study, 75% of the study participants felt that a unit of instruction on their facility ventilator and protocol parameters would be helpful with only 50% agreeing to a statement that they felt comfortable using the facility ventilator on their own. Prior to the unit of instruction, when given a written scenario and asked to set up the ventilator 43% of participants set up the ventilator correctly according to the facility protocols in under 5 minutes. Following the unit of study, 86% of participants set up the ventilator correctly and 100% were able to set it up in under 5 minutes. Following the unit of study 100% of the participants agreed (or strongly agreed) with a statement that they felt more confident using the facility ventilator protocols and 100% agreed with a statement that a review is important to maintain skills. **Conclusion:** Regular instruction, practice with feedback/rationale and monitoring can improve RT comfort and competence in relation to mechanical ventilator performance.

Sponsored Research - None

See table or figure in supplement to the October 2018 issue of Respiratory Care at www.rcjournal.com.

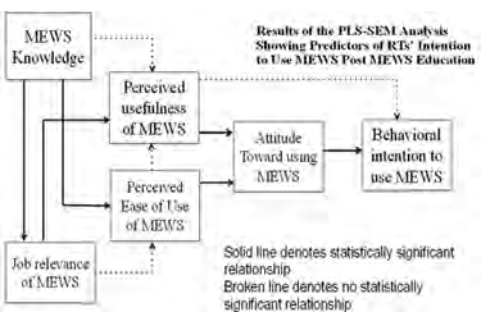
2976142

Respiratory Therapists' Awareness And Intended Use Of The Electronic Modified Early Warning Score.

Afnan AlRaimi[1,2], Constance C. Mussa[1]; [1]Rush University, Chicago, IL; [2]Imam Abdulrahman bin Faisal University, Dammam, Saudi Arabia

Background: The modified early warning score (MEWS) detects early clinical deterioration in patients to prevent catastrophic events. Respiratory therapists usually do not use the MEWS even though it is implemented as a default in the electronic health record (EHR) system. To optimize patient care, clinicians could use special guidelines and protocols that incorporate the MEWS. Our objective was to identify the major determinants of respiratory therapists' intention to use the modified early warning score (MEWS). **Methods:** A web-based self-administered survey based on the constructs of the Technology Acceptance Model (TAM) as well as awareness, attitude, and job-relevance was developed and validated using traditional scale development process. The survey was then distributed to 75 respiratory therapists (RTs) from the respiratory care department of Rush University Medical Center who were recruited using consecutive sampling. The RTs were then given a training session on the MEWS after which they were again asked to complete the survey. The study was approved by our institutional review board. **Results:** The response rate to both the pre and post survey was 60 percent. Of the 46 participants recruited to the study, the educational intervention elicited an increase in the MEWS knowledge score in 45 participants compared to the knowledge score prior to the educational intervention. Additionally, there was an increase in the behavioral intention score post intervention in 30 participants compared to the behavioral intention score prior to the educational intervention. There was also a statistically significant median increase in MEWS knowledge score (2.0) post educational intervention (4.0) compared to pre educational intervention (2.0), $p < .0001$. Regarding median behavioral intention scores, there was a statistically significant increase (1.0) post educational intervention (4.0) compared to pre educational intervention (3.0), $p < .0001$. Partial least squares structural equation modeling (PLS-SEM) revealed that MEWS knowledge influences attitude, which influences behavioral intention. **Conclusion:** Numerous studies have demonstrated that change in behavioral intention is a good predictor of change in behavior. Consequently, the increase in the respiratory therapists' behavioral intention score post MEWS education suggests that they may be more inclined to incorporate the MEWS score in their assessment of patients if they are educated about its clinical relevance.

Sponsored Research - None



3021723

A Systematic Approach To Increasing Respiratory Protocol Utilization In A Quaternary Care Facility.

Robert A. Ritchey, Keith J. Brown, Shannon McNiel, Mark Whitford, Ariel Modrykamien; Cardiopulmonary, Baylor University Medical Center, Dallas, TX

Background: A quality improvement project to increase the percentage of respiratoy therapy protocol (RTP) orders on non-ICU patients receiving scheduled therapy should increase the percentage of patients receiving protocol orders. For the purposes of this project, we established a goal to have 85% of all patients with scheduled respiratory therapy orders to also have a RTP order. Our current RTP order set encompasses Oxygen Therapy, Bronchodilator, Bronchopulmonary Hygiene, and Hyperinflation protocols. **Method**s: We analyzed our data to determine our pre-intervention protocol percentage usage on non-Intensive Care patients. Using an Issue Prioritization Matrix, input was collected from Respiratory (RT) staff and physicians to ascertain the root causes of low percentage use findings. After prioritization, a series of PDCA cycles were implemented in succession to address our findings. Cycle 1: Increase RT staff awareness of the protocols, correct use of the algorithms, and encourage suggestion of the RTP order set to physicians at bedside. A series of educational in-services were provided to the staff by the department's educator to cover these topics (7/10/17). Cycle 2: Provide weekly feedback to MDs when RTP not ordered yet condition appropriate. Provide feedback to staff regarding RTP use and turnaround times (defined as order to first assessment) in daily huddles (10/22/17). Cycle 3: Additional staff education on RTP usage, including providing additional methods of viewing RTP algorithms (11/5/17). One on one coaching for RT staff identified through quality audits to need additional training on correct RTP usage. Continued weekly feedback to providers regarding protocol usage percentage (11/20/17). Cycle 4: Daily phone calls to providers to notify them of patients without protocol orders that meet criteria (1/30/18). Eliminated PRN (as needed) treatments from denominator as deemed inappropriate for RTP use (2/8/18). Cycles Noted on Table. **Results:** Our pre-intervention (July 2016-June 2017) data indicated a 5% RTP order compliance. Throughout our PDCA cycles from July 2017 to April 2018, compliance steadily increased from 5% to 91%. Our goal of 85% compliance was first attained on February 18th, 2018 and has only dipped below goal on 2 occasions (79% & 82%). **Conclusion:** By implementing a systematic approach to educate and engage providers and staff on the available RT protocol order set, vast improvements in protocol utilization were achieved.

Sponsored Research - None

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- All presenters must register as Congress attendees (daily registration and student rates are available). All fees and expenses associated with the preparation, submission, and presentation of abstracts including, but not limited to, travel, housing accommodations, and meeting registration, are the responsibility of the author/presenter.
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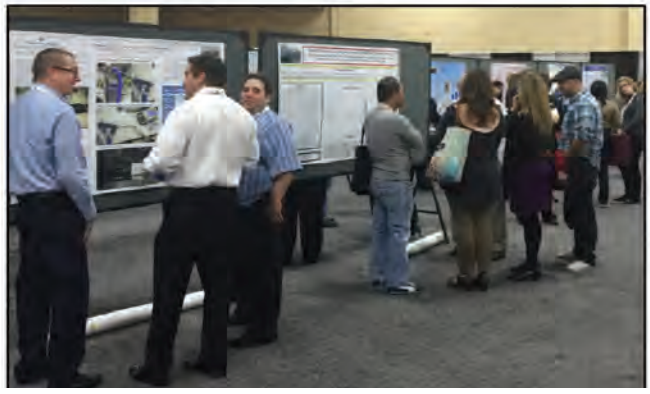

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