Compliance of Physicians With Documentation of an Asthma Management Protocol

Sawsan Baddar RN CRT, Elizabeth A Worthing MRPharmS MSc ClinPharm, Omar A Al-Rawas PhD FRCP, Youssef Osman MBChB MSc, and Bazdawi M Al-Riyami PhD FRCP

BACKGROUND: Studies continue to show poor physician compliance with asthma management guidelines in clinical practice. However, standardized protocols specifically designed to be practical and user-friendly improve patient outcomes. OBJECTIVE: To determine the degree of physicians’ compliance with the documentation of an asthma management protocol in a university hospital. METHODS: A simple asthma management protocol was designed and applied in our pulmonary clinic and primary care clinic for asthma. The protocol was based on the 1998 Manual for the Management of Asthma, from the Oman Ministry of Health, which follows internationally recognized guidelines. The protocol consisted of 4 sections: clinical history, peak expiratory flow (PEF) data, medication section, and simplified asthma management guidelines. RESULTS: All 30 physicians scheduled to conduct asthma clinics in the pulmonary clinic (14 physicians) and the primary care clinic (16 physicians) agreed to use the protocol. A total of 282 protocol forms were collected: 130 forms from 6 senior physicians and 152 from 24 junior physicians. Documentation of the entire clinical history was 65%, with the senior physicians scoring significantly higher documentation-completion rates (82%) for all components of the history than the junior physicians (50%). Documentation of all PEF data was poor (26%), despite high documentation of the PEF value itself (95%). There were significant differences in documentation of percent-of-predicted PEF between junior physicians in primary care clinic (70%) and other physicians (19%). Documentation of the entire medication section was only 34%. Although documentation of prescribed medicines was high (92%), compliance (48%) and inhaler technique (49%) documentation was low, with similar patterns demonstrated by all physicians. Documentation of the entire protocol by all physicians was low (9%), with junior physicians in the primary care clinic completing 28% of their forms. CONCLUSIONS: Our protocol enabled us to identify opportunities for improvement in documentation of asthma management in both the pulmonary and primary care clinics. The findings highlight the need for regular asthma education programs for all physicians, with a focus on documentation of performance skills such as monitoring of PEF and inhaler technique. Key words: asthma, management, guidelines, protocol, peak expiratory flow, compliance, inhaler technique. [Respir Care 2006; 51(12):1432–1440. © 2006 Daedalus Enterprises]
COMPLIANCE OF PHYSICIANS WITH DOCUMENTATION OF AN ASTHMA MANAGEMENT PROTOCOL

Introduction

With the increasing prevalence of asthma worldwide and evidence of wide variability in standards of asthma management, concerned bodies have issued consensus guidelines at national and international levels.1,2 Studies continue to indicate poor compliance with these guidelines, by both health-care providers and patients.3–5 As a result, numerous studies have focused on issues surrounding the gap between evidence-based guidelines and clinical practice.6–10 Difficulty of access to guidelines,6 lengthy format,6,10 alternative information sources,7 insufficient training of physicians,8 lack of educational materials,9 and time limitations9,10 have all been identified as contributing to poor compliance by health-care providers with published practice guidelines. On the other hand, significant improvements in management have resulted from the use of standardized protocols, specifically designed to be practical and user-friendly.11–15

Phase 1 of the International Study of Asthma and Allergies in Children16 revealed that asthma is common and associated with severe symptoms in Oman.17,18 In addition, the only published study on asthma management in Oman showed that the majority of physicians providing asthma management failed to demonstrate appropriate metered-dose inhaler (MDI) technique.19 This highlights the need for prompt recognition of asthma and optimal treatment by health-care providers and patients.18

National guidelines for the management of asthma were developed and launched in all regions of Oman in 1998.20 However, there has been no information on the compliance of health-care providers with these guidelines. We therefore designed a short, simple asthma management protocol and introduced it in the pulmonary clinic and the primary care clinic at Sultan Qaboos University Hospital, with the aim of determining the degree of physician compliance with the documentation of asthma management, thus identifying opportunities for improvement.

Methods

A prospective study was conducted from May to November 2002, with asthmatic patients ≥ 13 years old, who presented to the pulmonary clinic or the primary care clinic at Sultan Qaboos University Hospital. The pulmonary clinic is served by pulmonologists, senior residents, rotating junior residents, and a senior respiratory therapist (RT). The primary care asthma clinic is led by one senior family and community health physician assisted by rotating junior residents and the senior RT. The asthma management protocol was designed by the senior RT and reviewed by 2 pulmonologists and a clinical pharmacist, and was consistent with Oman’s national Manual for the Management of Asthma in Adults,20 which follows internationally accepted principles of asthma management. The protocol (Appendix 1) consisted of 4 sections:

1. Clinical history data, comprising family history, duration of symptoms, history of the past 3 months of asthma medication, nebulization and admission history, symptoms, and trigger factors
2. Peak expiratory flow (PEF) data, including the predicted and actual values, the percent-of-predicted value, and the PEF predictions reference chart21,22
3. Treatment, including prescribed medications, patient compliance, and inhaler technique

The medication section included a reference list of all asthma inhaler devices available in the hospital pharmacy. Patient compliance was measured by the patient’s recall of the prior 3 months of medication use, compared with the medication supply record. Good inhaler technique was defined as accurate completion of all essential steps, and poor inhaler technique as inaccurate completion of one or more essential steps.

Prior to physicians’ scheduled duties, the senior RT introduced the protocol individually to every physician in the pulmonary and primary care clinic, with a request to follow the protocol with all their asthma patients over the age of 13 years. If this was accepted, a number was assigned to the physician; the form was filled in with the patient’s name, medical record number, sex, age, height, and physician’s assigned number; and the form was placed in the patient’s file before attendance by the physician.

Physicians were not aware of the use of the protocol in the study. Both clinics were provided with a peak flow meter (Mini-Wright, Clement Clarke International, Harlow, Essex, United Kingdom), disposable mouthpieces (SafeT-way, Vitalograph, Buckingham, United Kingdom) and a colored wall poster (designed by the senior RT) of all the inhaler devices.

After each clinic the forms were collected from the patients’ files by the RT. Complete documentation was measured as a check mark in the components of the clinical history section, as specific PEF values in each component of the PEF section, as drug dose and frequency in the medication section, and as the letters “G” (for “good”), “P” (for “poor”), or “N” (for “new patient”) in the inhaler technique and compliance sections.

Statistical analysis was performed with statistics software (SPSS 10, SPSS, Chicago, Illinois). Comparisons between groups were performed with Fisher’s exact test. Differences were considered statistically significant when p < 0.05.

Outcome measures are expressed as percentage compliance for the following variables: definition of the areas of the protocol documented by all physicians; definition of critical areas of the protocol documented by all physicians; definition of senior and junior physicians’ documentation;
and definition of junior physicians’ documentation in the pulmonary and primary care clinic.

Results

All physicians scheduled to conduct asthma clinics in the pulmonary or primary care clinic agreed to use the protocol for all their asthma patients ≥ 13 years old. There were a total of 282 patient encounters (224 in the pulmonary clinic and 58 in the primary care clinic) by the 30 physicians (14 physicians in the pulmonary clinic and 16 in the primary care clinic, Table 1). Three new patients were seen in the pulmonary clinic and 9 new patients in the primary care clinic. On average, each physician had 9 patient encounters, but senior physicians had a much higher number per physician, compared to the rotating residents. The average number of patient encounters per resident in the primary care clinic was particularly low (less than 3).

Table 2 shows the extent of documentation of the clinical history components. There was 65% documentation for the entire section, with senior physicians scoring significantly higher documentation rates for all components than junior physicians (82% vs 50%, p < 0.001). The low documentation rate by junior physicians was primarily associated with the family history and duration-of-symptoms items. However, documentation of symptoms and trigger factors was 100% among all physicians.

Table 3 shows the documentation of PEF data. Although documentation of the PEF value itself was high among all physicians (95%), this was in contrast to documentation of the percent-of-predicted value (27%), which required a simple calculation based on the actual and predicted values. In addition, there were significant differences in completion of percent-of-predicted values between junior physicians working in the primary care clinic and both junior physicians working in the pulmonary clinic and all senior physicians (70% vs 19%, p < 0.001). The overall low documentation rate of the entire PEF section (26%) was thus driven by the low documentation of the percent-of-predicted value.

Table 4 shows the documentation of prescribed medications, compliance, and inhaler technique. All physicians, irrespective of level of experience or location of practice, had similar documentation rates for the components of this section. Although the documentation of prescribed medications was high (92%), the documen-
Compliance of Physicians With Documentation of an Asthma Management Protocol

Table 3. Peak Expiratory Flow Section Documentation on the Asthma Management Protocol Forms

<table>
<thead>
<tr>
<th></th>
<th>All Physicians (n = 282)</th>
<th>Senior Physicians (n = 130)</th>
<th>Junior Physicians (n = 152)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual PEF value</td>
<td>269 (95)</td>
<td>125 (96)</td>
<td>144 (95)</td>
<td>0.777</td>
</tr>
<tr>
<td>Predicted PEF value</td>
<td>203 (72)</td>
<td>84 (65)</td>
<td>119 (78)</td>
<td>0.012</td>
</tr>
<tr>
<td>Actual and predicted PEF values</td>
<td>202 (72)</td>
<td>83 (64)</td>
<td>119 (78)</td>
<td>0.008</td>
</tr>
<tr>
<td>Percent-of-predicted value</td>
<td>75 (27)</td>
<td>26 (20)</td>
<td>49 (32)</td>
<td>0.022</td>
</tr>
<tr>
<td>Entire section filled</td>
<td>72 (26)</td>
<td>23 (18)</td>
<td>49 (32)</td>
<td>0.006</td>
</tr>
</tbody>
</table>

*p = number of forms
PEF = peak expiratory flow

Table 4. Medication Section Documentation on the Asthma Management Protocol Forms

<table>
<thead>
<tr>
<th></th>
<th>All Physicians (n = 282)</th>
<th>Senior Physicians (n = 130)</th>
<th>Junior Physicians (n = 152)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prescribed medications</td>
<td>260 (92)</td>
<td>123 (95)</td>
<td>137 (90)</td>
<td>0.186</td>
</tr>
<tr>
<td>Inhaler technique</td>
<td>138 (49)</td>
<td>65 (50)</td>
<td>73 (48)</td>
<td>0.811</td>
</tr>
<tr>
<td>Compliance</td>
<td>135 (48)</td>
<td>74 (57)</td>
<td>61 (40)</td>
<td>0.006</td>
</tr>
<tr>
<td>Compliance and inhaler technique</td>
<td>103 (37)</td>
<td>50 (39)</td>
<td>53 (35)</td>
<td>0.538</td>
</tr>
<tr>
<td>Entire section filled</td>
<td>96 (34)</td>
<td>49 (38)</td>
<td>47 (31)</td>
<td>0.083</td>
</tr>
</tbody>
</table>

*p = number of forms

Table 5. Critical Areas Section Documentation on the Asthma Management Protocol Forms

<table>
<thead>
<tr>
<th></th>
<th>All Physicians (n = 282)</th>
<th>Senior Physicians (n = 130)</th>
<th>Junior Physicians (n = 152)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symptoms and trigger factors</td>
<td>282 (100)</td>
<td>130 (100)</td>
<td>152 (100)</td>
<td>1</td>
</tr>
<tr>
<td>Actual and predicted values</td>
<td>202 (72)</td>
<td>83 (64)</td>
<td>119 (78)</td>
<td>0.008</td>
</tr>
<tr>
<td>Medication Section</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prescribed medication</td>
<td>260 (92)</td>
<td>123 (95)</td>
<td>137 (90)</td>
<td>0.186</td>
</tr>
<tr>
<td>Compliance and inhaler technique</td>
<td>103 (37)</td>
<td>50 (39)</td>
<td>53 (35)</td>
<td>0.538</td>
</tr>
<tr>
<td>All of the above</td>
<td>70 (25)</td>
<td>30 (23)</td>
<td>40 (26)</td>
<td>0.581</td>
</tr>
</tbody>
</table>

*p = number of forms

The documentation of compliance and inhaler technique was low (37%), resulting in a low rate for the entire section (34%). Table 5 shows the documentation in 3 critical areas of the protocol (symptoms and trigger factors; actual and predicted PEF; and prescribed medication and compliance and inhaler technique), which was low for all physicians (25%). Complete documentation of the entire protocol by all physicians was also low (9%), although junior physicians in the primary care clinic completed 28% of their protocol forms (Table 6).

Discussion

Although there is international consensus on the key elements of asthma management,1-2 asthma guidelines themselves are bulky documents unsuitable for day-to-day use in the practice setting. To address this limitation, a variety of preprinted forms, flow sheets, guideline reminders, and pro forms have been designed to provide physicians with a concise format for practical guidance and documentation of patient management and to audit clinical practice.11-15 Our simple protocol included 2 practice points...
that were lacking in many formats. Guidance on calculating the predicted PEF value was given by the 2 nomograms in the protocol, which assist in the determination of asthma severity. The protocol also provides a formulary list that links available drugs and specific inhaler devices. The protocol must provide timely and up-to-date information for rotating physicians unfamiliar with brands in the local institution.

Our objective was to measure physicians’ documentation of asthma management steps, and our findings were consistent with previous reports that found incomplete physician documentation compliance, particularly in the sections relating to PEF and inhaler technique. In our study, the high documentation rate of the PEF values (95%) may have been facilitated by providing peak flow meters and disposable mouthpieces to the clinics, and this indicates that nearly all physicians measured the PEF for each patient. These results compare favorably with the 94% rate in an accident and emergency department and the 71% rate reported in a pediatric study in a general district hospital. However, even when both actual and predicted values were documented, few physicians (27%) documented percent-of-predicted values, which compares with a 62% documentation rate in an accident and emergency department. Our low documentation rate in the pulmonary clinic and by senior physicians (19%), may be due to reliance on clinical experience and comparisons of serial PEF values, as most of the patients were on follow-up and had previously recorded values. Time limitation and absence of a convenient calculator are other possible factors. Conversely, the high documentation rate (70%) among junior residents in the primary care clinic who had had less experience with asthmatic patients may have been because they used the PEF protocol as a “road map.”

PEF measurement is recommended as an integral part of asthma management by all the management guidelines and is used in the definition of asthma severity that guides treatment. However, the opinion of physicians on the role of PEF commonly differs from standards proposed in recognized guidelines, and the use of a peak flow meter is not perceived as a routine test in clinic practice. This ambivalence is also reflected in protocol designs that require documentation of selected PEF values rather than all PEF values. One study protocol that required data entry of actual PEF values alone reported that the majority of primary care clinicians incorrectly classified asthma severity based on symptoms and PEF variability. It may be that omission in the protocol of any of the PEF data points contributes to the inappropriate classification of severity. Computer-based clinical decision-support systems that incorporate forcing functions may improve clinician performance.

Documentation of prescribed medication by all physicians was high (92%), which may have been facilitated by the colored wall chart of inhaler devices and the comprehensive formulary in the protocol. In other studies there have been incomplete data or no data on prescribed medications. However, in our study the overall documentation rate of inhaler technique assessment was only 48%, and this compares with 44% in an accident and emergency department. Reasons for our incomplete documentation may include unavailability of placebo inhaler, patient’s device left at home, format of this section of the protocol, perception that follow-up patients have adequate inhaler ability, or reliance on the RT or clinical pharmacist. In a general district hospital, inhaler technique documentation was frequently missing, as this was perceived to be an area of nursing care, whereas in a primary care setting, inhaler technique documentation improved 10-fold on introduction of a physician-owned flow sheet. Since the ability to correctly use an MDI can be lost, we concur with respiratory teams that promote frequent checking of inhaler technique by the physician as a mandatory investment of physician time. Checking takes just 1 minute and can guide subsequent management steps toward retraining, change of device, or step up or down of asthma therapy. In a recent study we identified that only 20% of physicians demonstrated appropriate MDI technique, with general practitioners and accident and emergency physicians scoring significantly lower than internists and pediatricians. Studies have repeatedly shown that the majority of physicians who provide asthma management and counseling do not demonstrate correct inhaler technique. Although all our medical students participate in a group demonstration of inhaler technique and receive a flow-chart that lists the correct steps for all inhaler devices, that awareness does not survive the pas-

**Table 6. Overall Completion of Documentation on the Asthma Management Protocol Forms**

<table>
<thead>
<tr>
<th>Section</th>
<th>All Physicians (n = 282)</th>
<th>Senior Physicians (n = 130)</th>
<th>Junior Physicians (n = 152)</th>
<th>Junior Pulmonary Physicians (n = 112)</th>
<th>Junior Primary Care Physicians (n = 40)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All sections</td>
<td>26 (9)</td>
<td>11 (9)</td>
<td>15 (10)</td>
<td>p = 0.837</td>
<td>4 (4)</td>
</tr>
</tbody>
</table>

*p = number of forms
sage of time into the practice setting. We therefore plan to incorporate the inhaler flow-chart into the protocol.

The clinical history section was generally well documented. There was 100% documentation of symptoms and trigger factors by all physicians, and this compares with 94% symptoms documentation in an accident and emergency department and 99% symptom severity documentation by pediatricians in a general district hospital. In our protocol, data entry for family history and duration of asthma (76% and 74%, respectively) may have been overlooked, and central repositioning of the data format may correct this omission. Medication history was well documented (96%), and this compares with 95% in an accident and emergency department and 100% in a district general hospital. Although two thirds of the clinical history sections were completely documented, critical areas were documented in only one quarter of the forms, and the entire protocol in only 9% of the forms. It is not clear whether clinical confidence, perception of value, lack of time or resources, protocol format, documentation fatigue, calculated noncompliance, or a combination of these factors were reasons for this incomplete documentation adherence.

Benefits of the protocol include speed of data entry, legibility, and ease of data retrieval. More than half of the protocol’s size is taken by guideline reminders, and on first sight this may convey the impression of a lengthy document. However, the protocol was well accepted by junior residents in the primary care clinic, and these physicians continued to request the form after the conclusion of the study. A positive response to the introduction of a protocol has been noted in other studies, and we conclude that the form fulfilled a useful function in providing a “road map” of management steps. Popularity spread to the medical students, and the protocol was well accepted by junior physicians in the primary care clinic, we plan to introduce and explain the revised protocol to physicians in local primary care clinics, with audits of patients’ outcomes before and after implementation of the protocol. We have also added a chart of inhaler steps for each device, with guidance for the physician on essential steps that must be performed accurately (Appendix 2). Inhaler technique and patient adherence now appear before the medication section, together with diagnosis of asthma severity. Although counseling on inhaler use and environmental control management can require considerable time, these have been added to a new section for the patient’s management plan. We are considering a change from the A4 format into a “tourist map” format, with all sections displayed at a glance. As the protocol was well received by junior physicians in the primary care clinic, we plan to introduce and explain the revised protocol to physicians in local primary care clinics, with audits of patients’ outcomes before and after implementation of the protocol. Finally, since our patients move freely between different primary care clinics, we are considering patient ownership of the protocol, to be brought by the patients to whichever clinic they visit.

Conclusion

Our asthma management protocol enabled us to identify opportunities for improvement in documenting asthma management in both pulmonary and primary care clinics. Although the documentation of clinical history was incomplete, parts of the protocol that required additional performance skills, such as monitoring of peak flow and inhaler technique, showed a great need for improvement. The findings highlight the need for regular asthma education programs for physicians.
ACKNOWLEDGMENTS

We thank Doctor Atsu Dorvlo, Department of Mathematics and Statistics, College of Science, Sultan Qaboos University, for reviewing the statistical data.

REFERENCES

Appendix 1

Asthma Management Protocol

1. Clinical History Section:

Name: 
Family History Yes / No
M.R.N.: Duration of Symptoms: 

Please tick ( ) or ( ) when appropriate.

A. What asthma medication is the patient currently taking?
1. Short-acting betaagonist ( )
2. Long-acting betaagonist ( )
3. Inhaled corticosteroid ( )
4. Oral corticosteroid ( )
5. Theophylline ( )
6. Other ( )

B. Has the patient ever used a nebulized bronchodilator? ( )
If ( ), specify frequency ( )

C. Has the patient ever been admitted for asthma? ( )
If ( ), specify number of admissions to ward ( )

Date: 
Please tick ( ) or ( ) when appropriate

1. Does the patient have:
   a. Cough (when patient does not have common cold)
   b. Hay fever
   c. Sneezing
   d. Chest tightness
   e. Wheeze

2. Are the symptoms worse:
   a. At night
   b. With exercise
   c. With irritants or common cold
   d. When exposed to specific triggers such as, (dust, smoke, foods, etc.)

3. During specific times of the year (winter, humidity, etc.)

4. Do the symptoms respond to asthma therapy?

Some medications may cause respiratory symptoms:
1. Beta Blocker
2. ACE inhibitors (Captopril, Lisinopril)
3. Methylene blue (dilute) 4. SSDs

3. Medication Section:

<table>
<thead>
<tr>
<th>Medication</th>
<th>Device</th>
<th>Strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beclomethasone</td>
<td>MDI</td>
<td>500mcg/inh.</td>
</tr>
<tr>
<td>Fluticasone</td>
<td>MDI</td>
<td>200mcg/inh.</td>
</tr>
<tr>
<td>Ipratropium</td>
<td>Turbuhaler</td>
<td>30mcg/Bid</td>
</tr>
<tr>
<td>Seretide</td>
<td>Turbuhaler</td>
<td>100mcg/25mcg</td>
</tr>
<tr>
<td>Symbicort</td>
<td>Turbuhaler</td>
<td>160mcg/4.5mcg</td>
</tr>
<tr>
<td>Salbutamol</td>
<td>Turbuhaler</td>
<td>100mcg/Bid</td>
</tr>
<tr>
<td>Fluticasone</td>
<td>Turbuhaler</td>
<td>250mcg/12mcg</td>
</tr>
<tr>
<td>Fluticasone</td>
<td>Turbuhaler</td>
<td>500mcg/12mcg</td>
</tr>
<tr>
<td>Seretide</td>
<td>Turbuhaler</td>
<td>250mcg/12mcg</td>
</tr>
<tr>
<td>Seretide</td>
<td>Turbuhaler</td>
<td>500mcg/12mcg</td>
</tr>
<tr>
<td>Seretide</td>
<td>Turbuhaler</td>
<td>1000mcg/12mcg</td>
</tr>
<tr>
<td>Seretide</td>
<td>Turbuhaler</td>
<td>2000mcg/12mcg</td>
</tr>
</tbody>
</table>

4. Asthma Management Guidelines Section:

Step 1
- Intermittent
- Symptom < 3/day
- Night symptom < 1/month
- Initiate short-acting betaagonist: Salbutamol (200mcg) BD

Step 2
- Mild persistent
- Symptom < 3/day
- Night symptom < 2/month
- Initiate short-acting betaagonist: Salbutamol (200mcg) BD

Step 3
- Moderate
- Daily attacks
- Night symptom < 2 week
- Initiate inhaled steroids (High dose): Corticosteroids or inhaled beclomethasone (200-500mcg) daily or fluticasone (200-500mcg) daily

Step 4
- Severe
- Continuous symptoms
- Frequent night symptoms
- Limited physical activity
- Initiate long-acting betaagonist: Indacaterol or formoterol (150mcg) BD

Step Up:
- If needed to satisfactory control, consider step up. But first review:
  a. Medication technique
  b. Compliance
  c. Trigger factors
- Restart therapy in step 1 if cannot be controlled

Step Down:
- Review treatment every 3 to 6 months.
- If not satisfactory for at least 2 months, a medical examination or reevaluation should be considered.
Appendix 2

Assessment of Inhaler Technique

Observe patient’s technique & for each step put a √ or X in appropriate column

Good technique (G) = all essential steps (E) performed accurately

Poor technique (P) = one or more essential steps (E) performed inaccurately

* Common problem step

* MDI closed mouth technique is preferred to ensure consistent approach & facilitate compliance