Symptomatic asthma: attendance and prescribing in general practice

D. Nolan and P. White

Department of General Practice and Primary Care, Guy’s, King’s and St Thomas’ School of Medicine, Weston Education Centre, London, U.K.

Abstract Under-prescribing and low attendance continue to be cited as reasons for ongoing asthma symptoms in primary care despite marked increases in prescribing and structured care for asthma over the past 10 years. The objective of this study was to determine the relationship between continuing asthma morbidity and the attendance of and prescribing for symptomatic asthmatic patients in primary care. A random sample of 402 subjects from 801 who reported at least one of six symptoms in the previous month on most or every day were identified from responses to a validated morbidity questionnaire. An analysis of their care over a 2-year period (1 year before and 1 year after the questionnaire) was carried out from their general practice case-notes. Data on 308 patients was available for analysis. Ninety-four per cent of these symptomatic asthma patients attended over the 2-year period, with 77% attending for an asthma related consultation. Most patients were managed exclusively in primary care. Inhaled steroids were prescribed for 78% of patients and high dose inhaled steroids (≥800 mcg of beclomethasone or equivalent per day) were prescribed for 38%. Patients with most symptoms were more likely to be prescribed inhaled steroids. Rescue courses of oral steroids were prescribed for 29% of patients. Changes in asthma medications were recorded for 31% during the study period. Metered dose inhalers (MDI) were prescribed for 86% with more than half prescribed MDIs combined with some other delivery device. Elements of structured care were more frequently recorded in patients who reported most symptoms. In conclusion the asthma management of the majority of patients in this study was active with high levels of steroid prescribing. There appeared to be room to increase prescribing and to improve the structure of care. While patients who were symptomatic on steroids should have had their medications, delivery devices and structured care reviewed regularly, many were already on maximal treatment and were therefore likely to remain symptomatic. It is unclear how practitioners could improve morbidity in many of these patients as under-treatment and low attendance seem unlikely to be the principal causes of continuing symptoms.

INTRODUCTION

Asthma morbidity has remained high despite marked increases in overall prescribing and in the structure of care, while asthma mortality has shown some promising downward trends recently (1,2). Symptomatic patients present a considerable challenge to healthcare professionals as they are most at risk of admission, re-admission or death, and suffer significant absences from work (1,3,4). General practice continues to provide the bulk of the care for these patients in the NHS and is where the majority of prescribing occurs (5,6). Up to 50% of the health service costs of asthma are incurred by just 10% of asthmatic patients, usually the most severely affected (7,8). It follows that general practitioners should target care towards the more symptomatic patients in the effort to reduce overall asthma morbidity (9).

Despite increased asthma prescribing in primary care, there is still a belief that under-prescribing and poor attendance are significant factors in continuing asthma morbidity (10–12). General practice has responded to high asthma morbidity with a number of initiatives including involvement of specialist nurses, feedback of patient specific information, integrated care schemes and introduction of self-management plans (13–19). Evidence from these studies of a sustained impact on asthma morbidity has been at best equivocal.

This study set out to describe the attendance, prescribing and structure of care of symptomatic asthmatic patients in a primary care setting in order to identify the...
extent to which each of these factors contributed to continuing morbidity.

METHODS

Attendance, prescribing and structured care over a 2-year period (1995–1997) were assessed from the primary care case-notes of symptomatic asthmatic patients. Permission was sought from their general practitioner (GP) to visit their practices and to examine the case-notes of asthmatic patients previously identified as symptomatic. The Local Research Ethics Committee granted approval for the study. The principle investigator (D.N.) visited each practice over a 3-month period in 1998 and the notes of each patient (both computerized and paper) were examined.

Patient selection (Fig. 1)

As part of a separate randomized controlled trial, 40 GP practices in the London borough of Lewisham were asked to notify asthmatic patients (between 15 and 65 years) in their practices (20). Patients were selected if they had been issued with one prescription for an inhaled steroid or two prescriptions for inhaled β-agonists in the previous year. This method of recruiting has been shown previously to be highly specific for asthma in patients under 65 years (21). In mid 1996, 60% (2081/3463) of these patients returned a validated questionnaire reporting their morbidity in the previous month and service use and drug use in the previous 3 months (14,21).

Patients who returned the questionnaire were classified as ‘symptomatic’ if they reported at least one of the following six symptoms (daytime wheeze, night-time wheeze, daytime cough, night-time cough, daytime dyspnoea or night-time dyspnoea) on most or every day in the previous month.

Patients were further categorized on a scale of 1–6 according to the number of symptoms reported. Average attendance at their GP by the general population is at least 66% over 12 months, so a sample of 300 was chosen to give 95% confidence of being within ±5.5% of the true attendance (22). Eight hundred and one (38%) patients were identified as ‘symptomatic’ of whom 402 (50%) were selected using computer generated random numbers. The aim was to secure at least 300 eligible records for this study.

Time period (Fig. 2)

Entries in the medical records between April 1995 and March 1997 (1 year before and 1 year after the completion of the symptom and drug use questionnaire in 1996) were examined to assess attendance, prescribing and structured care before and after symptoms were reported. A template for data extraction was developed and piloted in two non-participating inner city practices.
**Data collected**

1. Patient profile: Age (at time of survey)
   - Sex
   - Smoker (current, ex or non/not recorded)
   - COPD recorded (COPD, chronic bronchitis or emphysema) in notes
2. Attendance:
   - GP surgery — Asthma related (some parameter of asthma care recorded)
   - Not asthma related
   - Telephone or home visit related to asthma
   - Hospital — From discharge letters relating to asthma (OPD, A+E or admission)
3. Elements of structured care: Recording of peak flow
   - Recording of predicted peak flow
   - Inhaler technique recorded
   - Self management plan recorded in notes
   - Attendance at asthma clinic in surgery
   - Influenza vaccination
4. Medication: All medications prescribed over the study period (2 years), according to the BNF classification, including dosage and device. (In the case of asthma drugs, it was assumed that metered dose inhalers (MDIs) were prescribed if no other details were recorded)
   - High dose inhaled steroids were classified as greater than or equal to 800 mcg of beclometasone (or equivalent) per day
   - Any changes to medications recorded in the notes
   - Continuous usage was classified as at least two consecutive occasions

Data was analysed with SPSS-PC version 7.0 (22). Simple frequency data with cross tabulations, chi-square values and chi-square for trend values are reported as appropriate. A Bonferroni correction factor was used to calculate significance values where multiple chi-square tests were performed (23).

**RESULTS**

Case notes were available for 308 patients out of the 402 selected. Four practices were not visited as two GPs had retired and two declined to participate. The notes of 25 patients registered in these four practices were therefore inaccessible. Sixty-seven (16.6%) patients were no longer registered with participating practices. Two sets of notes were incomplete and could not be analysed. The age, sex and symptoms scores of the patients whose notes were retrieved were compared with those whose notes were not retrieved and showed close correlation for age ($U_{\text{Mann-Whitney}} = -3.05, P = 0.002$), and sex ($U_{\text{Mann-Whitney}} = -2.3, P = 0.021$), but not for severity ($U_{\text{Mann-Whitney}} = -0.355, P = 0.723$). Patients whose notes were not available had reported fewer symptoms. There was a wide distribution of symptom reporting with 31% reporting one symptom, 25% two, 15% three, 10% four, 6% five and 13% all six symptoms on most or every day. The details of the patients whose notes were examined and those whose notes were not available are summarized in Table 1. Older age (grouped: 15–24, 25–34, 35–44, 45–54, 55–64 years), a record of smoking and a record of co-existent COPD in the notes were all significantly associated with higher numbers of symptoms. COPD was significantly associated with older age ($\chi^2 = 54.7, df = 4, P < 0.000, \chi^2$ for trend, $P < 0.000$) and smoking ($\chi^2 = 13.6, df = 1, P < 0.000, \chi^2$ for trend, $P < 0.000$).

Table 2 summarizes the attendance and structured care recorded for patients. The average number of consultations for asthma per year was 2.9 (range 0–28). There was a significant association between higher numbers of symptoms reported and higher numbers of consultations for asthma ($\chi^2 = 41.9, df = 20, P = 0.003, \chi^2$ for trend, $P < 0.000$). Record of a repeat asthma prescription with no other element of asthma care recorded was found in 33% of the patient notes. All of these patients had attended during the study period for a separate asthma related consultation. There was no record of attendance during the study period for 20 (6.5%) patients. Home visits for asthma had been recorded for 14...
(4.5%) patients and telephone consultations for asthma for 10 (3.3%) patients. Certificates of incapacity due to asthma related conditions had been issued to 31 (10%) patients. Higher overall levels of structured care (an aggregation of all structured care items) were associated with higher numbers of symptoms ($\chi^2 = 13.6; df = 5; P < 0.018, \chi^2$ for trend, $P = 0.001$). Individual components of structured care were not associated with increased symptoms.

The prescribing pattern of asthma medications and delivery devices over the study period is shown in Table 3. Inhaled steroids, in addition to being associated with higher numbers of symptoms were also associated with prescriptions for rescue courses of oral steroids ($\chi^2 = 52.2; df = 1; P < 0.000, \chi^2$ for trend, $P < 0.000$). Rescue courses of oral steroids had been prescribed for 91 (29%) patients, of whom all except one had been prescribed inhaled steroids and most (69%) had been prescribed high

---

**Table 1.** Age, sex, smoking pattern, severity and COPD diagnosis in the notes of patients whose records were available, age-sex profiles for patients whose notes were not available, and associations between these factors and increased number of symptoms reported on most or every day

<table>
<thead>
<tr>
<th>Mean age</th>
<th>Association with higher numbers of symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Notes available (n=308)</td>
<td>41.1 (15–64) yrs</td>
</tr>
<tr>
<td>Notes not available (n=94)</td>
<td>38.3 (16–62) yrs</td>
</tr>
<tr>
<td>Male : Female</td>
<td></td>
</tr>
<tr>
<td>Notes available (n=308)</td>
<td>40:60</td>
</tr>
<tr>
<td>Notes not available (n=94)</td>
<td>30:70</td>
</tr>
<tr>
<td>Recorded smoking (n=308)</td>
<td>134 (43.5%)</td>
</tr>
<tr>
<td>COPD recorded in notes (n=308)</td>
<td>46 (15%)</td>
</tr>
</tbody>
</table>

* Kendal’s $\tau=0.184, P=0.0004$.
† $\chi^2=13.7; P=0.017$.
‡ $\chi^2=23.1; P=0.0001$.

Bonferroni significance level ($P < 0.0125; df=5$).

**Table 2.** Attendance for asthma at the surgery and at hospital in the 2 years of the study, recording of elements of structured care in the same period, and the association between these and higher numbers of symptoms reported

<table>
<thead>
<tr>
<th>Attendance at surgery related to asthma</th>
<th>Year before questionnaire (1995–1996) n=308 (%)</th>
<th>Year after questionnaire (1996–1997) n=308 (%)</th>
<th>Both years together (1996–1997) n=308 (%)</th>
<th>Association with higher numbers of symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attendance at surgery — not related to asthma</td>
<td>66</td>
<td>63</td>
<td>77</td>
<td>Significant*</td>
</tr>
<tr>
<td>A+E attendance for asthma</td>
<td>87</td>
<td>83</td>
<td>94</td>
<td>NS</td>
</tr>
<tr>
<td>Admission for asthma</td>
<td>4</td>
<td>5</td>
<td>8</td>
<td>NS</td>
</tr>
<tr>
<td>Outpatient asthma</td>
<td>11</td>
<td>13</td>
<td>14</td>
<td>Significant†</td>
</tr>
<tr>
<td>Peak expiratory flow (PEF)</td>
<td>32</td>
<td>38</td>
<td>50</td>
<td>NS</td>
</tr>
<tr>
<td>Predicted PEF</td>
<td>25</td>
<td>28</td>
<td>36</td>
<td>NS</td>
</tr>
<tr>
<td>Self-management plan</td>
<td>9</td>
<td>7</td>
<td>11</td>
<td>NS</td>
</tr>
<tr>
<td>Attended asthma clinic</td>
<td>14</td>
<td>16</td>
<td>35</td>
<td>NS</td>
</tr>
<tr>
<td>Flu vaccine</td>
<td>25</td>
<td>26</td>
<td>32</td>
<td>NS</td>
</tr>
<tr>
<td>Inhaler technique check</td>
<td>33</td>
<td>19</td>
<td>41</td>
<td>NS</td>
</tr>
<tr>
<td>Good inhaler technique</td>
<td>15</td>
<td>9</td>
<td>19</td>
<td>NS</td>
</tr>
</tbody>
</table>

* $\chi^2 = 20.9; df = 8; P = 0.007$.
† $\chi^2 = 22.6; P < 0.000$.

Bonferroni significance level ($P < 0.004$).
dose inhaled steroids. A change in inhaled steroids (dose or preparation) had been recorded in the notes of 96 (31%) patients.

Metered dose inhalers (MDIs) were prescribed for 86% of patients with more than half using MDIs combined with some other delivery device. Changes to inhaler devices had been recorded for 62 (20.8%) patients over the 2 years, and these changes were associated with higher numbers of symptoms ($\chi^2 = 22.5; df=5; P < 0.000, \chi^2$ for trend, $P < 0.000$).

There was a statistically significant rise in use of long acting $\beta$ agonists in the year after symptoms were reported ($\chi^2 = 19.2; df=1; P < 0.004, \chi^2$ for trend, $P < 0.000$). No other parameter of care was significantly different between the 2 years. The use of non-respiratory medications was also noted in this group of patients, and is shown in Table 4. A regression analysis was performed to calculate odds ratios for each of the factors and the results are summarized in Table 5.

### Table 3. Asthma medications and devices prescribed over the study period and the association between each and the numbers of symptoms reported on most or every day

<table>
<thead>
<tr>
<th></th>
<th>Year before questionnaire completed n=308 (%)</th>
<th>Year after questionnaire completed n=308 (%)</th>
<th>Both years combined n=308 (%)</th>
<th>Association with higher numbers of symptoms n=308</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inhaled steroids (IS)</td>
<td>74</td>
<td>76</td>
<td>78</td>
<td>Significant*</td>
</tr>
<tr>
<td>High dose inhaled steroids</td>
<td>33</td>
<td>37</td>
<td>38</td>
<td>Significant†</td>
</tr>
<tr>
<td>$\beta_2$-agonist</td>
<td>87</td>
<td>86</td>
<td>94</td>
<td>NS</td>
</tr>
<tr>
<td>Long acting $\beta_2$-agonist</td>
<td>9</td>
<td>13</td>
<td>13</td>
<td>NS</td>
</tr>
<tr>
<td>Rescue courses of oral steroids</td>
<td>23</td>
<td>21</td>
<td>29</td>
<td>Significant‡</td>
</tr>
<tr>
<td>Metered dose inhalers (MDI)</td>
<td>85</td>
<td>82</td>
<td>86</td>
<td>NS</td>
</tr>
<tr>
<td>Metered dose inhalers (alone)</td>
<td>56</td>
<td>42</td>
<td>40</td>
<td>Significant§</td>
</tr>
<tr>
<td>Spacer device</td>
<td>19</td>
<td>23</td>
<td>24</td>
<td>Significant*†</td>
</tr>
<tr>
<td>Dry powder</td>
<td>23</td>
<td>24</td>
<td>27</td>
<td>NS</td>
</tr>
<tr>
<td>Breathe activated</td>
<td>6</td>
<td>9</td>
<td>10</td>
<td>Significant††</td>
</tr>
<tr>
<td>Nebulizer</td>
<td>5</td>
<td>6</td>
<td>6</td>
<td>Significant**</td>
</tr>
</tbody>
</table>

$\chi^2 = 16.05, P=0.007.$

$\chi^2 = 22.0, P=0.001.$

$\chi^2 = 22.5, P < 0.000.$

$\chi^2 = 17.1, P=0.004.$

$\chi^2 = 19.1, P=0.002.$

$\chi^2 = 17.2, P=0.004.$

$\chi^2 = 12, P=0.035.$

Bonferroni significance level ($P < 0.0045$).

### Table 4. Principal categories of non-respiratory medications prescribed over the study period and the association between these and higher number of symptoms reported on most or every day

<table>
<thead>
<tr>
<th>Medication</th>
<th>n=308 (%)</th>
<th>Association with higher numbers of symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiovascular medications Including anti-hypertensives</td>
<td>19</td>
<td>Significant*</td>
</tr>
<tr>
<td>Analgesics use including NSAIDs</td>
<td>32</td>
<td>NS</td>
</tr>
<tr>
<td>Psychoactive medications (benzodiazepines and anti-depressants)</td>
<td>18</td>
<td>Significant†</td>
</tr>
<tr>
<td>Gastrointestinal medication</td>
<td>16</td>
<td>NS</td>
</tr>
<tr>
<td>Rhinitis preparations</td>
<td>9</td>
<td>NS</td>
</tr>
</tbody>
</table>

$\chi^2 = 12.6; P < 0.027.$

$\chi^2 = 21.7; P < 0.001.$ (Significant with Bonferroni).

Bonferroni significance level ($P < 0.01$).
Most symptomatic patients in this study were prescribed inhaled steroids, with 38% prescribed at least 800 mcg of beclomethasone or equivalent per day. High levels of attendance were recorded in the notes. The majority of these patients were treated exclusively in primary care, and their continuing high asthma morbidity cannot easily be explained on the basis of low levels of inhaled steroid prescribing or infrequent contact with health services.

The study sample was derived from an original response rate of 60% and so it cannot be claimed to represent all asthmatics. However it is likely to more closely reflect the experience of the most symptomatic asthmatic patients as the method of recruiting was biased towards those on treatment and those symptomatic enough to have drawn the attention of the primary care team. Although biased towards patients who are on treatment, these are the patients who have presented to general practitioners and in whom treatments have been tried. Previous studies using the same method of recruitment have shown that virtually all patients recruited in this way had asthma as defined by variation in peak flow of more than 15% (14). A number of patients (15%) may have had co-existent COPD. However excluding those patients with suspected COPD from the analysis did not change the factors that were significantly associated with increased symptoms. The number of patients in the study who were no longer registered with their practices (16%) was within average patient list turnover in south London (24).

The use of the number of symptoms reported as the criterion of severity was based on the judgement that symptoms comprise the primary motivation for patients to present for and adhere to treatment, and that symptom control is one of the principal goals of the physician.

There was considerable variation in the details of the consultations recorded in each set of notes. While it is unsafe to assume that GP records accurately reflect the full content of the consultation, the lack of recorded information is important in itself as most GPs work in partnership and in multidisciplinary teams. Absence of recorded information is likely to lead to duplication, lack of consistent advice and inefficient use of limited time. Almost all of the prescribing was computer generated which has been shown to be accurate in previous GP based studies (25).

The main limitation of the study is its reliance on a retrospective examination of recorded clinical data. Nonetheless the observations made and relationships described are consistent with patients' reports in the questionnaires. Although numerous tests of association increase the likelihood that some significant results will occur by chance, most of the associations remained significant after the application of the Bonferroni correction factor. The use of logistic regression analysis confirmed many of the associations observed above. The findings were consistent with each other and seem to confirm clinical experience.

More than three-quarters of patients in this study remained 'symptomatic on steroids.' Most patients were prescribed inhaled steroids and also reported using them in the mailed 1996 questionnaire. Higher doses of inhaled steroids were prescribed for the more symptomatic patients in whom more delivery device changes were also recorded. These observations suggest that under-prescribing of inhaled steroids was not the key issue in ongoing symptoms. Low adherence may have a role in continuing symptoms, but the high attendance and high recorded prescribing indicates that adherence is unlikely to be the principal factor in ongoing symptoms.

There was an opportunity in many patients to alter the delivery devices to those that ensure higher lung deposition (spacer, dry powder, breath-activated or
nebulizers). The fact that the more symptomatic patients were prescribed these devices and had more device changes recorded in their notes suggests that this was not the central problem for such patients. There was nonetheless room to increase prescribing in many cases, particularly with respect to long acting β-agonists and higher dose inhaled steroids.

The finding of large numbers of patients who are ‘symptomatic on steroids’ raises a key issue for the management of asthma. Almost a third of patients were prescribed a rescue course of oral steroids for their asthma, despite the fact that most were already prescribed inhaled steroids. Continued symptoms may be inevitable for many patients in whom inhaled steroids may have a more limited role than was previously thought. Whilst these patients cannot be considered steroid resistant on this evidence, it would seem that inhaled steroids are only partially effective in reducing their symptoms. Our findings concur with those of Walsh et al. in Nottingham who found that a considerable number of asthmatics had uncontrolled asthma despite using inhaled steroids (26). The extent to which continuing high levels of symptoms can be explained by failed adherence or by inadequate drug delivery remains an issue, but there is little support for such an explanation in the findings of this study. High attendance rates were observed indicating that most of these patients are well known to their health care professionals. Over 90% of patients attended their general practitioners over the study period which suggests that an opportunity to intervene could have been taken. Attendance for asthma at the GP’s surgery was significantly associated with higher numbers of asthma symptoms. Low attendance did not seem to be an important factor in ongoing morbidity. Sixteen per cent of patients attended hospital during the study period, which is similar to rates reported elsewhere (27,28). Room to improve the structure of care exists for many patients, although the more symptomatic patients already had more elements of structured care recorded. For most highly symptomatic patients in this study attendance, prescribing and structured care are prominent elements of management.

CONCLUSION

The view that under-treatment is the principal cause of continuing asthma morbidity is not borne out in this study. Increased prescribing of asthma medications and higher levels of structured care were not associated with reduced morbidity. Many patients remained symptomatic despite high dose inhaled steroids and frequent attendance. Room for improvement does exist in a number of treatment areas including dose of steroid, choice of device, use of long-acting β-agonists and improved structured care. Whilst increasing medications and structured care for symptomatic patients are to be encouraged, it seems likely that continuing symptoms will remain the reality for many patients with asthma.

Acknowledgements

We would like to thank all the general practitioners who granted access to the case-notes. Dr Nolan was funded through the London Academic Training Scheme of the London Implementation Zone Education Initiative. Statistical advice was obtained from Richard Hooper. John Campbell, Helena Elkingston and Tom Kennedy provided comments on the manuscript.

REFERENCES


20. White P, Atherton A, Youlten L, Birchall B. Consultation Liaison in Asthma: Results of a Randomised Controlled Trial. London: Guy’s, King’s and St Thomas’ School of Medicine, 1999.


