

A criterion based audit of inpatient asthma care

Closing the feedback loop

ABSTRACT—We have assessed the care of patients admitted to a specialist respiratory medical ward acutely ill with asthma, using a criterion based audit derived from a standard management protocol already in use in our hospitals. The audit was first performed from 01.01.90 to 31.08.90; after implementing certain changes, the audit was repeated from 1.12.90 to 31.1.91. Special attention was paid in each audit review to pre-admission measures, inpatient management and pre-discharge and follow-up management. During both audit periods, of a total of 78 patients, 74 patients gave a reason for the worsening of their asthma; 59 had had PEF measured and 58 had received systemic steroids before admission; 77 patients had full objective assessment of severity on admission; 76 patients were discharged on oral steroids; 62 had PEF meters for home monitoring; and 65 of the 68 patients who lived in our district were seen again within six weeks as outpatients in the chest clinic. However, only 30/55 (54%) had PEF variability of 20% or less (our criterion for appropriateness of discharge, in the first audit period) and only 32/55 had a written check on their inhaler technique in the first audit period. By relaxing our PEF criterion for discharge (in line with national guidelines), by introducing a stamp for recording that inhaler technique had been checked, and with encouragement and exhortation from senior staff, we improved our performance of meeting the set standards to 17 of 23 (74%) patients for PEF variability and to 22 of 23 (96%) patients for written check on inhaler technique in the second audit period. Staff were gratified and rewarded by those aspects of patient management which the audit revealed to be of good quality. The problems highlighted during the first audit led to corrective action, and improvement in our practice was confirmed by the second audit.

Several studies have shown that the care of severely ill asthmatic patients admitted to hospital is better on wards or teams that include a specialist chest physician than on those without such a specialist [1–4]. Asthma is perhaps the commonest chronic disease in Britain; it affects all ages and its morbidity and mortality remain

K. L. LIM, MB, MRCP, *Medical Registrar*
B. D. W. HARRISON, MB, FRCP,
*Consultant Physician, Department of Respiratory
 Medicine, West Norwich Hospital, Norwich*

unacceptably high [5–8]. It is the commonest cause of acute admission to our respiratory medical ward. For all these reasons we chose it as our first condition for medical audit.

A protocol for the recognition and management of severe asthmatic attacks in adults has been in use in our district hospitals for the past twelve years. We have used this protocol for thirteen months from January 1990 to conduct a criterion based audit of inpatient care of asthmatics admitted to our respiratory medical ward. Our aim was to determine to what extent our practice measured up to the recommendations in the protocol. When we discovered defects in our management of asthma we implemented changes and reassessed our performance.

Method

The study took place in our respiratory medical ward at the West Norwich Hospital between 01.01.90 and 31.08.90, and from 01.12.90 to 31.01.91. Our management protocol defines an acute asthmatic attack on the basis of symptoms, signs and clinical measurements. For an attack to be defined as 'severe', at least two of the abnormalities in signs or measurements have to be present (Fig. 1). The protocol then outlines steps to be taken in the management of an acute severe asthmatic attack (Fig. 2). Our criteria were chosen so that we could audit objective assessment and treatment before admission; objective assessment on

Fig. 1. Protocol for managing severe asthma—list of symptoms, signs and measurements used to define a severe attack.

Symptoms

1. Patient unable to get up from chair or bed.
2. Patient unable to complete sentences in one breath.

Signs

1. Tachycardia – heart rate \geq 110/min.
2. Systolic paradox \geq 10mm Hg.
3. Tachypnoea – respiratory rate \geq 28/min.
4. A silent chest, cyanosis or signs of respiratory muscle fatigue each indicates a very severe attack.

Measurement

1. Peak expiratory flow < 30% of predicted normal.
2. Arterial PCO₂ which is normal (in an ill patient) or high.

<p>Immediate action</p> <ol style="list-style-type: none"> 1. High concentration of oxygen. 2. 5 mg nebulised Salbutamol. 3. Prednisolone 30–60 mg orally or hydrocortisone 3 mg/kg intravenously. 4. Avoid sedatives of any kind. then 5. Chest X-ray. <p>Subsequent treatment</p> <ol style="list-style-type: none"> 1. Continue oxygen. 2. 5 mg nebulised Salbutamol every 4–6 hours. 3. Prednisolone 30–60 mg daily. if initial attack is very severe or if patient's initial response to the above treatment is unsatisfactory, add 4. Aminophylline infusion at 1 mg/kg/hr. 5. Nebulised Ipratropium 0.5–1.0 mg. <p>Monitoring treatment</p> <ol style="list-style-type: none"> 1. Repeat PEF and blood gases 1–2 hours after starting treatment. 2. Measure and chart PEF at 0600, 1000, 1800 and 2200 hrs daily throughout the admission. 3. Repeat blood gases depending on response. <p>Indications for intensive care</p> <ol style="list-style-type: none"> 1. PaCO₂ rising above normal despite treatment. 2. PaCO₂ remaining above normal despite treatment. 3. Patient unconscious.
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Fig. 2. Protocol for managing severe asthma—treatment and monitoring of response.

admission and airway lability before discharge; and various aspects of the patient's management before and after discharge from hospital.

In January 1990, we introduced a proforma to act as a history taking sheet for the house physicians, as a format for summaries for the middle grade doctors, and to enable us to audit asthma care. The three pages of the proforma have been reproduced in Fig. 3.

The history of the present attack, drug treatment before admission and the medical and social histories are recorded on the first page (Fig. 3a). From this we audited:

1. Reason for deterioration of asthma.
2. Peak flow (PEF) measurement before admission.
3. Steroids started by general practitioners (GP) or casualty doctors.

The second page (Fig. 3b) records inpatient treatment and progress, and we audited:

4. Objective assessment of severity on admission, which had to include heart rate, systolic paradox, respiratory rate, PEF and arterial blood gases to be complete.

Page 1	(a)
UNITED NORWICH HOSPITALS	
PATIENT IDENTIFICATION:	hospital label
OCCUPATION:	
CONSULTANT:	WARD:
DATE ADMITTED:	DATE DISCHARGED:
AGE OF ONSET OF ASTHMA:	
NO OF ADMISSIONS OVER LAST 12 MONTHS:	DATE OF LAST ADMISSION:
HISTORY OF PRESENT ATTACK:	
DURATION SINCE PATIENT WAS LAST QUITE WELL (e.g. no nocturnal disturbances)	
DURATION OF IMMEDIATE ATTACK:	
REASON(S) FOR DETERIORATION:	
OBJECTIVE ASSESSMENT BEFORE ADMISSION: (peak flow, paradox etc. if mentioned):	
TREATMENT BEFORE ADMISSION: USUAL MEDICATION	EMERGENCY MEDICATION
COEXISTING MEDICAL PROBLEMS:	OTHER PAST DISEASES:
SMOKING HISTORY:	ALCOHOL HISTORY:
OTHER RELEVANT HISTORY (personal, social, family, drug therapy, date of LMP):	

Fig. 3. History/summary proforma: (a) page 1; (b) page 2; (c) page 3.

5. PEF variability in the 24 hours pre-discharge.

The last page (Fig. 3c) documents patient education and follow-up arrangements, and from this we audited four aspects of patient care:

6. Written check on inhaler technique.
7. Oral steroids on discharge.
8. PEF meter for home monitoring.
9. Follow-up appointment.

The audits were conducted at the end of a weekly ward round in January and February 1990 and then at two-monthly intervals in April, June and August. As a result of the June and August audits we introduced some changes and then conducted an audit of the preceding two months at the end of January. The data were collected manually by the clinical team (consultant, consultant's secretary, registrar, SHO, two house physicians and senior trained nurse).

Page 2	(b)
EXAMINATION AND INVESTIGATION	
OBJECTIVE ASSESSMENT OF SEVERITY:	
HEART RATE:	
RESPIRATORY RATE:	
BLOOD PRESSURE AND SYSTOLIC PARADOX:	
PEAK EXPIRATORY FLOW:	
ARTERIAL BLOOD GASES	PaO ₂ : PaCO ₂ : pH:
CHEST X-RAY:	
ABNORMALITIES IN OTHER SYSTEMS:	
OTHER RELEVANT OR ABNORMAL INVESTIGATIONS:	
TREATMENT AND MONITORING	
INITIAL TREATMENT: (Oxygen must be recorded on drug treatment card)	
LOWEST PEF:	HIGHEST PEF:
PEAK FLOW VARIABILITY IN 24 HOURS PRE-DISCHARGE: <20% / >20%	

Page 3	(c)
DISCHARGE AND FOLLOW UP	
INHALER TECHNIQUE CHECK PRE-DISCHARGE:	YES / NO
	BY WHOM ? :
TREATMENT ON DISCHARGE AND DURATION:	
ORAL STEROIDS:	
INHALED STEROIDS:	
INHALED BETA-AGONISTS:	
NEBULISED BETA-AGONIST:	
ORAL THEOPHYLLINES:	
ORAL BETA-AGONIST:	
OTHER:	
NEBULISER TREATMENT REQUIRED:	
NEBULISER OWNED BY / LENT TO PATIENT	
PEAK FLOW METER FOR SELF MONITORING:	
OWNED BY / PRESCRIBED FOR PATIENT / NOT GIVEN	
OUT PATIENT APPOINTMENT DATE:	WITH DOCTOR:
SELF ADMIT ACCESS AGREED:	YES / NO

Results (see Table 1)

There were 78 acute asthmatic admissions between 01.01.90 and 31.08.90 and 01.12.90 and 31.01.91 under one consultant chest physician. None required admission to, or transfer to, the ITU.

Pre-admission

There were no differences between the two study periods for any of the 'pre-admission' audit measures. For the two periods combined, 74 patients gave a reason for the worsening of their asthma. PEF had been measured in 59, and 58 had injections of steroids before admission.

Inpatient care

A complete objective assessment of the severity of their asthmatic attack was made in 77 patients. Arterial blood was sampled in all except one 12-year-old boy. In the first audit period, 30 patients had achieved PEF variabilities of 20% or less in the 24 hours preceding

discharge from hospital [9] (Fig. 4). There was marked improvement in PEF variability in patients admitted during February after the January audit, but this was followed by progressive deterioration in patients admitted after February through to August. Following the publication of national guidelines [10], the standard was changed to a variability of 25% or less and house physicians were asked to record the reasons for discharge if this criterion had not been met. Between 01.12.90 and 31.01.91, the PEF varied by 25% or less in 17 of the 23 patients during the 24 hours before discharge, and in another three patients the reasons why the patient had been discharged before this criterion had been met were recorded in the notes by the house physician.

Pre-discharge

The fluctuations in written checks on inhaler technique are also shown in Fig. 4. After the audit at the end of June we introduced a rubber stamp for use on the patient's PEF chart which required the signature of the trained nurse or doctor who had checked that patient's inhaler technique. This, plus encouragement from senior staff, resulted in much better check of inhaler technique, such that in the December/January period this criterion was satisfied in 22 of the 23 patients.

All but two patients were discharged on oral

Table 1. Results of a nine-item audit of asthma care performed for 78 admissions in two audit periods.

Audit measures	Period 1	Period 2
	1/1/90 to 31/8/90 <i>n</i> = 55	1/12/90 to 31/1/91 <i>n</i> = 23
<i>Pre-admission</i>		
1. Reason for deterioration of asthma	51 (93%)	23 (100%)
2. PEF pre-admission	42 (76%)	17 (74%)
3. Systemic steroids	39 (71%)	19 (83%)
<i>Inpatient</i>		
4. Full objective assessment of severity	54 (98%)	23 (100%)
5. PEF variability in 24 hours pre-discharge	[<20%] 30 (55%)	[<25%] 17 (74%)
<i>Pre-discharge</i>		
6. Written check on inhaler technique	32 (58%)	22 (96%)
7. Oral steroids on discharge	54 (98%)	22 (96%)
8. PEF meter for home monitoring	43 (78%)	19 (83%)
9. OPD appointment within 4 weeks	33 (60%)	13 (57%)

steroids. These two not been severely ill on admission and did not receive systemic steroid treatment. Sixty-two patients had PEF meters for monitoring their asthma at home and 46 patients were reassessed by us within four weeks of discharge from hospital. Another 19 patients were seen within six weeks, and 10 patients who were visitors to the county were asked to report to their local GP on returning home. Three non-compliant patients did not attend or were not given routine follow-up appointments.

Discussion

Most of the patients with an acute attack of asthma were admitted directly to our ward by their GP. A few were admitted from the A & E department or admitted themselves directly. Three-quarters of patients had PEF measured and received systemic steroids before their hospital admission, reflecting the high quality of general practice in this district.

As we should expect on a dedicated specialist respiratory medical ward, assessment of the severity of the asthma on admission was almost complete, but nevertheless this finding was very gratifying.

To our surprise, only 55% of patients fulfilled our criterion for PEF variability on discharge in the first eight months of the audit. There were probably three reasons for this. First, the criterion, though suggested by an earlier study [9], was too strict. When we relaxed it following the publication of national guidelines [10] we achieved a much better result. A second reason is the pressure put on doctors for an early discharge by patients who are visitors or holidaymakers. This group comprised 13% of our patients. Third, this district is short of general medical beds; our ward has the highest throughput per bed of any of our general medical wards and there is continual pressure on doctors and nurses to make beds available for further emergency admissions.

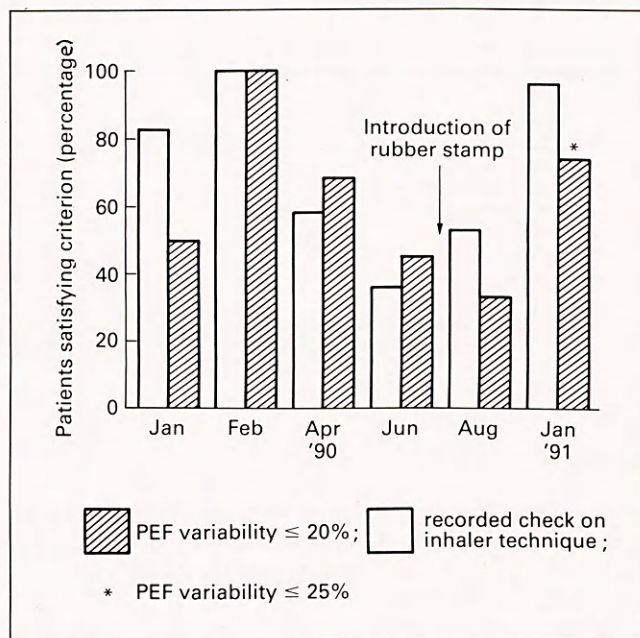


Fig. 4. Variation in performance of two criteria of asthma care at six audit sessions.

The recording of inhaler technique checks was also poor during the months from March to June when the ward experiences an annual increase in asthma admissions. In an attempt to overcome this problem, a rubber stamp was introduced and used on all PEF charts at the end of patients' beds. The house physician or trained nurse then had to record checks on inhaler technique before each patient was discharged. This, plus encouragement from senior staff, led to a marked improvement in recording that the checks had been made.

Conclusion

This audit has had three results. First, staff were pleased when we discovered how well patients were assessed on admission and how many were discharged on oral steroids. Second, the audit highlighted problems with our peak flow criterion for discharge and with the recording in the notes of inhaler technique checks. By modifying our peak flow criterion, by introducing a rubber stamp and by continued exhortation from senior staff, we were able to improve our performance of both criteria. Third, we had thus shown we had been able to close the audit feedback loop [11].

Our data were collected manually but computerisation would make the data easily accessible. We had no audit clerks in Norwich during this survey but such a criterion based audit could certainly have been performed by a trained clerk.

The simple framework evaluated in this study could be used to evaluate clinical practices in any medical condition in any medical specialty on a specialist or a general medical ward or firm.

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Address for correspondence: Dr B. D. W. Harrison, Department of Respiratory Medicine, West Norwich Hospital, Bowthorpe Road, Norwich NR2 3TU.

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