Acute adult asthma – assessment of severity and management and comparison with British Thoracic Society Guidelines

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To investigate the accuracy of clinical severity assessment of asthmatics and to compare emergency and subsequent ward management with British Thoracic Society (BTS) Guidelines, the records of all patients admitted for severe asthma (46) over a 5-month period to a District General Hospital were inspected.

Variations from recommended management were revealed. Appropriate oxygen administration was often not provided in casualty and patients frequently left hospital before their discharge criteria were attained: recommended diurnal variations in peak flow were exceeded in 26%. Eleven per cent of discharges were against medical advice, making provision of adequate management logistically difficult. Adherence to BTS guidelines on the need for arterial blood gas (ABG) analysis would have led to a failure to detect significant hypoxaemia in 25% of cases.

This study identified substantial variations from BTS management guidelines. It is suggested that oximetry is necessary on arrival to guide selection for arterial blood gas analysis.

Introduction

The adequacy of hospital management of asthma continues to be questioned (1–3), although subsequent British Thoracic Society (BTS) guidelines (4) might have been expected to improve management. Against this background asthma morbidity is increasing in the U.K. (5,6) and elsewhere (7). Any continuing failure to improve standards of active asthma management might occur for several reasons. These include lack of adherence to guidelines or the problem of inaccurate initial assessment because poor correlation exists between clinical signs of severity and subsequent progress (2,8,9).

The aims of the present study were to audit and assess two aspects of asthma management: firstly, compliance with the BTS guidelines and secondly, the predictability of these guidelines. In particular, the accuracy of initial severity classification was scrutinized.

Methods

Asthma admissions to a District General Hospital for 46 patients over a period of 5 months were prospectively studied. An audit form was provided after gaining the consent of admitting physicians and casualty staff. Checks were made with casualty, admission and discharge coding records to ensure inclusion of all admissions due to asthma. Hospital records of omissions were retrospectively inspected. Management was compared with BTS guidelines (4). Previous asthma control, assessment, management at presentation and subsequent care were reviewed. The length of stay and treatment at discharge were noted. Readmissions to the same hospital were recorded and were defined as patients readmitted during the 5-month study or within 4 months of it ending.

Irreversible airways disease was excluded by including only those below 50 years of age and by excluding patients whose peak expiratory flow rates showed an improvement of less than 15%. Heart rate, peak expiratory flow rate (PEFR), respiratory rate and oxygen tension (PO₂) were used to grade severity according to BTS guidelines into mild, moderate, severe, or life-threatening groups (4). Grades were determined by comparison with the predicted normal PEFR after adjustment for age and gender.

Results

Of 47 patients admitted between 1 March and July 31 1994, one was excluded because of irreversible airways disease. Of the remaining 46, 26 were women and 20 were men. Questioning revealed that 22 patients had been admitted previously with asthma, four had required ITU care and two had been ventilated. The duration of symptoms preceding presentation varied; 17 had been symptomatic for more
Severity assessment by PEFR classified 41 as severe to life-threatening. When analysis was performed employing heart rate or respiratory rate, fewer were classified as severe to life-threatening. 10 and 16, respectively. Arterial blood gas (ABG) analysis was available for 40 patients in casualty. Significant hypoxaemia ($PO_2<8.0$ kPa) was present in eight patients whose attacks were therefore defined as severe by BTS guidelines. However, two of these eight asthmatics were categorized as moderate according to all the clinical BTS assessment guidelines.

It was expected that all patients would have been treated with supplementary oxygen therapy, although the inspired oxygen concentration provided was recorded for only 28 patients. Fourteen of these received controlled oxygen therapy at a concentration of less than 40%. Nebulized bronchodilators were given to 44 patients; eight received salbutamol alone, 11 salbutamol followed later by salbutamol with ipratropium, and 25 were treated initially with salbutamol and ipratropium. Forty-two patients were given a steroid in casualty: orally for 25, intravenously for seven and both orally and intravenously for 10.

Following admission to the ward, pulse oximetry was recorded for 23 patients, two of whom continued to have low oxygen saturations (85-92%). A second ABG sample was recorded from 11 patients at a median time of 105 min after the first. Of the eight with an initial $PO_2$ of less than 8.0 kPa, six had a second ABG recorded. A chest radiograph was documented as showing clear lung fields in 25 patients; consolidation was present in two. Although it was expected that all patients had chest radiography, this was not recorded for 19 patients. No patient required admission to the intensive care unit.

Seventeen patients, 37% of this cohort, were discharged within 48 h of admission, 14 of whom presented with a life-threatening asthma according to PEFR. Five patients left hospital against advice. On the day of discharge, six patients still had a PEFR which, according to the BTS guidelines, indicated severe asthma. Two of these six were re-admitted. Diurnal variations of PEFR during the 24 h preceding discharge were recorded for 40 patients. PEFR fell in the mornings by more than 25% in 11 patients and by more than 50% in one. However, only one of these 11 patients was re-admitted. Oral steroids were provided for 45 patients at discharge but for only 30 by inhalation. Of the 16 not given inhaled steroids, two were re-admitted. Adequacy of inhaler technique was recorded in only 17.

Three patients were re-admitted during the study period and a further three during the subsequent 4 months. Five out of the six re-admissions presented initially with a life-threatening PEFR and two out of six had a $PO_2<8$ kPa. Three out of six re-admissions were discharged with a PEFR <75% predicted, but only one out of six had a diurnal variation in PEFR >25%.

Discussion

Our results demonstrate that clinical assessment may underestimate the degree of hypoxaemia. In particular, two of the eight patients with significant hypoxaemia ($PO_2<8.0$ kPa) were assessed as having a moderate attack of asthma according to grading by all three BTS clinical guideline observations (heart rate, respiratory rate and PEFR). The inaccuracy of initial clinical assessment in casualty has been implicated as contributing to morbidity in acute asthma (10), suggesting that pulse oximetry or ABG measurement should be routinely employed. At present, these investigations are recommended only when asthma attacks are graded as severe on clinical criteria (4). Pulse oximetry may also be advantageous as the degree of hypoxaemia is the most accurate guide to severity and hypoxaemia may worsen during nebulized bronchodilator therapy.

Only 30% of patients in this study were documented as having received the recommended minimum inspired oxygen concentration (40%). Casualty triage by nursing staff often leads to oxygen administration at low concentration for fear of oxygen toxicity in chronic obstructive airways disease. Subsequent medical reappraisal may have failed to establish appropriately high concentration oxygen therapy. Twenty-three patients received ward monitoring of oxygen saturation by oximetry, yet five of the eight with severe hypoxaemia apparently did not have in-patient oximetry performed, despite recommendations (4). This may have arisen because the BTS guidelines are relatively complex. Some authors have found that highlighting clinical features led to improved assessment in casualty (10) or have advocated simplified management schemes for different locations.

Although therapy with steroids and bronchodilators was satisfactory, the BTS guidelines propose that all patients should leave hospital taking inhaled steroids. However, these were not provided for 33% of patients. Inhaler technique was either not assessed or, if assessed, not documented for the majority of patients. This problem may have been logistic, as several different groups of staff (physiotherapists, nursing or medical) could have presumed that another group had assumed responsibility.

The BTS criteria for discharge were often not attained. For example, the morning measurement of the PEFR should show a diurnal variation of less than 25% from its previous evening assessment (4). However, 26% of patients left hospital before this criterion had been reached. Eleven per cent discharged themselves, demonstrating that the duration spent in hospital may be influenced by patient negotiation. None of these patients was re-admitted. Fourteen of 17 patients, (82%) initially classified by PEFR as having a life-threatening attack of asthma, were amongst 37% of the whole cohort who left hospital within 48 h. The fact that few patients were re-admitted, and none within 1 week, may indicate that the recommended discharge criteria need modification. Only one of 11 patients failing to meet the required diurnal variation in PEFR at discharge was re-admitted. On the other hand, strict discharge criteria would be supported by the finding that the PEFR was <75% predicted at discharge in three out of the six patients re-admitted.

The observed need for early assessment combined with a short in-patient period present logistic problems for patient
management and education. This may be best provided by an asthma nurse specialist who visits the ward (12).

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References