CLINICAL AUDIT OF MANAGEMENT OF ASTHMA IN CHILDREN AT KORLE BU TEACHING HOSPITAL

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SUMMARY
Asthma is now recognized as an important childhood illness in developing countries. Unnecessary morbidity and mortality are caused by lack of recognition and inadequate treatment of asthma. An audit of the management of children with acute asthma admitted to the Korle Bu Teaching Hospital was conducted with the view of making recommendations for the improvement of patient care.

The case notes of patients who had suffered at least 3 episodes of breathlessness and wheeze were inspected to assess the drug history, clinical evaluation of the severity of the attack, investigations requested and medications prescribed.

There were 102 admissions. A drug history was recorded for 60 (58.8%) admissions. Chest auscultation findings were documented for 98 (96.1%) patients and the ability to complete sentences for 10 (9.8%). The peak expiratory flow rate was not measured for any of the patients. Drugs had to be bought by parents/guardians for 16 (16.3%) admissions before treatment could be initiated. Treatment was delayed for more than 30 minutes in 20 (20.6%) patients. Nebulised salbutamol and systemic steroids were prescribed for 98 (96.1%) and 55 (53.8%) patients, respectively.

The results showed that the assessment and treatment of patients was inadequate and recommendations for improvement are made.

Keywords: Acute asthma, children, management, audit.

INTRODUCTION
The main focus of healthcare delivery among children in developing countries has been the prevention and treatment of infectious diseases and malnutrition since these are the major causes of morbidity and mortality.

However, with improving child survival due to effective intervention against these diseases, non-communicable diseases are assuming greater importance.

Asthma is the commonest chronic non-communicable childhood disease in developed countries, with a prevalence rate of between 4 to 20%. Prevalence rates similar to those for developed countries have been reported from several African countries including Ghana.

Acute asthma is potentially fatal. However, lack of recognition of the severity of an acute attack by medical practitioners, delay in obtaining medical help and inappropriate drug treatment, particularly underuse of steroids, have been shown to be important contributory factors to asthma deaths. Simple clinical indicators such as the ability to complete sentences, the use of accessory muscles of respiration, and the degree of reduction in lung function tests, such as the bedside measurement of the peak expiratory flow rate (PEFR), can be used to determine the severity of an acute attack.

Unequivocal evidence that asthma is a chronic inflammatory disease of the airways has resulted in a drastic change in its management. Anti-inflammatory therapy now forms a standard part of both the acute and prophylactic management of asthma. Other important aspects of treatment include the use of humidified oxygen and judicious fluid therapy in acute attacks.

Based on current knowledge about the pathogenesis of asthma, various national and international guidelines for the management of acute attacks have been developed to ensure optimal care. Despite this, many patients with asthma are...
still inadequately assessed and treated. In a previous questionnaire study of the knowledge and practice of house physicians in Korle Bu Teaching Hospital (KBTH) it was found that acute asthma in adults was poorly assessed and treated. In order to make recommendations for improvement in management, the present study was conducted in KBTH to evaluate the assessment and treatment of children with acute asthma as recorded in the case notes in comparison to national and international guidelines.

METHODS

Place and period of study: The study was a prospective audit carried out in the Department of Child Health (DCH), KBTH, Accra, Ghana from 1st February, 1996 to 28th February, 1997. KBTH has 1500 beds and is the main referral centre for acute emergencies in the Accra metropolis (population of 2 million). The DCH sees about 3000 acute admissions annually. The majority of emergency cases are initially attended to by house physicians doing a 6-month pre-registration rotation in Child Health.

Subjects: The subjects were children aged 2 to 12 years admitted to the Emergency Ward (EW) with an acute asthmatic attack.

Inclusion Criteria: Patients whose admission diagnosis was asthma were recruited if they had a history of at least 3 attacks of breathlessness and wheeze resolving either spontaneously or after bronchodilator therapy.

Exclusion Criteria: Patients with respiratory symptoms due to any of the following:
1. Cardiovascular disease
2. Pulmonary infection (ie, lung parenchymal disease) eg, tuberculosis
3. Structural respiratory tract abnormality

The data were collected using a standardised, pre-tested form. The clinical notes of consecutive patients recruited were inspected during and after discharge for each admission. The documentation of key points in the history and physical examination by the duty doctors were noted. Among these were the documentation of drugs taken prior to admission, and clinical signs helpful in the assessment of severity, such as pulse and respiratory rates, cyanosis, ability to complete sentences, use of accessory muscles, chest auscultatory findings and level of consciousness. Medications prescribed during admission and investigations requested were also documented.

Ethical clearance for the study was obtained from the Ethical and Protocol Review Committee of the University of Ghana Medical School.

Data Analysis: Precoded responses and observations were computerised using dBase IV software. Open-ended questions were grouped, coded and similarly entered. Frequencies were computed using SPSS software programme.

RESULTS

Patient Characteristics: Fifty-nine patients were admitted to the EW with a diagnosis of asthma during the study period. One of them had a history and chest radiograph highly suggestive of pulmonary tuberculosis and so was not included.

The 58 patients recruited had 102 admissions. Forty-two (72.4%) patients were admitted once, 6 (10.4%) were admitted twice and 10 (17.3%) had 3 or more admissions. For subsequent analysis a patient was considered as a new patient each time he/she was readmitted (ie, analysis was based on admission episodes). There were 49 (84%) males and 53 (52%) females. The age range was 2 to 12 years, with a mean age (S.D.) of 5.1 (2.5) years.

Drug History: This was recorded for 60 (58.8%) admissions.

Table 1 Clinical variables and investigations recorded for 102 admissions

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical Observations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Presence/ absence of cyanosis</td>
<td>28</td>
<td>27.0</td>
</tr>
<tr>
<td>Ability to complete sentences</td>
<td>10</td>
<td>9.8</td>
</tr>
<tr>
<td>Accessory muscle use</td>
<td>72</td>
<td>70.6</td>
</tr>
<tr>
<td>Chest auscultation</td>
<td>98</td>
<td>96.1</td>
</tr>
<tr>
<td>Level of consciousness</td>
<td>60</td>
<td>58.8</td>
</tr>
<tr>
<td>Clinical measurements</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heart rate</td>
<td>81</td>
<td>79.4</td>
</tr>
<tr>
<td>Respiratory rate</td>
<td>88</td>
<td>86.3</td>
</tr>
<tr>
<td>PEFR</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Investigations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chest radiograph</td>
<td>25</td>
<td>24.5</td>
</tr>
<tr>
<td>Full blood count</td>
<td>10</td>
<td>9.8</td>
</tr>
</tbody>
</table>

Clinical observations and measurements: The documentation of various clinical observations and measurements are shown in Table 1. The most commonly documented observations were chest auscultatory findings, whereas the ability to complete sentences was least commented on. The
PEFR was not measured for any of the patients because there were no peak flow meters.

**Laboratory Investigations:** The investigations requested are as shown in Table 1. Indications for the investigations were reviewed from the notes. There was no valid indication for 7 (28%) of the radiographs. Ten (40.0%) were taken because the patient had never had a chest radiograph since the onset of asthmatic symptoms. Five (20.0%) were taken to exclude pneumonia because of focal chest signs, and 3 (12.0%) were taken because the patient had a severe attack with poor initial response to therapy. Seven (70%) out of the 10 patients for whom a full blood count was requested were febrile.

**Availability of Drugs in Emergency Room:** Data were available for 98 admissions. The drugs initially prescribed on admission had to be bought from the pharmacy shop for 16 (16.3%) admissions before treatment could be initiated. This was because stocks had run out in the EW at the time of admission.

**Interval between Admission and Onset of Treatment:** The mean interval (SEM) was 34.6 (7.4) minutes, with a range of 5 to 540 minutes. Treatment was delayed for more than 30 minutes in 20 (20.6%) admissions. Eight (8.3%) of these were started on treatment after 120 minutes.

**Table 2: Drug Prescribed during Admission for 102 Patients.**

<table>
<thead>
<tr>
<th>Drug</th>
<th>Initial</th>
<th>%</th>
<th>Later</th>
<th>%</th>
<th>Initial + Later</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral Salbutamol</td>
<td>13</td>
<td>12.7</td>
<td>25</td>
<td>24.5</td>
<td>38</td>
<td>37.2</td>
</tr>
<tr>
<td>Nebulised Salbutamol</td>
<td>98</td>
<td>96.1</td>
<td>0</td>
<td>0</td>
<td>98</td>
<td>96.1</td>
</tr>
<tr>
<td>IV aminophylline</td>
<td>12</td>
<td>11.8</td>
<td>7</td>
<td>6.9</td>
<td>19</td>
<td>18.6</td>
</tr>
<tr>
<td>IV Steroids</td>
<td>24</td>
<td>23.5</td>
<td>12</td>
<td>11.7</td>
<td>36</td>
<td>35.2</td>
</tr>
<tr>
<td>Oral Steroids</td>
<td>3</td>
<td>2.9</td>
<td>16</td>
<td>15.7</td>
<td>19</td>
<td>18.6</td>
</tr>
<tr>
<td>Antibiotics</td>
<td>24</td>
<td>23.5</td>
<td>8</td>
<td>6.9</td>
<td>32</td>
<td>30.4</td>
</tr>
<tr>
<td>Oxygen</td>
<td>13</td>
<td>12.7</td>
<td>2</td>
<td>2.0</td>
<td>15</td>
<td>14.7</td>
</tr>
<tr>
<td>IV Fluids</td>
<td>10</td>
<td>9.8</td>
<td>5</td>
<td>4.9</td>
<td>15</td>
<td>14.7</td>
</tr>
</tbody>
</table>

*Initial = first drugs prescribed on admission
**Later = additional drugs prescribed after review
IV = intravenous
Freq = frequency

**Details of Drugs Prescribed:** The drugs prescribed are shown in Table 2. Nebulised salbutamol was the most commonly used drug (96.1%). Twelve of these patients were started concurrently on both nebulised and oral salbutamol. Intravenous aminophylline was used to treat acute asthma and was prescribed for 19 (18.6%) admissions. It was used as initial therapy in 12 admissions, 8 of whom were concurrently started on nebulised salbutamol, and 4 of whom received it as sole initial therapy.

**Discussion**

In a previous study conducted by one of the authors in KBTTH, it was found that house physicians' theoretical knowledge about the management of asthma was poor [10]. In the present study, we looked at the actual clinical management of acute asthma in children admitted to the emergency ward, as recorded in the case notes. This prospective audit confirmed the findings of the previous study. It showed that assessment of the severity of acute asthma attack in children by house physicians was poor in comparison to national [14] and international guidelines [11]. The limitation of inspection of case notes in this study is that poor documentation by doctors can give an erroneous impression of poor knowledge and inadequate clinical management skills. However, it is argued that accurate documentation is an integral part of good clinical management. The axiom: "What is not written was not done," also holds.
The results showed that a large percentage of admissions did not have a drug history documented. A drug history is important because it can give an indication of the severity of the exacerbation and also serves as a guide in deciding on further drug selection and dosage regimen.

Clinical observations are crucial to the objective assessment of the severity of a patient’s illness at the time of admission, and in the monitoring of progress during treatment. The documentation of heart and respiratory rates, chest auscultatory findings and the use of accessory muscles of respiration was high (above 70%), as was the case in a similar study in Toronto. However, a 100% documentation rate would have been expected since these are basic observations which do not involve the use of sophisticated equipment and should be documented for any patient in the emergency ward, especially for those in cardiorespiratory distress. The documentation of cyanosis, ability to complete sentences and level of consciousness which can indicate imminent respiratory arrest was low in both studies. In our setting where pulse oximetry and blood gas analysis are not available, accurate documentation of these clinical signs is crucial for identifying patients at high risk.

The house physicians’ use of the PEFR to assess the severity of attack could not be appraised because there were no peak flow meters in the EW. It is however noteworthy that Canny and associates in Toronto, found that only 2% of their patients had pulmonary function tests even though the facilities were available. This emphasises the point that doctors need to be made aware of the importance of measuring these parameters. Peak flow meters are inexpensive and should therefore be made available in the EW. Even the more expensive pulse oximeters would be a cost-effective investment for monitoring of the younger asthmatics (<5 years) and the severely dyspnoeic older asthmatics who are unlikely to use the peak flow meter correctly. The provision of these facilities should go hand in hand with raising the level of awareness of health-care providers of their value in assessment, in order to ensure that they are used.

In only a minority (25%) of patients were chest radiographs unduly requested. This is good practice as chest radiographs show abnormalities consistent with complicated acute asthma in only a minority of cases, and are only required to confirm a clinical suspicion of a complication. Apart from exposing patients to unnecessary radiation, non-essential radiographs create an unnecessary financial burden on the already over-burdened parents.

There was an unacceptable delay of 35 minutes (mean) (range 5 to 540 minutes) in initiating treatment for a significant number of patients. Ideally, all patients should have received treatment within 5 to 10 minutes of admission to the EW. It is particularly worrying that 8 (8.3%) patients waited for more than 2 hours to be given treatment. A major contributory factor to this delay was the unavailability in the EW of the prescribed drugs. Further studies are required to establish whether there are other causes of delay in initiation of treatment, so that they can be dealt with.

Nebulised salbutamol was prescribed for most of the patients. This is in keeping with the current first-line treatment for acute asthmatic attacks internationally. This contrasts with the finding in the earlier study that only 21% and 29% of house officers said they would use nebulised bronchodilators to treat moderate or severe asthma, respectively. It was suggested that in addition to ignorance about the use of nebulised bronchodilators, the lack of availability of facilities for nebulisation may have contributed to the low usage. The higher percentage of patients for whom nebulised salbutamol was prescribed in the present study is probably due to the fact that facilities had become available for nebulisation of drugs in the EW. It also suggests that knowledge of the benefits of nebulisation has improved.

Guidelines for the management of acute asthma in children recommend the use of aminophylline only in severe acute attacks not responding well to the use of nebulised short-acting beta, agonists and intravenous steroids. In this study, intravenous aminophylline was used as first-line drug for 12 out of the 19 (63%) patients for whom it was prescribed. The fact that 8 of these patients received both aminophylline and nebulised salbutamol concurrently as first-line drugs implies that the doctors did not think it was necessary to observe their response to nebulised salbutamol to serve as an indicator for the need for aminophylline. This could either be due to ignorance or due to the fact that the doctors thought the severity of the attack justified such an approach. Fortunately, no major side effects such as cardiac arrhythmias or convulsions were noted, in keeping with observations on the low incidence of side effects from the use of aminophylline in Ghana. Nevertheless, a cautious approach to the use of aminophylline in children would still be encouraged.
The use of systemic steroids is recommended in the management of acute exacerbations if response to inhaled short acting beta₂ agonist is not prompt i.e. after 2 doses at 20 to 30 minutes intervals.

Due to the fact that asthma is a chronic inflammatory airways disease, doctors should have a low threshold for prescribing systemic steroids during acute exacerbations. A much higher rate of prescription of steroids than the 53.8% found in this study would therefore have been expected. The underuse of systemic steroids in the management of acute attacks is contributed to by several factors. Important among these are the lack of knowledge of doctors about the inflammatory basis of asthma and their fear of steroid side effects due to a lack of understanding about the safety of short term intravenous and oral steroids at the recommended dosages.

It is recommended that supplemental oxygen, which can conveniently be used for nebulising beta₂ agonists, be administered to all children with a moderate or severe acute attack of asthma. The small number of patients who received oxygen during admission indicates a lack of appreciation by the attending doctors, of the occurrence of hypoxaemia. This is in line with earlier findings that only 28% and 74% of houseofficers said they would give oxygen for moderate and severe attacks respectively.

CONCLUSIONS

This study shows that documentation of clinical features that indicate the severity of asthma was inadequate. There was also under use of steroids and oxygen, as well as undue delay in the initiation of treatment. The development of management protocols which include a check-list for the assessment of severity would help to improve care. Monitoring apparatus and emergency drugs should be readily available.

REFERENCES


