



Is severity assessment after one hour of treatment better for predicting the need for admission in acute asthma?

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KEYWORDS

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Summary Aim: To determine if severity assessment after 1 h of treatment is better than assessment at presentation for predicting the requirement for hospital admission for emergency department (ED) patients with acute asthma.

Methods: Prospective, observational study conducted in 36 Australian ED for a 2-week period in 2001 involving patients aged 1–55 years presenting with asthma. Data collected included severity assessment according to the National Asthma Guidelines (Australia) at presentation and 1 h, and disposition. Descriptive analysis was applied.

Results: 720 cases were analysed. Patients with 'mild' asthma at either assessment time had a greater than 80% chance of discharge home. Patients assessed as 'severe' at either assessment had a greater than 85% chance of requiring hospital admission, but the 1 h assessment was better at predicting the need for Intensive Care Unit (ICU) admission. For the 'moderate' group, the initial assessment was a poor predictor of the need for admission however those who met the criteria for 'moderate' severity at 1 h had an 84% chance of requiring admission.

Conclusion: Assessment of asthma severity after 1 h of treatment is better than initial severity assessment for determining the need for hospital admission for patients initially assessed as having 'moderate' asthma and for predicting the need for ICU in patients initially assessed as 'severe'.

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Introduction

The National Asthma Guidelines¹ (NAG) were developed in an attempt to improve the quality as asthma care across the spectrum of disease and

treatment facility in Australia. They address both chronic and acute management and both hospital and local practitioner care. Where possible (e.g. the use of medications), the guidelines are based on evidence. Where evidence was lacking, a consensus approach was employed utilising a consultative process that included local practitioners, respiratory physicians and hospital doctors, but notably did not include emergency physicians.

Recommendations about disposition after emergency department (ED) treatment were included in

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the guidelines. The reasons for and basis of the recommendations are not clear, but may have been an attempt to address a perception that some patients who should have been admitted to hospital were being sent home from the ED or that too many patients were unnecessarily being hospitalised. At the time of development there was little evidence to inform this part of the guidelines, so consensus was employed, resulting in very conservative hospital admission recommendations based on initial assessment on arrival in ED. Experienced emergency physicians anecdotally report that decisions about disposition are often at odds with the guideline recommendations and that the response to initial treatment is a better predictor of the requirement for hospital admission and the level of care required.

The aim of this study was to determine if severity assessment after 1 h of treatment is better than assessment at presentation for predicting the requirement for hospital admission for ED patients presenting with acute asthma.

Methods

This prospective, observational study was conducted in 36 departments of emergency medicine (ED) in Australia for the period of 20th August to 2nd September, 2001 as part of the *Snapshot of Asthma in Australia 2001* project (see acknowledgments). It collected data on all patients aged between 1 year and 55 years of age presenting with a physician-confirmed diagnosis of acute asthma. This range was chosen to reduce potential overlap

with bronchiolitis and chronic obstructive airways disease. A detailed description of the *Snapshot of Asthma in Australia 2001* project methodology has previously been published.²

For this study, data collected included demographic information, asthma severity as classified by the NAG (Australia)¹ (Tables 1 and 2) at the time of presentation and after 1 h of treatment and final disposition from the ED (home, ward, intensive care unit—ICU). The primary outcome was the proportion of each severity classification that required hospital admission. Data analysis was descriptive.

Results

There were 831 asthma presentations in the study period. 765 patients (92%) had complete initial data and 720 (87%) had complete data at the 1 h assessment. 62% were children (aged under 16 years) and 44% of patients were female. Overall 32% of patients required hospital admission.

Severity assessment distribution at the presentation and 1 h time intervals are shown in Table 3. Table 4 shows the proportion of each severity classification that required hospital admission for each time interval.

More than 80% of patients assessed as 'mild' asthma severity at either time interval were able to be discharged home from the ED after treatment. More than 85% of patients meeting the criteria for 'severe' asthma at either time interval required hospital admission.

Table 1 Initial assessment of severity of acute asthma in children¹.

Symptoms	Mild	Moderate	Severe and life-threatening
Altered consciousness	No	No	Yes
Physical exhaustion	No	No	Yes, may have paradoxical chest wall movement
Talks in	Sentences	Phrases	Words
Pulsus paradoxus	Not palpable	May be palpable	Palpable
Pulse rate	< 100	100–200	> 200
Central cyanosis	Absent	Absent	Likely to be present
Wheeze intensity	Variable	Moderate—loud	Often quiet
Peak expiratory flow	> 60%	40–60%	< 40% or < 100 l/min
FEV ₁ (% predicted)	> 60%	40–60%	< 40% or < 1 l
Oximetry on presentation (SaO ₂)	> 94%	94–90%	< 90%
Admission necessary	Probably not	Probably	Yes—consider ICU

Table 2 Initial assessment of severity of acute asthma in adults¹.

Symptoms	Mild	Moderate	Severe and life threatening
Physical exhaustion	No	No	Yes, may have paradoxical chest wall movement
Talks in	Sentences	Phrases	Words
Pulse rate	< 100/min	100–120/min	> 120/min
Pulsus paradoxus	Not palpable	May be palpable	Palpable
Central cyanosis	Absent	May be present	Likely to be present
Wheeze intensity	Variable	Moderate—loud	Often quiet
Peak expiratory flow (% predicted)	> 75%	50–75%	< 50% or < 100 l/min
FEV ₁ (% predicted)	> 75%	50–75%	< 50% or < 1 l
Oximetry on presentation	> 95%	92–95%	< 92%; cyanosis may be present
Admission necessary	Probably not	Probably	Yes—consider ICU

Table 3 Severity assessment distribution at presentation and after 1 h of treatment.

NAG asthma severity class	No. (%) patients at time of assessment	
	Presentation	1 h
Mild	462 (60%)	564 (78%)
Moderate	275 (36%)	142 (20%)
Severe	28 (4%)	14 (2%)
Total	765	720

Table 4 Proportion of patients requiring hospital admission for each severity classification at presentation and after 1 h of treatment.

NAG asthma severity class	Hospital admissions (% raw proportion)	
	Presentation	1 h
Mild	13% (62/462)	18% (99/564)
Moderate	57% (156/275)	84% (119/142)
Severe	89% (25/28)	86% (12/14)
Total	32% (243/765)	32% (230/720)

Initial assessment as 'moderate' was a poor predictor of the need for hospital admission (57% admitted, 43% discharged), however the 1 h reassessment proved highly predictive with 84% of patients who met the criteria of 'moderate' severity at that time requiring hospital admission (Fig. 1).

Only 25% of patients initially assessed as 'severe' required ICU admission (assumes that transfer was for ICU admission). The 1 h assessment better

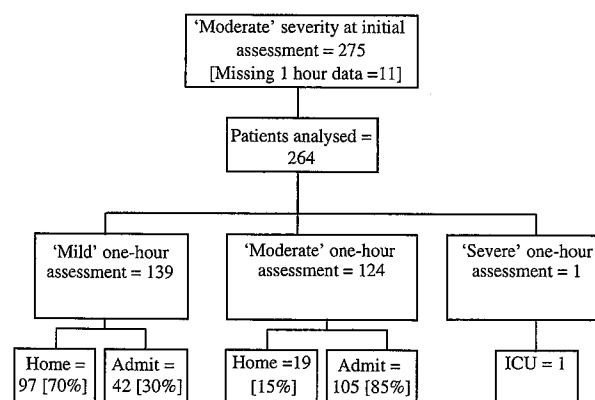


Figure 1 Analysis of outcome of patients assessed as 'moderate' severity on arrival.

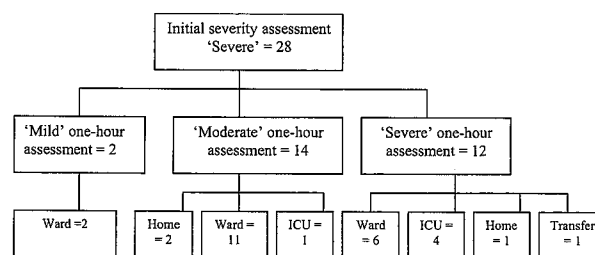


Figure 2 Analysis of outcome of patients assessed as 'severe' severity on arrival.

predicted the subgroup of patients requiring ICU admission (Fig. 2).

Discussion

Our results strongly suggest that assessment of asthma severity after 1 h of treatment is better than initial severity assessment for determining the

need for hospital admission for patients initially assessed as having 'moderate' asthma and for predicting the need for ICU in patients initially assessed as 'severe'.

These findings are supported by a number of studies, most published after the NAG guidelines were developed. A recent Canadian study showed that no clinical parameters measured at baseline (presentation to the ED) were associated with likelihood of hospital admission, hence making the initial assessment an unreliable predictor of the need for admission.³ In that study, the time interval of the alternative assessment was 2 h after initiation of therapy. At that time, both the forced expiratory volume value (FEV₁) and asthma score were predictors of hospital admission. Similarly, a small study conducted in Brazil has suggested that, for adult asthma patients, it was possible to predict hospitalisation or discharge home after the first hour of asthma management in the ED using clinical and pulmonary function measures.⁴ A study of adult asthma patients in Uruguay, which looked at a number of variables at a series of time intervals after ED presentation, found that clinical parameters measured after 30 min of treatment, including peak expiratory flow rate (PEFR) as a percent of expected and PEFR change over baseline as well as accessory muscle use, were the variables making the greatest contribution in discriminating between hospitalised and discharged patients.⁵ Additionally, Bollinger et al.⁶ in a South African study found that prediction of outcome, including need for hospitalisation, was not possible based on parameters at admission.⁶

The accumulated evidence strongly suggests that response to treatment rather than parameters at ED presentation determine the need for hospital admission. This has implications both for practice in ED and for the authors of guidelines such as NAG. For ED practice, they suggest that disposition decisions can be made based on patient assessment after a short period of aggressive treatment and that prolonged periods of observation in the ED are unlikely to refine this decision-making significantly. This should help to avoid the practice that has appeared in some ED of observing patients for several hours before deciding disposition. A decision based on assessment between 1 and 2 h would avoid unnecessary admissions (which would occur if the decision was based on the initial assessment), facilitate patient flow through the ED and reduce uncertainty for patients and their families. It may also avoid unnecessary use of ICU.

For the authors of guidelines, the data provide a basis for future recommendations and encourages a change in the current NAG recommendation.

Disposition decisions based on assessment after between 1 and 2 h of aggressive therapy seems both justified and practical. The obvious exception is where there is a clear need for ICU (e.g. respiratory arrest or intubation). Of interest, the recently published British Thoracic Society/Scottish Intercollegiate Guidelines Network guidelines for the management of asthma in adults recommend disposition decision after 2 h of treatment and observation in ED.⁷

In some countries, guidelines such as NAG have come to be regarded as embodying the required standard of care and failure to adhere to their recommendations has resulted in medicolegal challenge.⁸ Our data should provide physicians with some confidence that the NAG disposition recommendations are not supported by evidence and that successful medicolegal challenge based on this section of the guidelines is unlikely.

This study has some limitations that should be considered when interpreting the results. Patient selection was based on physician diagnosis of asthma. No attempt was made to confirm this with pulmonary function testing. While this approach may have resulted in the incorrect inclusion of some patients, it is a reflection of 'real world' practice in ED and should not have introduced a systematic bias. There is a modest amount of missing data, more so at the 1 h assessment. The results, in particular disposition patterns, may not be generalisable to other settings. The study sample has a high proportion of children that may limit generalisability to adult populations. Despite these limitations, the authors believe that the study is representative of asthma severity and response in Australia and provides useful information to guide disposition decision-making.

Conclusion

Assessment of asthma severity after 1 h of treatment is better than initial severity assessment for determining the need for hospital admission for patients initially assessed as having 'moderate' asthma and for predicting the need for ICU in patients initially assessed as 'severe'. Future versions of asthma guidelines should be modified taking this evidence into consideration.

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