The Royal College of Emergency Medicine

MODERATE & ACUTE SEVERE ASTHMA

CLINICAL AUDIT 2016/17

National Report

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Contents

Foreword

Dr Taj Hassan, RCEM President

There are approximately 5.4 million people in the UK who suffer from asthma, with one in five households being affected. Of greater concern is that every 10 seconds someone is having a potentially life threatening asthma attack and despite remarkable efforts by NHS staff, 3 people will die of acute asthma every day in the UK.

The subject matter for this audit could not, therefore, be more important and the QEC committee and staff who led this audit are to be congratulated for having managed to provide a comprehensive picture from so many Emergency Departments (ED). The results are sadly more concerning, with a decline in quality standards in some key areas and marked variation within systems.

The reasons for the concerning figures are probably multifactorial. The 'big ticket items' are likely to be a lack of adequate numbers of medical and nursing staff in EDs to cope with demand, crowding due to exit block compromising care delivery, a lack of robust protocols and pathways to support decision making, and lack of education in key areas for staff.

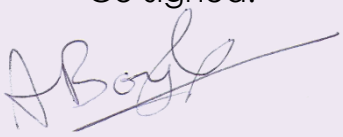
Whatever the reasons, there is no doubt that what we are doing is not good enough despite the often heroic efforts of clinical staff. Addressing variation in practice is important and finding ways to be consistent to deliver on key markers of success in this common, highly treatable condition is vital.

This report should be discussed by senior multidisciplinary ED teams to look at the key areas of clinical practice so that, where possible, appropriate refinements to the care pathway can be made. More importantly, the data will be of interest to regulators as a surrogate marker of quality care, which is perhaps being compromised due to inadequate staffing levels or overcrowding in the ED. Clinical Directors should consider these issues when making business cases to address staffing and system shortcomings well before the regulator visits.

There is no doubt that we must identify and address the factors that are compromising our ability to deliver the care we would want for our patients. Thanks again to the authors for shining a brighter light on this common life threatening condition that can be so well managed in the ED and improve the lives of so many.

Dr Taj Hassan, RCEM President

Co-signed:



Dr Adrian Boyle, Chair of Quality in Emergency Care Committee

Dr Jeff Keep, Chair of Standards & Audit Subcommittee

Executive summary

A total of 14043 patients presenting to 201 Emergency Departments were included in this audit. This was the third time this audit has been conducted. The chart on the following page is a summary of the performance against standards.

The purpose of the audit is to monitor documented care against the standards published in June 2016. The audit is designed to drive clinical practice forward by helping clinicians examine the work they do day-to-day and benchmark against their peers but also recognise excellence. There is much good practice occurring around the country and this audit is an important component in sharing this and ensuring patient safety.

The results of this audit show that many departments are finding it challenging to adhere to the time standards set by the British Thoracic Society and RCEM. It is thought that this, in part, reflects the increasing demands on Emergency Departments with higher volumes of patients with increasingly complex health needs.

In providing care for these patients at the front door, our resources are predictably stretched and so time to first assessment and treatment can be delayed and therefore re-assessment in a timely fashion more difficult to achieve. Identifying derangement in vital signs and peak flow early is a very important part of good asthma care as it guides treatment and therefore leads to a reduction in morbidity and mortality.

There is much that can be learned from departments who do manage to adhere well to these standards and they should be congratulated. Better sharing of working practices is needed where these are achieved and rapid cycle quality improvement work to raise standards where this is possible. It is not enough to say it is busy and there is no scope for improvement.

Hopefully, this document will provide a platform from which such improvement work can take place. Departments may find the suggested proformas, which can be found within RCEM Local Guidance, a practical way of improving documentation of timings and prompting re-assessment.

Even accounting for issues with documentation, the fact that only 25% of Departments can administer a nebulised bronchodilator within 10 minutes of arrival is of great concern. There is unacceptable variation when it is known that all EDs are busy. Action must be taken by Departments on fundamental standards that they are failing to achieve. These fundamental standards are priority areas for Quality Improvement Projects (QIPs) in the department.

Key recommendations

1. Departments should consider how oxygen is prescribed and ensure that all asthmatics are prescribed it on arrival to maintain saturations of 94-98%, preferably with a β2 agonist if required.

2. Vital signs are an important measure of both severity of illness and detecting treatment efficacy. Departments should consider an education programme for staff to improve this and conduct regular local audits/QIPs to ensure compliance with particular focus on timing and peak flow measurement.

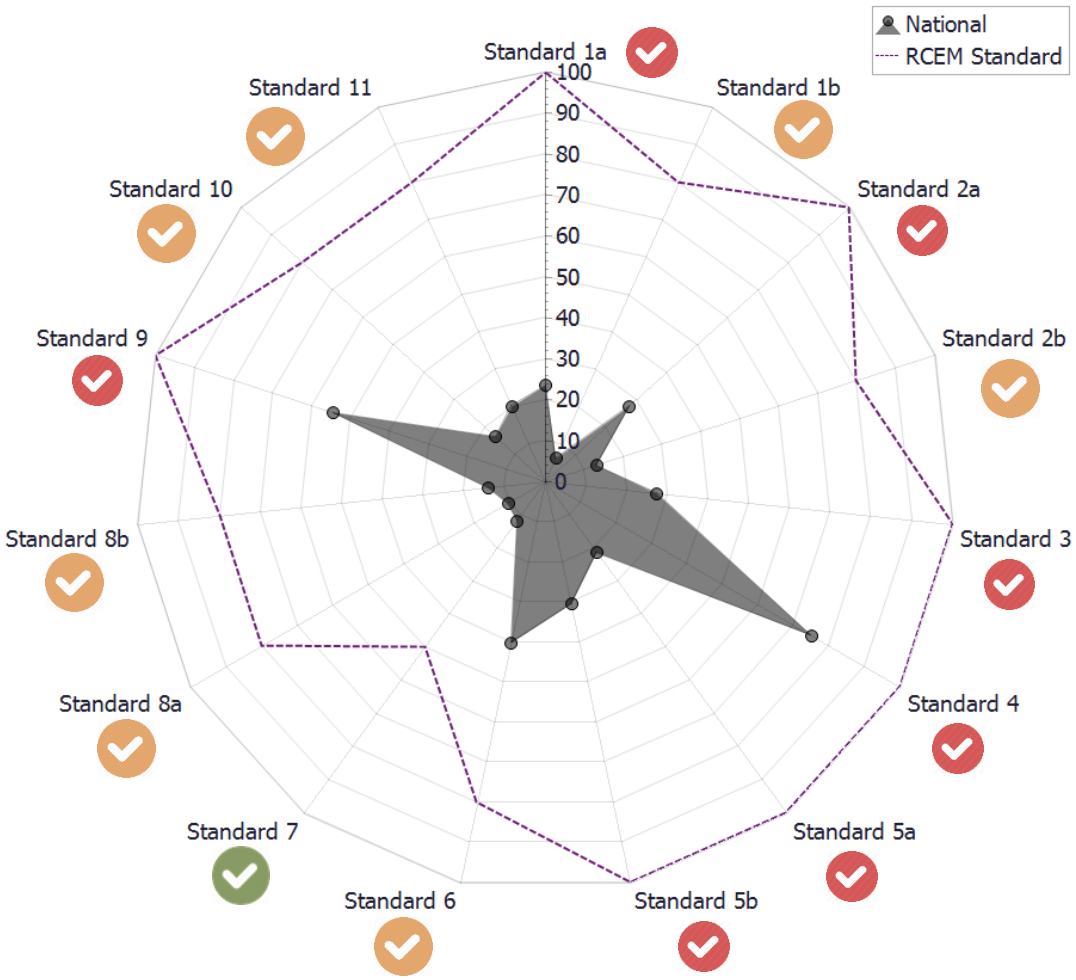
3. Consideration should be given to psychosocial factors in assessment of severity and discharge and departments should consider this in their education programme.

4. On discharge, all moderate-severe asthmatic patients should have a written management plan in place which includes assessment of inhaler type, technique, steroids and follow-up.

5. A proforma should be considered by departments to improve documentation and act as an aide memoir for assessment, discharge/admission criteria and dosing of medication.

Performance Summary

This graph shows the national performance against all standards for this audit.



Standards:

Fundamental Developmental Aspirational

↑ **Higher scores (e.g. 100%)** indicate higher compliance with the standards and better performance.

↓ **Lower scores (e.g. 0%)** indicate that your ED is not meeting the standards and may wish to investigate the reasons.

Summary of national findings

	RCEM Standard	National Results: 2016/17 (children and adults) (14043 cases) 2013/14 (children) (7001 cases) 2009/10 (adults) (5926 cases)				
		2016/17			2013/14	2009/10
		Lower quartile	Median	Upper quartile	Median	Median
STANDARD 1a: O_2 should be given on arrival to maintain sats 94-98%	**100%**	12%	19%	30%		85%[a]
STANDARD 1b: O_2 should be prescribed on arrival to maintain sats 94-98%	**80%**	1%	4%	8%		
STANDARD 2a: As per RCEM standards, vital signs should be measured and recorded on arrival at the ED	**100%**	15%	26%	40%	48%[b]	100%[c]
STANDARD 2b: Patients with any recorded abnormal vital signs should have a further complete set of vital signs recorded in the notes within 60 minutes of the first set	**80%**	4%	11%	19%		6%[d]
STANDARD 3: High dose nebulised β2 agonist bronchodilator should be given within 10 minutes of arrival at the ED ***Note: A pMDI + spacer is the preferred option in children with moderate asthma***	**100%**	12%	25%	36%	8%[e]	12%
STANDARD 4: Add nebulised Ipratropium Bromide if there is a poor response to nebulised β2 agonist bronchodilator therapy	**100%**	68%	77%	87%	88%[f]	
STANDARD 5: If not already given before arrival to the ED, steroids should be given as soon as possible as follows: Adults 16 years and over 40-50mg prednisolone PO or 100mg hydrocortisone IV Children 6-15 years 30-40mg prednisolone PO or 4mg/kg hydrocortisone IV Children 2-5 years 20mg prednisolone PO or 4mg/kg hydrocortisone IV ***Note: children receiving maintenance steroid tablets should receive 2mg/kg prednisolone up to a maximum dose of 60mg***	-					

	RCEM Standard	National Results: 2016/17 (children and adults) (14043 cases) 2013/14 (children) (7001 cases) 2009/10 (adults) (5926 cases)				
		2016/17			2013/14	2009/10
		Lower quartile	Median	Upper quartile	Median	Median
STANDARD 5a: within 60 minutes of arrival (acute severe)	**100%**	6%	19%	32%	See cell below	30%[g]
STANDARD 5b: within 4 hours (moderate)	**100%**	12%	28%	43%	66%[h]	
STANDARD 6: Intravenous Magnesium 1.2 - 2g over 20 minutes to be given to adults with acute severe asthma who do not respond well to bronchodilators	**80%**	23%	38%	60%		
STANDARD 7: Evidence of consideration given to psychosocial factors in adults prior to discharge	**50%**	0%	6%	18%		
STANDARD 8: Evidence of assessment before discharge that:	-					
STANDARD 8a: the patient's inhaler TECHNIQUE is satisfactory	**80%**	0%	7%	14%		
STANDARD 8b: the patient's inhaler TYPE is satisfactory	**80%**	1%	9%	20%		
STANDARD 9: Discharged patients should have oral prednisolone prescribed as follows: Adults 16 years and over 40-50mg prednisolone for 5 days Children 6-15 years 30-40mg prednisolone for 3 days Children 2-5 years 20mg prednisolone for 3 days ***Note: children receiving maintenance steroid tablets should receive 2mg/kg prednisolone up to a maximum dose of 60mg***	**100%**	40%	52%	71%	62%[i]	69%[j]
STANDARD 10: Written discharge advice given to the patient	**80%**	4%	8%	25%		
STANDARD 11: GP or clinic follow-up arranged according to local policy for discharged patients within 2 working days	**80%**	7%	16%	28%		63%[j]

Notes about the results

The **median** value of each indicator is that where equal numbers of participating EDs had results above and below that value. The median figures in the summary table may differ from other results quoted in the body of this report which are mean (average) values calculated over all audited cases.

The **lower quartile** is the median of the lower half of the data values.

The **upper quartile** is the median of the upper half of the data values.

The asthma standards have been updated since 2009/10 and 2013/14. This does not make it possible to directly compare the current and the previous audit results. The figures shown in the table above are for the closest equivalent standards. The cells shaded grey indicate either that no equivalent standard was available for that year or that no data was collected. The notes below state the standards as they were previously and these should be borne in mind when comparing current and past audit results.

a. The standard in 2009/10 was:

> *Evidence in the notes that Oxygen was being given on arrival*

The audit question had referred to oxygen given 'pre-arrival', not 'on arrival'.

b. No ED managed to achieve the RCEM standard of fully measuring and recording all vital signs for all patients within 15 minutes of arrival in the ED. This figure is the rate of overall vital signs measurement.

c. The standard in 2009/10 was:

> *98% documented evidence of peak flow, pulse rate, respiratory rate and oxygen saturation measured on arrival*

The overall performance percentage was not calculated and, for ease of comparison, the figure shown here is the lowest median of pulse, respiratory rates and oxygen saturation (but does not include peak flow).

d. The standard in 2009/10 was:

> *75% of cases peak flow, pulse rate, respiratory rate and oxygen saturation repeated within 1 hour of arrival*

This figure relates to vital signs, including peak flow, being measured on a repeat occasion.

e. The standard in 2013/14 was:

Beta agonist (moderate) or Beta agonist and ipratroprium (severe) given as dosages below within 10 minutes of arrival:

Drug	***Moderate***	***Severe***
Beta 2 agonist	*2-10 puffs via spacer (or salbutamol 2.5-5mg or terbutaline 5-10mg by nebuliser)* *Increase by 2 puffs every 2 min up to 10 puffs depending on response*	*10 puffs via spacer or salbutamol 2.5-5mg or terbutaline 5-10mg by nebuliser*
Beta 2 agonist +/- ipratroprium		*Add 250 microgram (5mcg/kg) via spacer or nebuliser if poor response*

f. Referring to the standard above, 88% of patients were given beta agonist (moderate) or beta agonist and ipratropium (severe) with no stipulated timeframe.

g. The standard in 2009/10 was:

90% of cases IV hydrocortisone 100mg or oral prednisone 30-50mg given within 30 minutes of arrival

The figure of 30% applied to all asthma patients – moderate and acute severe - who were given steroids within 60 minutes, but only 18% of patients were given steroids within 30 minutes.

h. The standard in 2013/14 was

IV hydrocortisone or oral prednisone given as dosages below before leaving the ED:

Drug	***Moderate***	***Severe***
IV hydrocortisone	*N/A*	*4 mg/kg (if vomiting)*
or oral prednisone	*30-40mg (over 5 yrs)*	*30-40mg (over 5 yrs)*

No timeframe was stipulated for steroids to be given.

i. The standard in 2009/10 was:

90% of discharged patients should have oral prednisolone 30 – 50mg for 5 days

The standard in 2013/14 was:

90% of discharged patients to be prescribed oral prednisolone as follows:

Drug	***Moderate***	***Severe***
Oral prednisolone	*30 – 40mg for up to 3 days (over 5 years)*	*30–40 mg for up to 3 days (over 5 years)*

It should be noted that the current standard is set at 100%.

j. The standard in 2009/10 was:

90% of cases GP or clinic follow up arranged within 2 days for discharged patients

Introduction

This report shows the results from an audit of patients who presented at Emergency Departments (ED) with moderate or acute severe asthma. Cases included adult patients aged 16 years and over, and paediatric patients between 2-15 years old.

Background

This audit brings together RCEM's previously audited adult and paediatric asthma audit topics. The standards have been reviewed against the most recent standards and guidance.

Aims

The audit will be conducted for the third time to continue the work of the 2009/10 adult and 2013/14 paediatric data collections. It will identify current performance in EDs against RCEM clinical standards, show the results in comparison with other departments, and also across time if there was previous participation in 2009/10 or 2013/14.

The objectives of this audit are:

1. To benchmark current performance in EDs against the standards
2. To allow comparison nationally and between peers
3. To identify areas in need of improvement
4. To compare against previous performance in 2009/10 and 2013/14

Methodology

Participation summary

Nationally, **14043** cases from **201** EDs were included in the audit.

Country	Number of relevant EDs	Number of cases
National total	201/233 (86%)	14043
England	179/179 (100%)	12863
Scotland	5/26 (19%)	302
Wales	10/13 (77%)	529
Northern Ireland	6/9 (67%)	323
Isle of Man /Channel Islands	1/3 (33%)	26

Pilot methodology

A pilot of the audit was carried out prospectively from 13th July 2016 to 29th July 2016, with the help of 8 sites. The pilot period was used to test the audit questions and the quality of data collected.

Pilot sites

We are grateful to contacts from the following trusts for helping with the development of the audit:

- Airedale General Hospital, Airedale NHS Foundation Trust
- Blackpool Victoria Hospital, Blackpool Teaching Hospitals NHSFT
- Norfolk and Norwich University Hospital, Norfolk and Norwich University Hospitals NHSFT
- Peterborough City Hospital, Peterborough and Stamford Hospitals NHS Foundation Trust
- Queen's Medical Centre, Nottingham University Hospitals NHST
- Royal Gwent Hospital, Aneurin Bevan University Health Board
- Southampton General Hospital, University Hospital Southampton NHSFT
- Wishaw General Hospital, NHS Lanarkshire

Audit history

All EDs in the UK were invited to participate in July 2016. Data were collected using an online data collection tool. The audit is included in the NHS England Quality Accounts for 2016/2017.

Participants were asked to collect data from ED patient records on consecutive cases who presented to the ED between 1st January 2016 and 31st December 2016 and were subsequently discharged home or died.

Sample size

RCEM recommended auditing a different number of cases depending on the number of patients seen within the data collection period. If this was an area of concern, EDs were able to submit data for more cases for an in-depth look at their performance.

Basing the audit sample size on the number of cases in this way increases the reliability of an ED's audit results.

Audited cases should be consecutive during the data collection period (1st January 2016 to 31st December 2016).

Expected number of cases	Recommended audit sample
< 50	All eligible cases
50-250	50 consecutive cases
>250	100 consecutive cases

Standards

The audit asked questions against standards published by RCEM in June 2016:

Standard	%	Standard type
1a. O_2 should be given on arrival to maintain sats 94-98%	100	Fundamental
1b. O_2 should be prescribed on arrival to maintain sats 94-98%	80	Developmental
2a. As per RCEM standards, vital signs should be measured and recorded on arrival at the ED	100	Fundamental
2b. Patients with any recorded abnormal vital signs should have a further complete set of vital signs recorded in the notes within 60 minutes of the first set	80	Developmental
3. High dose nebulised β_2 agonist bronchodilator should be given within 10 minutes of arrival at the ED *Note: A pMDI + spacer is the preferred option in children with moderate asthma*	100	Fundamental
4. Add nebulised Ipratropium Bromide if there is a poor response to nebulised β_2 agonist bronchodilator therapy	100	Fundamental
5. If not already given before arrival to the ED, steroids should be given as soon as possible as follows: Adults 16 years and over 40-50mg prednisolone PO or 100mg hydrocortisone IV Children 6-15 years 30-40mg prednisolone PO or 4mg/kg hydrocortisone IV Children 2-5 years 20mg prednisolone PO or 4mg/kg hydrocortisone IV *Note: children receiving maintenance steroid tablets should receive 2mg/kg prednisolone up to a maximum dose of 60mg*		
5a. within 60 minutes of arrival (acute severe)	100	Fundamental
5b. within 4 hours (moderate)	100	Fundamental
6. Intravenous Magnesium 1.2 - 2g over 20 minutes to be given to adults with acute severe asthma who do not respond well to bronchodilators	80	Developmental
7. Evidence of consideration given to psychosocial factors in adults prior to discharge	50	Aspirational

8. Evidence of assessment before discharge that:		
8a. the patient's inhaler TECHNIQUE is satisfactory	**80**	**Developmental**
8b. the patient's inhaler TYPE is satisfactory	**80**	**Developmental**
9. Discharged patients should have oral prednisolone prescribed as follows: Adults 16 years and over 40-50mg prednisolone for 5 days Children 6-15 years 30-40mg prednisolone for 3 days Children 2-5 years 20mg prednisolone for 3 days *Note: children receiving maintenance steroid tablets should receive 2mg/kg prednisolone up to a maximum dose of 60mg*	**100**	**Fundamental**
10. Written discharge advice given to the patient	**80**	**Developmental**
11. GP or clinic follow-up arranged according to local policy for discharged patients within 2 working days	**80**	**Developmental**

About this report

Understanding the different types of standards

Fundamental: need to be applied by all those who work and serve in the healthcare system. Behaviour at all levels and service provision need to be in accordance with at least these fundamental standards. No provider should provide any service that does not comply with these fundamental standards, in relation to which there should be zero tolerance of breaches.

Developmental: set requirements over and above the fundamental standards.

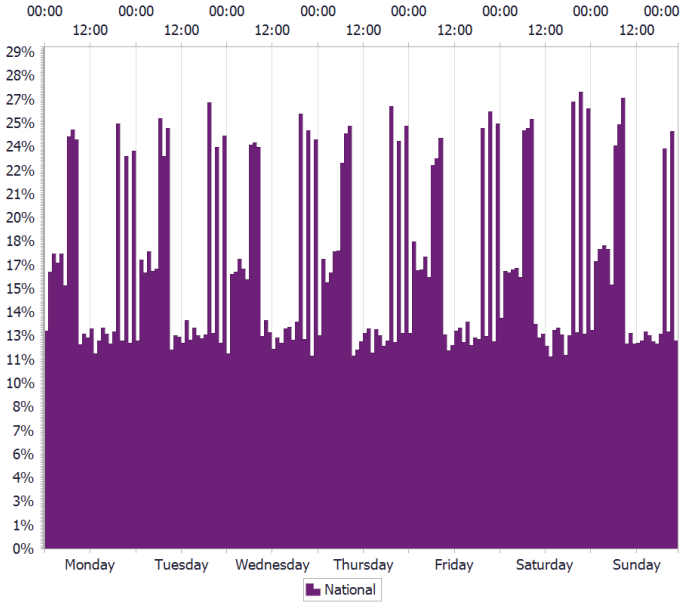
Aspirational: setting longer term goals.

For definitions on the standards, refer to appendix.

Understanding the charts

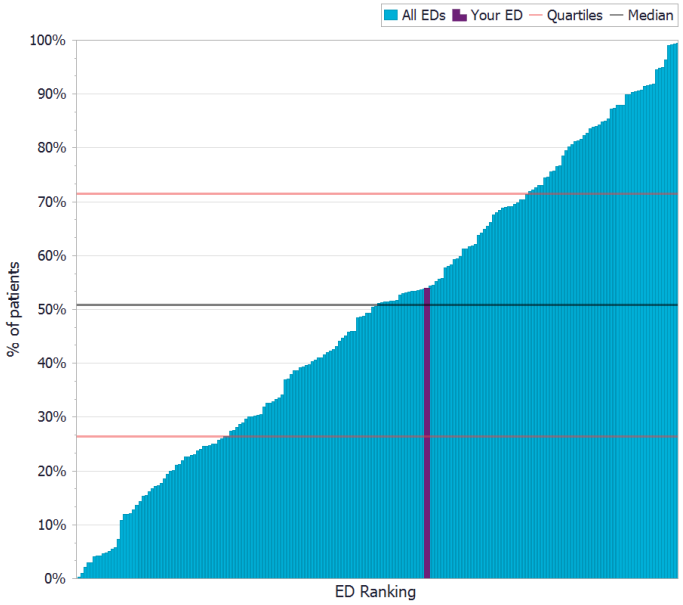
There are different types of charts within this report to present the data. The example graphs below show the type of charts you will encounter.

Time and date



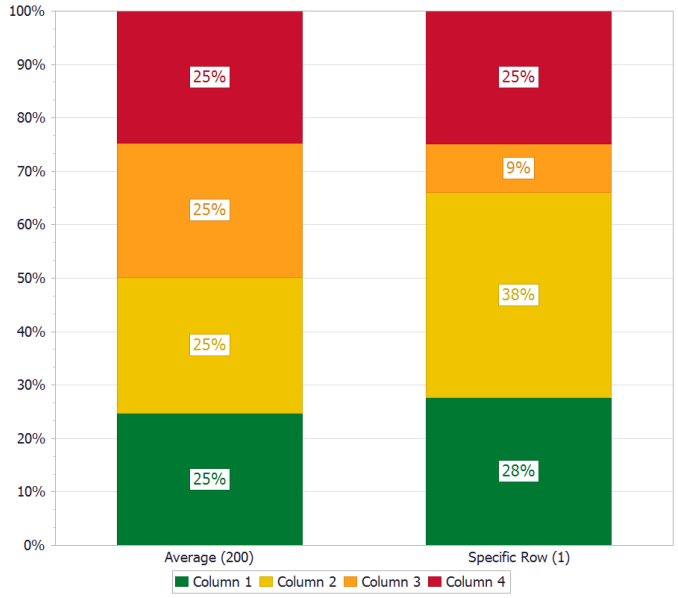
This chart shows the day and time of patient arrivals. Higher bars show when a lot of patients are arriving in the ED, whereas lower bars show quieter arrival times.

Sorted Bar Chart



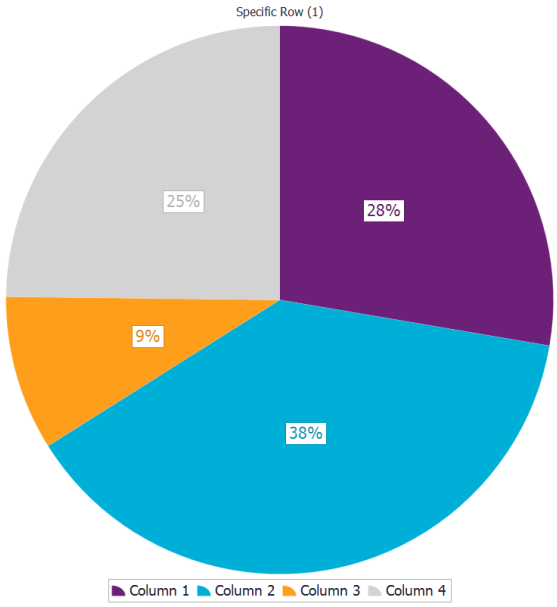
Sorted bar charts show the national performance, where each bar represents the performance of an individual ED. The horizontal lines represent the median and upper/lower quartiles. Local reports will identify your ED with a vertical red bar.

Stacked Bar Chart



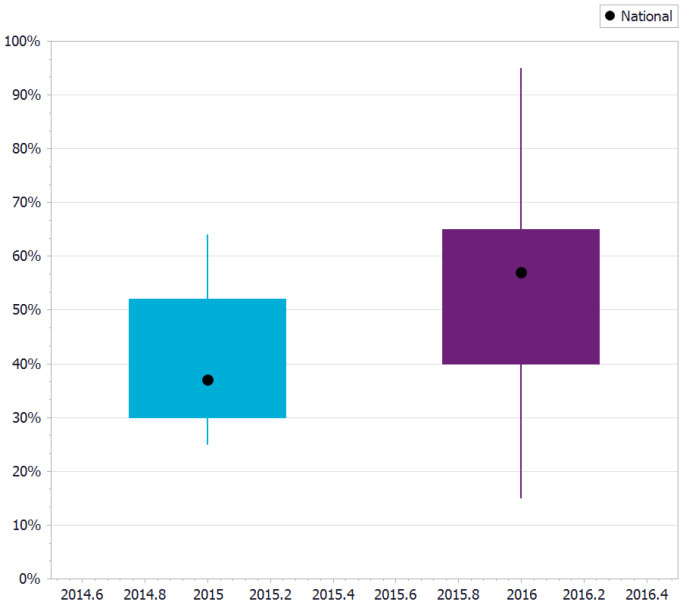
Stacked bar charts show the breakdown of a group nationally. These are used when it will be helpful to compare two groups side by side, for example comparing local data with the national data.

Pie Chart



Pie charts show the breakdown of a group nationally. They help you understand the composition of a sample and which subgroups are largest.

Box and Whisker Chart



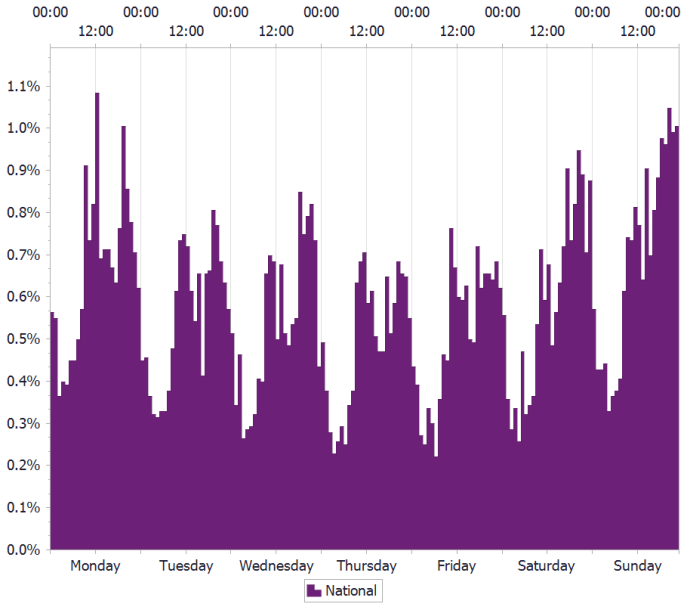
These charts show you the median, upper and lower quartiles, and minimum and maximum values.

The dot in the middle of the 'box' is the median. The top line of the box is the upper quartile and the bottom line is the lower quartile. The thin 'whiskers' show the minimum and maximum values.

Section 1: Casemix

National case mix and demographics of patients.

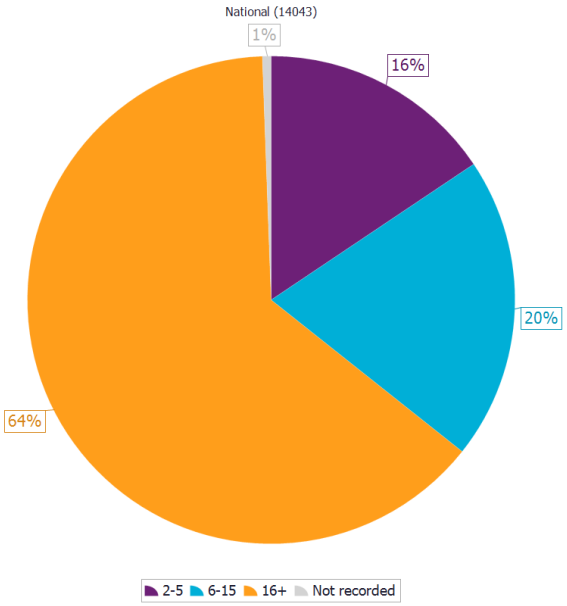
Q1&2. Date and time of arrival



Sample: all patients

There is a relatively even distribution of asthma attendances over the weekdays, peaking late evening. On Sunday evenings, there appears to be an increased incidence of attendance which may reflect reduced access to GP services over the weekend but the aetiology is not known. It is certainly reflective of ED attendances in general.

Q3. Age of patient

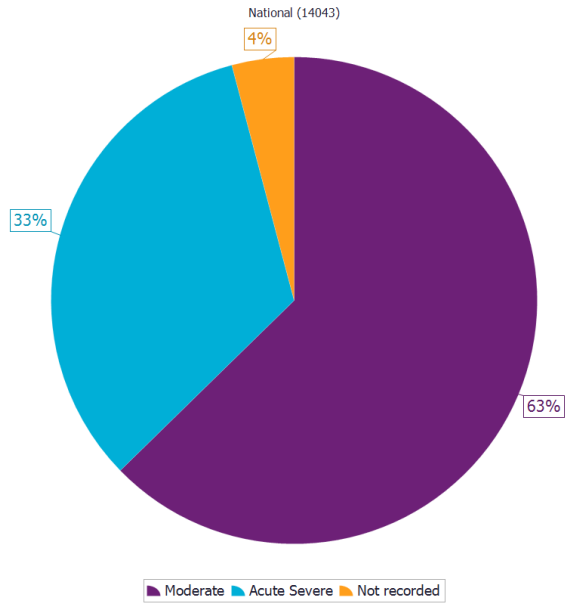


Sample: all patients

Note: The chart represents the ages of patients that were included in the audit rather than actual ED attendance.

The majority of patients included in this audit were adults with 36% being children.

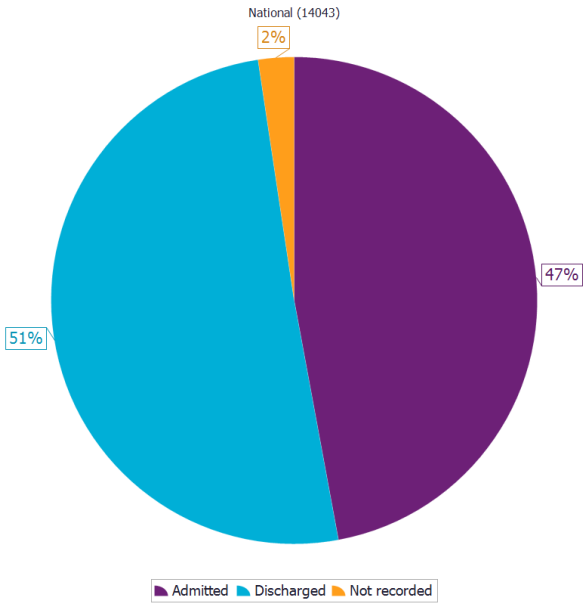
Q10. Were the patient's asthma symptoms considered to be moderate or acute severe?



Sample: all patients

On presentation, 62.7% of patients had moderate asthma versus 33.2% acute severe asthma. However, in 4.1% of cases, the asthma severity level was not recorded.

Q14. Was the patient admitted or discharged?



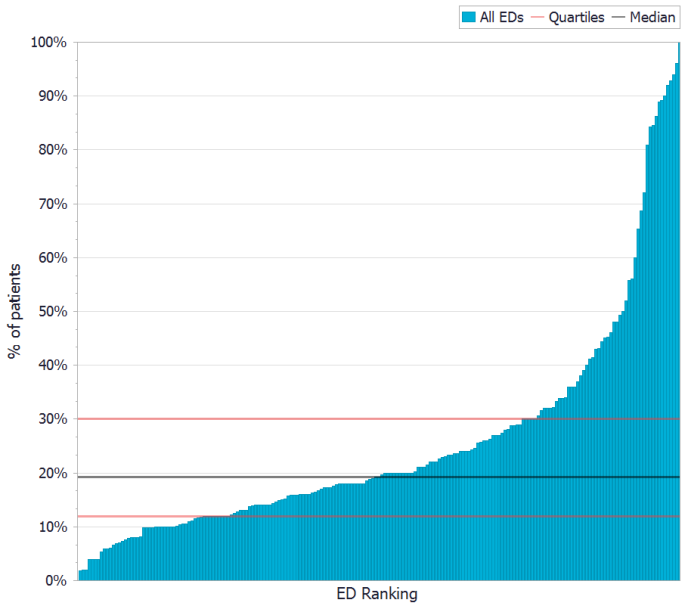
Sample: all patients

This chart shows that the majority of patients were discharged, emphasising the importance of robust discharge arrangements.

Section 2: Audit results

Initial ED observations

Q4. Was oxygen given on arrival to maintain saturation 94-98%

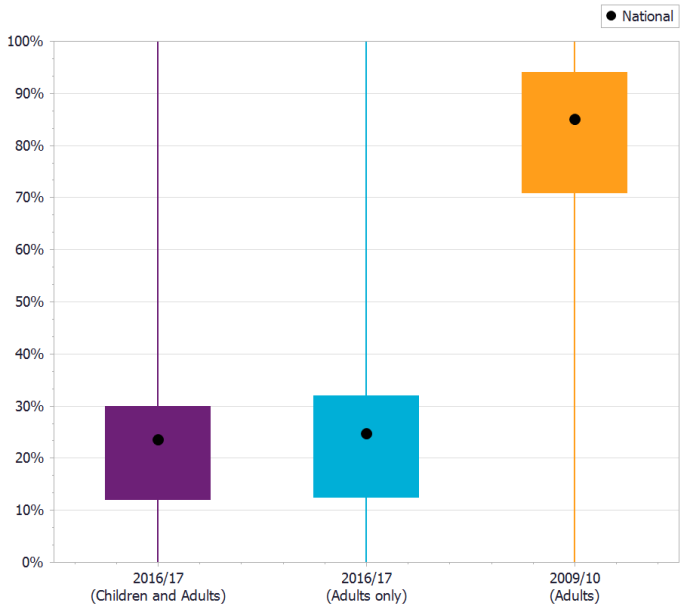


STANDARD 1a: O_2 should be given on arrival to maintain sats 94-98%.

Sample: all patients

Most departments only managed to demonstrate giving oxygen on arrival in 19% of their patients with very few achieving the standard.

Q4. Oxygen given on arrival compared with previous years

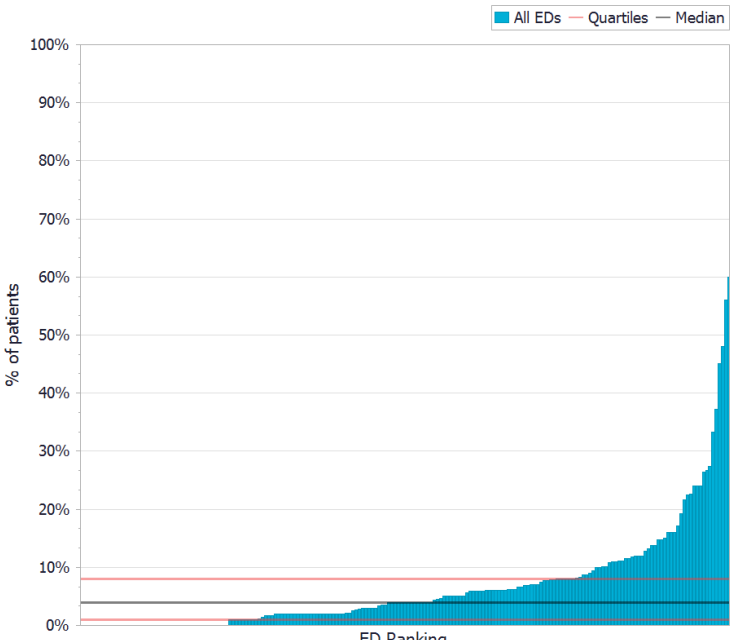


Sample: all patients

No data is available for 2013/14 (children) audit and the data for 2009/10 (adult) audit relates to a non-identical standard.

In the 2009/10 audit, a different question was asked: had O_2 been given pre-arrival (i.e. by the ambulance service) - this was achieved in 85% of patients. It seems unlikely that this pre-hospital Oxygen would be stopped in the ED if needed to maintain saturations. This suggests that documentation of the prescribing of Oxygen may be influencing the collection of accurate data. There is currently no standard way of documenting the prescribing of oxygen.

Q5. Was oxygen prescribed on arrival to maintain saturation 94-98%

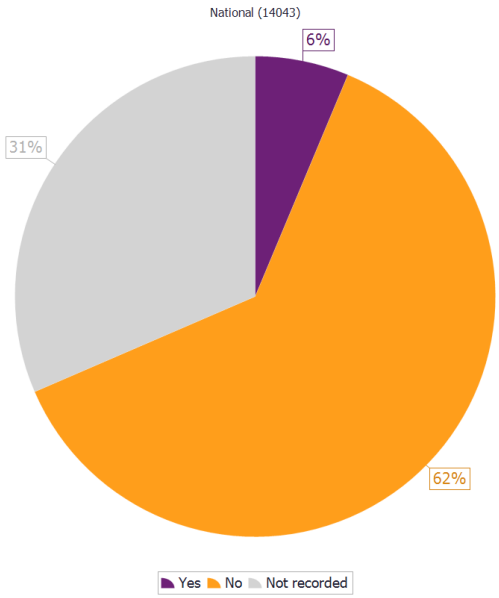


STANDARD 1b: O_2 should be prescribed on arrival to maintain sats 94-98%

Sample: all patients

These charts show that very few departments are able to demonstrate prescribing of oxygen on arrival.

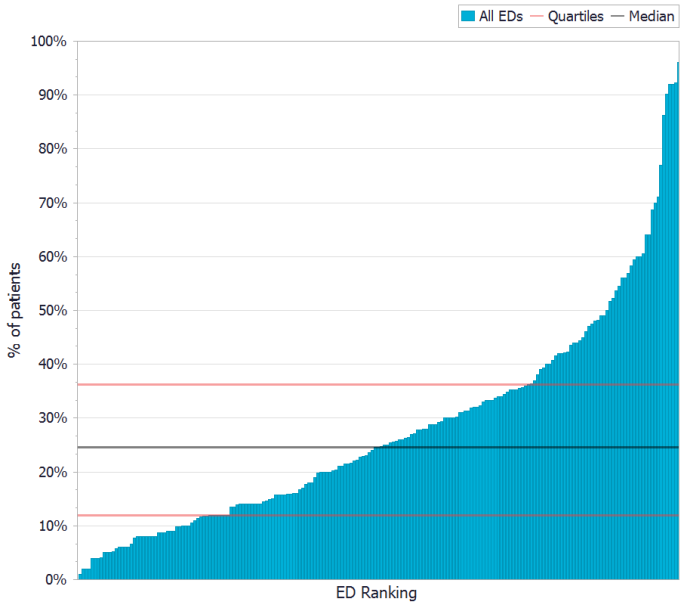
Q5. Was oxygen prescribed on arrival to maintain saturation 94-98%



The pie chart shows that only 6.3% of patients were actually prescribed oxygen.

Q6. Was high dose nebulised β2 agonist bronchodilator given within 10 minutes of arrival at the ED?

QIP



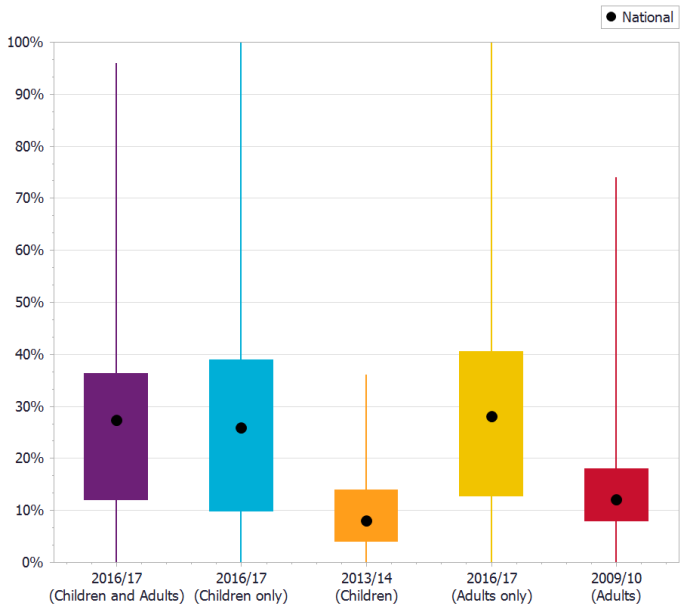
STANDARD 3: High dose nebulised β2 agonist bronchodilator should be given within 10 minutes of arrival at the ED.

Note: A pMDI + spacer is the preferred option in children with moderate asthma

Sample: all patients

On average, only a quarter of patients got bronchodilator within 10 minutes of arrival. The audit does not take into account that many patients will have received bronchodilator in an ambulance or at their GP prior to arrival at hospital and so may not require it within 10 minutes. Future audits and QIPs should look at this area.

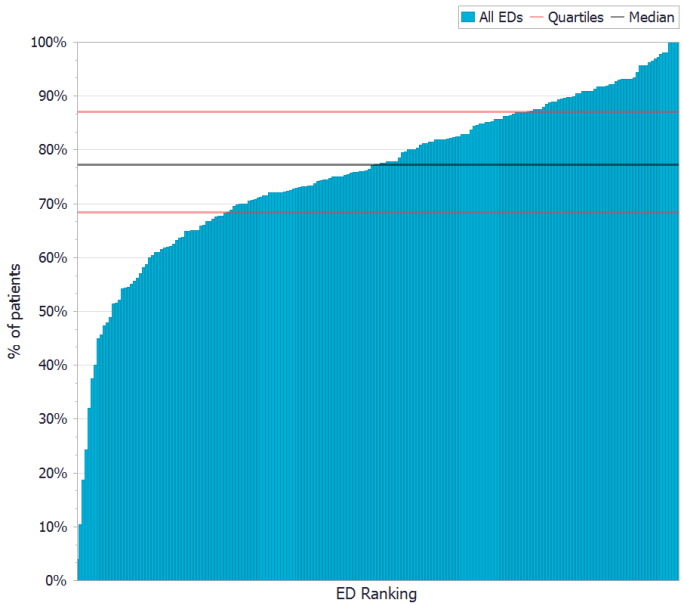
Q6. High dose nebulised β2 agonist bronchodilator given within 10 minutes of arrival at the ED compared with previous years



Sample: all patients

Performance in this area has improved marginally from previous years. The 2009 RCEM audit used a standard of 20mins and found that compliance almost doubled. This fits with many patients not requiring bronchodilator immediately particularly in cases of moderate asthma (65%). Future audits and QIP should take this into account.

Q7. If there was a poor response to nebulised β2 agonist bronchodilator therapy, was nebulised Ipratropium Bromide added?

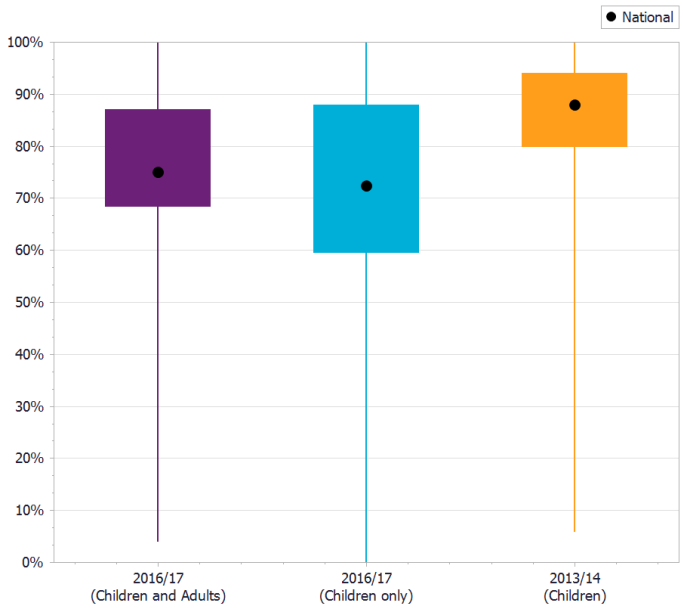


STANDARD 4: Add nebulised Ipratropium Bromide if there is a poor response to nebulised β2 agonist bronchodilator therapy

Sample: all patients excluding Q7 = 'no, not needed'

This standard was adhered to well with the median achieving it for 77% of their patients.

Q7. Nebulised Ipratropium Bromide added if a poor response to nebulised β2 agonist bronchodilator therapy, compared with previous years



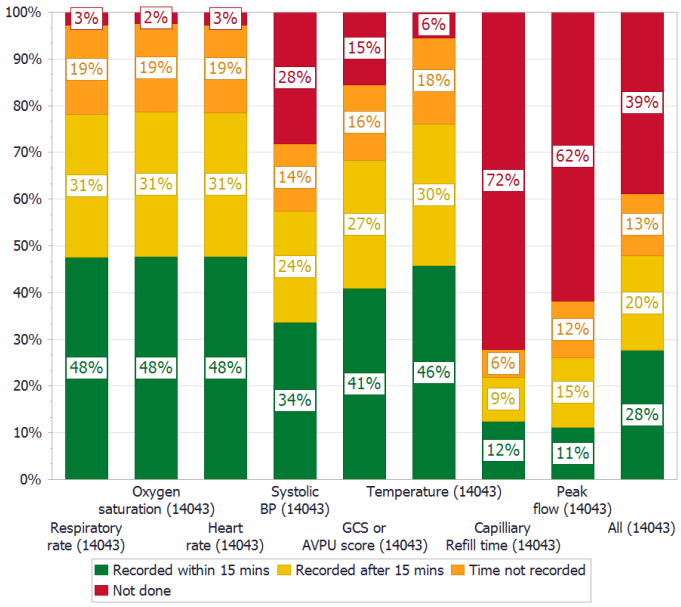
Sample: all patients excluding Q7 = 'no, not needed'

We are only able to compare the results for Standard 4 with 2013/14 (children) which shows a slight drop in compliance with the standard.

Vital Signs

Q8. Were the following vital signs measured and recorded?

Q8a. Respiratory rate
Q8b. Oxygen saturation
Q8c. Heart rate
Q8d. Systolic blood pressure
Q8e. GCS or AVPU score
Q8f. Temperature
Q8g. Capillary refill time
Q8h. Peak flow



STANDARD 2a: As per RCEM standards, vital signs should be measured and recorded on arrival at the ED.

Sample: all patients

Note: Capillary refill time only applies to children

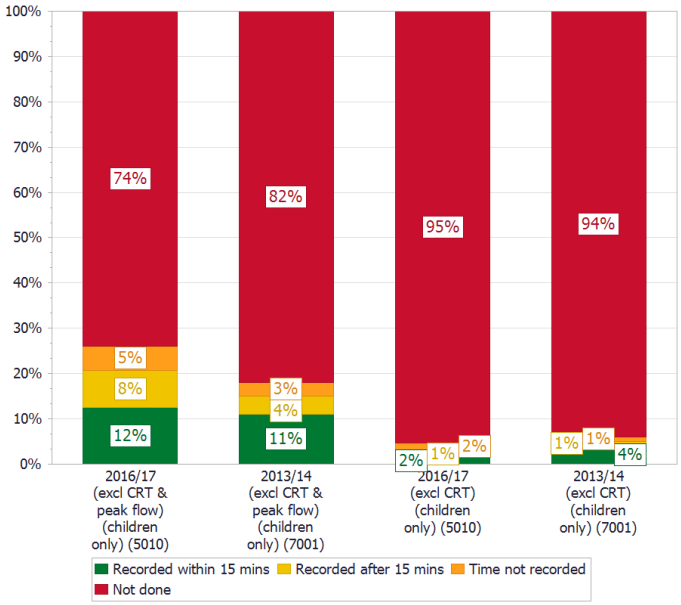
Note: 'All' does not include capillary refill time or peak flow as these are not included in the fundamental standard

Compliance with the standard was achieved in 47.6% (oxygen saturation), 40.9% (AVPU/GCS), 45.8% (temperature) and 33.7% (systolic BP). Overall, only a third of patients had all of their vital signs recorded on arrival. Encouragingly, this goes up to 61.1% if more timing is excluded.

Capillary refill time and peak flow were not recorded on arrival very often but again compliance goes up 4-fold if timing is excluded.

BTS guidance has PEFR as a predominant feature of good practice in assessing both severity and treatment effectiveness. Departments should consider how QIP methodology might help to imbed this good practice.

Paediatric vital signs monitoring compared to previous audit

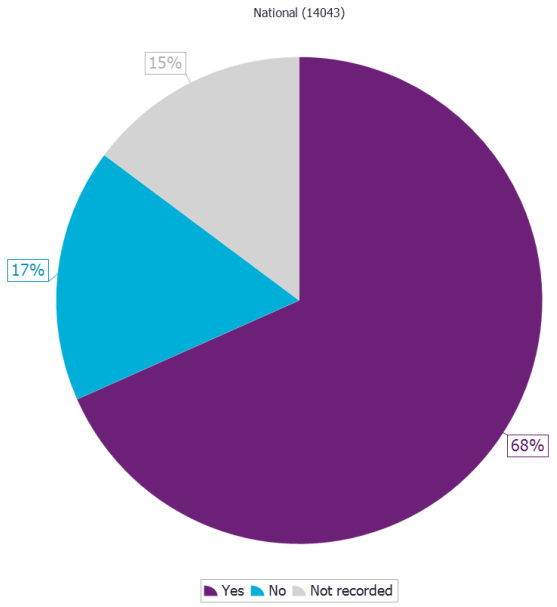


Sample: 5010

We are only able to compare the results for children for previous years as the same question was not asked in adults in the 2009 audit.

There has been some improvement in the recording of vital signs in children with 25% in 2013/14 having the standard vitals versus 18% in 2013/14. There is clearly scope for improvement, however, particularly with regard to the timing of vital signs. As vital signs are a key tool in assessing the severity of asthma in both children and adults in both BTS and RCEM guidelines it is important that these are carried out as soon as possible on arrival.

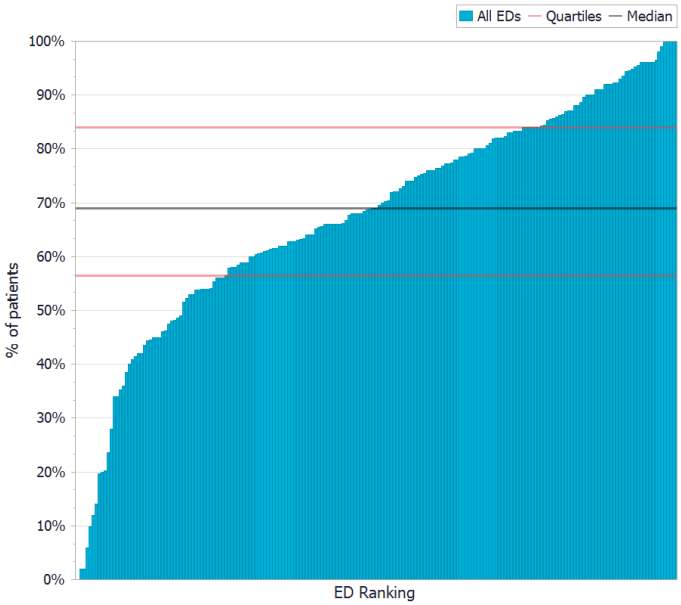
Q9. Were any of the recorded vital signs identified as abnormal?



Sample: all patients

70% of vitals were abnormal, demonstrating the importance of obtaining them at the earliest possible stage.

Q9. Were any of the recorded vital signs identified as abnormal?

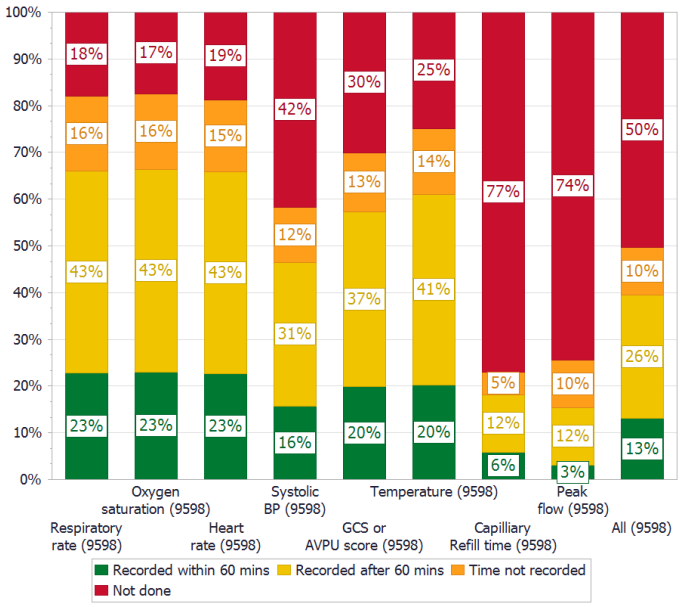


Sample: all patients

There is quite a variation in departments in terms of the proportion of patients having abnormal vitals on arrival which is surprising. Some departments having only 20 or 30 percent of patients with an abnormality and some departments having nearly 100% of patients with abnormal vital signs. As these patients are categorised as either moderate or severe asthma you might expect the majority to have abnormal vital signs. The significance of this, is not clear.

Q13. Were the following vital signs measured and recorded on a repeat occasion?

Q13a Respiratory rate
Q13b Oxygen saturation
Q13c Heart rate
Q13d Systolic blood pressure
Q13e GCS or AVPU score
Q13f Temperature
Q13g Capillary refill time
Q13h Peak flow



STANDARD 2b: Patients with any recorded abnormal vital signs should have a further complete set of vital signs recorded in the notes within 60 minutes of the first set.

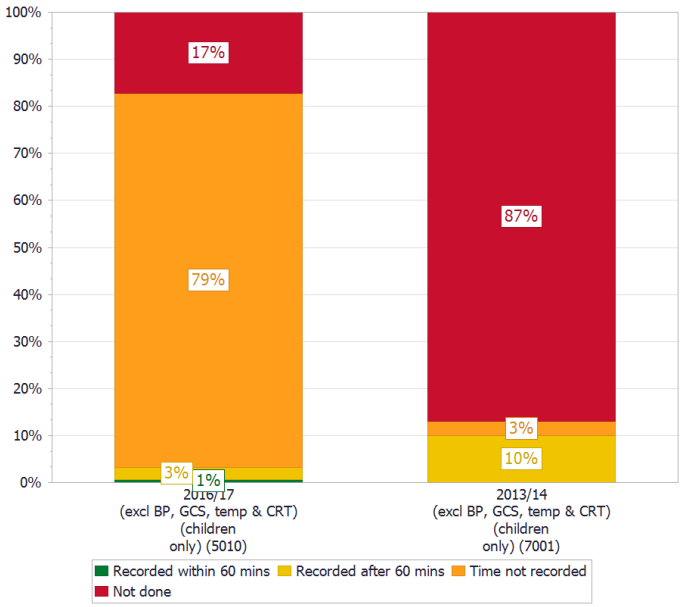
Subsample: Q9=yes (except capillary refill which only includes children) (n=9598)

Note: 'all' does not include capillary refill or peak flow as they are not fundamental standards.

Most departments are managing to repeat the majority of vital signs demonstrating good practice. BP, GCS and AVPU are not recorded as often.

For 39% of patients a **full** set of vitals is repeated in the department but only 13% of departments manage to do this within the hour. Peak flow is particularly badly recorded with only 21% getting a repeat done. Departments should focus on getting all of these vitals recorded which would only take a few more minutes. BTS and RCEM emphasise the use of PEFR in monitoring effectiveness of treatment.

Repeat paediatric vital signs monitoring compared to previous audit



Sample: 5010

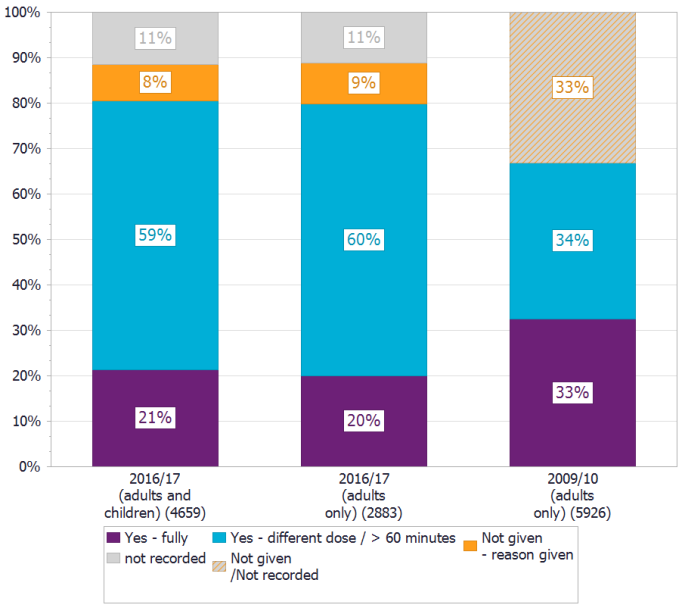
There has been a significant improvement in the measurement of repeat vital signs in children rising from 13% to 83%. Departments struggle to do this within the recommended one hour time frame.

In 2009, only HR, Sats and RR were recorded in the standard and when directly compared there has again been a significant improvement with 19% of patients getting these within the hour in 2016 versus 11% in 2009.

Subsequent observations and treatment

Q11. If not already given before arriving at the ED, were steroids given?

Patients diagnosed as acute severe



STANDARD 5: If not already given before arrival to the ED, steroids should be given as soon as possible as follows:

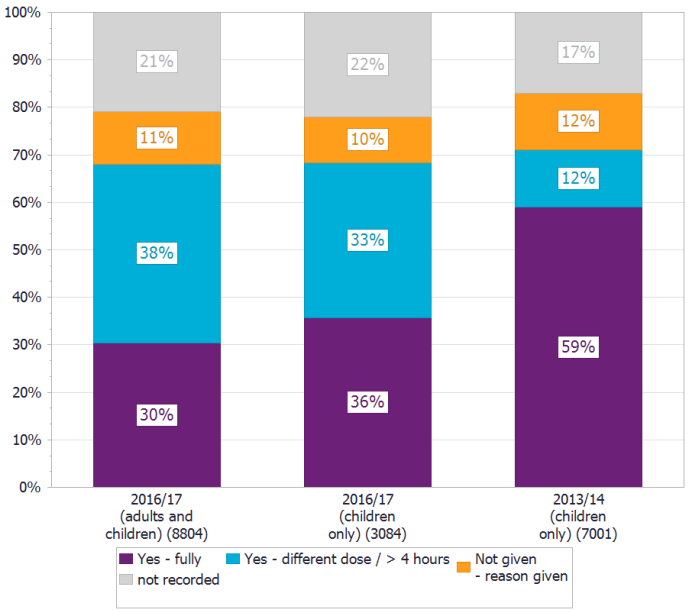
Adults 16 years and over
40-50mg prednisolone PO or 100mg hydrocortisone IV
Children 6-15 years
30-40mg prednisolone PO or 4mg/kg hydrocortisone IV
Children 2-5 years
20mg prednisolone PO or 4mg/kg hydrocortisone IV

Note: children receiving maintenance steroid tablets should receive 2mg/kg prednisolone up to a maximum dose of 60mg

STANDARD 5a: within 60 minutes of arrival (acute severe).

A total of 88.6% of patients received steroids within the hour. This is an improvement on the last adult audit in 2009 where it was 30% and in 2013 66% and represents widespread good clinical practice.

Patients diagnosed as moderate



QIP

STANDARD 5: If not already given before arrival to the ED, steroids should be given as soon as possible as follows:

Adults 16 years and over
40-50mg prednisolone PO or 100mg hydrocortisone IV
Children 6-15 years
30-40mg prednisolone PO or 4mg/kg hydrocortisone IV
Children 2-5 years
20mg prednisolone PO or 4mg/kg hydrocortisone IV

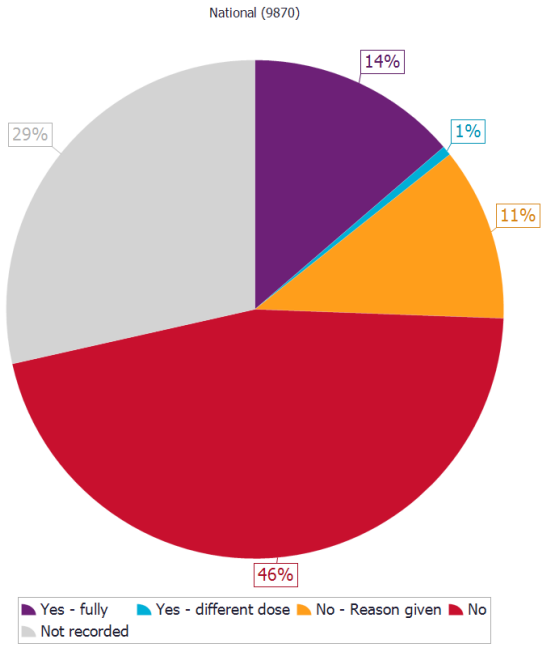
Note: children receiving maintenance steroid tablets should receive 2mg/kg prednisolone up to a maximum dose of 60mg

STANDARD 5b: within 4 hours (moderate).

Subsample: Q10=Moderate (n=8804)

Steroids were considered or given within four hours in 79% of patients with moderate asthma which represents good practice. Departments should reflect on the dosing of steroids in children and how better adherence to the guidelines might be achieved as this has dropped since 2013.

Q12. In adults, was Intravenous Magnesium 1.2 - 2g over 20 minutes given to patients with acute severe asthma who did not respond well to bronchodilators?



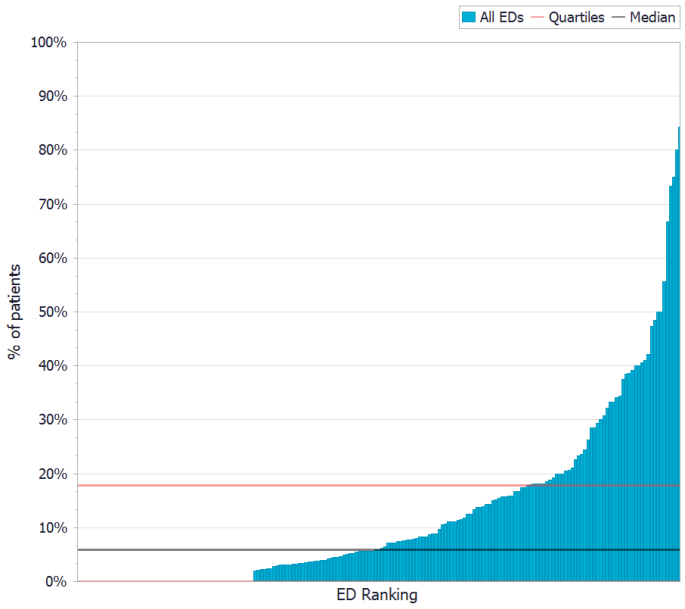
STANDARD 6: Intravenous Magnesium 1.2 - 2g over 20 minutes to be given to adults with acute severe asthma who do not respond well to bronchodilators.

Subsample: Q3='16 years or over' AND Q10='Acute severe', EXCLUDE Q12='No – reason given' and 'No – paediatric

It is unclear why intravenous magnesium is not being given as per the guidelines in both BTS (evidence level B) and RCEM and would be a worthwhile departmental QIP to assess the barriers to its use as it is a surprising finding.

Discharge

Q15. In adults, is there evidence of consideration given to psychosocial factors prior to discharge?

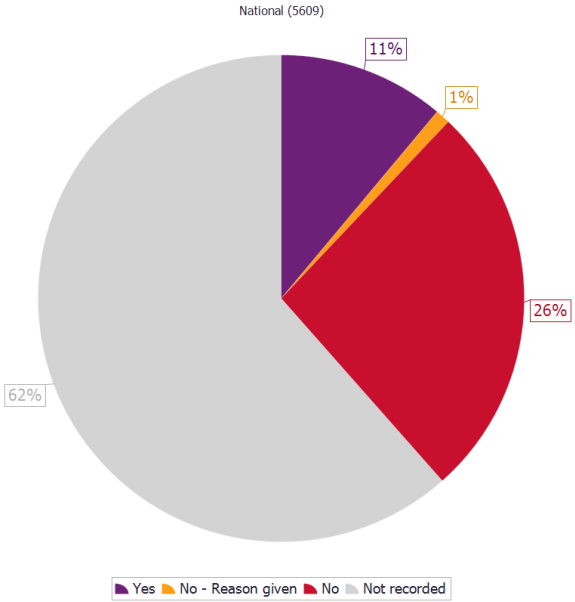


STANDARD 7: Evidence of consideration given to psychosocial factors in adults prior to discharge.

Subsample: Q3='16 years or over' AND Q14='Discharged', EXCLUDE Q15 'No – paediatric patient' AND 'No – reason given'

The top 25% of EDs managed to assess this in some of their patients in this new aspirational standard but generally it was not considered very often.

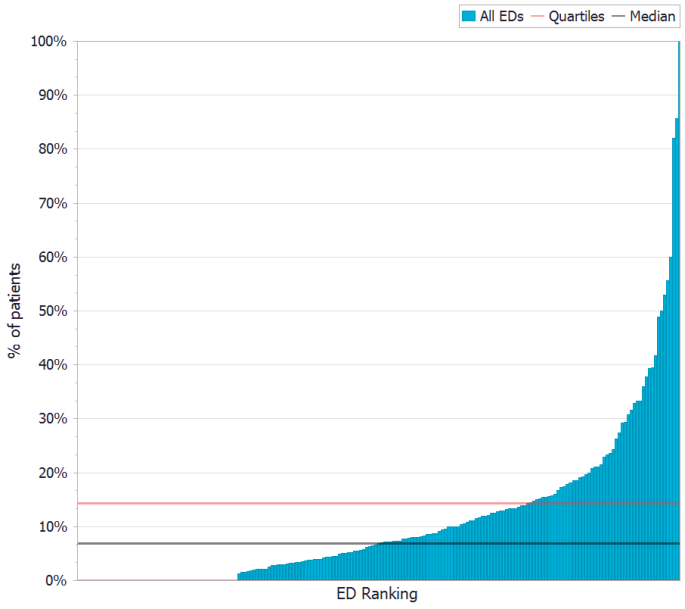
Q15. In adults, is there evidence of consideration given to psychosocial factors prior to discharge?



Sample: 5609

Examples of psychosocial factors include mental illness, learning difficulties, social isolation, income problems, alcohol or drug abuse and equally apply to the discharge of children into safe environments where their illness can be managed. At least one of these adverse factors were recorded in the majority of asthma deaths in the National Enquiry 2014 and departments should consider how they can imbed this new consideration into their practice. A proforma may help.

Q16. Was the patient's inhaler TECHNIQUE assessed and found to be satisfactory?



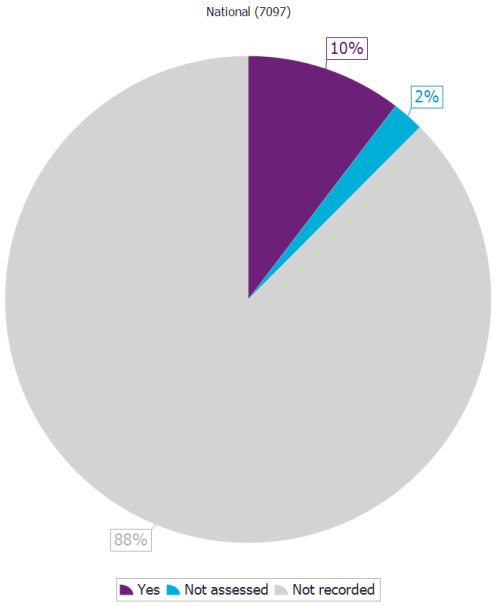
STANDARD 8: Evidence of assessment before discharge that:

STANDARD 8a: the patient's inhaler TECHNIQUE is satisfactory

Subsample: Q14='Discharged', EXCLUDE Q16='Not assessed - reason given'

Inhaler technique was not often tested on discharge. As this has been identified as an important part of the discharge package by BTS, departments should look to units demonstrating good practice and how this might be translated into their own.

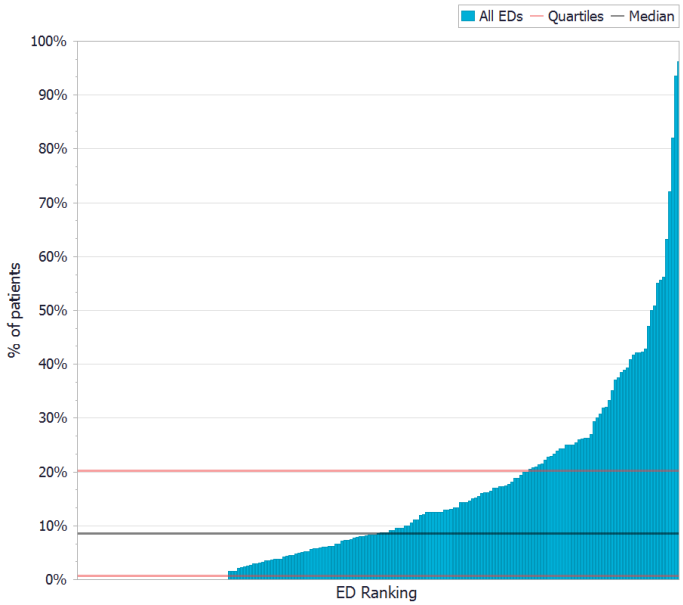
Q16. Was the patient's inhaler TECHNIQUE assessed and found to be satisfactory?



Sample: 7097

In the vast majority of cases (87.5%), the patient's inhaler technique was not recorded as being assessed and so while we might assume that it has not been done, it may be in some cases that the assessment was merely not recorded.

Q17. Was the patient's inhaler TYPE assessed and found to be satisfactory?



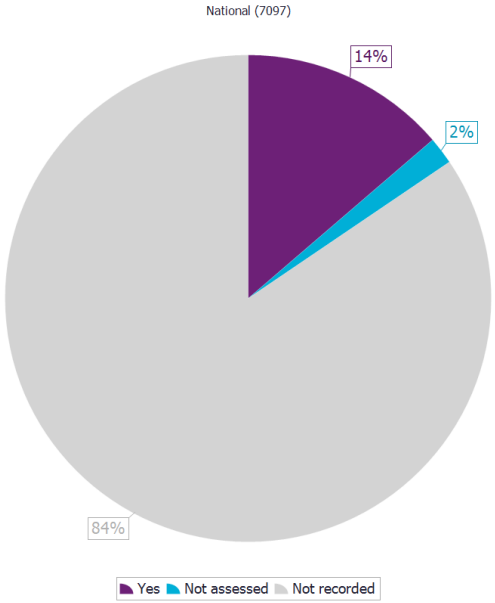
STANDARD 8: Evidence of assessment before discharge that:

STANDARD 8b: the patient's inhaler TYPE is satisfactory

Subsample: Q14='Discharged', EXCLUDE Q17='Not assessed - reason given'

Inhaler type was often not assessed in EDs as part of the discharge package. Again, a checklist as part of a proforma may help here.

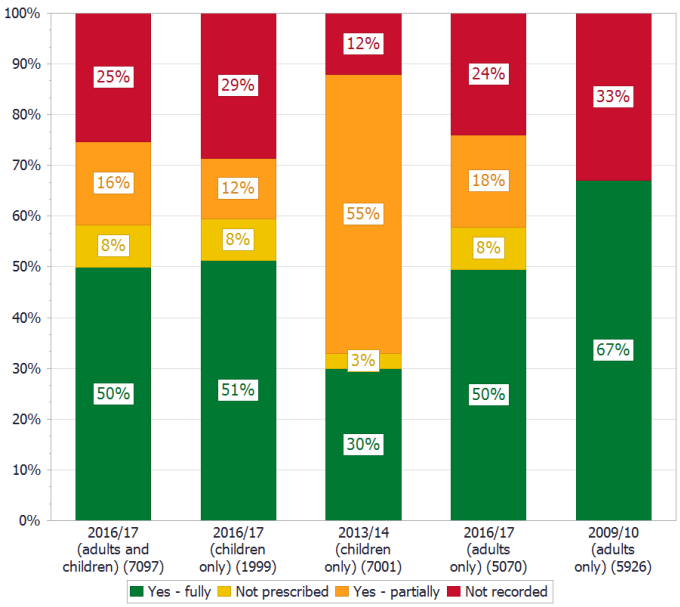
Q17. Was the patient's inhaler TYPE assessed and found to be satisfactory?



Sample: 7097

Recording of correct inhaler type was poor with only 15.5% of patients showing that it was documented as either satisfactory or not assessed.

Q18. Was oral prednisolone prescribed?



QIP

STANDARD 9: Discharged patients should have oral prednisolone prescribed as follows:

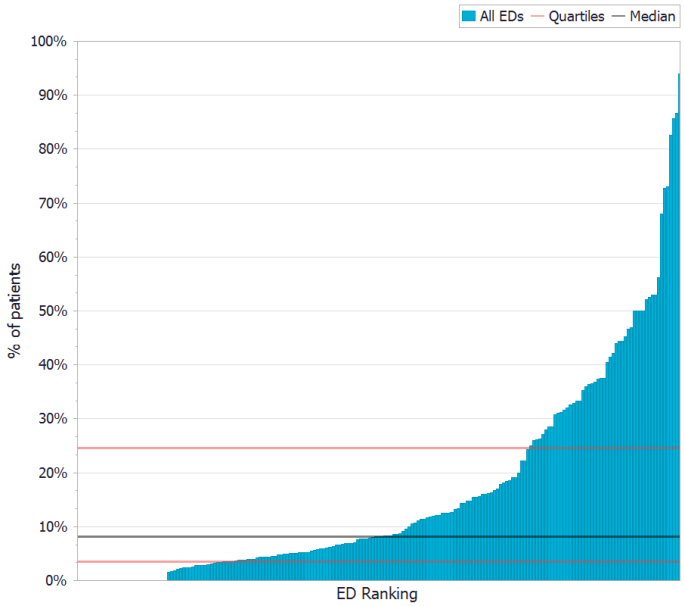
Adults 16 years and over
40-50mg prednisolone for 5 days
Children 6-15 years
30-40mg prednisolone for 3 days
Children 2-5 years
20mg prednisolone for 3 days

Note: children receiving maintenance steroid tablets should receive 2mg/kg prednisolone up to a maximum dose of 60mg

Subsample: Q14='Discharged' EXCLUDE Q18='Not prescribed - reason given'

There has been an improvement in the prescribing of discharge prednisolone in adults with 76% having them prescribed. It is not clear why there has been a small decline in adherence in the paediatric group. Departments should have clearly available guidelines for steroid dosing, prescription and documentation.

Q19. Was written discharge advice given to the patient?

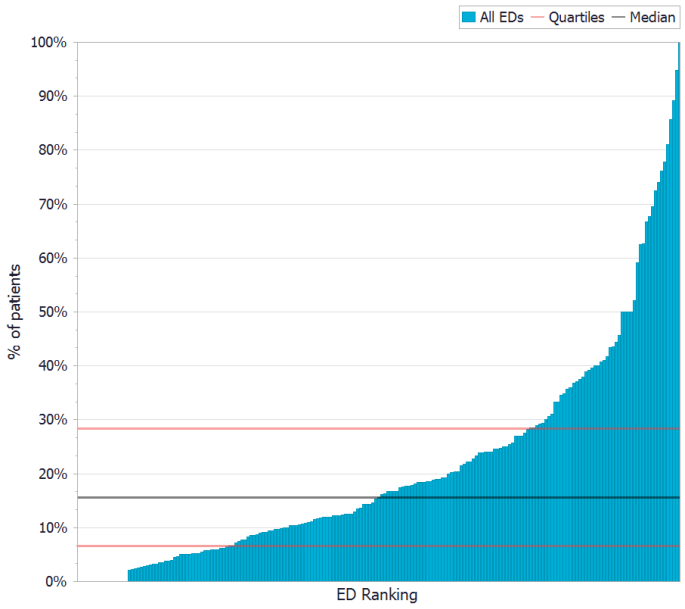


STANDARD 10: Written discharge advice given to the patient.

Subsample: Q14='Discharged'

There was quite a range of responses to this with some EDs never giving written advice. Some departments are managing this however and it represents good practice. A take home leaflet should be made available stating treatment plan advice and escalation advice.

Q20. Was GP or clinic follow-up arranged according to local policy?

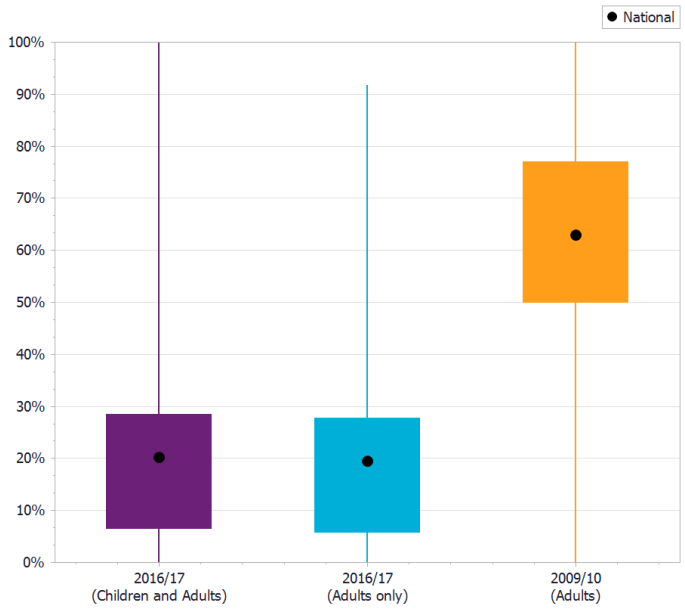


STANDARD 11: GP or clinic follow-up arranged according to local policy for discharged patients within 2 working days.

Subsample: Q14='Discharged'

50% of departments arranged GP follow-up for 16% of their patients according to local policy

Q20. GP or clinic follow-up arranged according to local policy compared to previous years



Sample: 7097

When compared to 2009 adults there has been a significant drop in the numbers of patients being advised on follow-up from a lower quartile of 50% in 2009 to 7% in 2016. It is hard to explain why this might be the case.

It is important that there are close links with primary care so that the patient is supported on discharge and re-attendance is avoided.

Analysis

The purpose of this audit was to benchmark current performance in Asthma care to allow for comparison between the previous audit collections and between departments. Allowing for changes in questions asked between years, we have been able to see that disappointingly performance has dropped in almost all areas where we compare medians.

We chose the fundamental standards but it is evident that all but a few departments are unable to meet these in the current climate. Nonetheless, there are improvements to be made and there are centres demonstrating good practice from which learning can be shared. *These standards provide numerous QI project opportunities to be developed in EDs across the UK.*

Key themes from the audit

Timings - typically, we see that compliance with the standard drops off when any sort of timing is involved in the question. Compare, for example, vital signs, which as a group are recorded in only 12.1% of cases on arrival but go up to 41.1% if more time passes. If a patient waits in a queue to be seen or to get into a cubicle, it may not be possible to get vitals or treatments commenced on arrival as they compete in line with other potentially life-threatening presentations. As such, it is a possibility that this performance decline reflects what we are seeing nationally, i.e. the effects of overcrowding on adherence to clinical performance standards.

Vital signs – what is recorded and when, with particular attention to peak flow.

Treatment – early bronchodilators with follow-up ipratropium (area of good practice) and early steroids (also done well).

Discharge advice – sporadic and needs standardising.

Limitations

Retrospective examination of notes is highly dependent on documentation and so audit is only representative if the standard of documenting is good. A number of questions were introduced this year, designed to analyse this and certainly the oxygen standard would seem to confirm that documentation may be a problem, contributing to some of the low medians. For the purposes of this audit, the following patient populations were excluded:

- Under age 2
- Life threatening Asthma

Summary of recommendations

1. Departments should consider how oxygen is prescribed and ensure that all asthmatics are prescribed it on arrival to maintain saturations of 94-98%, preferably with a β2 agonist if required.

2. Vital signs are an important measure of both severity of illness and detecting treatment efficacy. Departments should consider an education programme for staff to improve this and conduct regular local audits/QIPs to ensure compliance with particular focus on timing and peak flow measurement.

3. Consideration should be given to psychosocial factors in assessment of severity and discharge and departments should consider this in their education programme.

4. On discharge, all moderate-severe asthmatic patients should have a written management plan in place which includes assessment of inhaler type, technique, steroids and follow-up.

5. A proforma should be considered by departments to improve documentation and act as an aide memoir for assessment, discharge/admission criteria and dosing of medication.

Using the results of this audit to improve patient care

The results of this audit should be shared with all staff, including doctors and nurses, who have responsibility for looking after patients diagnosed with moderate and severe asthma.

Discussing the results of this audit with colleagues is a good way of demonstrating the ED's commitment to improving care. Engaging staff in the action planning improvements to care being delivered will lead to more effective implementation of the plan.

EDs may wish to consider using a rapid cycle audit methodology, which can be used to track performance against standards, as a tool to implement the action plan. For further resources, please visit the RCEM Quality Improvement webpage.

Further information and supporting material can be found at the RCEM Local Guidance webpage, the SIGN website and the BTS website.

Please note that a revised version of the Sign & BTS guidelines was published in November 2016.

Further Information

Thank you for taking part in this audit. We hope that you find the results helpful.

If you have any queries about the report please e-mail audit@rcem.ac.uk or phone 020 7400 6108.

Details of the RCEM Clinical Audit Programme can be found under the Current Audits section of the RCEM website.

Feedback

We would like to know your views about this report and participating in this audit. Please let us know what you think by completing our feedback survey: www.surveymonkey.co.uk/r/RCEMaudit16

We will use your comments to help us improve our future audits and reports.

Useful Resources

- Site-specific report – available to download from the clinical audit website
- Site-specific PowerPoint presentation developed to help you disseminate your site-specific audit results easily and efficiently – available to download from the clinical audit website for registered users
- Local data file – a spreadsheet that allows you to conduct additional local analysis using your site-specific data for this audit. Available to download from the clinical audit website for registered users
- National data file - you can also access data from other EDs to customise your peer analysis
- RCEM Learning modules on asthma

Report authors and contributors

This report is produced by the Standards and Audit Committee subgroup of the Quality in Emergency Care Committee, for the Royal College of Emergency Medicine.

- Jeff Keep – Chair, Standards and Audit Committee
- Adrian Boyle – Chair, Quality in Emergency Care Committee
- Nicola Littlewood – Member, Standards and Audit Committee
- Rob Stacey – Member, Standards and Audit Committee
- Francesca Cleugh – Member, Standards and Audit Committee
- Sam McIntyre – Quality Manager, RCEM
- Mohbub Uddin – Deputy Quality Manager, RCEM
- Alex Griffiths – Quality Officer, RCEM
- Jonathan Websdale – Analyst, L2S2

Appendices

Appendix 1: Audit questions

Patient reference	

Casemix

Q1	Date of arrival	DD/MM/YYYY	
Q2	Time of arrival or triage, whichever is earlier	HH:MM	
Q3	Age of patient	2-5 years	
		6-15 years	
		16 years or over	

Initial ED observations

Q4	Was oxygen **given** on arrival to maintain saturation 94-98%	Yes	
		No	
		Not recorded	
Q5	Was oxygen **prescribed** on arrival to maintain saturation 94-98%	Yes	
		No	
		Not recorded	
Q6	Was high dose nebulised β2 agonist bronchodilator given within 10 minutes of arrival at the ED?	Yes	
		No	
		Not recorded	
Q7	If there was a poor response to nebulised β_2 agonist bronchodilator therapy, was nebulised Ipratropium Bromide added?	Yes	
		No	
		No – not needed	
		Not recorded	
Q8	Were the following vital signs measured and recorded?		

		Yes	Time (leave blank if unknown)	No
Q8a	Respiratory rate		HH:MM	
Q8b	Oxygen saturation		HH:MM	
Q8c	Heart rate		HH:MM	
Q8d	Systolic blood pressure		HH:MM	
Q8e	GCS or AVPU score		HH:MM	
Q8f	Temperature		HH:MM	
Q8g	Capillary refill time		HH:MM	
Q8h	Peak flow		HH:MM	

Q9	Were any of the recorded vital signs identified as abnormal?	Yes	
		No	
		Not recorded	
Q10	Were the patient's asthma symptoms considered to be:	Moderate	
		Acute severe	

Subsequent observations and treatment

Q11	If not already given before arriving at the ED, were steroids given as follows: Adults 16 years and over 40-50mg prednisolone PO or 100mg hydrocortisone IV Children 6-15years 30-40mg prednisolone PO or 4mg/kg hydrocortisone IV Children 2-5 years 20mg prednisolone PO or 4mg/kg hydrocortisone IV ***Note: children receiving maintenance steroid tablets should receive 2mg/kg prednisolone up to a maximum dose of 60mg***	Yes – fully	
		Yes – different dose	
		Not given – reason given	
		Not recorded	
		Enter time given or leave blank if not recorded	HH:MM
Q12	In adults, was Intravenous Magnesium 1.2 - 2g over 20 minutes given to patients with acute severe asthma who did not respond well to bronchodilators?	Yes – fully	
		Yes – different dose	
		No – reason given	
		No – paediatric patient	
		No	
		Not recorded	

Q13	Were the following vital signs measured and recorded on a repeat occasion?			
		Yes	Time (leave blank if unknown)	No
Q13a	Respiratory rate		HH:MM	
Q13b	Oxygen saturation		HH:MM	
Q13c	Heart rate		HH:MM	
Q13d	Systolic blood pressure		HH:MM	
Q13e	GCS or AVPU score		HH:MM	
Q13f	Temperature		HH:MM	
Q13g	Capillary refill time		HH:MM	
Q13h	Peak flow		HH:MM	

Discharge

Q14	Was the patient admitted or discharged?	Admitted	
		Discharged	
		Not recorded	
*Only answers Q15-Q20 if the patient was **discharged***			
Q15	In adults, is there evidence of consideration given to psychosocial factors prior to discharge?	Yes	
		No – reason given	
		No – paediatric patient	
		No	
		Not recorded	

Q16	Was the patient's inhaler **TECHNIQUE** assessed and found to be satisfactory?	Yes	
		Not assessed – reason given	
		Not recorded	
Q17	Was the patient's inhaler **TYPE** assessed and found to be satisfactory?	Yes	
		Not assessed – reason given	
		Not recorded	
Q18	Was oral prednisolone prescribed as below? *<u>Adults 16 years and over</u>* *40-50mg prednisolone for 5 days* *<u>Children over 6-15 years</u>* *30-40mg prednisolone for 3 days* *<u>Children 2-5 years</u>* *20mg prednisolone for 3 days* ***Note: children receiving maintenance steroid tablets should receive 2mg/kg prednisolone up to a maximum dose of 60mg***	Yes – fully	
		Yes – partially	
		Not prescribed – reason given	
		Not recorded	
Q19	Was written discharge advice given to the patient?	Yes	
		No – reason given	
		No	
		Not recorded	
Q20	Was GP or clinic follow-up arranged according to local policy?	Yes - within 2 working days	
		Yes - after 3 or more working days	
		No – reason given	
		No	
		Not recorded	

Notes

Appendix 2: Participating Emergency Departments

Aberdeen Royal Infirmary
Addenbrooke's Hospital
Aintree University Hospital
Airedale General Hospital
Alder Hey Hospital
Alexandra Hospital
Altnagelvin Area Hospital
Antrim Area Hospital
Arrowe Park Hospital
Barnet Hospital
Barnsley Hospital
Basildon University Hospital
Basingstoke and North Hampshire Hospital
Bassetlaw Hospital
Bedford Hospital
Birmingham Children's Hospital
Blackpool Victoria Hospital
Bradford Royal Infirmary
Bristol Royal Hospital for Children
Bristol Royal Infirmary
Bronglais General Hospital
Broomfield Hospital
Calderdale Royal Hospital
Causeway Hospital
Charing Cross Hospital
Chelsea & Westminster Hospital
Cheltenham General Hospital
Chesterfield Royal Hospital
City Hospital (Birmingham)
Colchester General Hospital
Conquest Hospital
Countess of Chester Hospital
County Hospital Stafford
Croydon University Hospital
Darent Valley Hospital
Darlington Memorial Hospital
Derriford Hospital
Diana, Princess of Wales Hospital
Doncaster Royal Infirmary
Dorset County Hospital
Dr Gray's Hospital
Ealing Hospital
East Surrey Hospital
Eastbourne District General Hospital
Epsom General Hospital
Fairfield General Hospital
Forth Valley Royal Hospital
Friarage Hospital
Frimley Park Hospital
Furness General Hospital
George Eliot Hospital
Glan Clwyd Hospital
Glangwili General Hospital
Gloucestershire Royal Hospital
Good Hope Hospital
Grantham & District Hospital
Hairmyres Hospital
Harrogate District Hospital
Heartlands Hospital
Hereford County Hospital
Hillingdon Hospital
Hinchingbrooke Hospital
Homerton University Hospital
Horton Hospital
Huddersfield Royal Infirmary
Hull Royal Infirmary
Ipswich Hospital
James Paget Hospital
John Radcliffe Hospital
Kettering General Hospital
King George Hospital
Kings College Hospital
King's Mill Hospital
Kingston Hospital
Leeds General Infirmary
Leicester Royal Infirmary
Leighton Hospital
Lewisham Hospital (Children's ED)
Lincoln County Hospital
Lister Hospital
Luton and Dunstable University Hospital
Macclesfield District General Hospital
Maidstone District General Hospital
Manchester Royal Infirmary (Adults)
Manor Hospital
Medway Maritime Hospital
Milton Keynes Hospital
Morriston Hospital
Musgrove Park Hospital
New Cross Hospital
Newham General Hospital
Norfolk & Norwich University Hospital
North Devon District Hospital
North Manchester General Hospital

North Middlesex University Hospital
Northampton General Hospital
Northern General Hospital
Northumbria Specialist Emergency Care Hospital
Northwick Park Hospital
Ormskirk & District District General Hospital
Peterborough City Hospital
Pilgrim Hospital
Pinderfields Hospital
Poole General Hospital
Princess Alexandra Hospital
Princess of Wales Hospital
Princess Royal University Hospital
Queen Alexandra Hospital, PO
Queen Elizabeth Hospital (Birmingham)
Queen Elizabeth Hospital (Gateshead)
Queen Elizabeth Hospital (Woolwich)
Queen Elizabeth The Queen Mother Hospital
Queen's Hospital (Burton)
Queen's Hospital, Romford
Queen's Medical Centre, Nottingham
Rotherham District General Hospital
Royal Albert Edward Infirmary
Royal Alexandra Children's Hospital
Royal Berkshire Hospital
Royal Blackburn Hospital
Royal Bolton Hospital
Royal Bournemouth General Hospital
Royal Cornwall Hospital
Royal Derby Hospital
Royal Devon and Exeter Hospital (Wonford)
Royal Free Hospital
Royal Gwent Hospital
Royal Hampshire County Hospital
Royal Infirmary of Edinburgh
Royal Lancaster Infirmary
Royal London Hospital (The)
Royal Manchester Children's Hospital
Royal Oldham Hospital
Royal Preston Hospital
Royal Shrewsbury Hospital
Royal Stoke University Hospital
Royal Surrey County Hospital
Royal Sussex County Hospital
Royal United Hospital
Royal Victoria Hospital - Belfast
Royal Victoria Infirmary
Russells Hall Hospital
Salford Royal Hospital
Salisbury District Hospital
Sandwell General Hospital
Scarborough General Hospital
Scunthorpe General Hospital
Sheffield Children's Hospital
South Tyneside District General Hospital
South West Acute Hospital
Southampton General Hospital
Southend Hospital
Southmead Hospital
St George's
St Helier Hospital (Adult)
St James's University Hospital
St Mary's Hospital
St Marys Hospital (Newport, IOW)
St Peter's Hospital
St Richard's Hospital (Chichester)
St Thomas' Hospital
Stepping Hill Hospital
Stoke Mandeville Hospital
Sunderland Royal Hospital
Tameside General Hospital
The Cumberland Infirmary
The Great Western Hospital
The James Cook University Hospital
The Princess Elizabeth Hospital
The Princess Royal Hospital
The Queen Elizabeth Hospital (King's Lynn)
The Royal Liverpool University Hospital
Torbay District General Hospital
Tunbridge Wells Hospital
Ulster Hospital
University College Hospital
University Hospital Lewisham
University Hospital of North Durham
University Hospital of North Tees
University Hospital of Wales
University Hospital, Coventry
Warrington Hospital
Warwick Hospital
Watford General Hospital
West Cumberland Hospital
West Middlesex University Hospital
West Suffolk Hospital

Weston General Hospital
Wexham Park Hospital
Whipps Cross University Hospital
Whiston Hospital
Whittington Hospital
William Harvey Hospital
Withybush General Hospital
Worcestershire Royal Hospital
Worthing Hospital
Wrexham Maelor Hospital
Wythenshawe Hospital
Yeovil District Hospital
York Hospital
Ysbyty Gwynedd

Appendix 3: Standards definitions

- When entering times, use 24 hour clock, e.g. 7:23pm = 19:23, and leave blank if the time is not known

- GSC – Glasgow Coma Scale

- AVPU – alert, voice, pain, unresponsive scale

- For the purposes of this audit, abnormal vital signs are defined as:

  Temperature (degrees Celsius)[2]
  - <35 or >37.9 in children <3 months of age
  - <35 or >38.9 in children 3-6 months of age
  - <35 in children >6 months of age (NB: no upper limit)

  Respiratory rate (breaths per minute)[1]
  - <30 or >40 in children <1y of age
  - <25 or >35 in children aged 1-2 years
  - <25 or >30 in children aged 2-5 years
  - <20 or >25 in children aged 5-12 years
  - <15 or >20 in children aged >12 years

  Heart rate (beats per minute)[1]
  - >160 in children <12 months
  - >150 in children aged 12-24 months
  - >140 in children aged >2 - 5 years
  - >120 in children aged >5 - 12 years
  - >100 in children aged >12 years

  Oxygen saturation (%) in air ≤95%[2]
  GCS <15 or less than 'Alert' on the AVPU scale
  Capillary refill time > 3 seconds[2]

Appendix 4: Calculations

STANDARD	GRADE	Analysis sample	Analysis plan
1. a) O2 should be given on arrival to maintain sats 94-98%	F – 100%	All	Standard met: Q4='Yes' Standard failed: Q4='No' or 'Not recorded'
1. b) O2 should be prescribed on arrival to maintain sats 94-98%	D – 80%	All	Standard fully met: Q5='Yes' Standard failed: Q5='No' or 'Not recorded'
2. a) As per RCEM standards, vital signs should be measured and recorded on arrival at the ED	F – 100%	All Note: analyse peak flow separately	Standard met: Q8a-f='Yes' AND Time ≤ 15 minutes after arrival Standard failed: if one or more Q8a-f='No' OR Time not entered
2. b) Patients with any recorded abnormal vital signs should have a further complete set of vital signs recorded in the notes within 60 minutes of the first set	D – 80%	Subsample: Q9='Yes' Note: analyse peak flow separately	Standard met: Q13a-f='Yes' AND Time ≤ 60 minutes after first set Standard failed: if one or more Q13a-f='No' OR Time not entered
3. High dose nebulised β2 agonist bronchodilator should be given within 10 minutes of arrival at the ED ***Note: A pMDI + spacer is the preferred option in children with moderate asthma***	F – 100%	All	Standard met: Q6='Yes' Standard failed: Q6='No' or 'Not recorded'
4. Add nebulised Ipratropium Bromide if there is a poor response to nebulised β2 agonist bronchodilator therapy	F – 100%	All EXCEPT Q7='No – not needed'	Standard met: Q7='Yes' Standard failed: Q7='No' or 'Not recorded'
5. If not already given before arrival to the ED, steroids should be given as soon as possible as follows: <u>Adults 16 years and over</u>	-		

40-50mg prednisolone PO or 100mg hydrocortisone IV Children 6-15 years 30-40mg prednisolone PO or 4mg/kg hydrocortisone IV Children 2-5 years 20mg prednisolone PO or 4mg/kg hydrocortisone IV ***Note: children receiving maintenance steroid tablets should receive 2mg/kg prednisolone up to a maximum dose of 60mg***			
a) within 60 minutes of arrival (acute severe)	F – 100%	Subsample: Q10='Acute severe'	Standard met: Q11='Yes - fully' or 'Not given – reason given' AND Time ≤ 60 minutes Standard failed: Q11='Yes – different dose' or 'Not recorded' OR Time > 60 minutes
b) within 4 hours (moderate)	F – 100%	Subsample: Q10='Moderate'	Standard met: Q11='Yes - fully' or 'Not given – reason given' AND Time ≤ 4 hours Standard failed: Q11='Yes – different dose' or 'Not recorded' OR Time > 4 hours
6. Intravenous Magnesium 1.2 - 2g over 20 minutes to be given to adults with acute severe asthma who do not respond well to bronchodilators	D – 80%	Subsample: Q3='16 years or over' AND Q10='Acute severe', EXCLUDE Q12='No – reason given' and 'No – paediatric'	Standard met: Q12='Yes - fully' Standard failed: Q12='Yes – different dose' or 'No' or 'Not recorded' NB Ignore 'No – paediatric' patient' responses
7. Evidence of consideration given to psychosocial factors in adults prior to discharge	A – 50%	Subsample: Q3='16 years or over' AND Q14='Discharged', EXCLUDE Q15 'No – paediatric	Standard met: Q15='Yes' Standard failed: Q15='No' or 'Not recorded'

		patient' AND 'No – reason given'	
8. Evidence of assessment before discharge that:	-		
b) the patient's inhaler TECHNIQUE is satisfactory	D – 80%	Subsample: Q14='Discharged', EXCLUDE Q16='Not assessed - reason given'	Standard met: Q16='Yes' Standard failed: Q16='Not recorded'
c) the patient's inhaler TYPE is satisfactory	D – 80%	Subsample: Q14='Discharged', EXCLUDE Q17='Not assessed - reason given'	Standard met: Q17='Yes' Standard failed: Q17='Not recorded'
9. Discharged patients should have oral prednisolone prescribed as follows: Adults 16 years and over 40-50mg prednisolone for 5 days Children 6-15 years 30-40mg prednisolone for 3 days Children 2-5 years 20mg prednisolone for 3 days ***Note: children receiving maintenance steroid tablets should receive 2mg/kg prednisolone up to a maximum dose of 60mg***	F – 100%	Subsample: Q14='Discharged' EXCLUDE Q18='Not prescribed - reason given'	Standard met: Q18='Yes - fully' Standard failed: Q18='Yes – partially' or 'Not recorded'
10. Written discharge advice given to the patient	D – 80%	Subsample: Q14='Discharged'	Standard met: Q19='Yes' or 'No - reason given' Standard failed: Q19='No' or 'Not recorded'
11. GP or clinic follow-up arranged according to local policy for discharged patients within 2 working days	D – 80%	Subsample: Q14='Discharged'	Standard met: Q19='Yes – within 2 working days' or 'No - reason given' Standard failed: Q19=' Yes - after 3 or more working days' or 'No' or 'Not recorded'

Appendix 5: Inclusion and exclusion criteria

Inclusion criteria

- Adults (16 years and over) presenting to the ED with moderate or acute severe asthma
- Children (2-15 years) presenting to the ED with moderate or acute severe asthma

Exclusion criteria

- Adults (16 years and over) presenting to the ED with mild, life-threatening or near-fatal asthma
- Children (2-15 years) presenting to the ED with mild, life-threatening asthma or features of a pre-terminal event
- Paediatric patients aged under 2 years old

Appendix 6: References

[1] Samuels M and Wieteska S (2011), *Advanced Paediatric Life Support: The practical approach*. 5th ed. Manchester: Advanced Life Support Group

[2] NICE Clinical Guideline: Feverish illness in children (CG160) (May 2013)

[3] SIGN & BTS British Guideline on the Management of Asthma (October 2014)

[4] National Asthma Audit, Asthma UK