

National benchmarking as a support system for clinical governance

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ABSTRACT ✓ Audit of the management of acute asthma in hospital has developed in tandem with guidelines produced and updated by the British Thoracic Society (BTS), on the principle that agreed guidelines combined with systematic review of practice by periodic audit are more likely to result in improvements in practice than guidelines alone.

A short audit data set was distilled from previous experience with more elaborate tools and made available nationally to audit departments and through letters to consultant members of the BTS. Hospitals have been able to contribute since 1990.

The data set reflects key items of the process of care: peak flow measured on admission and twice daily during the hospital stay; blood gases on admission; systemic corticosteroids as an inpatient; discharged with inhaled and oral corticosteroids; written self-management plans; follow-up arrangements.

Data from 4,741 admissions over a seven year period are presented. The proportion of patients nationally receiving these items of asthma care is given. The median values for hospital performance improved significantly over the seven years, although there is potential for further improvement. If these data represent the national picture, they could form the basis upon which to set national standards for the care of patients with acute asthma in hospital. A further result of the developing audit has been the recognition of the value of external benchmarking in providing a context for the interpretation of local audit results.

This audit system provides hospitals with a quick and easy method of obtaining an overview of local performance, with comparative national data for the same year. This has potential as a tool for clinical governance with much wider applicability, providing the data are handled carefully, particularly as the variability between hospitals diminishes over time.

In 1990, the first national guidelines for the management of asthma were produced^{1,2}. These have been revised and

updated^{3,4} but the major elements regarding acute severe asthma remain unchanged. In parallel with the initial document, a detailed national audit of hospital care of acute severe asthma demonstrated many deficiencies in care and confirmed continuing wide variations between hospitals and between specialists and non-specialists⁵. The data were reduced to a minimum data set of eight variables that were deemed clinically important, were collectable and showed variation between units. In 1995–7 hospitals were invited to submit data on 20 to 40 consecutive cases and in return receive an analysis comparing their unit's performance with the national picture for that year and, where appropriate, against previous submissions from the particular hospital. This report summarises the data collected over a seven year period and discusses how they might be used to assess clinical performance and thus inform the process of clinical governance.

Methods

The first two audits in 1990 and 1991 covered 40 adult hospitals across the UK, including both teaching and district general hospitals. Clinical audit departments collected data retrospectively from case records on 20 or more consecutive admissions with a discharge diagnosis of acute severe asthma, using a standard proforma. From 1995 onwards, hospitals were periodically invited to participate in further audits, using a short standardised proforma and instruction leaflet for just eight of the original variables: peak flow measured on admission; assessment of peak expiratory flow rate (PEF) variability during the hospital stay; blood gases on admission; systemic corticosteroids as an inpatient; discharged with inhaled and oral corticosteroids; written self-management plans; follow-up arrangements. It takes five to ten minutes per case record to collect this information. Data were analysed centrally and returned to the hospital within a month. The report described the local results compared on box and whisker plots with the median and inter quartile ranges from all other contributing centres. Trends were tested for significance using chi-square analysis for trend.

Results

Forty hospitals took part in the first audit in 1990 (766 cases) and 34 of these in 1991 (900 cases). In 1995–7, 67 units took part (3,075 cases) (Table 1). By the end of 1995, 15% of participants had submitted data twice, and of 80

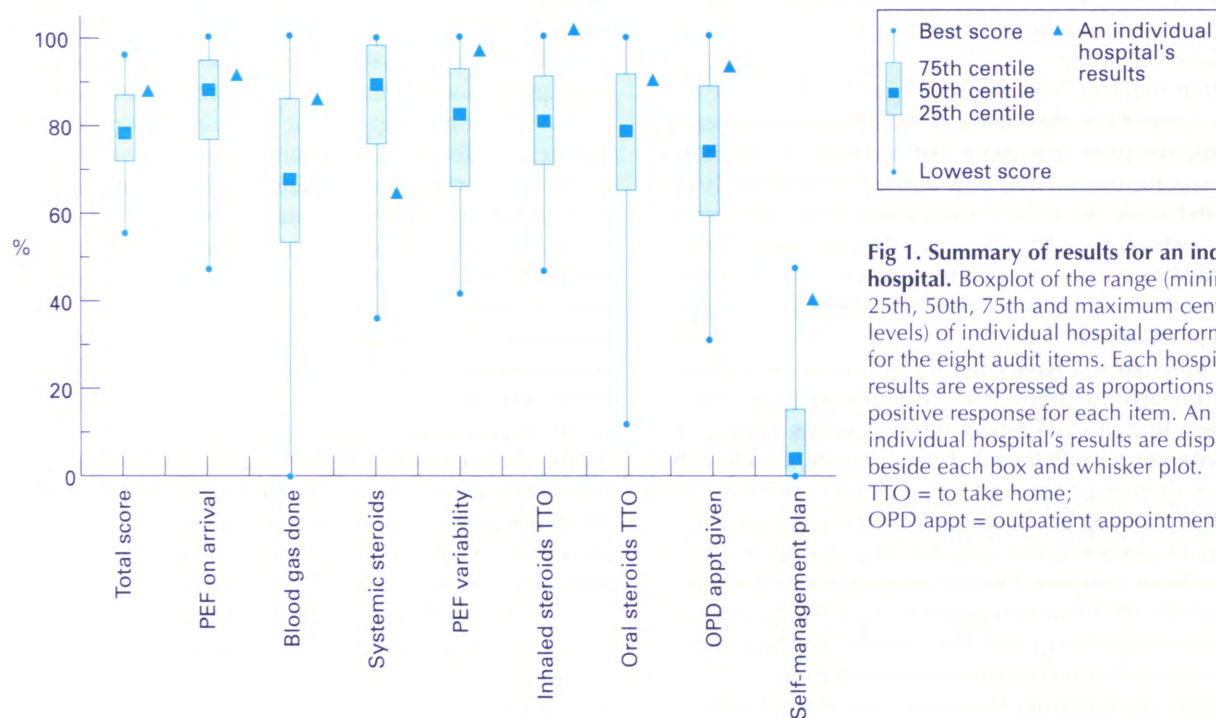
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Table 1. Summary of accumulated results in BTS asthma audit database, by year.

	1990 no (%)	1991 no (%)	1995 no (%)	1996 no (%)	1997 no (%)
Number of patients	766	900	1,508	970	597
Number of centres	40	34	34	21	12
PEF recorded on admission	661 (80)	745 (83)	1,325 (88)	880 (91)	502 (84)
Blood gases measured on admission	534 (70)	621 (69)	1,043 (69)	717 (74)	n/a
Gases measured or SaO ₂ >92%	n/a	n/a	1,173 (78)	852 (88)	517 (87)
Systemic steroids given*	<i>648</i> (85)	<i>770</i> (86)	1,129 (75)	812 (84)	437 (73)
PEF measured twice daily on ward	597 (78)	756 (84)	1,159 (77)	814 (84)	449 (75)
Inhaled steroids given at discharge	613 (80)	724 (80)	1,288 (85)	890 (92)	542 (91)
Oral steroids given at discharge	597 (78)	704 (78)	1,215 (81)	698 (60)	535 (90)
Outpatient follow-up planned	561 (73)	656 (73)	987 (65)	730 (79)	413 (69)
Written self-management plan given	57 (9)	97 (11)	414 (27)	426 (44)	332 (56)

*1990 and 1991 proforma asked about systemic steroids given at any time (results in italics), from 1995 onwards, systemic steroids given as part of initial treatment.

PEF = Peak expiratory flow rate



hospitals that have contributed data, 52 now have data from more than one year (65%). In 1995 we estimated from questionnaire returns that 24% of the annual total of acute asthma cases seen by those units would have been included in the audit with a median of 40 cases submitted (range 13 to 121).

At the end of the 1995 collection cycle, we enquired who had collected the data. There were 29 responses, which can be split into three categories – audit staff (21), medical staff (3) and nurses (5). Most had had no difficulty completing the proformas and 7 of the 29 reported changes that had

already been instituted following the receipt of the results. The feedback to each hospital was presented as box and whisker plots setting out the maximum, median, minimum and interquartile range of data from hospitals across the UK for that year for each item (Fig 1). This comparison of a particular hospital with the national picture illustrates how the hospital compares with its peers in the UK. The average results for each of the five years of data collection are shown in Table 1. In each year the scatter was wide and similar to that shown in Fig 1 for 1995, with the lowest value for each variable occurring in less than 50% of cases

from an individual hospital. Although the scatter between units remains wide, there has been a significant trend towards a higher median performance with time, particularly for the use of inhaled steroids on discharge and for the use of written self-management plans (Fig 2).

Discussion

This paper describes a series of comparative audits of the same eight variables over a seven year period. The items audited have been distilled from a much larger data set used in 1990 and reflect the process of admission, care in hospital and discharge for acute asthma occurring in adults (>16 years). Although this is an audit of process, at least three variables are known to relate to outcome: use of inhaled steroids and written self-management plans reduce morbidity^{6,7} and reduced peak flow variability is linked, although not definitely proven to relate to fewer early re-admissions⁸⁻¹¹. The eight item tool demonstrates differences in the process of care in hospitals with high and low re-admission rates¹², and is one of the outcome indicators recommended by a National Health Service Executive (NHSE) working group¹³.

The audit tool was deliberately designed to be simple and quick to complete by non-medical staff. Retrospective audit necessarily assumes that items not recorded in the notes were not performed. This follows the legal principle for missing data and, since these eight items are of key importance for asthma management, is probably justified. It is not yet possible to collect even eight items as part of routine care, so periodic audit of consecutive cases over a short time is a practical alternative.

Single hospitals will have difficulty acquiring the numbers of cases needed for useful statistical comparisons, which limits the value of even repeat internal audits since small changes cannot be differentiated from chance, let alone be attributed to changes in staff or procedures or to a non-comparable case-mix in the samples. Moreover, repeat audits take time to complete, running the risk that by the time they have been completed the originating junior staff have moved on. Such local audits compare unfavourably with one that can be completed quickly and provide feedback within a month together with comparative national data.

Until now, participating hospitals have been invited to submit data either on consecutive acute asthma cases seen over a specified time interval or a random sample of a larger cohort. In future it would be more appropriate to limit the audit to consecutive series and require hospitals to document the number of cases not included, in order to judge the completeness of the sample. This would allow statements to be made about the actual number of cases (and proportion) for which each item was performed. This is an absolute number, with no need to consider the variability of the sample compared with the population from which it is drawn. Providing the sample was of sufficient size, the generalisability of the results could also be assured, for the same reason. Our results show a median sample size of 40,

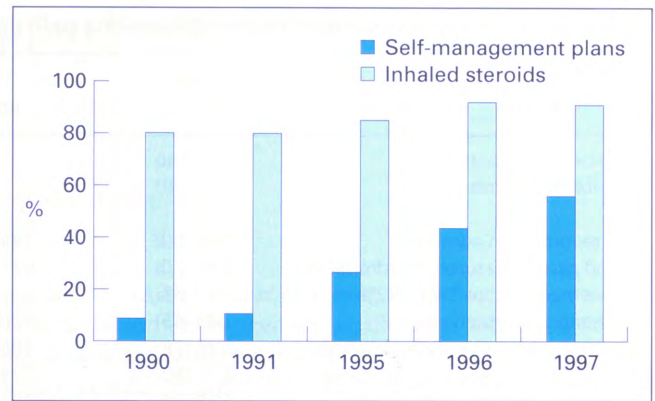


Fig 2. Proportion of patients in whom two standards were being met over a seven year period.

suggesting that a minimum cohort of one month of admissions, and a preferred sample of two months of cases, would be appropriate.

The NHSE report on outcome indicators for asthma accepts that some of the indicators will have to be derived from process of care. Mant and Hicks¹⁴, studying myocardial infarction, suggest that process measures can detect important differences in the outcome of care and note that many fewer cases are required to detect change when process rather than true outcome is studied, making this a more practical approach. A later contribution observed that some aspects of care can be studied only by measuring process and that the use of process measures has been neglected¹⁵. If certain processes are known to relate to outcome it makes sense to monitor them directly, since outcome will always be more complex and likely to be confounded by case-mix.

The report to participants sets out the individual hospital's performance compared with others in the UK. Total compliance is almost never achievable and may indeed be inappropriate. As long as there are wide variations in performance and the ideal is above the national median, the latter is by definition achievable, since half the hospitals perform better than this. It is reasonable to suggest and easy to understand that a hospital with data in the top quartile is doing well in satisfying agreed guidelines, whereas data in the lowest quartile suggest the opposite. Such comparisons add purpose and context to the interpretation of local audit findings and justify the collection of relatively small numbers in an individual unit.

The British Thoracic Society executive has formally endorsed this audit tool, indicating that if a hospital is performing poorly this ought to trigger a review of the service in that unit. However, the stated caveat is that audit values may be low because data have been poorly recorded or facilities and/or organisation of the unit is poor, and not only because of the poor performance of staff. A poor performance should trigger an investigation with the intention of leading to better performance in subsequent years. A

separate professional judgement is required to select a level below which a formal review (possibly an external review) would be appropriate. It might be that a scheme should develop such that units falling below some agreed standard (see below) would receive a visit along the lines of the BTS peer review scheme¹⁶, which is intended to produce a constructive critique of a unit. The present peer review scheme is voluntary and confidential, but if clinical governance is instituted the reviews are likely to become more formal and to go automatically to management. A constructive report that helps to identify deficiencies in a unit's organisation or staff performance is surely better than crisis management.

Over a period of time, median values should improve with this system, as units seek to improve their performance; stable levels are likely to be attained eventually, suggesting that performance has reached a clinically ideal level, or is uniformly limited by available resources. At this stage the distribution of hospital results for each item will show a normal distribution, so that particular scrutiny of hospitals in the lowest centiles would be inappropriate, since they would be there only by chance. An absolute standard could then be determined from the normal distribution curve and hospitals could be expected to perform better than this level.

The serial data do show an improving trend over the seven years for five of the eight items. Whilst care must be taken when comparing results from different hospitals in different years, the trend is numerically statistically significant. Further study is needed of measures that show no trend of consistent improvement to try to tease out whether ideal practice is being achieved or guideline recommendations are unrealistic. Fig 2 shows the different patterns of improvement for use of inhaled steroids and written self-management plans at discharge. The latter continues to rise, suggesting that there is general acceptance of under-performance on this point, but there is a suggestion of a plateau being reached for the former. Further audit data are needed to know if this is a true plateau and further study will be required to establish whether this is due to practical constraints or clinical desirability.

Conclusion

Audit has had a poor record in improving practice over the last decade¹⁷. One problem is that there has usually been no method for the individual clinician to effect (or to fund) necessary action, and no formal check to see that identified problems have been addressed. Clinical governance may introduce a means by which action has to follow an audit showing poor performance. We have demonstrated a trend to closer adherence to key guideline recommendations, which are, as far as possible, evidence based. This would support the hypothesis that repeated attention from guideline production, editorial and advertising material, and audit is leading to higher standards of hospital asthma care in the UK. There has also been a reduction in asthma

deaths over this period and an improvement in the standard of care of those patients who die^{18,19}.

We believe we have demonstrated one method available to clinical governance to monitor performance in a meaningful way. Our method of comparing data between hospitals identifies a range of performance in different units. Most doctors faced with the knowledge of results in the lowest quartile (or outside some absolute standard) would wish to examine their unit's care and try to improve matters to match the performance of their peers.

The present audit scheme has worked well and has proved acceptable to professionals. It provides a numerical performance measure that, with continuing refinement, selects out those hospitals with the weakest performance compared to their peers and to national guidelines. Although used here for one medical condition, it could be applied to any of the common medical problems presenting to hospital. It has potential to form part of the process of clinical governance by helping to detect important process deficiencies in a non-confrontational manner before they become a problem.

Acknowledgement

The seed for this work was sown by Anthony Hopkins in the early 1990s, when he challenged the BTS Standards of Care Committee, as well as other professional groups, to identify the three key items for audit of selected topics. We salute his memory.

References

- 1 Guidelines for the management of asthma in adults I: chronic persistent asthma. Statement by the British Thoracic Society, Research Unit of the Royal College of Physicians of London, King's Fund Centre, National Asthma Campaign. *Br Med J* 1990; **301**:651-3.
- 2 Guidelines for the management of asthma in adults II: acute severe asthma. Statement by the British Thoracic Society, Research Unit of the Royal College of Physicians of London, King's Fund Centre, National Asthma Campaign. *Br Med J* 1990; **301**:797-800.
- 3 Guidelines on the management of asthma. *Br Med J* 1993; **306**:776-82 and *Thorax* 1993; **48**: S1-S24.
- 4 The British Guidelines on Asthma Management, 1995 position statement. *Thorax* 1997; **52**(Suppl):S1-S21.
- 5 Pearson MG, Ryland I, Harrison BDW. Audit of acute asthma before and one year after publication of guidelines. *Respir Med* 1996; **90**:539-46.
- 6 Neville R. Patient education and guided self management plans. *Respir Med* 1996; **90**:385-6.
- 7 Geddes DM. Inhaled steroids: benefits and risks. *Thorax* 1992; **47**:404-7.
- 8 Pearson MG, Ryland I, Harrison BDW. A national audit of acute severe asthma in adults. *Quality in Health Care* 1995; **4**:23-30.
- 9 Udwardia ZF, Harrison BDW. An attempt to determine the optimal duration of hospital stay following a severe attack of asthma. *J R Coll Physicians Lond* 1990; **24**:112-4.
- 10 Bucknall CE, Robertson C, Moran F, Stevenson RD. Why uncritical criterion based audit is not enough: analysis of PEF data from a prospective asthma audit. *Thorax* 1992; **47**:884P.
- 11 Williams TJ, Spencer J, Fahey T, Harris L. Timing of discharge from hospital of patients admitted with acute asthma: a district hospital experience. *J R Coll Physicians Lond* 1994; **28**:306-9.

- 12 Slack R, Bucknall CE. Readmission rates are associated with differences in the process of care in acute asthma. *Quality in Health Care* 1997;6:194-8.
- 13 Pearson M, Goldacre M, Coles J, et al (Eds). Outcome indicators for asthma; report of a working group to the Department of Health, London Royal College of Physicians Research Unit and Oxford Unit of Health Care Epidemiology. London: NHSE, 1999.
- 14 Mant J, Hicks N. Detecting differences in quality of care: how sensitive are process and outcome measures in the treatment of acute myocardial infarction? *Br Med J* 1995;311:793-6.
- 15 Crombie IK, Davies HTO. Beyond health outcomes: the advantages of measuring process. *J Evaluation Clin Pract* 1998;4:31-8.
- 16 Page RL, Harrison BDW. Setting up interdepartmental peer review; the British Thoracic Society's scheme. *J R Coll Physicians Lond* 1995;29:319-24.
- 17 Hopkins A. Clinical audit: time for a reappraisal? *J R Coll Physicians Lond* 1996;30:415-25.
- 18 Campbell MJ, Cogman GR, Johnstone SL, Holgate ST. Age specific seasonality and trends in asthma mortality in England and Wales 1983-1992. *Br Med J* 1997;314:1439-41.
- 19 Bucknall CE, Slack R, Godley CC, Mackay TW, Wright SC. Scottish Confidential Inquiry into Asthma Deaths, 1994-6. *Thorax* 1999;54:978-84.

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Hormone replacement therapy for endocrine deficiencies

Edited by John Wass and James Ahlquist

The availability of specific and precise hormone assays has provided clinicians and epidemiologists with powerful tools for research and clinical management. This has enlarged our understanding of endocrine under- and over-activity, encompassing the importance of tissue responsiveness to hormones. It has also made clinicians aware of the reality of subclinical diseases, ie tissue and organ damage preceding clinical manifestations, and raises the possibility of starting endocrine replacement therapy in symptom-free people. This presents clinicians with a number of challenges: Which individuals to select for HRT treatment? How much should they be given? When is the best time to treat? What benefits of HRT are there for the postmenopausal women? How can treatment be effective and most acceptable to the patient?

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