Recognising adverse events and critical incidents in medical practice in a district general hospital

Graham Neale, E Jane Chapman, Jonathan Hoare and Sisse Olsen

ABSTRACT – A pilot audit of case records of consecutively discharged patients from a district general hospital was undertaken by specialist registrars, SHOs and senior nurses in order to identify adverse events (AEs) and critical incidents (CIs) related to hospital care. Experienced external assessors taught the clinical staff to use a previously validated structured method of case record review that facilitates analysis. The external assessors audited the same case records in parallel. Aggregated data from 154 case records of patients admitted to the general medical wards were collected for analysis. Fifteen AEs and 41 CIs were identified in the case records covering the hospital admission. In addition, 16 AEs and nine CIs were discovered to have occurred before admission or, for three AEs, shortly after discharge. One-half of the episodes related to problems arising during ward care and for one-half of these issues remained unresolved at the time of discharge. One-third of episodes related to medications or the administration of intravenous fluids – and in these cases there were defects in monitoring the patients' clinical progress. This study led to initiatives to improve care at the host hospital and we believe that further programmes along similar lines are indicated.

KEY WORDS: adverse events, audit, case record review, critical incidents, medications, ward care

It is well established that defects in medical practice put hospital inpatients at risk.[1] In the surgical specialties confidential studies into deaths within 30 days of a surgical procedure[2], within one year of delivery[3] and after major trauma[4] have significantly improved clinical practice and organisation of care. Physicians have a less distinguished record in assessing defects in practice in order to improve the quality of care, except in the management of some well-defined conditions such as asthma.[5]

Recently, however, a National Confidential Enquiry into Patient Outcomes and Deaths (NCEPOD) study of acutely ill medical patients, requiring admission to intensive care, revealed inadequacies in care. Two-thirds of patients had serious physiological disturbances for 12 or more hours before being assessed by an intensivist, and in over half of these cases the consultant physician had no knowledge of, or input into, the referral to intensive care.[6] This report dovetails with a confidential study of 200 deaths after emergency medical admission to three general hospitals in England, which concluded that shortfalls in care may have contributed to the fatal outcome in 25 cases.[7] The authors identified problems with diagnosis, wrong treatment and delayed treatment as significant issues but did not collect data on the organisation of care. They concluded that 'the issues raised are likely to be relevant for all medical admissions,' given that at least 90% of patients in acute hospital medical wards present as emergencies.

In its first national report, the National Patient Safety Agency (NPSA) estimated that, in acute NHS hospitals in England, over half a million patient safety incidents are reported each year, leading to over 800 deaths.[8] More than two-thirds of incidents cause no lasting harm. These figures must be treated with caution, however, because they are extrapolations from data acquired from a small number of trusts over only a few months. Moreover, from these and other studies, it appears that doctors contribute only 10% reports.

Retrospective case record review has been used to establish the incidence of adverse events in hospital practice.[9] However, attempts to address common problems of medical management have made little progress. Donald Berwick, Chairman and Chief Executive of the Institute for Healthcare Improvement, believes that, in part, this is because 'doctors fail to see the problem'.[10] This fits well with the statement by Dr Peter Simpson, Chairman of the expanded and renamed NCEPOD, that efforts to change clinical practice must be clinically led.[11]

The principal aim of this study was to open the eyes of clinical staff to defects in clinical care in their hospital. It had three objectives:

- To examine the feasibility of training clinical teams to undertake a confidential structured method of case record review to reveal defects in their clinical management of patients.
- To determine whether structured analysis of recorded data could be used to define problems in management.

Graham Neale FRCP, Visiting Professor, Department of Biosurgery and Surgical Technology

E Jane Chapman M Soc Sci BSc RGN Dip R Man, Adviser in Risk Management, Clinical Safety Research Unit

***Jonathan Hoare** MRCS, Specialist Registrar

Sisse Olsen MRCS, Research Fellow, Department of Biosurgery and Surgical Technology

Imperial College, London

*St Mary's Hospital, London

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- To show how structured audit could be used to improve clinical care.

It was not designed to produce rigorous epidemiological data.

Methods

The study was carried out at the end of 2003 in a large district general hospital. The leaders of three general medical teams agreed to encourage their support staff to cooperate. Each team was responsible for emergency admission every 8 days. We aimed to examine the case records of 50 patients discharged consecutively from the care of each team. For logistic reasons case records of patients admitted with myocardial infarction and stroke were excluded from the study. Clerical staff working on the four wards allocated to general medicine sequestered sequential case records from their own areas and also acted as guardians of records from patients admitted to other wards as 'outliers'. The process of review was completed within a few days of patients being discharged from hospital.

Box 1. Definition of an adverse event and a critical incident.

An *adverse event* is defined as an unintended injury to a patient, as a result of healthcare management rather than the disease process, sufficiently serious to prolong hospital admission or to cause disability persisting after discharge or to contribute to death.

A *critical incident* is defined as an undesirable event in the management of the patient that could have led to harm or did so in a manner that did not fulfil the criteria for an adverse event.

Table 1. Structure of the analytical process.

Timing of incident
- Pre-admission
- Admission (initial assessment in A&E and on ward)
- During procedure
- Post-procedural care
- General ward care
- At discharge

Nature of incident. Related to:
- Primary disorder
- Comorbidity (including simple tests, eg blood count)
- Technical undertaking
- Medication (including provision of intravenous fluids)
- Infection
- General care, eg nutrition, pressure areas, mobility
- Use of resources

Nature of clinical deficiency
- Diagnostic accuracy
- Assessing the patient's general condition
- Skill (related to procedure) or knowledge
- Prescribing/administering medications
- Monitoring progress
- Summarising condition and planning future care
- Organisational

The method of assessment has been described in detail elsewhere.[12] In brief, over 2–3 weeks, members of medical teams (specialist registrars (SpRs), senior house officers (SHOs) and senior nurses), supported administratively by ward clerks, assessed the case records of consecutively discharged patients. Their evaluations were integrated with the findings of an external assessor experienced in case analysis.

Senior nurses and SHOs screened case records against a set of 15 criteria known to be associated with adverse events. In addition, they were asked to comment on any aspect of a patient's care with which they were not satisfied. In other reported studies of case record review only screen-positive records were retained for assessment. In this study, SpRs assessed case records, irrespective of screening status, using a rapid review questionnaire derived from that described previously.[12]

Finally, an external assessor (GN), who was skilled in retrospective case record analysis, reviewed all the case records using the previously standardised questionnaire. As this was not an epidemiological study, as much as possible of an individual patient's illness was reviewed, including problems with care arising before the index admission and sometimes immediately after admission. Moreover, CIs were recorded as well as AEs (Box 1).

Data analysis

The data collection forms were anonymised to ensure that neither the individual patient nor care provider was identifiable. Data were entered into an SPSS programme for computerised analysis. The results are largely descriptive. Percentages, means, medians and interquartile ranges are used where indicated. Analyses focussed on the timing of the incidents, their nature and underlying clinical deficiencies (Table 1). Contributory factors were briefly examined according to the methodology described previously.[13]

Ethical approval

The medical director and audit committee of the host hospital supported the project but asked that approval be sought from the ethics committee of an adjacent trust. Approval was granted on the understanding that each unit was internally responsible for the observations made regarding patients under its care and that the research team collated only fully anonymised data.

Key Points

A practical method of clinical audit is described, leading directly to an analysis of faults in hospital clinical care

The method involves medical and nursing staff, thereby encouraging teamwork and the concept of total quality care

The resulting analyses should be useful in developing systems for improving hospital practice

Results

Case records

One hundred and fifty-four case records were examined (75 men and 79 women). The patients ranged in age from 21 to 95 years (median 72; interquartile range 23 years; mean 68 years). Hospital stays ranged from 1 to 67 days (median 4 days; interquartile range 4 days; mean 5.6 days). The patients had the usual spectrum of disorders presenting as emergencies to general medical units. Less than 10% of the cases assessed were directly related to the three specialties of the consultant staff – gastroenterology, endocrinology and rheumatology (Table 2).

Screening process

A case record was regarded as 'screen positive' if it met one of the 15 specified criteria. Because of difficulties in retaining case records, nurses screened 121 records and SHOs 122 of the 154 entered into the study. Forty of the screened records were accepted as positive. Assessors found 16 AEs and 19 CIs in 26 of these records and six adverse events and 22 critical incidents in 46 of the 82 screen-negative records. Thus, screening selected 33% of case records and these contained 73% of the AEs and 46% of the CIs found on detailed assessment.

Nurses commented on the care provided in 45 cases. On 21 occasions they commented on critical incidents, four of which were not picked by assessors. SHOs commented on 21 cases. On eight occasions these concerned critical incidents of which three were not picked up by the assessors. Most of the remaining comments from both nurses and SHOs concerned organisational issues.

Comparison of evaluations by specialist registrars and assessors

Overall, the external assessor and the SpRs found a similar number of recordable events (Table 3), but the correlation between their findings was poor (k = <0.2). The SpRs recorded 14 CIs that were missed by the external assessor primarily because the episodes had not been recorded clearly in the case records. On the other hand, the external assessor was more adept at recognising episodes that occurred outside the index admission (16 AEs, eight CIs). All but one of these AEs had precipitated a hospital admission.

The clinical assessor spent between 5 and 60 minutes (mean 18 minutes) examining individual case records. Using the rapid review questionnaire SpRs spent between 2 and 30 minutes on each case record (mean times varied between registrars – registrar A 15 minutes; B 7 minutes; C 10 minutes; D 6 minutes).

Analysis of adverse events and critical incidents

Adverse events and CIs recognized by both SpRs and assessors were aggregated for analysis, giving a total of 81 (31 AEs and 50 CIs).

Timing (Figs 1 and 2). Thirty-nine episodes (48% total) related to inadequate ward care, of which nine were not resolved at the time of discharge. In addition, there were seven deficiencies at the time of discharge.

Twenty episodes (25%) precipitated the admission to hospital. Eleven of these episodes stemmed from inadequate monitoring of treatment, and eight of these arose from previous hospital admissions and two from outpatient treatment.

Nature of episodes (Figs 1 and 3). Twenty-six episodes (32%) were medication related (Fig 1) and most of these arose from poor monitoring of the patient's progress, especially in relation to the treatment of hypertension (eight cases), heart failure (four cases) and diabetes mellitus (three cases).

Table 2. Medical disorders of patients whose case records were entered into the study.

Presenting disorders, *n* = 154	(%)	Recorded comorbidities, *n* = 256	(%)
Respiratory (infection, asthma)	20	Treated hypertension	18
Chest pain (excluding acute infarction)	12	Ischaemic heart disease	13
Fall/collapse	9	Diabetes mellitus	13
Cardiological (dysrhythmia, heart failure)	8	Respiratory conditions	10
Abdominal (vomiting/diarrhoea)	6	CNS disorder	8
Confusional state	5	Arthritis	6
CNS disorder (excluding acute stroke)	5	Cardiological conditions	4
Miscellaneous	35	Miscellaneous	28

CNS = central nervous system.

Table 3. Comparison of findings by specialist registrars (SpRs) and external assessor.

SpR	Number of case records reviewed	Number of AEs and CIs recorded by SpR	Number of AEs and CIs recorded by external assessor in the same case records
A	55	13	15
B	28	3*	12*
C	15	4	4
D	25	3	3
Total	123	23	34

* p = <0.05 (Chi-square); AE = adverse event; CI = clinical incident.

Twenty-three episodes (28%) related to diagnosis/assessment of the presenting condition. These covered a wide range of conditions, mostly in elderly patients. Of four patients with respiratory problems, three were readmitted within 1–3 days of discharge (in one patient with pulmonary embolism as a result of a long-haul flight the scanning had been read incorrectly). Three patients with micturition problems had not been adequately assessed. An elderly patient with unexplained bleeding per vaginum, sufficiently severe to require blood transfusion, was sent home with an outpatient appointment, only to be re-admitted short of breath with severe anaemia.

Seventeen episodes (21%) related to failure to recognise or assess comorbidities correctly. In particular, seven routine haematology and three urine tests were missed or mis-interpreted. Three patients were being treated for anaemia with ferrous sulphate, although their haematological indices did not suggest iron deficiency.

Perceived clinical deficiencies (Figs 2 and 3). Deficiencies in care were recognised across the whole clinical spectrum. There was significant clustering around the prescription, administration and monitoring of treatment with medications and intravenous fluids. Assessment of the patient's condition and planning of post-discharge care were observed to be weaknesses. This correlates with the finding that 10% of admissions related to disorders arising from medications prescribed during a previous hospital admission. Review of risk management records 9 months after the study showed that none of these cases had been reported.

Contributory factors

A detailed assessment of contributory causes, including patient characteristics, task factors, input by individual clinicians, team factors, work environment and organisational factors was not

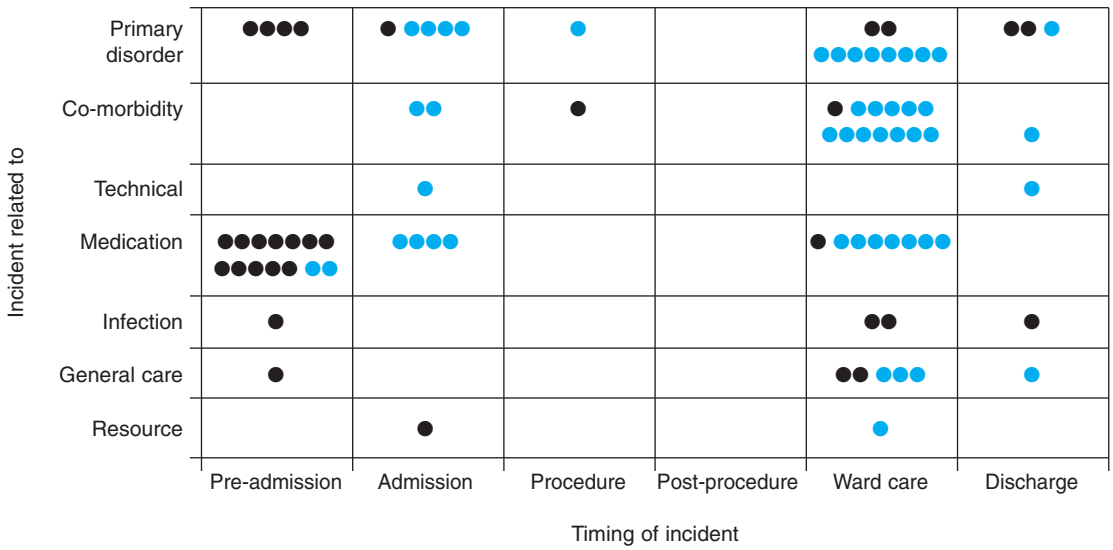

Fig 1. Relationship between the nature and timing of episodes.
● = adverse event;
● = critical incident.

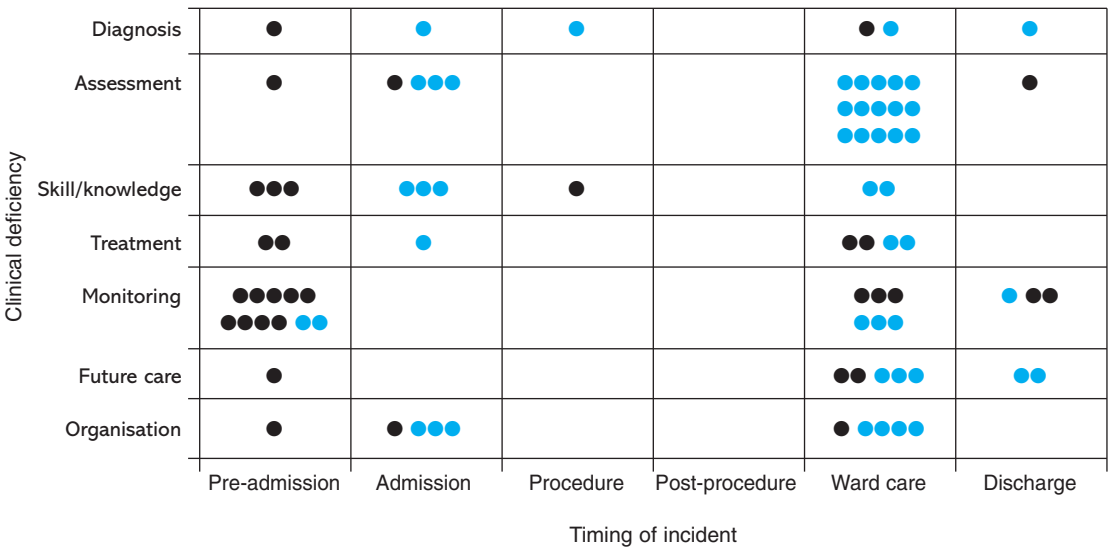

Fig 2. Relationship between the clinical deficiency and timing of the episode.
● = adverse event;
● = critical incident.

possible within the resources available to the research team. However, the participating teams were clearly very busy with substantial specialist commitments in addition to the care of emergency admissions. Registrars found that often they only had time to 'trouble-shoot' rather than conducting formal ward rounds. Staff claimed that it was not possible to provide discharge summaries with explanatory letters to general practitioners, largely because of a lack of secretarial support. With acute medical admissions often exceeding 30 within 24 hours it was not possible to follow the guideline of the Royal College of Physicians[14] that consultants should spend 15 minutes assessing each newly admitted patient.

Discussion

Method of data collection

The screening process could be undertaken quite rapidly (10–15 cases per hour) and 73% of AEs were found in the 33% cases that were screen positive. However, screening is of limited practical value because, even without knowing the screening status, SpRs spent little time on screen-negative case records. On the other hand, screening appeared to generate a feeling of involvement by the whole clinical team and the free comments by SHOs and senior nurses revealed several issues in the care process that would not have been otherwise recognised. Nurses were more than twice as likely as SHOs to indicate what they perceived as difficulties in the care of patients. Eighteen (40%) of their comments related to organisational problems, especially at the time of discharge.

Specialist registrars had heavy clinical commitments and they found it difficult to find time to assess clinical records. Their period of training was too short to ensure that they fully understood the process and we were unable to make sufficient time available for joint discussion between assessors and SpRs to discuss individual cases.

The poor correlation between the findings of SpRs and clinical assessors, in part, reflects the process. Specialist registrars had 'inside' knowledge about the care of many of the patients and this was reflected in a significant proportion of the episodes that they described. They concentrated primarily on episodes occurring during admissions. In contrast, the clinical assessor spent more time searching through the records, thereby revealing deficiencies in care outside the index admission, especially in relation to pre-admission monitoring. Problem cases were discussed by the external assessors and agreement reached as to whether or not criteria for AEs and CIs were satisfied.

Overall we achieved the first objective of the study: with appropriate support clinical teams are able to undertake an integrated assessment of case records and so reveal systemic defects in care.

Structured analysis

A new form of structured analysis was designed for this study. It has three components – when the episode was initiated, its underlying nature and why did it happen. This allowed three sets of comparisons (Figs 1–3). Inevitably, to a considerable extent, the judgements are subjective. However, the second objective of defining and quantifying problems in case management was achieved. Inadequate ward care, especially in the later stages of an admission to hospital, led to half the incidents identified and defects in joint hospital and primary care led to hospital admission in 25% cases. A third of the problems arose from medication (especially in relation to hypertension, cardiac failure and diabetes mellitus) and a quarter from problems in diagnosis and assessment.

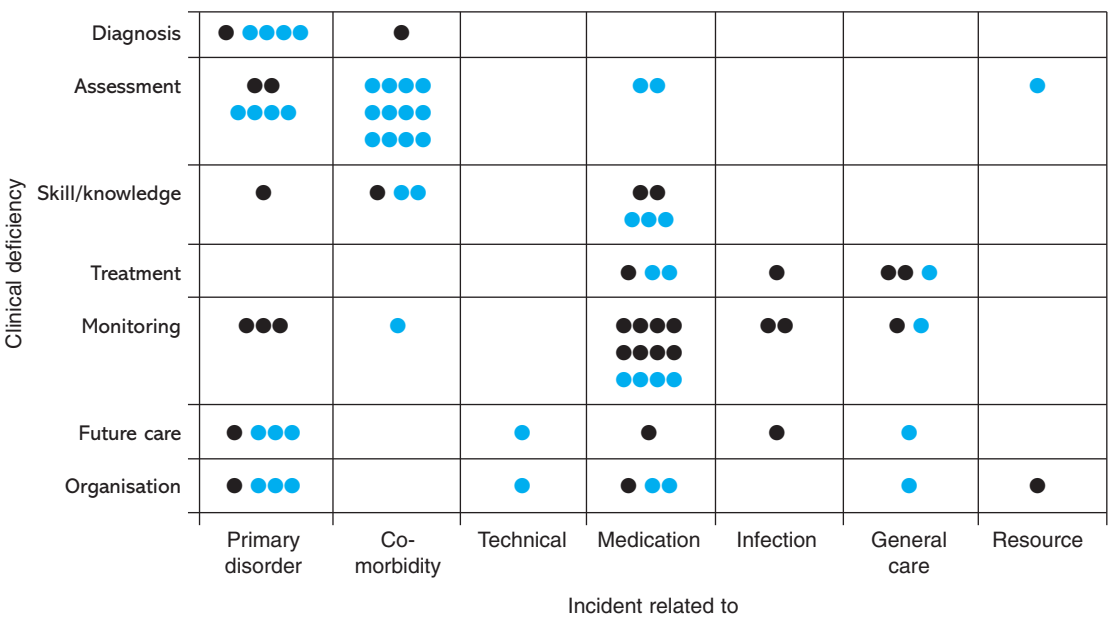

Fig 3. Relationship between the clinical deficiency and the nature of the episode.
● = adverse event;
● = critical incident.

Addressing the problems

The data arising from this study were presented at a Grand Round and generated considerable discussion. The medical director-elect asked for more detailed examination of the findings so that his team might consider how best to address issues on a whole hospital basis.

The SpRs engaged in this study were prepared to comment on the problems. They described feeling constantly 'embattled'. One wrote 'The process of the acute take, post take, and then the frantic days of clearing beds for the next take – ordering and begging for investigations, chasing and often pleading for results – all has the feeling of working in a field hospital rather than providing considered medical practice. This is not an environment suitable for the careful and meticulous review of hospitalised patients'. The external assessors working alongside the clinicians involved in the care of patients were in no doubt about the difficulty of providing high quality medical practice with present staffing levels, especially when working to the rules of the European Working Time Directive. The above statement illustrates how difficult it may be to improve the quality of hospital care of patients with acute medical problems. More encouraging was the comment that some kind of regular review within a team would improve the quality of both service provision and clinical morale.

Currently we are attempting to produce a computer program that will make it easier to collect and analyse data. With an annual audit of this nature it may be possible to show changes with time. This has not been achieved for general medical care, although an interesting attempt has been made in a small hospital in a tight-knit rural community in Australia.[15]

Acknowledgements

SO developed the methodology, set up the study, collaborated in determining controversial assessments, constructed the SPSS database and abstracted the data. GN suggested the study, assessed the case records, analysed the data and wrote the paper. EJC and JH facilitated the study within an NHS trust. GN and SO act as guarantors. None of the authors has any competing interests.

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