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Adverse events in British hospitals: preliminary retrospective record review

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Abstract

Objectives To examine the feasibility of detecting adverse events through record review in British hospitals and to make preliminary estimates of the incidence and costs of adverse events.
Design Retrospective review of 1014 medical and nursing records.
Setting Two acute hospitals in Greater London area.
Main outcome measure Number of adverse events.
Results 110 (10.8%) patients experienced an adverse event, with an overall rate of adverse events of 11.7% when multiple adverse events were included. About half of these events were judged preventable with ordinary standards of care. A third of adverse events led to moderate or greater disability or death.
Conclusions These results suggest that adverse events are a serious source of harm to patients and a large drain on NHS resources. Some are major events; others are frequent, minor events that go unnoticed in routine clinical care but together have massive economic consequences.

Introduction

Retrospective studies of hospital case records in the United States and Australia have shown a substantial rate of adverse events, defined as unintended injuries caused by medical management rather than the disease process. The Harvard medical practice study found that 3.7% of hospital admissions led to adverse events.[1 2] In 70% of these patients the adverse event led to slight or short lived disabilities, but in 7% the disabilities were permanent and in 14% they contributed to death. Similar rates were found in a study from Colorado and Utah.[3 4] The quality in Australian healthcare study identified adverse events in 16.6% of admissions, half of which were considered preventable.[5] This study included a wider range of adverse events of minor or moderate severity. Other methodological differences also exaggerate the difference between the United States and Australian figures.[4 6] The Australian study estimated that adverse events accounted for 8% of hospital bed days and cost the Australian healthcare system $4.7bn a year. Adverse events also result in huge personal cost to the affected individuals, both patients and staff.[7]

The epidemiology of adverse events has not been studied in Britain. We report preliminary findings from a pilot study that examined the feasibility of applying United States and Australian methods and the potential value of a parallel study in the United Kingdom.

Methods

Design and procedure

The study was carried out at two acute hospitals in the London area. We reviewed 500 randomly drawn records from site 1 between July and September 1999 and 514 records from site 2 between December 1999 and February 2000. In both sites the index admissions studied occurred in two months in 1998, about a year before the review periods. We reviewed 273 (26.9%) records from general medicine (including geriatrics), 290 (28.6%) from general surgery, 277 (27.3%) from orthopaedic surgery, and 174 (17.2%) from obstetrics. Admissions to the four specialties studied in 1998-9 were 19 397 in site 1 and 18 335 in site 2. The proportions of admissions studied were 2.6% and 2.8% respectively.

Review process

The review team consisted of an experienced nurse who worked as project manager with four part time research nurses. A consultant physician acted as lead medical assessor, working with five part time surgical and obstetric colleagues, each of whom had been qualified for a minimum of 10 years. Each reviewer screened sets of notes under supervision until they were judged to be fully conversant with the review process.

The nurse reviewers used 18 predefined screening criteria to assess the case records. Records that

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Table 1 Number of adverse events by specialty

Specialty	No (%) of records reviewed	No of patients with adverse events detected		Total No of adverse events detected	
		All (% of records)	Preventable (% of events)	All (% of records)	Preventable (% of events)
General medicine	273 (27)	24 (8.8)	18 (75)	25 (9.2)	19 (76)
General surgery	290 (29)	41 (14.1)	17 (41)	47 (16.2)	20 (43)
Obstetrics	174 (17)	7 (4.0)	5 (71)	7 (4.0)	5 (71)
Orthopaedics	277 (27)	38 (13.7)	12 (32)	40 (14.4)	13 (33)
Total	1014	110 (10.8)	52 (47)	119 (11.7)	57 (48)

Example of adverse event

A 53 year old man with a history of stroke, multiple resistant *Staphylococcus aureus* infection, leg ulcers, and heart failure was admitted for treatment of venous ulceration and cellulitis of both legs. He sustained two adverse events:

1. Failure to manage the leg ulcers aggressively led to the development of osteomyelitis. He subsequently had below knee amputation of both legs.

2. Incorrect management of his urinary catheter resulted in necrosis of the tip of the penis. He had suprapubic catheterisation and developed an infection. The patient's hospital stay was extended by 26 days.

screened positive (n = 405) were then reviewed by clinicians, who identified any adverse events and completed a detailed questionnaire. The clinicians assessed the impact of each adverse event on the patient in terms of disability and additional bed days, likely cause, place and date of occurrence, type of adverse event (for example, whether related to a particular procedure or treatment), and preventability and recorded detailed clinical information. Records were reviewed once only, although difficult issues were resolved after duplicate review and discussion between two or more assessors. Criteria for adverse events are given on the *BMJ*'s website. A full description of the methods has been published.[2 5] Copies of the British review forms are available from the authors.

Results

In all, 110 (10.8%) of 1014 patients experienced an adverse event (table 1). However, some patients experienced multiple events, and the overall number of events was 119 (11.7%). There was no significant difference in sex between patients who did and did not experience an adverse event. However, patients with adverse events were older than those who did not experience an adverse event ($P < 0.001$; see tables A and B on *BMJ*'s website)

Seventy three (66%) patients who suffered an adverse event had minimal impairment or recovered within one month; 37 (34%) patients developed an injury or complication that resulted in moderate impairment (21 patients; 19%) or permanent impairment (seven patients; 6%) or contributed to death (nine patients; 8%). Overall, 53 (48%) adverse events were judged preventable. The box shows an example of a patient who experienced serious adverse events.

The 119 adverse events resulted in a total of 999 extra bed days, of which 460 (46%) were judged preventable and therefore could have been saved. Each adverse event led to an average of 8.5 additional days in hospital (range 0-70 days) with additional direct costs of £290 268 to the trusts concerned (table 2).

Table 2 Estimated cost of adverse events (1999 values)

Specialty	No of patients with adverse events	Mean (SD) extra bed days for all adverse events	Daily cost of bed (£)	Total cost of additional bed days for study sample (£1000s)
General medicine	25	4.87 (5.67)	171	20.8
General surgery	47	6.07 (12.52)	282	80.4
Obstetrics	7	3.57 (2.88)	305	7.6
Orthopaedics	40	14.58 (17.87)	311	181.4
Total	119	8.54 (13.55)	—	290.2

Discussion

Our pilot study has established the feasibility of conducting a major record review of adverse events in the United Kingdom. We found that 10.8% of patients admitted to hospital experience an adverse event, with an overall 11.7% rate of adverse events when multiple adverse events are included. About half of these events were judged preventable. A third of adverse events led to moderate or greater disability or death. Some adverse events are serious and are traumatic for both staff and patients. Others are frequent, minor events that go unnoticed in routine clinical care and yet together have massive economic consequences.

This study is primarily a pilot and has certain limitations. The study was small and based on only two hospitals. In addition, the case mix does not accurately reflect hospital practice. The specialties included in the review could have higher rates of adverse events than other specialties. Nevertheless, the specialties we chose constitute a large proportion of inpatient care.

Although we cannot extrapolate with any precision, our findings strongly suggest that adverse events are a serious problem in the NHS, as they are in the United States and Australia. We estimate that around 5% of the 8.5 million patients admitted to hospitals in England and Wales each year experience preventable adverse events, leading to an additional three million bed days. The total cost to the NHS of these adverse events in extra bed days alone would be around £1bn a year.

What is already known on this topic

Substantial numbers of patients in hospital in the United States and Australia have been found to suffer adverse events

No data are available for the United Kingdom

What this study adds

In this pilot study about 10% of patients admitted to acute hospitals experienced an adverse event

A third of these events led to moderate or greater impairment

About half of the adverse events were preventable with current standards of care

Preventable adverse events could cost the NHS around £1bn a year in terms of additional bed days

In the United States and Australia retrospective case record analysis has provided the foundation and driving force for initiatives to reduce harm to patients and to make more efficient use of expensive hospital resources. Our findings indicate that a full national study would be justified in the United Kingdom, as indicated in the chief medical officer's recent report.[8] We believe that the investigation should cover at least 20 general hospitals (of varying size and type) and include 500 representative case records from each hospital. This would yield around 1000 adverse events for detailed analysis. Such a study would provide reliable information on the numbers, types, and costs of adverse events occurring in NHS hospitals. This would allow the principal causes to be explored and specific risk reduction strategies to be identified and costed. The total cost of such a study would probably be equivalent to the money lost through preventable adverse events in less than eight hours in the NHS.

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Involving consumers in designing, conducting, and interpreting randomised controlled trials: questionnaire survey

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Abstract

Objective To assess the extent to which consumers are involved in the work of clinical trial coordinating centres in the United Kingdom and the nature of consumers' involvement in randomised trials coordinated by these centres.

Design National surveys using structured questionnaires with some open ended sections.

Setting 103 clinical trial coordinating centres in the United Kingdom identified through a database assembled in 1997 by the NHS clinical trials adviser.

Participants Named contacts at 62 coordinating centres and investigators in 60 trials that were identified as involving consumers.

Main outcome measures Number of coordinating centres and number of trials in which consumers were involved and the nature of consumers' involvement.

Results Of the 62 eligible centres, 23 reported that consumers had already been involved in their work, and most respondents were positive about this involvement. 17 centres planned to involve consumers. 15 centres had no plans to involve consumers, but only four of these considered such involvement irrelevant. Responses from investigators about the 48 individual trials were mostly positive, with respondents commenting that input from consumers had helped refine research questions, improve the quality of patient information, and make the trial more relevant to the needs of patients.

Conclusions Consumer involvement in the design and conduct of controlled trials seems to be growing and seems to be welcomed by most researchers. Such involvement seems likely to improve the relevance to consumers of the questions addressed and the results obtained in controlled trials.

Introduction

There is substantial evidence that there are mismatches between the research that gets done and the research that patients would like to see done.[1–3] This has led some to call for greater involvement of patients in the research process.[4 5] Research designed to assess the effects of treatments and randomised controlled trials in particular seem especially likely to benefit from the involvement of consumers.

Both consumers and researchers are interested in involving consumers in clinical trials, but there has been little formal advocacy of such involvement in the United Kingdom. The 1998 guidelines on clinical trials from the Medical Research Council referred to the involvement of consumers only in an appendix,[6] and the guidelines of the Association of the British Pharmaceutical Industry made no mention of consumer involvement.[7] Most reports of trials do not make

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