Use of hospital beds: a cohort study of admissions to a provincial teaching hospital

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Abstract

An instrument was developed to study the use of hospital beds and discharge arrangements of a cohort of 847 admissions to the John Radcliffe Hospital, Oxford, for a three week period during February–March 1986. For only 38% of bed days were patients considered to have medical, nursing, or life support reasons for requiring a provincial teaching hospital bed. The requirements for a bed in the hospital decreased with the patient's age and length of stay in hospital. For only a tenth of patients was the general practitioner concerned in discussions with hospital staff about the patient's discharge and less than one third of patients had been given more than 24 hours' notice of discharge.

Several features might increase the proportion of bed days that are occupied by patients with positive reasons for being in hospital. Among these are an increased frequency of ward rounds by consultants, or delegating discharge decisions by consultants to other staff; providing diagnostic related protocols for planning the length of stay in hospital; planned discharges; and providing liaison nurses to help with communication with primary care staff.

Introduction

Hospitals throughout the world face the same problem of balancing quality of care against cost containment. In the United States cost containment in hospitals is greatly influenced by medical insurance companies which determine through payment the appropriateness of hospital admissions and length of stays. In the United Kingdom general practitioners have a controlling influence on admissions to hospitals. Length of stay is often determined how many people are waiting for a bed. Several authors have analysed the appropriateness of hospital admissions and length of stay in the United States,¹⁻⁵ but few such studies have been undertaken in the United Kingdom.⁶⁻⁸

We carried out a study on the use of beds by patients admitted to the John Radcliffe Hospital, Oxford, for three weeks during February–March 1986. We developed and used an instrument aimed at measuring the use of beds by an interview with nursing and medical staff. The instrument is similar to the Boston appropriateness evaluation protocol,⁴ which measures unnecessary days of hospital care by audit of medical records.

Methods

The hospital—The John Radcliffe Hospital is a teaching hospital that acts as the main acute district general hospital for the city of Oxford and surrounding towns and villages. Acute stay beds for patients with respiratory, gynaecological, and neurological problems are available at other hospitals in the city. The hospital has one of the highest throughputs of patients for any acute unit in England and Wales.

The cohort—All admissions to the hospital between 24 February and 16 March 1986 under medical, geriatric, and general surgical consultant physicians were included. The cohort excluded obstetric and gynaecological patients and children under age 16. Day patients were also excluded. The patients were followed up prospectively until discharge or death.

Data collection—The following data were collected for all patients admitted: name, sex, date of birth, date of admission, type of admission (emergency, elective), specialty, diagnosis, and date of discharge or death. Information was collected on which wards the patients stayed, and whether the wards were the usual wards for that particular consultant's patients. The number of movements between wards for each patient was recorded for each day in hospital. Whether or not the patient was on the "wrong" ward was determined, wrong ward being defined as not the usual ward used by the patient's consultant. The short stay admissions wards and intensive therapy and coronary care units were not defined as wrong wards. The days of ward rounds and days of "on take" for emergency admissions for each consultant were recorded.

Patient interviews—One in 10 patients in the study were interviewed while on the wards to discover their views about their hospital stay and discharge plans. Nine tenths of the patients interviewed in hospital were seen again at home between 10 and 18 days after discharge.

Questionnaire survey of general practitioners—For all patients discharged the general practitioners were asked by questionnaire when and how they were informed of the patients' discharges.

Bed study instrument—For every alternative patient who was in hospital the day after his or her admission, data were collected on use of hospital beds using the bed study instrument. This was administered by two community physicians (P A and J M) at interview with the senior nurse on each ward. The bed study instrument consists of two parts. Part 1 (table I)

TABLE I—The bed study instrument criteria for appropriateness of hospital days

- 1 Has that day a life threatening condition that requires treatment or observation, including acute haematological disorders
- 2 Any invasive therapeutic, or investigative procedure that day
- 3 Postoperative day for criterion 2 above
- 4 Requiring close medical monitoring by a doctor
- 5 Undergoing ventilation
- 6 Undergoing any form of intravenous therapy
- 7 Care of major surgical wound and drainage
- 8 Continuous monitoring of vital signs, including cardiac monitor
- 9 Scheduled for any invasive therapeutic or investigative procedure and requiring preoperative evaluation

TABLE II—Reasons for not being at home

- 1 Requires nursing care but does not need to be in acute district general hospital
- 2 Receiving specialist remedial treatment
- 3 Waiting for investigation that could be done as an outpatient
- 4 Waiting for result of investigation
- 5 Waiting for bed in another hospital
- 6 Waiting for part III or other accommodation
- 7 Waiting for ward round
- 8 Waiting for another opinion
- 9 Waiting for remedial therapists' assessment
- 10 Waiting for teaching ward round or session
- 11 Waiting for transport
- 12 Unable to look after self at home
- 13 Convalescence
- 14 Uncertainty over medical aftercare
- 15 Uncertainty over nursing aftercare
- 16 Uncertainty over social aftercare

consists of nine criteria related to medical, nursing, and life support services. The patient was considered to have a positive reason to be in hospital if any criterion was met. Part 2 (table II) consists of 16 criteria to determine why the patient was not at home if none of

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the nine criteria of part 1 applied. The criteria of part 2 are listed in a hierarchical order—that is, when more than one criterion was given the highest criterion in the order was accepted.

Validity of instrument—For a 6% random sample of bed days the interview with the senior nurse using the bed study instrument was validated by interview with the appropriate senior registrar of the patient. For 88% of the cases senior registrars and the nurses were in agreement on whether or not there was a positive reason for use of the hospital bed (Kendall's coefficient of concordance,⁹ $W=0.88$, $p<0.00001$). This level of agreement is better than that achieved between physicians assessing the appropriateness of bed days by audit of medical records.⁵

Results

During the three weeks of the study there were 847 admissions: 584 (69%) were for emergencies and 263 (31%) for elective procedures; 432 (51%) patients were admitted under the care of a physician, 322 (38%) under a surgeon, and 93 (11%) under a geriatrician. Thirty six consultants admitted patients, with an average of 23 patients per consultant.

The mean length of stay was 7.7 days for emergency admissions and 5.0 days for elective admissions. The mean length of stay for medical patients was 6.0 days, surgical patients 6.2 days, and geriatric patients 13.4 days.

The patients who were admitted as emergencies accounted for 77% of bed days; medical patients accounted for 44% of bed days, surgical patients for 34%, and geriatric patients for 22%. Patients over age 65 accounted for just under half (398; 47%) of admissions and 65% of bed days. Patients over 85 accounted for less than a tenth (59; 7%) of admissions and 13% of bed days.

Less than a third (254; 30%) of the patients were moved at least once between wards during their hospital stay, and half (415; 49%) spent one or more days on the wrong ward during their hospital stay.

BED STUDY INSTRUMENT

Four hundred and five patients were eligible for assessment with the bed study instrument. The instrument was completed for 328 (81%) of these patients but not for the remaining 77 because either they had been discharged or they had died before the first ward visit. Table III gives the distribution of use of hospital beds.

TABLE III—Distribution of bed day use by type of admission

	Type of admission		Total (n=2317)
	Emergency (n=1828) (%)	Elective (n=489) (%)	
<i>Positive reasons for being in hospital:</i>			
Life threatening condition (1)*	3.3	1.6	3.0
Undergoing invasive procedure (2)	3.0	16.8	5.9
Requiring specialist skills (3-8)	24.7	29.2	25.6
Scheduled for invasive procedure (9)	3.0	6.3	3.7
<i>Reasons for not being at home:</i>			
Waiting, social reasons (6,11, 12, 13, 16)†	12.1	4.3	10.5
Requiring nursing care (1, 2, 5, 9, 15)	38.0	32.5	36.9
Waiting, medical reasons (3, 4, 7, 8, 10, 14)	15.9	9.2	14.5

*Numbers in parentheses refer to numbers in table I.

†Numbers in parentheses refer to numbers in table II.

Overall, the patients sampled were considered to have positive reasons for being in this hospital on 38% of the total bed days as judged by the instrument. The proportion of bed days with positive reasons was as follows: 52% in surgical beds, 37% in medical beds,

and 22% in geriatric beds; 34% of bed days for emergency admissions were judged to have positive reasons compared with 48% of bed days for elective admissions. The proportion of patient bed days with positive reasons was related to the patient's age, being 50% for patients aged 16-64 years but only 19% for patients over 84.

The proportion of bed days with positive reasons decreased steadily from 74% on the first day after admission to 22% on the eighth day after admission. Thereafter, the proportion remained unchanged for increasing lengths of stay. It increased from 35% for patients who had one move during their hospital stay to 94% for patients who had four moves. It decreased from 43% for patients who were never on the wrong ward to 30% for those who spent all of their time on the wrong ward.

The proportion of bed days with positive reasons was related to days of consultant ward rounds and days when consultants were "on take" for emergency admissions. For the three days leading up to a ward round the proportion remained constant at 33%. On the day after a ward round the proportion increased to 62% and then decreased to 40% by the third day after the ward round. For the three days leading up to an "on take" day the proportion remained constant at 40%, increasing to 60% the day after and reducing to 40% by the third day after the "on take" day.

Patient interviews—Discharge plans had been discussed with three fifths of patients during their hospital stay. Discussion of discharge plans was not related to the patient's length of stay. When interviewed at home nine tenths of patients said that they were satisfied with the timing of their discharge, though less than a third of all patients interviewed had been given more than 24 hours' notice of discharge.

General practitioner's discharge questionnaire—548 of 610 (90%) questionnaires sent to the general practitioners of patients discharged were completed. For only one quarter of patients was the general practitioner informed of the discharge on or before the day it had occurred. For only a tenth of patients did the general practitioner discuss the patient's discharge with hospital staff. General practitioners were not more concerned in the discharge plans of patients with more complex social problems or of very elderly patients.

Discussion

We developed the bed study instrument, which can be used at interview with nursing or medical staff to determine bed use. The validity of the instrument can be judged according to how well it replicates the assessment of the experienced nursing and medical staff. The high degree of concordance between doctors and nurses suggests that the instrument is reliable. We adopted the instrument to be used at interview rather than by an audit of medical records because we believed that it would provide more accurate and complete information concerning the patient's hospital stay. Using the instrument, for only 38% of bed days during the three week period during February to March 1986 was the patient considered to have positive reasons for being in hospital.

How does this result compare with other studies? In a study at the Radcliffe Infirmary, Oxford, during March 1970 it was estimated that 32% of bed days could have been saved by using alternatives to admission and by earlier discharge.⁸ In a study examining 1132 hospital admissions to over 100 hospitals in the United States during 1974-82 it was found that 60% of hospital bed days were "appropriate."⁵ Appropriateness was measured by auditing medical records using a protocol similar to the bed study instrument. The

difference between the two studies may be due to different case mixes. The John Radcliffe Hospital has a low proportion of elective admissions. Such admissions were found to have a higher proportion of bed days judged to have positive reasons.

There are several possibilities for increasing the proportion of bed days that are occupied by patients with positive reasons for being in hospital. Since ward rounds by consultant physicians seem to be major determinants of the date of a patient's discharge increasing the frequency of ward rounds at which discharge decisions are made, delegating responsibility for discharge decisions to other staff, and providing diagnostic related protocols to plan patients' length of stay in hospital would all promote earlier discharge. In North America length of stay is partly determined by payment for agreed length of stay for diagnostic groups. Using the Delphi technique^{10 11} it is possible to reach agreement on suitable lengths of stay for diagnostic groups. In a North American study conducted in four general hospitals feedback of information to physicians about appropriate use of beds reduced inappropriate bed use by between two thirds and two and a half total days compared to the inappropriate bed use for patients of physicians who got no feedback.¹²

In several previous studies the findings suggested that planned discharge allows more effective use of beds,¹³⁻¹⁶ but there was little evidence of discharge planning in our study. We are now auditing the case notes for evidence of discharge planning and auditing general practitioner referral letters for evidence of information relevant to a patient's discharge.

Providing liaison nurses to hospital wards might help achieve earlier planned discharge of patients. The task of the nurse would not be to take over the role of the ward staff in dealing with discharge but to facilitate this role. This could be achieved by the nurse inquiring about discharge plans for patients on the ward, providing information about primary care and social services, helping with communication with primary care staff, ensuring that discharge notes are sent to the

general practitioner on time, and troubleshooting particularly complex or difficult problems. Such a role could be evaluated by a randomised controlled trial assessing the impact of the liaison nurse on discharge planning and length of hospital stay.

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ANY QUESTIONS

Are febrile convulsions in a child a contraindication to combined measles, mumps, and rubella vaccination and to measles and pertussis immunisation?

Convulsions are the commonest severe sequel of measles (estimates range from one per 200 to 500 cases). They are commoner when the child has had febrile convulsions; since measles is endemic in Britain such a history emphasises the importance of children being immunised against measles, mumps, and rubella. The risk is much smaller (one eighth to one tenth the magnitude) that a convulsion will be precipitated by the febrile reaction commonly occurring five to 10 days after immunisation.¹

Before 1988 the Department of Health's advice was that a personal history of convulsions was a contraindication to pertussis immunisation. It is now realised, however, that this leaves such children at a greater risk from the disease than from any complication of the immunisation.² The new edition of the DHSS's guidelines makes a personal history of convulsions only a special consideration,³ and it is my practice to recommend vaccination for children with febrile convulsions. Most pertussis immunisation should be carried out before the ages when febrile convulsions become common (after 9 months). In young infants afebrile convulsions, associated with underlying neurological conditions such as epilepsy, are commoner. These children are usually also advised to have pertussis immunisation.³ With a baby it may be prudent initially to immunise it against diphtheria and tetanus, later catching up with pertussis immunisation when the diagnosis is clear. Otherwise management may be complicated through a deteriorating neurological condition being (wrongly) blamed on the immunisation.

The parents of a child with a tendency to convulsions should be counselled on the management of any fever developing after immunisation. These convulsions usually occur five to 10 days after measles or measles, mumps, and rubella immunisation whereas they take place in the first 72 hours after pertussis immunisation. The advice is the same as when fever is caused by an infection, and doctors vary in their favoured techniques: paracetamol, extra fluids, thin clothing, a cool room, and tepid sponging are all popular procedures. In the United States the recommendation is to give an antipyretic drug routinely for the 72 hours in high risk children. Where the tendency is severe a short course of an anticonvulsant drug is sometimes helpful, an alternative being for parents to have rectal diazepam to hand. In the past an injection of immunoglobulin was sometimes given with measles to prevent its febrile effects. This practice is now contraindicated as it may interfere with the effectiveness of the mumps and rubella components of the combined measles, mumps, and rubella vaccine, which is now being introduced for routine use in Britain.⁴—ANGUS NICOLL, lecturer, department of tropical medicine, London School of Hygiene and Tropical Medicine, London

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