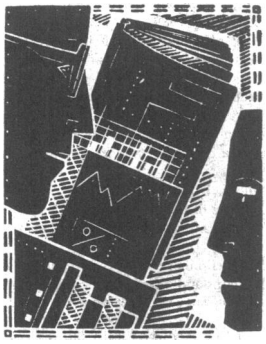
AUDIT IN PRACTICE



THIS WEEK . . .

• *In the three linked articles Drs Clarke, Chambers, and Milne deal with the issue of using readmission rates as an outcome indicator for hospital care. The first paper assesses the feasibility of measuring readmission rates from routinely collected Körner data in a study of three districts in North East Thames region and the second, based on a study in one district, whether readmissions may be judged as avoidable or unavoidable. The third article examines the validity of using readmission rates as an outcome indicator, and the authors conclude that such an approach is misleading and should be avoided.*

Measuring readmission rates

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Abstract

***Objective*—To assess the feasibility of extracting data on readmissions and readmission rates from Körner data for use as health service indicators.**

***Design*—Retrospective analysis of inpatient Körner data for January 1988 to April 1989.**

***Setting*—Three districts in North East Thames region.**

***Main outcome measures*—Number of readmissions after index discharge for all acute specialties combined and by specialty (general medicine, general surgery, gynaecology, trauma and orthopaedics, and geriatrics); readmission rates at 28 days after index discharge; and rates standardised for age group and sex by specialty and by consultant.**

***Results*—All specialties showed an early peak in number of admissions, which levelled off by 28 days. Readmission rates at 28 days were appreciably lower in surgical specialties than in medical specialties (for example, general surgery 4·1% *v* geriatric medicine 15·1%). They were related to age and sex of the patient. Rates standardised for these variables did not significantly differ by district. Likewise, significant differences in standardised rates were not obtained for consultants within a specialty in one district.**

***Conclusions*—Readmission rates may be measured with Körner data. The pattern of readmissions with time means that readmission rates should be measured at not more than 28 days after the index discharge; the rates require standardisation for age and sex. Annual comparisons of standardised rates may be made among districts for combinations of specialties; those among individual consultants or specialties are unlikely to be statistically valid.**

Introduction

There has been recent interest in the use of readmission rates as an indicator of outcome of hospital care.[1-4] This study was initiated to investigate the feasibility of measuring readmission rates for use as a health service indicator. Readmission rates have been investigated in the United Kingdom in the Oxford record linkage study[5,6] and have been measured elsewhere for various different specialty groups, although in some cases long follow up periods were used.[7-9] Comparison between published sources is not straightforward because of the different definitions of readmission,[10,11] and constructing expected readmission rates—for example, for specialties within a district health authority—has proved to be impossible.

Various aspects of Körner data collection now allow identification of readmissions, which was previously impossible from Hospital Activity Analysis data. This paper suggests how to measure readmissions with definitions derived from the current NHS data model, provided that a district has the relevant data sets and the necessary capability for analysis.

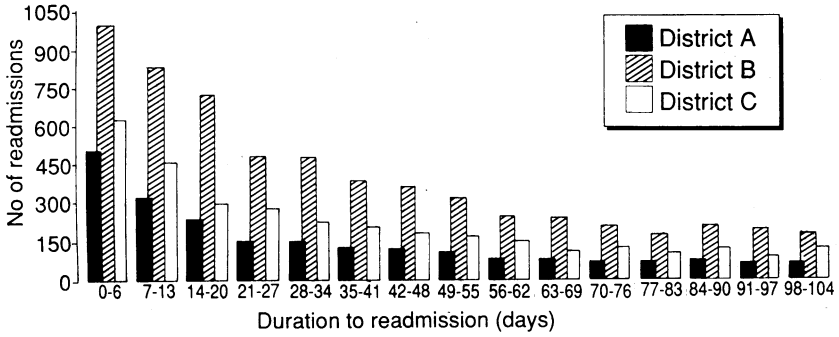


FIG 1—*Readmissions after index discharge for acute specialties according to duration to readmission in three districts in North East Thames region, index discharges, 1988*

Methods

DEFINITIONS

A readmission was defined as the next subsequent admission of a patient as an immediate (that is, emergency or unplanned) admission to any hospital within the same district, within a defined interval of a previous (index) discharge taking place within a defined reference period (calendar year 1988). Continuing readmissions were recorded up to April 1989, four months after the last possible index discharge on 31 December 1988.

An index admission was defined as including planned and unplanned admissions and day cases with no time limit on length of stay. Particular specialties were excluded: psychiatry, mental handicap, obstetrics and "well babies," mental illness, psychogeriatrics, radiotherapy, and general practitioner admissions. Direct transfers between hospitals within the district were identifiable as such and were not counted as readmissions.

The numerator for a readmission rate was defined as the number of readmissions in a given time interval after an index discharge from the care of the particular consultant, specialty, or district.

The denominator was defined as the corresponding number of patients discharged (alive) within the reference period.

OVER COUNTING

The definitions allowed each index event or first admission to be associated with only one readmission,

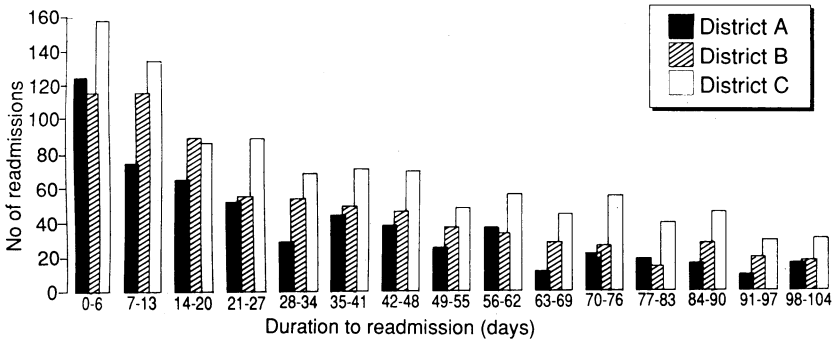


FIG 2—*Readmissions after index discharge in general medicine*

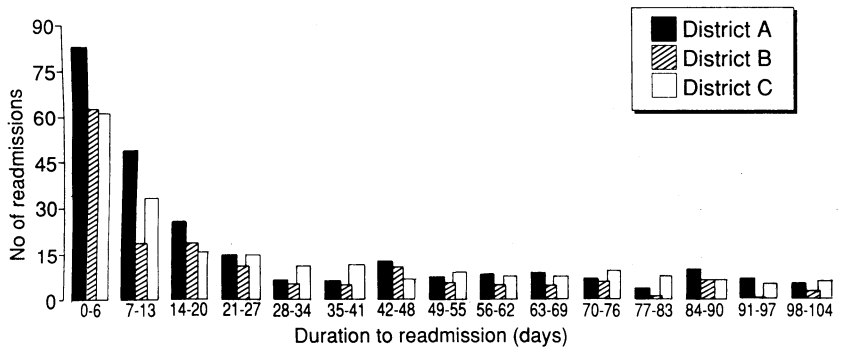


FIG 3—*Readmissions after index discharge in gynaecology*

and this removes the effects of over counting. (Without this restriction if a patient was admitted three times in the reference period, with consecutive admission and discharge dates A-a, B-b, C-c respectively, he or she might seem to have had three readmissions (a-B, b-C, and a-C), although in fact only the first two should be counted.)

The definitions allowed for a readmission in its turn to become an index event with a subsequent readmission. Planned readmissions were excluded from the definition as they result from a plan of care rather than from any deficit in the care delivered in the first admission.

EXCLUSIONS

Present Körner systems do not enable the numerator to include readmissions to a district other than to that of the index discharge. (Record linkage, for example, using the NHS number as currently planned,[1] would allow for adjustment for this cross boundary flow between districts.) Deaths outside hospital soon after discharge are not recorded and could not be excluded from the denominator.

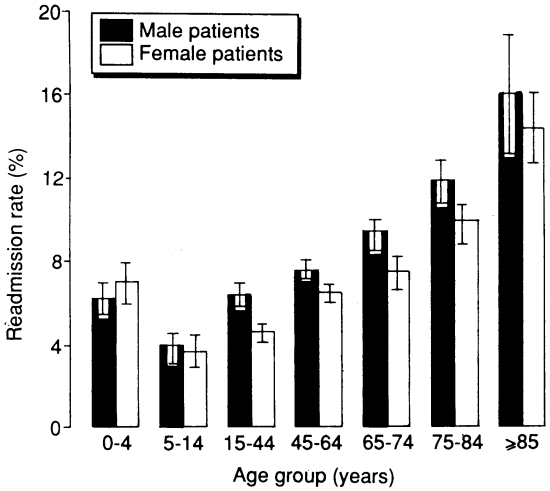


FIG 4—*Readmission rates at 28 days by age group and sex for acute specialties and districts combined, index discharges, 1988. Bars are 95% confidence intervals*

DATA RETRIEVAL AND ANALYSIS

Regionally stored inpatient Körner data covering the period January 1988 to April 1989 were analysed. The above definitions were used to identify readmissions and readmission rates by age and sex and to examine directly standardised readmission rates by time after index discharge for three districts in North East Thames for all acute specialties combined, for several individual specialties (general medicine, general surgery, gynaecology, trauma and orthopaedics, and geriatrics), and for individual consultants in one specialty in one district. The relevant total index discharges were used as the standard population in each case; 95% confidence intervals were calculated for directly standardised rates.

Results and discussion

Figure 1 shows the pattern of readmissions with time after index discharge in the three districts for all acute specialties. (Actual numbers are used so that the height of each bar depends on annual throughput in the different districts and specialties.) Figures 2 and 3 show the contrasting patterns for general medicine and gynaecology respectively. Figure 4 shows readmission rates at 28 days by age group and sex for all acute specialties and districts combined. Figure 5 shows the rates by specialty for each of the districts.

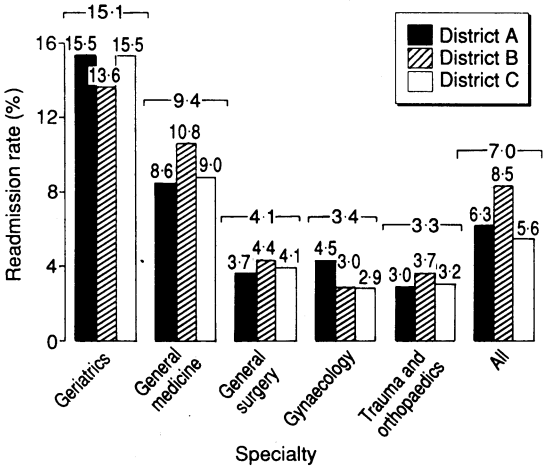
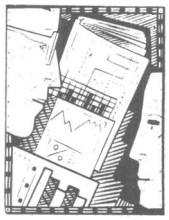


FIG 5—*Readmission rates at 28 days for each district by individual specialty and all specialties combined, index discharges, 1988*

Figure 6 illustrates district comparisons of readmission rates directly standardised for age group and sex for each specialty. (Specialties cannot be directly compared in this graph as a different standard was used for each.) The table shows the standardised rates for individual consultants in general surgery in one district.

Readmission rates are measurable with routinely collected health service data provided that both a unique districtwide patient identification number and a flexible database are available.

There was a pattern in the number of readmissions occurring over time after index discharge, which was specific to different specialties. Medical specialties had a relatively low early peak and a higher background level whereas surgical specialties had a more pronounced early peak and a relatively low background level (figs 2 and 3). All showed an early excess of readmissions within 28 days after index discharge, which gradually decayed to a background level. The pattern supported using a readmission rate at 28 days for comparisons. The readmission rate was related to age and sex of the patients. Differences might be expected in admission thresholds for different age groups and sexes, but the differences in readmission



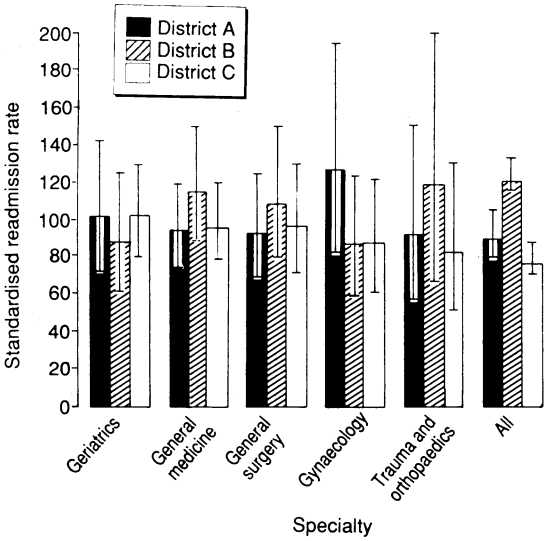


FIG 6—*Readmission rates at 28 days directly standardised for age group and sex for three districts by acute specialty, 1988 (standard differs for each specialty). Bars are 95% confidence intervals*

Readmission rate at 28 days for general surgery directly standardised for age group and sex by consultant in district A, 1988

	Standardised readmission rate	No of readmissions	95% Confidence interval
Consultant 1	69	23	36 to 135
Consultant 2	113	65	60 to 213
Consultant 3	104	78	62 to 177
Consultant 4	107	24	39 to 296
All	100	190	

rates that we found must reflect different *re*admission thresholds. The propensity to *re*admit might be predicted to correspond with increasing age and the perceived frailty of patients in older age groups. But the difference relating to sex remains more difficult to interpret.

There were appreciable differences among the readmission rates in different specialties with those in surgical specialties being lower than in medical specialties (for example, general surgery 4·1% *v* geriatric medicine 15·1%). This finding fits with known differences of case mix and severity. General medical patients commonly have more than one illness or problem and have more chronic conditions, both of which might result in an increased likelihood of readmission. The readmission rates at 28 days are similar to those found in the Oxford record linkage study.[5] Surprisingly, for each specialty the differences in readmission rates among districts were not significant once the rates were standardised for age and sex. This suggests that reliable annual comparisons between districts will require data aggregated from more than one specialty. Furthermore, it should be remembered that similar specialties in different districts are liable to have differences of case mix and severity that systematically affect the readmission rates. This effect was not examined here but will need to be considered if rates are to be compared reliably. Differences among readmission rates for individual consultants within the same specialty over a year are likely to be based on too few events to allow reliable comparisons. Data aggregated over several years would give larger numbers for comparison but would result in less timely feedback and mask short term trends.

To summarise, although certain difficulties were encountered, readmission rates may be measured with routinely collected health service data. They require standardisation for age and sex as readmission is more likely in male patients and in older age groups. Readmission rates showed a decay pattern with time that was specialty specific; surgical readmission rates were lower than medical readmission rates. Statistically valid annual comparisons of readmission rates may be made among districts only for combinations of specialties. Routine comparisons at the level of individual consultants or specialties, however attractive, are inadvisable.

We thank Tad Matus, who was closely concerned with the early stages of this work, and Ruaridh Milne, Nick Black, and Mark McCarthy for their comments and suggestions.

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Are readmissions avoidable?

Aileen Clarke

Abstract

***Objective*—To examine the possible use of readmission rates as an outcome indicator of hospital inpatient care by investigating avoidability of unplanned readmissions within 28 days of discharge.**

***Design*—Retrospective analysis of a stratified random sample of case notes of patients with an unplanned readmission between July 1987 and June 1988 by nine clinical assessors (263 assessments) and categorisation of the readmission as avoidable, unavoidable, or unclassifiable.**

***Setting*—District in North East Thames region. 481 General medical, geriatric, and general surgical inpatients with a readmission at 0-6 days or 21-27 days after the first (index) discharge between July 1987 and June 1988 from whom 100 case notes were selected randomly and of which 74 were available for study.**

***Main outcome measures*—Assessment of readmissions as avoidable, unavoidable, unclassifiable, variability of assessment within cases and variability among assessors according to specialty and duration to readmission.**

***Results*—General medical and geriatric readmis-**

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