Readmissions: a primary care examination of reasons for readmission of older people and possible readmission risk factors

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Aim. To identify the reasons that may have contributed to the emergency readmission of older people to a medical unit, within 28 days of hospital discharge.

Background. The current UK Government has initiatives in place to monitor quality and service delivery of NHS organizations. This is achieved by setting, delivering and monitoring standards, one of which is ‘emergency readmission to hospital within 28 days of discharge (all ages), as a percentage of live discharges’.

Design/method. A year-long study examined reasons for unplanned readmission of patients (aged 77 and over) within 28 days of hospital discharge. The population was patients, registered with North Bradford PCT General Practitioners, readmitted to one of five care of older people wards in two local acute trust NHS hospitals. Patient records were scrutinized and data related to demography, diagnosis and readmission were collected using a structured extraction tool. Data analysis was undertaken using descriptive statistics and identification of differences and correlations within the data.

Results. A pilot study indicated patients readmitted from home vs. other sources and patients discharged to home vs. other sources had a significantly shorter stay on readmission. The main study showed other significant findings. Patients who lived in care were readmitted sooner than those who lived at home: those discharged home vs. other sources and agreeing to increased social service provision had longer stays on readmission. Shorter length of stay on index admission (up to 72 hours) was associated with increased likelihood of earlier readmission.

Conclusions. A framework of factors was identified and could be used to target resources to meet patients’ needs more flexibly.

Relevance to clinical practice. It is possible that the process of targeting resources to ‘at-risk’ patients might enable services to be delivered in a more cost-efficient and cost-effective way.

Key words: emergency readmission, nurses, nursing, older people, risk prevention
Introduction

In 1997, a new UK government was elected with a commitment to change. The focus was on quality, cost effectiveness and cost efficiency with the aim of improving services by targeting resources appropriately. The new government wanted to monitor improvements in the National Health Service (NHS) and, in 1998, published a policy document entitled *A First Class Service. Quality in the New NHS* (Department of Health 1998a). This proposed a ‘three pronged strategy’ to improve performance within the NHS. It is the final part of this strategy (Standard 3 – area vi) entitled *Health Outcomes of NHS Care* that formed the focus of the study. Monitoring of the health outcomes was undertaken by the introduction of performance indicators.

Performance indicators were introduced in 1998 (Department of Health 1998b). Data are collected by each NHS Trust and reported on an annual basis (Department of Health 2002). Examination of the statistics for emergency readmission within 28 days of hospital discharge (all ages – all specialities) shows there is a wide variation across the UK in relation to this area.

Further government policies have been introduced to improve standards of care for older people. *The NHS Plan* (Department of Health 2000) had an emphasis on areas that can promote and maintain health and independence by providing better home care and support. *The National Service Framework for Older People* (Department of Health 2001) set standards for their care, whether in the home setting, in the care home sector or in hospital. One of the milestones within this document is to ensure that the rate of emergency readmissions in older people (aged over 75) does not increase. The challenge to all areas is therefore to maintain a low readmission rate against an ageing population and increases in demand upon services. Part of the process to help implement this is to look towards the potential for preventing admission/readmission. This can be achieved by a closer understanding of the reasons for readmission and taking account of local variations in order to inform future developments. Triggers to identify people who are at high risk of readmission need to be identified.

Background

The rationale of this study was to examine the reasons for the emergency readmission of older people to a medical unit within 28 days of hospital discharge. Then, to consider how this information may ultimately help in future service provision within primary care by identifying those patients who may be at high risk of readmission and target resources more appropriately.

The literature from 1990 until 2003 was examined to provide information about hospital readmission of older people. The following databases were searched: Ovid server to access PREMEDLINE, MEDLINE and CINAHL and the Cochrane database. Other web sources accessed included Swetswise; British Nursing Index; Economic and Social Research Council, Department of Health research database; Bandolier; Scharr; Trip; Agenet; Pubmed, ZETOC, *British Medical Journal*, and *Nursing Standard*. The following key words were used: readmission, hospital readmission, readmission to hospital, unplanned readmission, old people, older people and geriatrics. Combinations of all of these keywords were also investigated.

Other journal articles came from references found in the articles. Some UK-based authors with recent publications in this area were contacted to discover if their studies into readmissions were continuing. A further aspect to the literature searching was to put a short paragraph into the weekly bulletins of the Royal College of Nursing (RCN) Research and Development Co-ordinating Centre about the focus of this study and asking anyone who was undertaking similar work to email a reply. In total, 92 articles were identified and the abstracts read. From these, 83 papers were selected, which met the inclusion criteria and corresponded to the aim of the study. The literature review was very extensive and is outside the remit of this paper, hence only an outline of the search strategy is included.

Various definitions were found in the literature as to the time period used between discharges following the index or first admission to readmission. Most of the literature in the UK uses the definitions taken from Chambers and Clarke (1990). They measured readmission rates using 28 days as a marker of time and in this paper they defined a readmission as the:

> Next subsequent admission of a patient, emergency or unplanned, to any hospital within the same district within a defined reference period (p. 1134).

The time period of 28 days was first measured in the 1980s using Korner data. The use of Korner data was to enable data collection and cost information to be reported using Standardized Minimum Data sets (Perrin 1992). This period is still used. In the early 1990s, there were relatively few studies into readmissions in the UK and those that were completed tended to examine readmission rates as a useful indicator of outcomes of care (Chambers & Clarke 1990, Clarke 1990, Milne & Clarke 1990, Victor & Jefferies 1990). Each of these papers identified that data collection using the Korner system
was useful in measuring readmissions, but that the data failed to show whether the readmission was planned or emergency. This, in turn, made interpreting such information difficult. A couple of small studies in the early 1990s attempted to examine factors other than the pre-existing medical condition, such as social service support, that might relate to the readmission of older people (Heeks et al. 1991, Howard 1992). However, these papers used only small samples of patients and came to no firm conclusion.

In the UK, the readmission rates are often used as one of several outcome measures in randomized-controlled trials and discharge planning studies. Overall, the literature concludes that the main cause of readmissions most commonly involves a relapse of an existing illness and that often this relapse may be unavoidable (Gautam et al. 1996, Levy et al. 2000, Munshi et al. 2002, Pearson et al. 2002). However, there is minimal information on other factors that may have contributed to the readmission, or what measures could have been put in place to help prevent an older person being readmitted.

The study

Aim

To identify the reasons that may have contributed to the emergency readmission of older people to a medical unit within 28 days of hospital discharge.

Design

A descriptive design was used to identify variables and correlations within the data, which on analysis will indicate if there is any statistical significance in the relationships. It is the intention to examine any positive or negative correlations within the data to identify any consistent patterns.

Participants

The population for the study were all patients registered with North Bradford Primary Care Trust (PCT) General Practitioners, aged 77 years and over, who had been readmitted acutely to one of the five care of the older people medical wards, in the two acute NHS Hospitals in the area, within 28 days of discharge. The age of 77 years and above for admission to the care of the older people wards is a policy of the acute hospitals. The total patient population of North Bradford PCT is around 94 000 with just over 7000 patients aged over 75 years. It is a predominantly white area with only a 1% Asian population and encompasses some socially deprived urban areas and some more affluent areas.

Data collection

At the time of undertaking the study, the researcher worked as one of a team of nurse Case Managers in North Bradford PCT. The team works in a proactive manner to facilitate, when appropriate, early discharge from an inpatient setting into intermediate care facilities or to community hospitals within Bradford. Part of the routine work of the Case Management Team within North Bradford is to visit every care of the elderly ward each day and proactively review those patients on the ward who are registered with North Bradford PCT GPs. Information is taken from the medical and nursing notes of each patient, listing their condition, investigations, home circumstances. Information is also taken if a death occurred. If rehabilitation is required or other conditions that meet the admission criteria of the community hospitals, then the Case Management Team facilitate early discharge into intermediate care facilities or the community hospitals. Permission for this part of the routine work was obtained at the inception of the role of the Case Manager from the Chief Nurse, Consultants and Senior Management within the acute Hospital NHS Trust.

Access to the information was by the admission sheets (KMR – Korner Medical record) for each patient collected each day from the Patient Admissions office, and the readmission status was checked on the hospital Patient Administration System (PAS). If a readmission was identified, a one-page data collection sheet was commenced. The information collected was: the patient’s age, gender, number of days between the index admission and readmission and the length of stay of the previous or index admission. Further information was then obtained from the medical and nursing notes as to where the patient was readmitted from and subsequently discharged to. The reason for the readmission was identified and whether this was related to the previous admission. Information on social circumstances was noted. At discharge, the length of stay of the readmission was noted.

The data collection sheet was kept in the Case Manager’s folder until the patient was discharged. At this point, the main researcher put the patient’s name on a separate sheet along with the hospital number to be able to verify the information later or collect further information if required. The patient’s name was then deleted from the data collection sheet to maintain full anonymity and the patient was given a study number. The information was then transferred to the Case Manager’s office which is kept locked and which is within a secure building. Access to the information was then
restricted to the main researcher and the researcher’s supervisor. A database was established (Statistical Package for Social Science – SPSS) to input the data and aid in the data analysis.

Ethical issues and approval

Approval was sought from the University of Bradford Divisional Ethics Advisory Panel (DEAP). Before commencement of the study, the Local NHS Research Ethics Committee (LREC) was approached. Because of the nature of the routine work of Case Management, data required for the study were already routinely collected. It was therefore decided by the LREC that the study could come under the remit of the Clinical Audit Department. Written permission was duly obtained from this department. Written permission was also obtained from all the consultants who worked in the care of the elderly department.

Results and analysis

Pilot study results

The pilot study was undertaken over three summer months (May–July, 2002). The total number of patients admitted to the care of the elderly wards at the two hospitals (five wards) over the three months was 1308. Within this total, 291 patients were admitted who were registered with North Bradford PCT GPs – 22.2% of total admissions. In the group of the 291 North Bradford patients, there were 26 deaths – a level of 8.9%.

Included in the group of 291 patients were 39 emergency readmissions – 13.4% of the total. These were 13 males and 26 females. The readmission rate in the pilot study was high, and this prompted the year-long study. The mean age of the readmitted patients was 85.6 years and, within the readmission total, there were six deaths, or 15.4%. Of the readmitted patients (39), the mean length of stay on the index admission was 7.9 days, the mean length of stay at readmission was 14.3 days and the mean days between discharge on the index admission and readmission were 12.3 days. The reason for the readmission was examined. Most of the readmissions were the result of a deteriorating existing medical condition (71%).

The data were examined to identify if where the patient was readmitted from made a difference to the length of stay at readmission, or similarly, if where the patient was discharged to following the readmission was associated with the length of stay at readmission. The index length of stay was also examined to determine if this affected the number of days until readmission.

The days between the index admission and readmission with the length of stay at readmission were not different, but if deceased patients were excluded, then those patients readmitted from home had a significantly shorter stay then those from other sources (t = −2.147, P < 0.04). There was no difference in readmission length of stay according to discharge destination but, again, if deceased patients were excluded, then those patients discharged to home following readmission had a significantly shorter length of stay than those discharged to other destinations (t = −2.749, P < 0.01).

A positive correlation was found between the initial length of stay and days until readmission (r = 0.965, P < 0.007). If deceased patients were excluded, the results showed r = 0.883, P < 0.027. This slightly weakened the correlation, but it is still strong. Thus, the longer patients had in hospital on their index admission, the longer the period before readmission.

Certain amendments were made to the data collection form based upon the pilot study, and a final amendment was made following an extensive literature search.

Main study

From September 2002 until the end of August 2003, 4222 patients were admitted into the five care of the older people wards at the Bradford Royal Infirmary and St Luke’s Hospital. Of this total, 1235 patients were from North Bradford PCT (29.25%). From this total, 144 patients died (11.65%). Out of the main total of 1235 patients, 109 were readmissions (8.82%). Twenty of these readmitted patients subsequently died (18.34%). The Department of Health readmission figures for 2001 (5.9%) and 2002 (6.0%) cover all ages and all specialties (Department of Health 2002). However, statistics of raw data are available from the authors PCT to inform on the readmission rate for patients aged 77 and over. For the year 2000/01, the rate was 8.6% that was the readmission rate as a percentage of all discharges and all specialties. Likewise, the rate was 8.5% in the year 2001/02. However, this does not give any indication of the reasons behind the readmission, or whether it was a medical or surgical readmission, or a planned or emergency. It is important to try to reduce the readmission rate and address those factors that may have contributed to the emergency readmission.

The mean age of the readmitted patients was 83.61 years (SD = 4.78). Table 1 shows the breakdown of the living arrangements of the readmitted patients.

The data analysis in both the pilot and main study showed a higher percentage of females readmitted. The ratio of men
to women in the main study, readmitted patients, (62% female, 38% male) was almost identical to the mix of sexes seen for all care of the older people admissions to the acute wards over the same period of time (61% female, 39% male).

The variables examined included:
- Length of stay on the index admission;
- Length of stay on readmission;
- Source of readmission;
- Destination following discharge;
- Patients in receipt of social services prereadmission;
- Patients who refused any social service input or refused any increase in services on discharge following readmission;
- Patients who agreed to an increase in social service provision on hospital discharge;
- Hour, day, month and mode of readmission;
- Reasons for readmission;
- If the patient had a cardiac or respiratory diagnosis;
- Patients who were readmitted more than once.

There were many reasons that accounted for the emergency readmission of the older patient. The most frequent reason (69.7%) was a deterioration of an existing medical condition. However, other reasons were apparent. These were readmissions with pneumonia (0.9%), increase in shortness of breath (3.7%), chest infection (0.9%), deep vein thrombosis (3.7%), falls (1.8%), etc., which were not related to the index admission diagnosis, but appeared following the initial discharge.

The mean index length of stay for the 109 patients in this study was 10.74 days (SD = 10.73, range from 1 to 59 days). The data were examined to compare if the length of stay on a patient’s index admission had any relation on the length of time until they were readmitted. The mean days between index admission and readmission was 13.50 (SD = 8.70).

Some of the literature suggested a link between a short index length of stay and the likelihood of early readmission. The data were thus compared in those patients who had a short index length of stay (72 hours or less) to when they were readmitted.

There were 32 patients in this group and they comprised 29.4% of the overall total of patients seen. The data were analysed for the difference between two independent means, that is, those patients who had an index admission length of stay of up to 72 hours and those who had an index admission stay of 4–59 days to when they were readmitted. The results showed that the mean readmission interval for the group of patients who had an index stay of up to 72 hours was 10.84 days (SD = 8.35). Those patients who had a longer length of stay on their index admission of between four and 59 days had a mean readmission interval of 14.61 days (SD = 8.65) and this result was significant ($t = 2.537$, $P < 0.05$). Therefore, patients who had a stay on index admission of up to 72 hours had an increased likelihood of earlier readmission. This result concurs with that of the pilot study.

An analysis was made on the influence of living arrangements on the readmission interval. The analysis consisted of four components:
- The time interval between index admission discharge and subsequent readmission for those patients who lived alone vs. those patients who either lived at home with someone or lived in care. The mean readmission interval in days for those who lived alone was 15.50 days (SD = 9.02). For those who lived with someone or who were in care, the mean was 11.40 days (SD = 7.88). The finding that the latter group had a smaller mean readmission interval was statistically significant ($t = 2.519$, $P < 0.02$). Those patients who lived with someone or in care were readmitted sooner than patients who lived at home alone.
- The second analysis was undertaken on the readmission interval of those patients who lived at home with someone vs. those who lived in care. The mean interval for those patients who lived at home with somebody was 12.50 days (SD = 8.35), and the mean for those patients in care was 10.51 days (SD = 7.58). A $t$-test for comparison of readmission intervals showed a significant difference ($t = 2.6084$, $P < 0.01$). This shows that people living in care were readmitted sooner than those living at home with somebody and again the difference was significant.
- When the readmission interval for patients living at home alone (mean 15.50 days, SD = 9.02 days) was compared with the readmission interval of patient living at home with somebody else (mean 12.50 days, SD = 8.35 days), no significant difference was seen, $t = 1.35$ (NS).
- A final analysis compared all those patients who were readmitted from home, whether they lived alone or with someone vs. those patients readmitted who lived in care. The mean readmission interval of those patients readmitted from home was 14.65 days (SD = 8.89), whereas the readmission interval for those in care was 10.51 days (SD = 7.58). The difference was statistically significant, $t = 2.29813$, $P < 0.05$. 

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Therefore those patients who were readmitted from a care setting were readmitted sooner than those from home.

Patients who were discharged home had a mean duration of readmission stay of 14.14 days (SD = 17.72). This compared with a mean stay of 10.76 days (SD = 11.99) for the group of patients discharged to other settings. The analysis showed a difference that patients had a significantly longer stay on readmission if they were discharged to home vs. other settings, $t = 1.187$. This result differs from the findings in the pilot study.

The data were examined to ascertain if patients were in receipt of social service support, usually home care, before their readmission and then on discharge whether this support stayed at the same level or increased. A record was also made if the patient refused any increase in social service input or if there was a complete refusal of any social service input. Patients who were transferred to a community hospital were excluded from the analysis. This is because of the fact the data were only collected on patients during their acute episode of care and not following transfer to another setting. For similar reasons, patients who were readmitted from a nursing or residential home were also excluded.

The focus of this part of the data collection was to ascertain whether patients were in receipt of social service care in their own home setting and whether this increased following a readmission. The data were examined to assess if receipt or absence of social service input prerreadmission affected the readmission interval. The mean readmission interval for patients with social service input was 15.09 days (SD = 8.86) while that for the no social service input group was 14.45 days (SD = 8.99). No significant difference was seen between the two means (NS). Therefore, there was no difference in time interval between discharge of index admission and readmission in those patients at home, whether they were in receipt of social services prerreadmission or not.

In the acute trust hospitals, every patient who is discharged to the home setting is offered an increase in social service provision. The length of stay on readmission was examined in those patients who agreed to an increase in social services on discharge, and compared with those who refused social service input following their index admission. The mean interval in those patients who agreed to an increase in social services on discharge was 20.92 days (SD = 17.68), whilst the mean interval in those who refused any social services input or any increase in services was 11.64 days (SD = 17.79). This difference was statistically significant ($t = 1.549, P < 0.05$). This showed that those patients who agreed to an increase in social services following readmission, who were discharged home, had a longer length of stay on readmission than those who refused social services or refused any increase in social services on discharge home.

It appears from the data that more patients were readmitted late afternoon and early evening. The number of readmissions in the period from 8.00 AM to 5.00 PM was 49, with 41 patients readmitted from 5.00 PM to 10.00 PM, and the remaining 19 over the night time period.

A further aspect to the analysis was to determine if proportionately more patients were readmitted at a weekend (Saturday and Sunday) or during the week. In this study, it was found the 20 patients had been readmitted over the course of the weekends, while 89 patients had been readmitted during a week day. The mean was 15.5 (SD = 4.8), therefore, less patients than the average were readmitted per day over the weekend.

More patients were readmitted over four winter months, namely, January (9.2%), February (11.0%), March (14.7%) and April (10.1%), the remaining months were fairly consistent.

There were 11 patients who were readmitted a second time, and eight patients who were readmitted three times. The mean length of stay of the patient’s first readmission was 9.55 days (SD = 8.27) and the mean length of stay of their second readmission was 11.73 days (SD = 13.97). The data were analysed and showed that there was no significance between the lengths of stay of the patient’s first readmission to that of their second readmission ($t = 0.445$, NS).

The mean length of stay on the patient’s second readmission was 17.50 (SD = 20.43) days and the mean length on their third readmission was 6.75 days (SD = 6.79). The means were compared ($t = 1.411$, NS). This shows a slightly higher length of stay on the patients’ third readmission, but is not a significant result.

Discussion

The variables examined in the current study correspond to those in the literature and, perhaps, give a more comprehensive account of the factors within primary care that may have contributed to the readmission of the older person. Within the literature, there did not appear to be a study that examined the number of variables the current study did. Most studies only examined certain aspects of the readmission process. Moreover, the current study adds to the volume of knowledge on this important topic, and there were some significant results from the data.

The recording of a patient’s medication history would have helped identify further risk factors associated with readmission. Unfortunately, this aspect was not in the scope of the current study.
Papers by Heeks et al. (1991) and Bound and Gardiner (2002) examined the aspect of malignancy and readmissions. They suggest that patients who have a malignant illness may benefit from a more appropriate form of care management, thus reducing the need for readmission. This aspect was not considered in the present study.

Tierney and Worth (1995) examined the costing of readmissions. This is an important aspect to recognize in that all NHS organizations need to run a cost-effective and efficient service. For the targeting of resources to provide a more robust service, this would have been an important aspect to consider.

At times, the authors had to rely on other team members to collect the data. It may, therefore, be possible that not all were recorded because of other work commitments. However, it is unlikely as the first author rechecked each readmission sheet and completed any missing data.

The significant findings in our study are vulnerable to increased risk of Type I error as a result of multiple testing, and this should be borne in mind when interpreting the results. We considered the use of Bonferroni adjustments, but this approach is itself vulnerable to increased risk of Type II error (Perneger 1998).

Having collected and analysed the data, the author developed a framework of risk factors, which contributed to the readmission of patients in North Bradford PCT (Fig. 1).

![Figure 1](image-url) Risk factors identified following the index admission of older people within North Bradford Primary Care Trust, which caused readmission. *Patient factors; #External factors.

The framework can be used to target those patients identified as having one or more risk factors. This study has shown that it could be possible to predict patients who are at higher risk of readmission, having identified certain risk factors. However, it is not the author’s intention to say whether different sources of readmission were more or less important than others. There will always be those patients who are readmitted with a diagnosis unrelated to their previous admission, but these patients are less foreseeable.

**Conclusion**

The aim of this study was to identify the reasons that may have contributed to the emergency readmission of older people to a medical unit, within 28 days of hospital discharge.

Following statistical analysis and examination of the data, it has been possible to identify certain risk factors that were connected with the likelihood of readmission of older people from the North Bradford PCT. This group of risk factors was similar to risk factors identified in other previously published studies that described work carried out in other centres. No new individual risk factors, specific to Bradford, were identified.

It would, therefore, seem appropriate that when an older person goes into hospital on their index admission and the risk factors are identified, then this should in turn trigger interventions and closer patient monitoring in an attempt to prevent readmission. Recently, initiatives such as the Single Assessment Process (Department of Health 2000, 2001), closer working between health and social services and integrated discharge teams that include secondary and primary care staff, have all been introduced into Bradford. It could be argued that input from these service developments might serve to prevent readmission in at-risk patients. As these developments are very recent, it would be interesting to review the readmission rate for North Bradford PCT patients in a year’s time to examine their impact.

It would also make an interesting area for further study to interview the patients and relatives or carers about why they feel that they had been readmitted and what could have been performed to prevent the ‘revolving door’ of hospital readmission. The benefits of patient involvement are becoming widely recognized and in the North Bradford PCT there is a patient representative on most working groups.

It is possible that the process of targeting resources to at-risk patients might enable services to be delivered in a more cost-efficient and effective way.

**Contributions**

Study design: LD, RN; data collection: LD; data analysis: LD, RN; manuscript preparation: LD, RN.

**References**


