AUDIT

Readmissions at Royal Oldham Hospital AMU

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Abstract

Background This paper contributes to the developing body of literature that explores the theme of hospital readmissions. Interest in this area has grown since a policy of non-payment for 30-day readmissions was introduced by the Department of Health. This has moved hospitals to seek out ways of reducing their readmission rates.

Aim The goal of this study was to investigate the drivers of readmissions at the Royal Oldham Hospital of the Pennine Acute Trust, by identifying patterns existing within a sample of readmitted patients.

Methodology A random sample of 55 patients readmitted to the Acute Medical Unit (AMU) within 30 days of a previous discharge during December 2013 was used. Factors frequently implicated in readmissions were selected as variables for analysis.

Results The findings were largely concurrent with previous observations that old age, male gender, previous hospital admissions and existing co-morbid conditions increase the risk of readmission. The findings were consistent with reports that diagnoses at the times of admission and readmission are typically different, and that common causes of readmission are infection and complications relating to co-morbid conditions.

Conclusion This study forms solid foundations upon which more expansive auditing can take place, and specific recommendations are made for the reduction of readmission rates on AMU.

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http://dx.doi.org/10.7227/MMJ.0005

MANCHESTER 1824
Manchester University Press

Introduction

In 2011 the Department of Health introduced legislation which means that hospitals do not get paid for patients acutely readmitted within 30 days of their previous discharge. This applies to all readmissions for which the index admission was elective, and 25% of readmissions following an emergency admission.[1] Readmissions relating to mental health, maternity, children under four years and cancer were excluded on the basis that in these cases 'readmission is often considered a necessary part of care'.[2] Beyond these exceptions, it is felt that readmissions following both elective and emergency admissions should largely be preventable, and high 30-day readmission rates are seen as indicative of ineffective patient management and inadequate quality of care.[3]

The policy launched on a background of increasing readmission rates: from 8.4% in 2000–1 to 11.63% in 2010–11.[4] According to healthcare data provider CHKS, *hospital admissions occurring within 30 days of a previous discharge provided hospital trusts with an income of £2.2 billion in 2009–10*. Based on these figures, the 2011 changes to readmissions policy equate to an annual income deficit for hospitals of £790 million.[2] The financial incentives of reducing 30-day readmissions are therefore clear. The story is similar in the US, where, since 2012, financial penalties are applied to underperforming hospitals.[5] Consequently, interest in readmissions has grown, with literature exploring three themes: (1) investigations into whether readmission rates are a good measure of quality of care, (2) studies of interventions which might reduce readmissions, and (3) attempts to identify factors that drive readmissions.[6] This paper falls into the last of these categories.

The list of factors that potentially contribute to readmissions is long and complex.[2] This may be reflected in the varying readmission rates of different hospitals and trusts.[7] Although figures like these are undoubtedly influenced by factors outside of trust control, such as community backup and population demographics, there is growing evidence that the key determinants of readmissions may originate from within. For instance, Dharmarajan et al.[8] studied readmissions of patients in the US with an index admission diagnosis of heart failure, acute myocardial infarction or pneumonia. The authors report that the spectrum of diagnoses at readmission is consistent across hospitals with high, average and low readmissions. That is, the distribution of readmission diagnoses does not vary between hospitals but the absolute rate of readmission does. This indicates that readmissions performance may not be related to disease- and treatment-specific factors, but to institution-wide policies and practices, along with demographic factors such as socioeconomic status affecting the general health of the population.

Most relevant are those practices that influence the standard of inpatient care, the transition from inpatient to outpatient, and community care at discharge. It is probable that patients experiencing optimal levels of inpatient care and a smooth, well-coordinated discharge into outpatient or community care, are less likely to be readmitted within 30 days than those who do not. As such, readmissions could be considered as a marker of hospital performance in these areas. The contexts of readmissions are equally important. The method or route of index admission and the latency between discharge and readmission may be particularly significant. A high proportion of readmissions following elective admission periods could well be a consequence of substandard inpatient care and discharge procedure, and likewise short intervals between the time of discharge and readmission. This is especially true if a patient rebounds within seven days. It has been stated that in these circumstances, poor medical management and insufficient discharge support and medication reconciliation are frequently implicated.[3] This is also the period in which iatrogenic causes and hospital-acquired infection are likely to be present. This would imply that the hospital is often more culpable when the turnaround between discharge and readmission is quick. It is therefore quite alarming that nearly 50% of readmissions in the NHS occur within seven days.[3,7]

Avoiding unnecessary readmissions relies on understanding which patients are likely to be readmitted. Donzé et al.[9] report that potentially avoidable readmissions are commonly related to complications associated with seven co-morbid conditions: diabetes, chronic heart failure, atrial fibrillation, ischaemic heart disease, neoplasm, chronic obstructive pulmonary disease (COPD) and chronic kidney disease. Patients with these co-morbid conditions are therefore a high-risk group. The most frequent causes of readmission in this study were infection, care of neoplasm and heart failure. Significantly, diagnoses at first admission and readmission were typically different, suggesting that readmissions are as likely to relate to a patient's co-morbidities as they are to the cause of index admission.[7] Katikireddi and Cloud[10] have produced a comprehensive list of patient characteristics commonly associated with readmission. These 'red flags' are summarised in Table 1. The authors argue that through assessing patients for these criteria early in their admission period, it is possible to tailor their care, and make appropriate discharge planning, greatly reducing risk of readmission.

Aims and standards

The aim of this project was to contribute to an ongoing review of readmissions within the Pennine Acute Trust. Currently, the trust readmission rate is 8.61%, higher than the average of 8.20% in its peer

Table 1: Red flag warnings for patients at high risk of readmission.

Medical factors	Psychosocial factors	Use of medical resources	Patient characteristics
Coronary artery disease	Poor self-rated general health	6+ visits to GP within 1 year	Aged 80+
Advanced and disseminated malignancy	Moderate to severe functional disability	At least 1 hospital admission within 1 year	Male
Chronic renal failure	Living alone		
Chronic obstructive pulmonary disease			
Diabetes			
Heart failure			
Dysphagia			
3+ chronic diseases			

group.[7] Based on the 2009–10 readmissions data, the potential annual loss of income resulting from readmissions is £9.4 million. This represents 3.4% of total income, which can be compared to a national figure of 3.0%.[3]

The Pennine Acute Trust operates from four sites. This audit aims to examine readmissions at one of these: Royal Oldham Hospital. Owing to time limitations, only readmissions to the Acute Medical Unit (AMU) at this hospital within one calendar month were included for analysis. The goal of this project was not to assess performance of the unit in comparison with other hospitals, but to identify patterns within the readmission data, providing insight into the types of patient most likely to be readmitted and the ways in which the hospital may be contributing to readmissions. This may then inform future audit loops and ultimately begin the process of reducing readmissions.

Methodology

This was a retrospective study of patients readmitted to AMU within 30 days of their last hospital discharge. Data from patients for whom the date of readmission took place within the month of December 2013 was included. A sample of 55 patients meeting these inclusion criteria was arbitrarily selected. Demographic details for all patients admitted to AMU in the same time frame were attained for comparison. The relevant data was received in Excel files from the Divisional Information Manager, or accessed through the 'ALS/Healthview' system on the Pennine Acute Trust intranet.

The following variables were selected for further analysis:

- age
- gender
- number of previous hospital admissions within a year
- type of residence inhabited by patient
- method of index admission
- admission diagnosis
- readmission diagnosis
- existing chronic co-morbidities
- latency between discharge and readmission.

Results and analysis

Age and gender

Of 55 readmitted patients, 31 (56.4%) were male and 24 (43.6%) were female. In contrast, of 1,078 patients admitted to AMU in the same period, 510 (47.3%) were male and 568 (52.7%) were female. The age distributions of these patients are presented in Table 2. The mean age of readmitted patients was 68.4 years (range 16–93). The 70+ age group had the highest proportion of readmitted patients, followed by the 60–69 and 40–49 age groups. The relative risk of readmission was highest in the 0–17 and 40–49 age groups, however.

Previous hospital admissions

Of readmitted patients, in the previous year 40 (72.7%) had been admitted to hospital at least once, 12 (21.8%) had been admitted at least three times and 5 (9.1%) had been admitted at least five times.

Residential source of readmissions

The types of residence inhabited by patients in our sample are outlined in Table 3.

Table 2: Age distribution of patients admitted to AMU in December 2013 and patients readmitted to AMU in December 2013.

Admitted patients			Readmitted patients			Relative risk of readmission
Age	Frequency	%	Age	Frequency	%	
0–17	15	1.4	0–17	1	1.8	1.31
18–29	66	6.1	18–29	2	3.6	0.59
30–39	80	7.4	30–39	1	1.8	0.24
40–49	105	9.7	40–49	7	12.7	1.31
50–59	144	13.4	50–59	4	7.3	0.54
60–69	157	14.6	60–69	9	16.4	1.12
70+	511	47.4	70+	31	56.4	1.19

Table 3: The distribution of patients according their residential inhabitancy.

Residence	Frequency	%
Own home	47	85.5
Retirement home	3	5.5
Care home	3	5.5
Nursing home	2	3.6

Table 4: The distribution of patients by admission method.

Admission method	Frequency	%
A&E	38	69.1
Elective planned	8	14.6
GP or locum GP	1	1.8
Emergency other	8	14.6

Method of index admission

The relative distributions of patients according the route of their index admission are outlined in Table 4. In total, 14.6% of patients were readmitted following an elective admission.

Primary diagnoses at index admission and readmission

There was a great range of diagnoses at admission and readmission. Infection was the most common diagnosis at admission (n = 15 (27.3%)). The most common type of infection was pneumonia (n = 4 (7.3%)). The most common cause of readmission was also infection. In total, 22 (40%) patients were readmitted with infection, including eight (14.5%) cases of pneumonia, and three unspecified lower respiratory tract infections. In total, 20 (36.4%) patients were readmitted with the same problem that they were originally admitted with.

Co-morbid conditions

Of 55 readmitted patients, 51 (92.7%) had at least one chronic condition. These co-morbidities can be grouped based on the body systems they affect. The percentage of patients with a co-morbid condition affecting each body system is illustrated in Figure 1. A total of 34 (61.8%) patients were readmitted with a potential complication of their co-morbidity. Figure 1 also illustrates the relative numbers of patients for whom readmission was related to a co-morbidity affecting these different systems.

Of readmitted patients, 31 (56.4%) had at least one of the seven chronic co-morbid conditions identified by Donzé.[9] The relative numbers of patients with each co-morbidity are illustrated in Figure 2. All readmitted patients with a co-morbid condition of the immune system were readmitted with a possible complication of that condition.

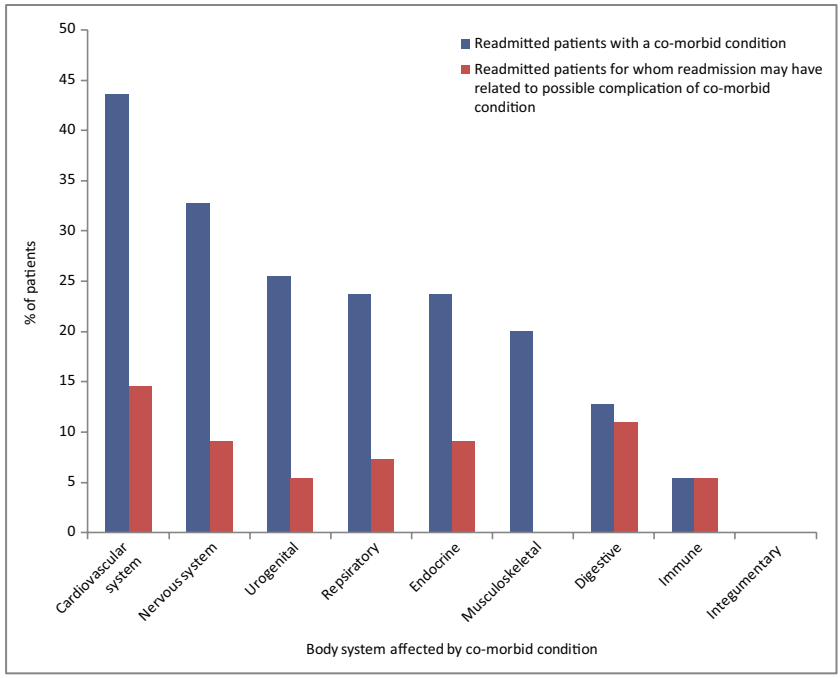

Figure 1: The percentage of patients with a co-morbid condition according to the body system that co-morbid condition affects.

Latency between discharge and readmission

The mean time between discharge and readmission was 12 days (+/– 9.1, median = 12, range = 29). There were 21 (38.2%) patients readmitted within 7 days of discharge. Of these, 10 had the same diagnosis as at admission and 9 were readmitted with an infection. The distribution of readmissions according to the time period between discharge and readmission is illustrated in Figure 3.

Discussion and potential future work

The characteristics of readmitted patients in this report were generally consistent with risk groups acknowledged in the literature review.[10] When compared with the sample of all patients admitted to AMU, the sample of patients readmitted to AMU in the same time frame contained a higher proportion of males, patients with at least one previous hospital admission within a year, and patients in the older age groups. These characteristics could therefore be used as markers for identifying and red flagging potential readmission candidates. Interestingly, however, the relative risk of readmission was highest in the 0–17 and 40–49 age groups. The small sample may well account for the high relative risk in the 0–17 age group,

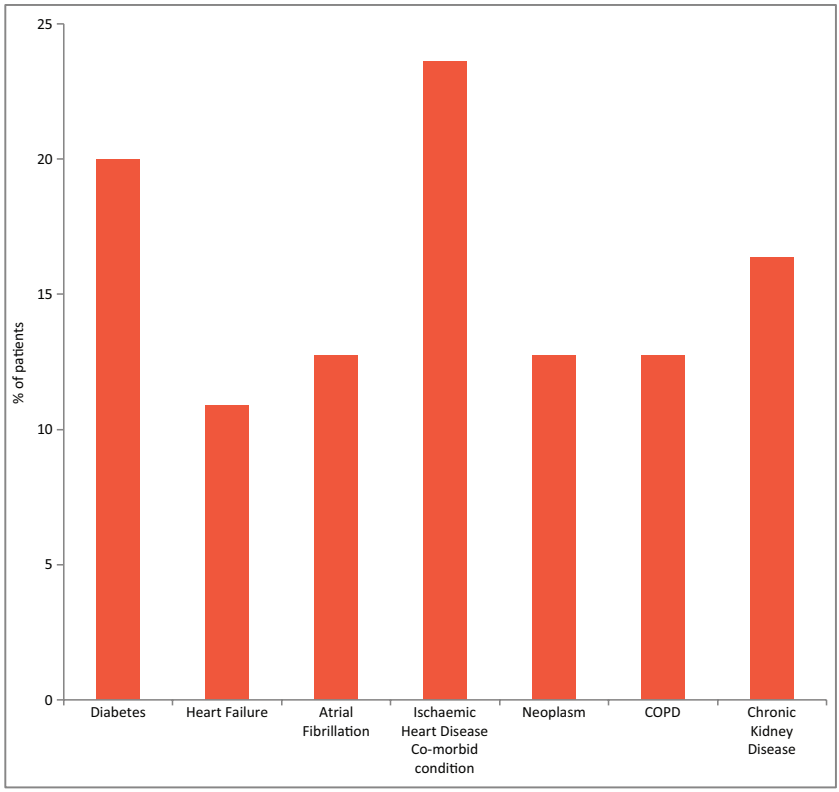

Figure 2: The percentage of readmitted patients with specific co-morbid conditions.

but the high relative risk in the 40–49 group is more likely to be significant. This is difficult to reconcile with previous reports, and any future work should seek to ascertain whether the pattern is repeated at Oldham or elsewhere, and analyse possible causes. Interestingly, our results also indicate low readmissions from care and nursing homes. This could be the result of advance care planning, which may also be an effective tool for reducing readmissions.

Over 92% of our sample had at least one co-morbid condition. These were most frequently cardiovascular or neurological. The most common cardiovascular co-morbid conditions were ischaemic heart disease, atrial fibrillation and heart failure, whilst dementia accounted for the majority of neurological co-morbidities. This is perhaps unsurprising given the age distribution of the sample. The single most common co-morbid condition was ischaemic heart disease. All co-morbidities identified by Donzé[9] featured heavily in our sample. In concordance with that study, over 61% of patients in our study were readmitted with diagnoses that are potentially

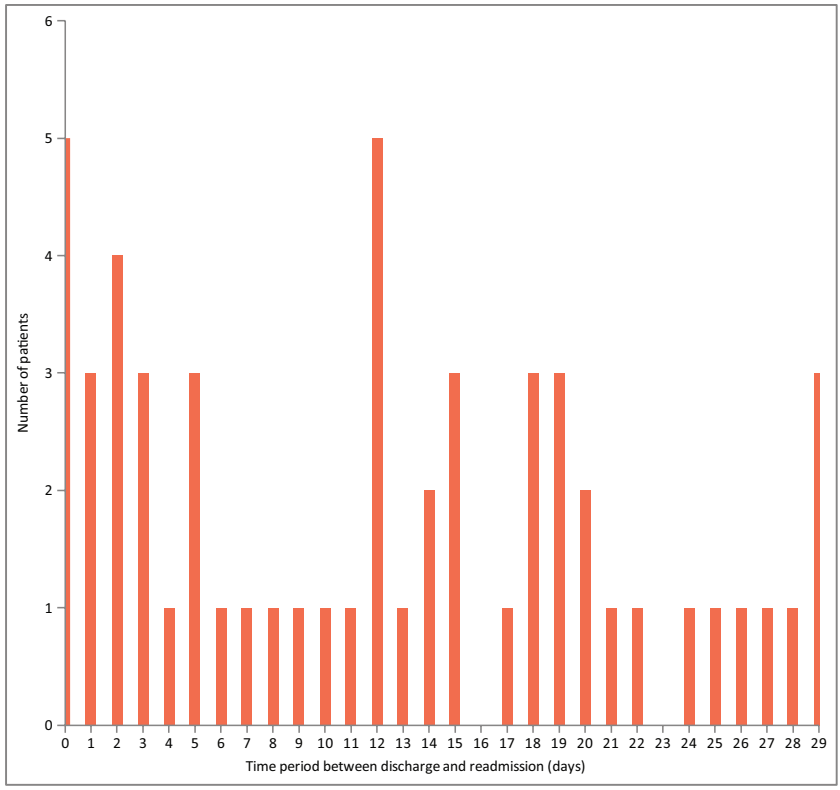

Figure 3: The distribution of readmitted patients according to the time between discharge and readmission.

related to their co-morbidities. Where readmissions were deemed likely to be related to a co-morbid condition, those affecting the cardiovascular and gastrointestinal systems were most frequently implicated. Liver pathologies were particularly prominent in our sample. This suggests that liver and gastroenterology specialist input at AMU may benefit from a review.

Our results tie in with previous reports that only a minority of primary diagnoses at admission and readmission are the same, and that patients are more often readmitted with a complication of a co-morbid condition than recurrence of the condition they were originally admitted with. However, 10 patients with seven-day readmissions did have the same diagnosis at admission and readmission. Worryingly, this implies that the patient's problem was not adequately managed during their initial admission, indicating poor patient care. It is equally concerning that 40% of patients were readmitted due to infection. The nine patients readmitted with infection within seven days are of particular interest, as in these cases there is an increased likelihood that the infection was acquired in hospital.

The possibility that readmissions result from hospital-acquired infection therefore requires further investigation. Given that pneumonia was the most common infection, investment in resources for the specialist respiratory multidisciplinary team (MDT) might be cost-effective.

The distribution of readmissions over time is bimodal, peaking in the first few days and at around two weeks. These peaks may represent a breakdown in the provision of seamless community support. This requires further investigation. The percentage of patients readmitted within seven days was 38%; less than the 50% seen across the NHS.[3,7] This is a positive outcome for the Pennine Acute Trust, as it has been suggested that readmissions occurring within seven days often result from hospital care issues or issues relating to discharge.[3] Likewise, that only 14% of readmissions followed an elective admission is a positive sign. A goal of future work should be to see whether these patterns repeat over longer durations and hospital-wide. Extension of our study over a period of 12 months could form the basis for a larger prospective audit, and produce more robust conclusions for the trust. The limitations of our study could be overcome with greater access to case notes, and details of support provisions made in the community.

Limitations

The desirable goal of this audit would be to definitively identify the causes of readmission and state conclusively whether readmissions had been preventable. However, the causes of readmission are often complex and multifactorial. Precise causality is therefore difficult to establish. In addition, there were limitations with the electronic system used. Missing letters and vague or incomplete notes made it difficult to build a complete picture of the sequence of events and standard of patient care. A significant limitation is the small sample size, which leaves a degree of uncertainty about patterns identified in terms of their capacity to represent AMU over an extended time period.

Conclusions

The methodological difficulties experienced highlight a need for auditing in order to address the difficulties of data collection and interpretation for hospital readmissions. This has significant financial implications for the future. Our findings concur with observations already proposed by researchers in the US and UK about the types of patient most likely to be readmitted. A tool for identifying these high-risk candidates for readmission could therefore be an effective means by which to reduce readmissions.

The study also highlights local observations at Oldham and identifies the need for specific issues to be addressed. For example, the study suggests a need to review speciality service provision within AMU, especially

gastroenterology and respiratory. In addition, diabetes and cardiopulmonary hospital–community interface may have solutions to offer in reducing hospital readmissions. However, the low number of nursing- and care-home readmissions indicates that advance care planning is effective and should therefore be continued as a development for reducing hospital readmissions. Infection is an ongoing source of readmission. Whilst infection-prevention measures have yielded lower incidence, this study highlights a continuing need for improvement in the long term. In addition, it suggests a need for primary and secondary care interaction and engagement, which may bring in new solutions such as community IV antibiotic therapy. A prospective audit using our template over a period of 12 months could provide the trust with a more reliable understanding of hospital readmissions and enable more specific recommendations for reducing them. Expansion of the database to include readmissions to other sites within the Pennine Trust would also help to produce more robust conclusions for the trust.

Acknowledgements

With thanks to Dr Venkat Sridharan, Consultant in Elderly Medicine at the Royal Oldham Hospital, who was my supervisor throughout this project.

References

1 Department of Health. A simple guide to payment by results, gateway reference 18135. London: Department of Health; 2011.
2 NHS Confederation, Foundation Trust Network. The impact of non-payment for acute readmissions. Briefing [Internet]. 2011 [cited 2014 Jan 20]; 211:1–10. Available from: http://www.chks.co.uk/userfiles/files/The%20impact%20of%20non-payment%20for%20acute%20readmissions%20FINAL%20FOR%20WEB.pdf.
3 Sg2Healthcare intelligence. Sg2 Service Kit: reducing 30 day emergency readmissions [Internet]. London: Sg2 Healthcare intelligence; 2011 [cited 2014 Jan 20]. Available from: http://www.hsj.co.uk/Journals/2/Files/2011/6/15/Sg2_Service%20Kit_Reducing%2030-Day%20Readmissions.pdf.
4 Department of Health. Research and analysis: emergency readmissions data. London: Department of Health; 2013.
5 American College of Emergency Physicians. Medicare's hospital readmission reduction programme FAQ [Internet]. 2015 [cited 2014 Feb 10]. Available from: https://www.acep.org/Physician-Resources/Practice-Resources/Administration/Financial-Issues-/-Reimbursement/Medicare-s-Hospital-Readmission-Reduction-Program-FAQ/.

6 Drozda JP. Readmission rates. BMJ. 2013;347:f7478.
7 Robbins D. Analysis of emergency readmissions. Pennine Acute Trust; 2013.
8 Dharmarajan K, Hsieh AF, Lin Z, Bueno H, Ross JS, Horwitz LI, et al. Hospital readmission performance and patterns of readmission: retrospective cohort study of Medicare admissions. BMJ. 2013;347:f6571.
9 Donzé J, Lipsitz S, Bates DW, Schnipper JL. Causes and patterns of readmissions in patients with common comorbidities: retrospective cohort study. BMJ. 2013;347:f7171.
10 Katikireddi SV, Cloud GC. Planning a patient's discharge from hospital. BMJ. 2008;337:a2694.