A ten-year retrospective study of unplanned hospital readmissions to a regional Australian hospital

Rick McLean, Kumara Mendis and Joe Canalese

Abstract

Objective: To examine the trend in unplanned readmissions (URs) to Dubbo Base Hospital (DBH) over the period 1996–2005 and assess possible correlations with basic demographic data.

Results: URs increased over the study period, both as a total number and as a proportion of total admissions (from 4.7 to 5.4%), while average length of stay decreased from 5.3 to 4.4 days and available hospital beds decreased from 156 to 116. The proportion of URs for people aged 75 years has more than doubled over the same period. There were clear temporal variations in URs (greatest number occurring on Fridays and in late winter/early spring) and variations with age and gender (greatest number in young males; peaks for males in 0–10 and 71–80-year deciles and for females in 0–10, 21–30 and 71–80 year deciles). Fifty percent of URs occurred within 7 days of discharge. There was a statistically significant but small correlation between length of prior admission and time to readmission (Spearman correlation coefficient, 0.068; $P<0.01$) although the time to readmission did not change over the study period. Chronic obstructive pulmonary disease (3.8%), complications of procedures (3.6%), heart failure and pneumonia (each 2.2%), angina (2.1%) and acute bronchiolitis (1.8%) were the top causes of URs.

Conclusion: URs are becoming more frequent in DBH; analysis of associations and trends over time are the first step in determining targeted measures to address the problem.

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What is known about the topic?

Hospital readmission rates have been reported to be rising but there is little published Australian data, and no comprehensive hospital studies. It has been suggested that unplanned readmission might relate to premature discharge and quality of care, and unplanned readmission rates have been proposed as a potential key performance indicator for comparisons between hospitals in Australia, as is already occurring overseas.

What does this paper add?

This paper confirms that the unplanned readmission rate to a major regional public hospital has risen over the last 10 years and that there is a small but significant negative correlation with prior length of stay. It highlights some key demographic factors that are associated with high rates of unplanned readmissions, and diseases which are more likely to result in unplanned readmissions.

What are the implications for practitioners?

The study shows that any hospital can analyse its data to provide valuable insights into factors around unplanned readmissions.

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HOSPITAL READMISSION RATES have been increasing during the last 5 years in developed[1-3] as well as developing countries.[4] Major concerns of readmission are the cost to the health services, financial implications and emotional distress to patients and their families and perpetuating dependency behaviour among patients. Furthermore, a recent statement by the then Australian Government Minister for Health and Ageing suggests that a range of indicators including unplanned readmission rates are likely to be used to compare hospital performance into the future.[5]

It has been reported that a lower quality of inpatient care increases the risk for unplanned early readmission in patients with heart failure, diabetes, or obstructive lung disease,[6] and a recent study concluded that adjusted rates of

potentially avoidable readmissions are scientifically sound enough to warrant their inclusion in hospital quality surveillance.[7] On the other hand, another detailed analysis argued that it is difficult to conclude if early readmission is a valid and useful quality indicator.[8]

However, overall there is support for readmission rates being used as a surrogate for quality of care delivered in hospitals. For example, at a local level a New South Wales Health review stated that "hospital readmissions remain the most accurate predictor of mortality and increased disease burden"[9]. Despite this, there is a paucity of hospital readmission data from many states in Australia. A Western Australian rural hospital study reported that unplanned readmissions increased from 4.5% in 1995–96 to 6% in 1997–98,[10] and a study from John Hunter Hospital in NSW in 1998 reported an unplanned readmission rate of 5.5%.[11]

Dubbo Base Hospital (DBH) is a regional base hospital in NSW which serves the acute medical needs of the 40 000 people in Dubbo and another 80 000 from the surrounding areas. During the summer of 2005 there were anecdotal concerns that readmission rates of DBH were increasing, with one possible reason being premature discharges as a result of an increasing number of patients requiring acute admission and a decreasing number of hospital beds available. Such concerns warranted analysis of the trends over time. It was also felt that this exercise would be a worthwhile local quality assurance measure.

We analysed the long-term trends of unplanned readmissions at DBH during the 10-year period from 1996 to 2005 to determine any associations with the length of hospital stay, total bed numbers and other demographic and clinical variables.

Methods

The DBH readmission data were extracted from the HOSPAS data system operated by NSW Health in its public hospitals. The HOSPAS data system commenced operation at DBH in 1995. A hospital readmission is defined as a readmission within 28 days of discharge from the index admission. By definition, in the HOSPAS system the planned readmissions for haemodialysis for renal failure patients were excluded.

The variables extracted were:

(1) Readmission date (2) Previous admission date (3) Previous discharge date (4) Urgency of admission (5) Date of birth (6) Gender (7) Town of residence (8) Postcode (9) Alive or dead (10) Nominated Aboriginality (11) Current diseases codes (five) (12) Current procedure codes (five) (13) Previous diseases codes (five) (14) Previous procedure codes (five). The urgency of admission had five discrete categories: (a) Emergency (b) Non-Emergency/Planned (c) Other/Urgency not assigned (d) Maternity/Newborn (e) Regular same-day planned admissions.

The emergency category was defined as a patient who has a condition that requires treatment within 24 hours of the time of the diagnosis. We called this category an "unplanned readmission" and the other four categories were combined as "planned readmissions". A unique identification number was given to all records with the same medical record number so that we could identify each admission over the period of analysis.

The following data items were calculated at the time of the analysis:

- Age (readmission date –date of birth)
- Duration of the hospital stay before readmission (previous discharge date –previous admission date)
- Readmission interval (readmission date – previous discharge date).

The DBH yearly admission data and the bed number from 1996–2005 were provided by the DBH administration, and hospital deaths were provided by the Medical Records Unit. The yearly readmission rate was calculated from the admission and readmission data. Statistical analysis was undertaken using SPSS, version15 (SPSS Inc, Chicago, Ill, USA). Ethical approval for the study was obtained from the Human Research Ethics Committee, Greater Western Area Health Service (No. GW2005/11).

1 Hospital admissions, unplanned readmissions, length of hospital stay before readmission, time between discharge and readmission, hospital beds, hospital deaths in Dubbo Base Hospital (DBH) from 1996–2005

Year	Total admissions (TA)	Unplanned readmissions (UR)	UR as % of TA	Length of hospital stay before readmission (days)	Time between discharge and readmission (days)	Hospital beds	Hospital deaths
1996	13806	652	4.7	5.3	10.7	156	152
1997	14192	612	4.3	5.6	10.3	163	149
1998	13687	622	4.5	4.5	10.9	124	169
1999	14562	627	4.3	4.5	10.8	131	157
2000	14327	637	4.4	5.0	10.8	126	153
2001	13818	652	4.7	4.7	11.0	126	151
2002	14643	754	5.1	4.0	11.0	126	159
2003	14838	682	4.6	4.3	11.1	122	162
2004	15030	819	5.4	3.9	10.2	126	135
2005	16465	896	5.4	4.4	10.8	116	159
Total	145368	6953					1546

Spearman's correlation coefficient for period 1996–2005, between		
(a) Total admissions and number of unplanned readmissions	0.742	$P < 0.05$
(b) Number of hospital deaths and number of unplanned readmissions	–0.043	Not significant
(c) Number of hospital beds and number of unplanned readmissions	–0.486	Not significant
(d) Length of prior hospital stay and number of unplanned readmissions	–0.784	$P < 0.05$

Results

From 1996 to 2005, there were a total of 145 368 admissions to DBH of which 14 169 (9.7%) were classified as hospital readmissions. The total yearly hospital admissions increased from 13 806 in 1996 to 16 465 in 2005 and the hospital deaths per year from 152 to 159 (Box 1). However, the total bed number decreased from 156 to 116 during the same period. Of the 14 169 total readmissions, 6953 (49%) were unplanned readmissions.

The number (and proportion) of unplanned readmissions has steadily increased from 652 (4.7% of total admissions) in 1996 to 896 (5.4%) in 2005. The number (and proportion) of unplanned readmissions of patients aged 75 years and above has risen from 80 (12.3% of all unplanned readmissions) to 223 (24.9%) over the same period. The average mean hospital stay before a readmission has decreased from 5.25 days (CI, 4.57–5.75 days) in 1996 to 4.35 days (CI, 3.94–4.75 days) in 2005 while the average interval between discharge and readmission has remained generally stable at just under 11 days.

Unplanned readmissions were highest during the winter and early spring months from July to October (Box 2). The lowest number of unplanned readmissions occurred on Saturdays and Sundays (Box 3) while the highest number occurred on Fridays.

The highest number of unplanned readmissions in any age group was for males in the age decile 0–10 years (Box 4). For males, the unplanned readmissions showed a bi-modal distribution with a second peak in the 71–80-year decile. However, for females there were three peaks: 0–10, 21–30 and 71–80-year deciles.

The proportion of total admitted patients identifying as Aboriginal has steadily increased from 11.7% (1612 of 13 806) in 1996 to 18.3% (3018 of 16 465) in 2005 although the proportion of unplanned readmissions of patients identifying as

2 Unplanned readmissions by month

Month	Unplanned readmissions (no. [%])
January	485 (7.0)
February	512 (7.4)
March	592 (8.5)
April	556 (8.0)
May	552 (7.9)
June	560 (8.1)
July	631 (9.1)
August	657 (9.4)
September	639 (9.2)
October	616 (8.9)
November	566 (8.1)
December	587 (8.4)
Total	6953 (100)

3 Unplanned readmissions by day of week

Day of the week	Unplanned readmissions (no. [%])
Sunday	809 (11.6)
Monday	1038 (14.9)
Tuesday	1042 (15.0)
Wednesday	1042 (15.0)
Thursday	1020 (14.7)
Friday	1143 (16.4)
Saturday	859 (12.4)
Total	6953 (100)

4 Unplanned readmissions by age and gender

	Gender	
Age group (years)	Females	Males
0–10	548	714
11–20	228	149
21–30	527	205
31–40	405	229
41–50	297	307
51–60	324	414
61–70	348	549
71–80	474	577
81–90	357	210
91+	46	25
Total	3554	3379

There were 129 records that were not coded for gender.

Aboriginal has fluctuated between 14.0% and 19.8% without showing any clear trend over the time period (Box 5). Over the study period the proportion of total admissions of patients identifying as Aboriginal was 14.6% while the proportion of unplanned admissions of patients identifying as Aboriginal was 17.0%.

As a major regional hospital, DBH accepts patients from a range of surrounding towns when the level of health care appropriate for the particular patient and condition cannot be provided locally. Box 6 shows the towns from which the unplanned readmissions originated as well as their respective populations and distances from Dubbo. The majority of the unplanned readmissions were from Dubbo (61.9%) while Gilgandra (3.9%), Wellington (3.5%), Nyngan (2.2%) and Warren (2.0%) were the next four most frequent towns from which readmissions arrived. There is no clear trend between the number of readmissions and population, although there is a trend to lower numbers from more distant towns.

Box 7 shows the frequency of unplanned readmission intervals. The mean readmission interval is 10.7 days. More than 25% of unplanned readmissions occurred during the first 4 days, 51% by 9 days and 80% by 18 days. The highest number of unplanned readmissions for a single day occurred on the first day after discharge — 602 for the study period — comprising 8.7% of unplanned readmissions. The change in the unplanned readmission interval over the period of the study was examined. This showed some variation (between 10.2 and 11.1 days) but showed no significant trend, being 10.7 days in 1996 and 10.8 days in 2005.

We examined the association between the length of the stay before the index readmission and the readmission interval using a scatter plot (Box 8). The Spearman correlation coefficient is 0.068 which is statistically significant ($P < 0.01$) but small.

The most frequent diseases causing unplanned readmissions listed using their ICD-10 (International classification of diseases, tenth revision) codes are shown in Box 9. Other chronic obstructive pulmonary disease (COPD) (3.8%), complications of procedures not elsewhere classified

5 Total admissions and admissions and unplanned readmissions of patients identifying as Aboriginal

Year	Total admissions (TA)	Aboriginal admissions (AA)	AA as a % of TA	Total unplanned readmissions (TUR)	Aboriginal unplanned readmissions (AUR)	AUR as a % of TUR
1996	13806	1612	11.7	652	91	14.0
1997	14192	1787	12.6	612	113	18.5
1998	13687	1819	13.3	622	118	19.0
1999	14562	2119	14.6	627	95	15.2
2000	14327	1954	13.6	637	98	15.4
2001	13818	2137	15.5	652	111	17.0
2002	14643	2261	15.4	754	124	16.4
2003	14838	2282	15.4	682	120	17.6
2004	15030	2455	16.3	819	162	19.8
2005	16465	3018	18.3	896	150	16.7
Total	145368	21444		6953	1182	

(3.6%), heart failure and pneumonia organism unspecified (each 2.2%), angina (2.1%) and acute bronchiolitis (1.8%) were the top causes. Box 10 shows the diagnoses for unplanned readmissions within the first 7 days. The most frequent diagnosis within the first 7 days was complications of procedures (6.3%). The next most frequent were predominantly respiratory (pneumonia and COPD) although cardiac causes (angina, heart failure and myocardial infarction) were also common.

The frequency of readmissions from 1999 (when ICD-10 came into operation) to 2005 for two chronic diseases (heart failure and COPD) are shown in Box 11. The number of readmissions for both diseases has shown some year-to-year variation over the period, although a significant trend for either condition is not apparent.

Discussion

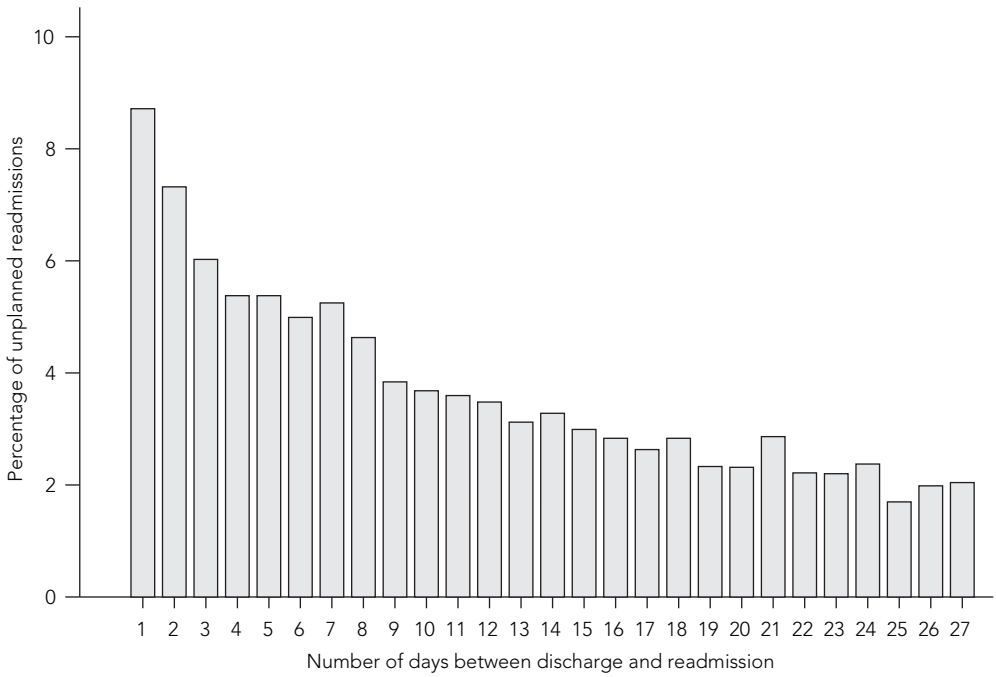
The results show that clinicians and administrators at any regional hospital can undertake a quality assurance exercise around key clinical indicators to provide a wealth of data to assist in the provision of better services to patients in the region as well as hard evidence to substantiate or refute anecdotal or observational assertions.

The lack of comparable Australian published data around unplanned readmissions, especially

6 Towns associated with unplanned readmissions

Town	Unplanned readmissions (no. [%])	Population	Distance from DBH
Dubbo	4307 (61.9)	34 319	<10
Gilgandra	273 (3.9)	4 522	66
Wellington	243 (3.5)	8 120	50
Nyngan	154 (2.2)	2 369	167
Warren	137 (2.0)	2 651	128
Narromine	133 (1.9)	6 507	43
Coonamble	123 (1.8)	2 974	164
Cobar	101 (1.5)	4 918	300
Mudgee	89 (1.3)	8 726	129
Gulgong	88 (1.3)	2 918	111
Bourke	82 (1.2)	3 096	370
Trangie	79 (1.1)	867	77
Coonabarabran	77 (1.1)	3 422	160
Walgett	77 (1.1)	6 944	280
Lightning Ridge	70 (1.0)	2 681	350
Wongarbon	69 (1.0)	666	18
Others	– (12.2)		

7 Frequency of time interval from discharge to unplanned readmission*



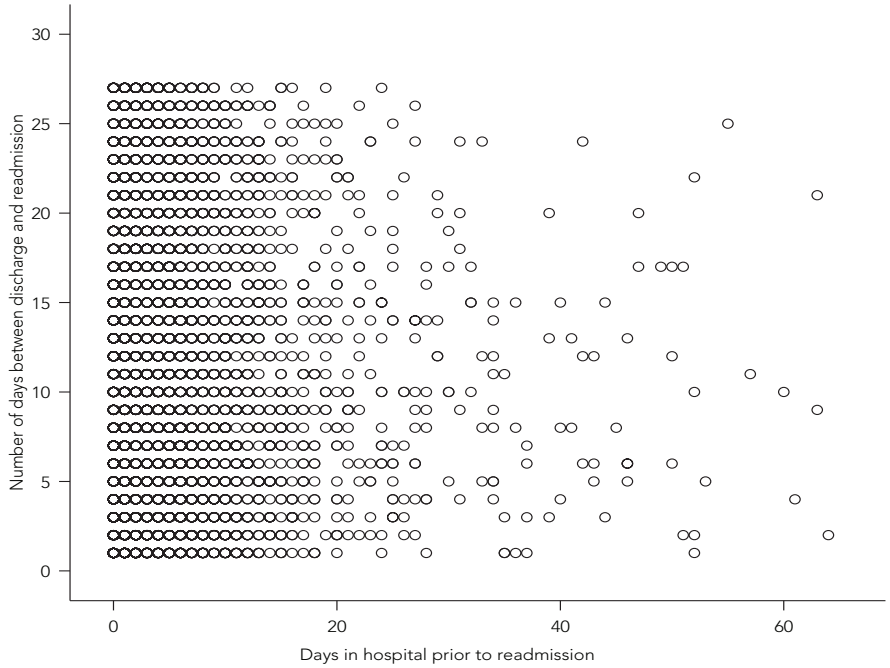
**The mean for time interval was 10.7 days and mode 9 days.*

time trends, is surprising and has meant that it has been difficult to benchmark our results in a meaningful way. However, we believe that results will have the greatest effect if used in the standard quality assurance cycle at a local level to improve performance over time, although the use of national league table comparisons is being suggested as being valuable.

The study shows that the number of unplanned readmissions and the proportion of total admissions that are unplanned readmissions have steadily increased over the last 10 years at DBH, while the number of deaths has remained relatively stable and the number of available beds has continued to decrease. In comparison with other reported Australian data on unplanned readmissions, the public hospitals participating in the Australian Council on Healthcare Standards (ACHS) Comparative Reports Service in 2006 had a mean rate of unplanned readmissions of 2.8 per 100 admissions.[12] The DBH unplanned readmission rate of 5.4% in 2005 was above the 80th percentile of national performance of 5.1%. We are unaware of any comparable reported trends over time in peer-reviewed journals. The change in the number of inpatient beds and the decrease in the length of stay are similar to trends in most public hospitals in Australia over recent times and reflect changes to the way health care is delivered, including more day-stay surgery and increasing use of private hospitals.

Internationally, readmission to hospitals is still ill-defined, poorly understood and shows significant variability, with the reported rates in adult populations varying from 5% to 29%.[13] A recent report from the National Health Service Information Centre shows that emergency readmission rates to hospitals in the United Kingdom are rising, with a 22% increase in readmissions (to 8.6 per 100 discharges) among the 16–75-years age group from 1998 to 2006. For the over 75s, there was a 31% increase over the same time

8 Scatter plot of duration of initial hospital admission and time to unplanned readmission



Correlation coefficient (Spearman's rho) = 0.068 (P < 0.01)

period, to 13.6 per 100 discharges.[3] The overall rate for DBH is towards the lower end on this range and therefore may be acceptable, although the proportion of unplanned readmissions aged 75 years and over has doubled over the period of our study. Explanation of the variation is limited, but one possible cause is the lack of uniformity in the definition of readmission and the various types such as unplanned or planned. In NSW data standards these are defined precisely so that the variations are less likely and the changes over time are significant. However, one study limited to reviewing readmissions for a month in NSW concluded that it is difficult to evaluate readmission rates because there were no comparable studies from Australia.[11]

The length of initial hospital stay is only one of a number of factors that could influence unplanned readmission and this study has not attempted to exhaustively examine them. It is possible to list such factors broadly into those relating to the patient, to in-hospital care and to post-discharge arrangements. As the population ages, more people are developing chronic and multisystem diseases. Acute exacerbations of one or more diseases are inevitable and therefore the need for hospitalisation will increase with age and time, regardless of the quality of the primary care. During hospitalisation high quality care will reduce the likelihood of unplanned readmission, but premature discharge is only one factor that might adversely affect quality of care. Good discharge planning and seamless transition back to primary care will also reduce the likelihood of unplanned readmission.

Our study clearly demonstrates that the majority of the readmissions occur soon after discharge, with more than half occurring in the first 9 days. There was a statistically significant negative correlation between the length of the initial hospital

9 Frequency of diagnosis for unplanned readmissions*

ICD-10 code description	Frequency (%)
Other chronic obstructive pulmonary disease	264 (3.8)
Complications of procedures, not elsewhere classified	248 (3.6)
Heart failure	152 (2.2)
Pneumonia, organism unspecified	150 (2.2)
Angina pectoris	147 (2.1)
Acute bronchiolitis	125 (1.8)
Pain in throat and chest	104 (1.5)
Abdominal and pelvic pain	101 (1.5)
Depressive episode	83 (1.2)
Acute myocardial infarction	83 (1.2)
Type 2 diabetes mellitus	77 (1.1)
Atrial fibrillation and flutter	72 (1.0)
Other surgical follow-up care	72 (1.0)
Cholelithiasis	67 (1.0)
Other disorders of urinary system	66 (1.0)

*Frequencies more than 1% listed.

10 Frequency of diagnosis for unplanned readmissions within 7 days

ICD-10 code description	Frequency (%)
Complications of procedures, not elsewhere classified	188 (6.3)
Other chronic obstructive pulmonary disease	96 (3.2)
Angina pectoris	56 (1.9)
Pneumonia, organism unspecified	56 (1.9)
Abdominal and pelvic pain	53 (1.9)
Heart failure	51 (1.7)
Acute myocardial infarction	31 (1.3)
Pain in throat and chest	28 (1.2)
Cholelithiasis	27 (1.2)
Depressive episode	27 (1.1)

admission and the time to readmission. However, the strength of the correlation is weak and a visual examination of the scatter plot is unlikely to convince either a clinician or a hospital administrator that the increasing premature discharges are correlated with the primary cause of the rising unplanned readmission rate. Furthermore, greater examination and consideration of the potential confounders described above would be necessary before a causal relationship could be postulated. Factors such as quality of care can only be assessed on a patient-by-patient basis by clinicians involved in care.

Although most unplanned readmissions occur soon after discharge and the proportion of total admissions that are readmissions is rising there has been no change to the length of the interval to unplanned readmission over the study period — if discharges were occurring earlier than clinically appropriate it would be expected that readmissions would be occurring earlier in recent times.

We are unaware of any other local data that would allow us to undertake other comparisons. However, in an international study of hospital readmissions,[14] The Netherlands and the state of New York had the longest stays and generated the lowest readmission rates for most diagnoses, while Scotland and the states of Washington and California had considerably shorter stays but higher readmission rates. Nevertheless, the authors concluded that these country-specific findings do not support the hypothesis that high readmission rates are the inevitable price of early discharge. It has been reported elsewhere that increased readmission rates are perhaps the inevitable price of early discharge,[15] and premature discharge has been recognised as an important factor responsible for unplanned readmission in the UK.[16] However a shorter length of stay did

11 Frequency of unplanned readmissions for heart failure and COPD from 1999–2005

	1999	2000	2001	2002	2003	2004	2005
Total unplanned readmissions	627	637	652	754	682	819	896
Heart failure (no. [%])	21 (3.3)	23 (3.6)	19 (2.9)	21 (2.8)	12 (1.8)	23 (2.8)	28 (3.1)
Chronic obstructive pulmonary disease (no. [%])	26 (4.1)	39 (6.1)	24 (3.7)	24 (3.2)	33 (4.8)	65 (7.9)	33 (4.2)

not necessarily appear to result in increased rates of readmission in a Canadian study.[17]

Dubbo is situated in western NSW and has a higher proportion of its population identifying as Aboriginal than in many other areas in NSW. Dubbo Base Hospital provides services to large Aboriginal populations in surrounding areas. Given the unequivocally poorer health outcomes of Aboriginals at a national level we wished to see if this was reflected in an increased number of unplanned readmissions. Although the proportion of total admissions of patients identifying as Aboriginal increased steadily over the study period, the proportion of unplanned readmissions of patients identifying as Aboriginal did not show a similar trend. Nevertheless, over the entire study period there was a proportionally greater representation of Aboriginals in unplanned readmissions (17.0%) than in total admissions (14.6%) and, furthermore, both proportions are higher than the 10.3% of population identifying as Aboriginal in the Dubbo postcode (2830) area in the 2006 census (data from the Australian Bureau of Statistics website). While this may not be surprising given the known poorer health status of Aboriginal populations, generally it does have implications for hospital staff when considering groups worthy of targeting in order to reduce unplanned readmissions.

Around two-thirds of unplanned readmissions were from Dubbo itself with the remainder from surrounding towns. However, of the region served by DBH the city of Dubbo only accounts for one-third of the total population. This apparently paradoxical result might be explained by the fact that a number of non-Dubbo residents who required readmission to a hospital were handled in their local hospital rather than being returned to Dubbo. This would particularly be the case for less serious conditions. Another explanation is that patients from outlying areas who were sick enough to require admission to DBH (usually on transfer from their local hospital) were transferred back to their local hospital for further care before discharge home. In this context they would have a longer hospitalisation, but this would not be recorded in the statistics from DBH. The hospital data system has only recently been upgraded to allow detection of any readmission to hospitals within the area health service boundary: a prospective study could be undertaken around this issue.

There are some other results concerning unplanned readmissions that could assist planning by hospital authorities. Some are well known, such as the late winter and early spring peak that coincides with the increased number of admissions at that time with respiratory conditions. However the occurrence of most unplanned readmissions on Friday has implications for care over the weekend. In addition, if such patients have been sent from general practitioners' rooms the seamlessness of transition arrangements from hospital to aftercare might need to be examined. The high numbers of unplanned readmissions in the 0–10-year decile for both males and females deserves further investigation. It is assumed that the second peak for females in the reproductive years related to complications related to pregnancy, but once again closer scrutiny is warranted to examine risk factors.

The pattern of diseases for patients with unplanned readmissions to DBH is similar to patterns in Europe and the US, where COPD and heart failure have the highest rate.[14] There were differences between the overall frequency and the frequency within the first 7 days. Complications of procedures was the most common within the first 7 days, but COPD was the most common cause overall. Other acute conditions occurred more frequently in the first 7 days, including angina and pneumonia, while heart failure was a more common cause overall. In DBH, although the overall number is relatively low, heart failure readmissions have not decreased over the period of study. Given the high unplanned hospital readmission rate and the resulting costs reported in NSW[18] this has prompted the development of the "NSW Clinical Service Framework for Heart Failure" in which hospital readmissions are seen as one of the most accurate predictors of mortality and increased disease burden.[19] As a result, in a follow-up report, the NSW Chronic Care Program stated that unplanned readmissions for

heart failure were declining in NSW.[20] In the 2006–09 phase III report, NSW Health has gone a step further[21] by stating that "At the state level hospital readmissions within 28 days will be monitored for the major chronic diseases on an annual basis. This will occur using new methodology that is currently being developed with the Australian Council on Healthcare Standards. It is planned to include readmissions within 28 days in Area Health Service Performance Agreements as of 2006/07."

The cost of unplanned readmissions to the health budget is high. A study from the US calculated that between 1974 and 1977, 24% of Medicare inpatient expenditure was spent on readmissions.[22] This was projected to be about $8 billion in 1984. Therefore even a small decrease in readmissions will result in substantial savings.

One of the main issues for clinicians and administrators is which hospital readmissions could have been prevented. One review suggested that between 9% and 48% of all readmissions were judged to be preventable because they were associated with indicators of substandard care during the index hospitalisation, such as poor resolution of the main problem, unstable therapy at discharge, and inadequate post-discharge care.[23]

According to a Cochrane review the impact of discharge planning on unplanned readmission may be small,[24] although the review commented on methodological shortcomings with the different reported measures of outcome which meant that the ability to pool data was restricted. However, it stated that even a small reduction in length of stay or readmission rate could free up capacity for subsequent admissions in a health care system where there is a shortage of hospital beds for acute care. A study from Victoria[25] has demonstrated that coordinating the provision of short-term community services and providing follow-up through the Post-Acute Care (PAC) program can be a beneficial component of discharge planning. The PAC program led to greater improvement in overall quality of life at 1 month after discharge and a reduction in hospital bed-day utilisation in the 6 months after discharge, with an apparent reduction in health care costs.

Our study demonstrated that any regional hospital or health service can determine trends over time that might indicate significant problems in local patient care. The analysis can then be used to direct further targeted analysis and intervention in areas that have a high cost so that the most effective continuous quality improvement cycle can be instituted.

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Competing interests

The authors declare that they have no competing interests.

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