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Narrabri District Hospital

Return to acute care following hospitalisation for six acute conditions and two elective surgeries
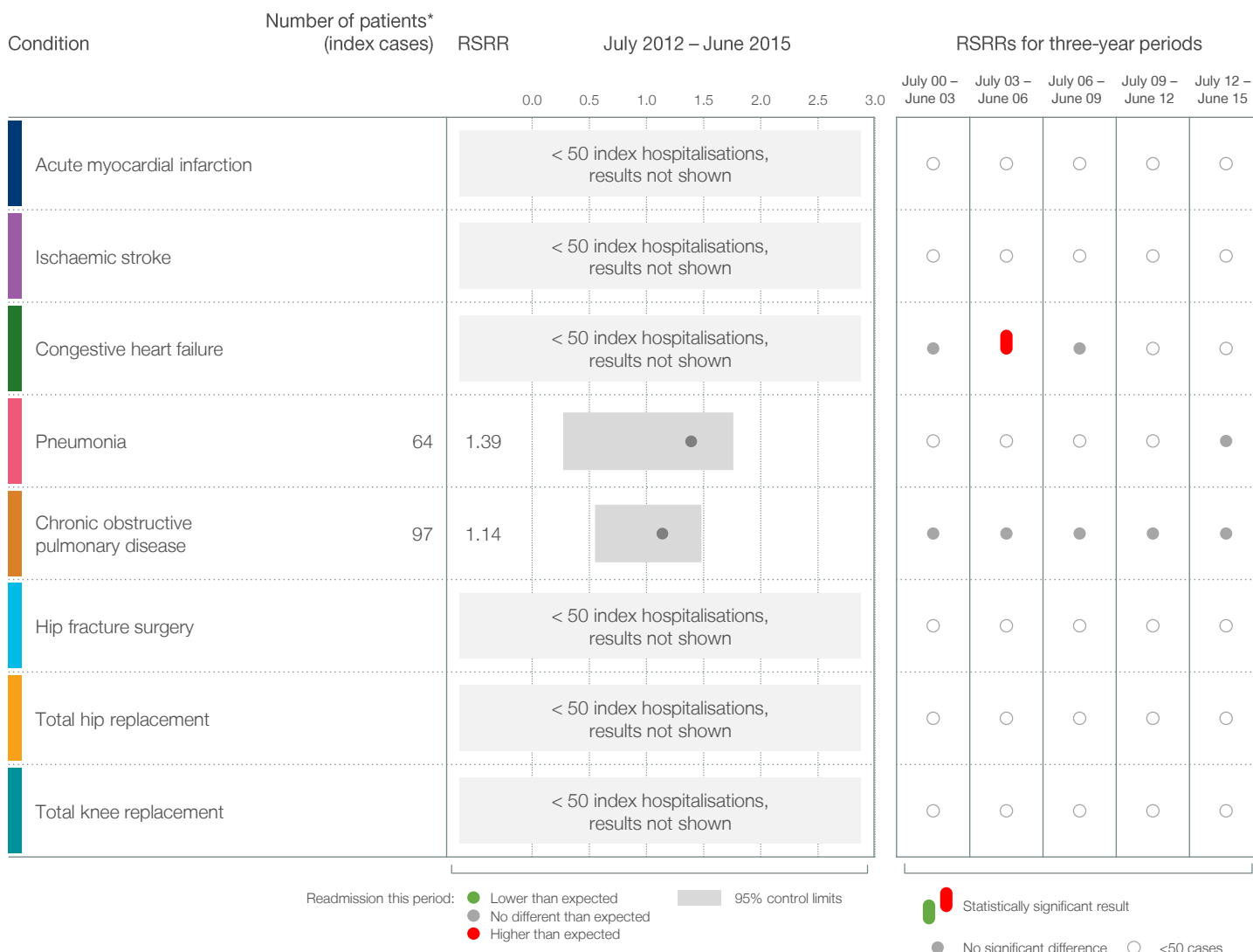
A hospital's risk-standardised readmission ratio (RSRR) is the 'observed' number of readmissions that occurred among its patient cohort divided by the 'expected' number of readmissions among its patients[1]. For this report, readmission is defined as a return to acute care[2].

Funnel plots with 95% and 99.8% control limits around the NSW ratio are used to interpret the ratios and identify outlier hospitals – those with 'special cause' variation that may warrant further investigation. The RSRR does not enable direct comparisons between hospitals. It assesses each hospital's results given its particular case mix.

Slightly different approaches are used for the conditions. A 30-day time period is used for the six acute conditions while a 60-day period is used for the elective surgeries. The analyses focused on acute conditions only consider readmission episodes that are classed as acute emergencies while analyses for the elective surgeries also include some 'planned' readmissions, such as planned returns to theatre for wound wash-outs.
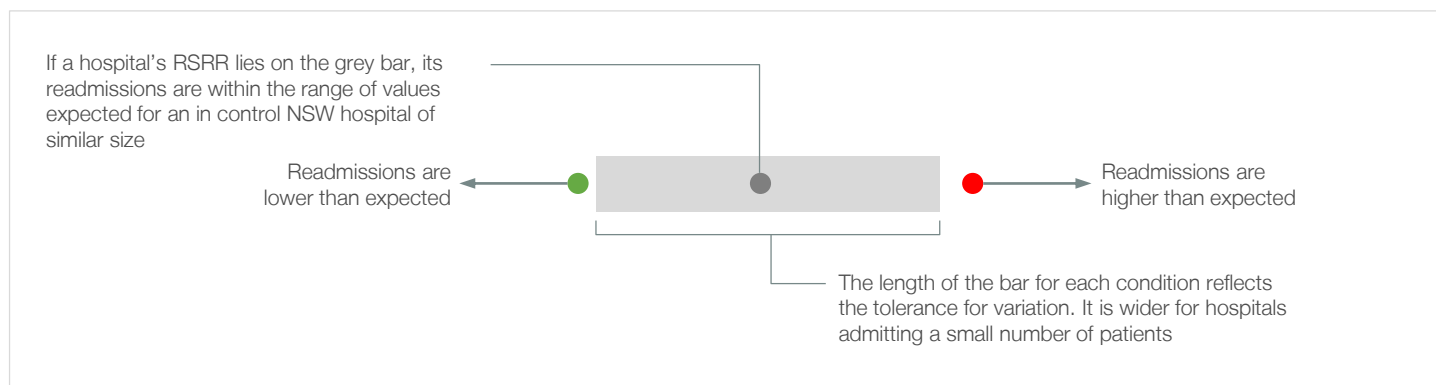
RSRRs do not distinguish readmissions that are avoidable from those that are a reflection of the natural course of illness.

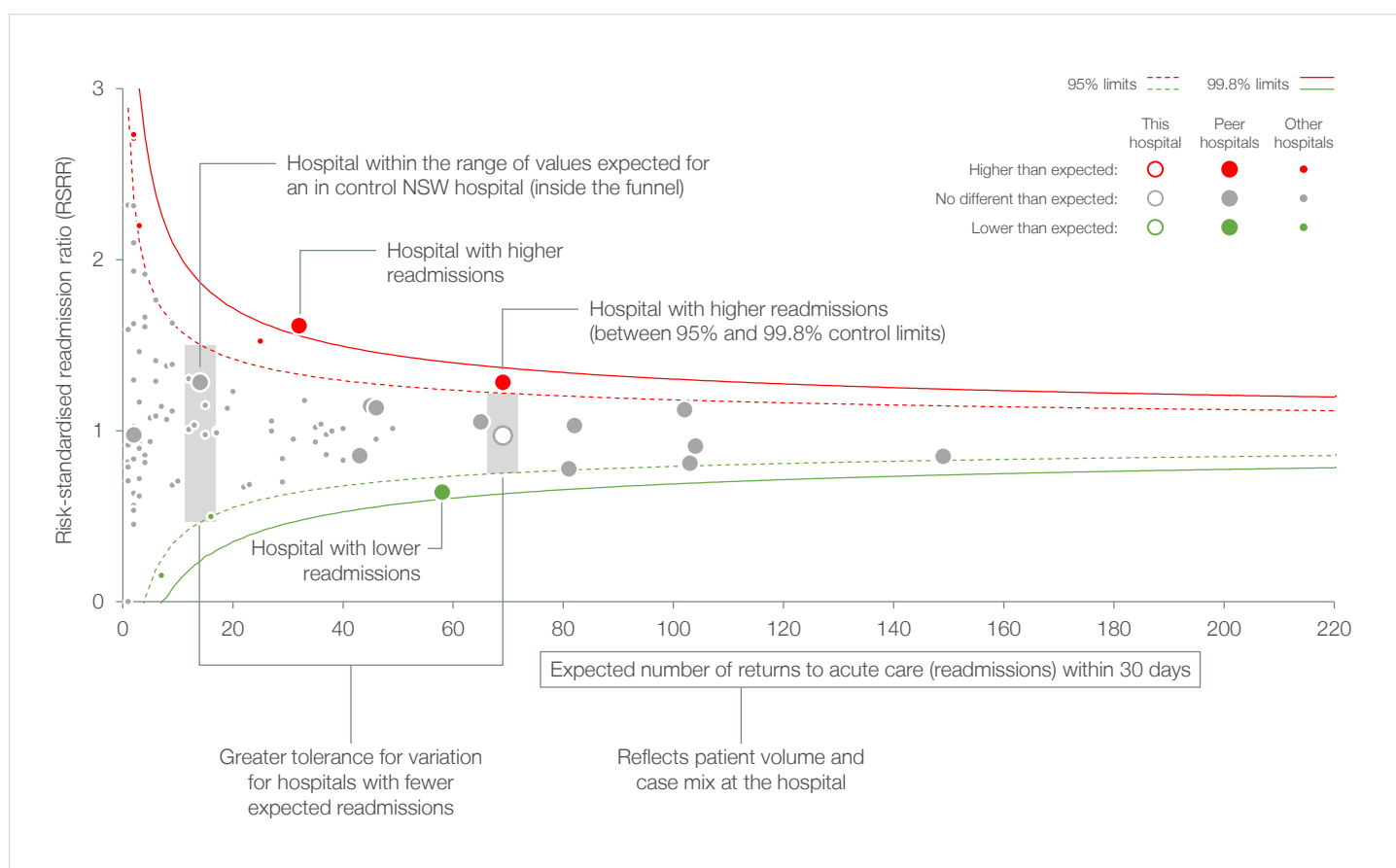## Risk-standardised readmission ratios (RSRRs) for six acute conditions and two elective surgeries

Condition	Number of patients* (index cases)	RSRR	July 2012 – June 2015	RSRRs for three-year periods July 00 – June 03	July 03 – June 06	July 06 – June 09	July 09 – June 12	July 12 – June 15
Acute myocardial infarction			< 50 index hospitalisations, results not shown	○	○	○	○	○
Ischaemic stroke			< 50 index hospitalisations, results not shown	○	○	○	○	○
Congestive heart failure			< 50 index hospitalisations, results not shown	●	🔴	●	○	○
Pneumonia	64	1.39	●	○	○	○	○	●
Chronic obstructive pulmonary disease	97	1.14	●	●	●	●	●	●
Hip fracture surgery			< 50 index hospitalisations, results not shown	○	○	○	○	○
Total hip replacement			< 50 index hospitalisations, results not shown	○	○	○	○	○
Total knee replacement			< 50 index hospitalisations, results not shown	○	○	○	○	○

RSRR scale: 0.0 0.5 1.0 1.5 2.0 2.5 3.0

Readmission this period:
● Lower than expected
● No different than expected
● Higher than expected
▭ 95% control limits

🔴 Statistically significant result
● No significant difference
○ <50 cases

* Index cases exclude those with <30 days follow up information.

How to interpret the dashboard

If a hospital's RSRR lies on the grey bar, its readmissions are within the range of values expected for an in control NSW hospital of similar size

Readmissions are lower than expected ←

Readmissions are higher than expected →

The length of the bar for each condition reflects the tolerance for variation. It is wider for hospitals admitting a small number of patients

How to interpret a funnel plot

95% limits ----   99.8% limits ——

	This hospital	Peer hospitals	Other hospitals
Higher than expected:	○	●	•
No different than expected:	○	●	•
Lower than expected:	○	●	•

Risk-standardised readmission ratio (RSRR)

Hospital within the range of values expected for an in control NSW hospital (inside the funnel)

Hospital with higher readmissions

Hospital with higher readmissions (between 95% and 99.8% control limits)

Hospital with lower readmissions

Expected number of returns to acute care (readmissions) within 30 days

Greater tolerance for variation for hospitals with fewer expected readmissions

Reflects patient volume and case mix at the hospital

Narrabri District Hospital

30-day return to acute care following hospitalisation for acute myocardial infarction

<50 index hospitalisations,
results not shown

Narrabri District Hospital

30-day return to acute care following hospitalisation for ischaemic stroke

<50 index hospitalisations, results not shown

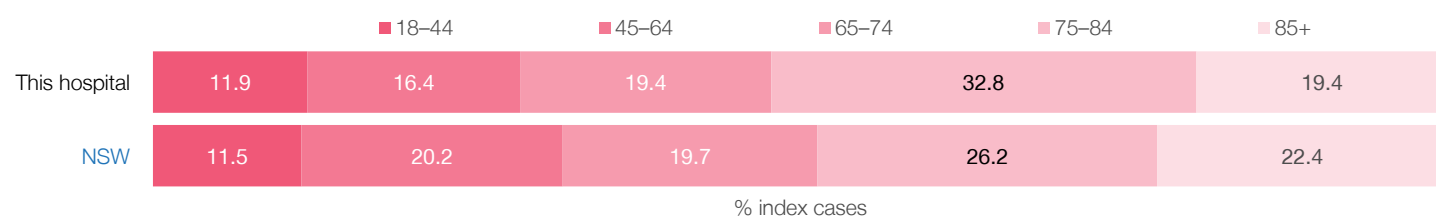# Narrabri District Hospital

30-day return to acute care following hospitalisation for congestive heart failure

<50 index hospitalisations,
results not shown

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Narrabri District Hospital

30-day return to acute care following hospitalisation for pneumonia

Patient cohort, index cases[3,4]

	This hospital	NSW
Total index cases for pneumonia	67	46,422
Average length of stay (days)	5.9	5.6
Patients transferred in from acute care in another hospital	8	4,505
Discharge destination:		
Home	56	40,374
Other	11	6,048

Age profile for index cases (years)*[5]

	18–44	45–64	65–74	75–84	85+
This hospital	11.9	16.4	19.4	32.8	19.4
NSW	11.5	20.2	19.7	26.2	22.4

% index cases

Factors associated with 30-day pneumonia return to acute care[6]

Factor	% difference from NSW
Liver disease	0.1
Diabetes, uncomplicated	0.0
Lymphoma	-0.1
Solid tumour without metastasis	-0.4
Rheumatoid arthritis/collagen	-1.6
Pulmonary circulation disorders	-2.3
Other neurological disorders	-2.5
Depression	-2.7
Deficiency anaemia	-3.2
Hypertension	-3.3
Metastatic cancer	-3.9
Renal failure	-4.1
Weight loss	-4.8
Abuse drug/alcohol/psychoses	-5.1
Congestive heart failure	-7.0
Cardiac arrhythmia	-7.4
Diabetes, complicated	-8.8
Female	-10.2
Chronic pulmonary disease	-11.6
Fluid and electrolyte disorders	-27.3

% difference from NSW (index cases with factor recorded)

*Age was a significant factor in the final model of 30-day readmission following hospitalisation for pneumonia.

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Narrabri District Hospital

30-day return to acute care following hospitalisation for pneumonia

Location of returns to acute care[7]

	This hospital	NSW
Total readmissions following index hospitalisation for pneumonia	10	6,543
Readmitted to the hospital where acute care was completed	8	5,304
Readmitted to a different hospital	2	1,239
Of these:		
To an urban public hospital	0	
To a regional or rural public hospital	2	
To a private hospital	0	

Reasons for and time to returns to acute care[8]

- Same principal diagnosis
- Condition related to principal diagnosis
- Potentially related to hospital care (relevant at any time)
- Potentially related to hospital care (time sensitive, ≤ 7 days post discharge)
- Potentially related to hospital care (time sensitive, 8–30 days post discharge)
- Other conditions

Distribution of reasons for returns to acute care

This hospital: 10.0 | 20.0 | 10.0 | 10.0 | 10.0 | 40.0

NSW: 19.8 | 19.6 | 6.8 | 8.3 | 16.1 | 29.4

% returns to acute care

Number of, and reasons for, returns to acute care following hospitalisation for pneumonia, by days post discharge

Number of returns to acute care

1–7 days: 1, 1, 1, 1
8–14 days: 2
15–21 days: 2, 1
22–30 days: 1

Days post discharge

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Narrabri District Hospital

30-day return to acute care following hospitalisation for pneumonia

Hospital-specific RSRRs report the ratio of actual or 'observed' number of returns to acute care to the 'expected' number of returns. A competing risk regression model draws on the NSW patient population's characteristics and outcomes to estimate the expected number of returns for each hospital, given the characteristics of its patients.

An RSRR less than 1.0 indicates lower-than-expected returns to acute care, and a ratio higher than 1.0 indicates higher-than-expected returns. Small deviations from 1.0 are not considered to be meaningful. Funnel plots with 95% and 99.8% control limits around the NSW ratio are used to identify outliers.

Hospital level pneumonia RSRR by number of expected returns to acute care (readmissions)[9]
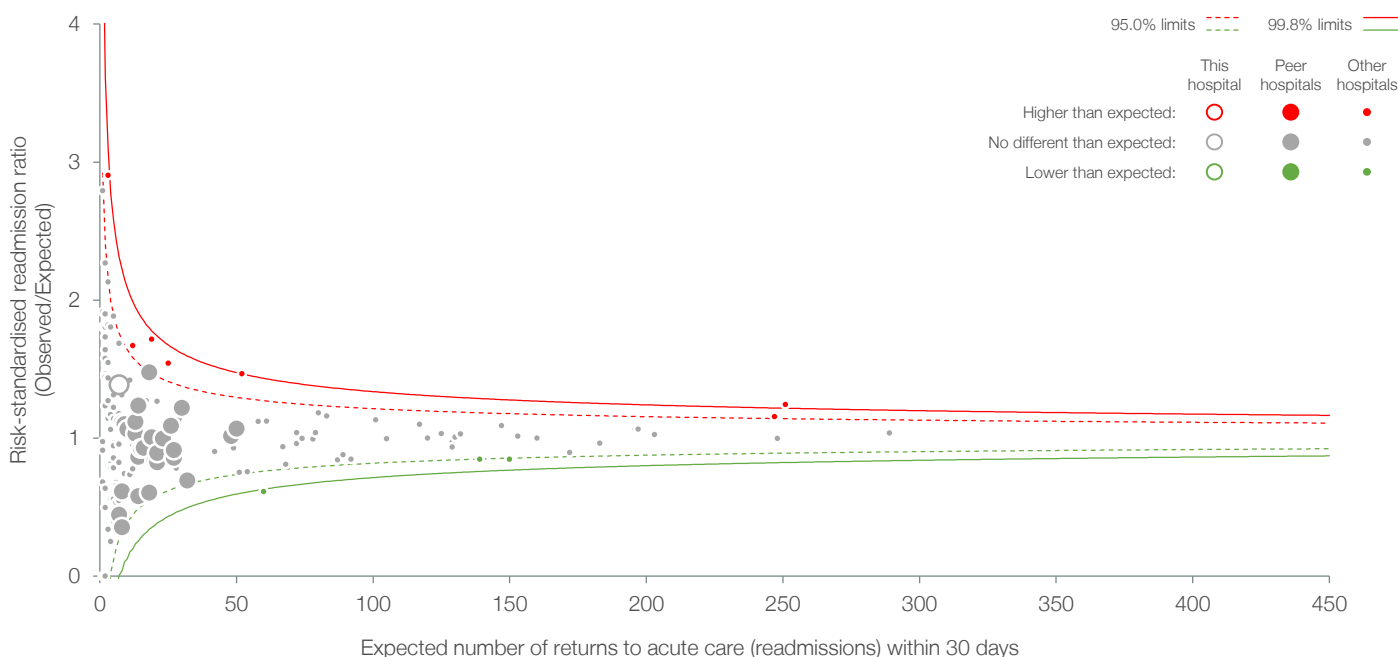
Illustrating the effect of standardisation, July 2012 – June 2015

In order to make fair comparisons, a number of risk adjustments are made to readmission data. These take into account patient factors that influence the likelihood of returning to acute care within 30 days. The table below illustrates the effect of statistical adjustments on this hospital's results.

Unadjusted ratio	Age and sex standardised ratio	Risk-standardised readmission ratio
1.08	1.09	1.39

Ratio: ■ Lower than expected   ■ No different than expected   ■ Higher than expected

The extent to which comorbidities are coded in the patient record may affect risk adjustment. Therefore the 'depth of coding'[10] has been assessed across NSW hospitals. In July 2009 – June 2012, the average depth of coding was 1.1 diagnoses in this hospital and 3.7 in NSW public hospitals; and in July 2012 – June 2015, there were 1.6 diagnoses in this hospital and 4.8 in NSW public hospitals.

Three-yearly RSRR and annual unadjusted readmission rates

The RSRR is calculated on the basis of three years of data. It takes account of differences in patient characteristics so that assessments of hospital performance are fair. To give an indication of results within the three-year period, the figure below shows the RSRR result for July 2012 – June 2015 alongside differences between this hospital and the NSW result for annual unadjusted readmission rates.

RSRR: ○ Lower than expected   ○ No different than expected   ○ Higher than expected

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Narrabri District Hospital

30-day return to acute care following hospitalisation for pneumonia

Pneumonia, this hospital's risk-standardised readmission ratio, expected readmission rates and observed (unadjusted) readmission rates, July 2000 – June 2015

Statistically significant result
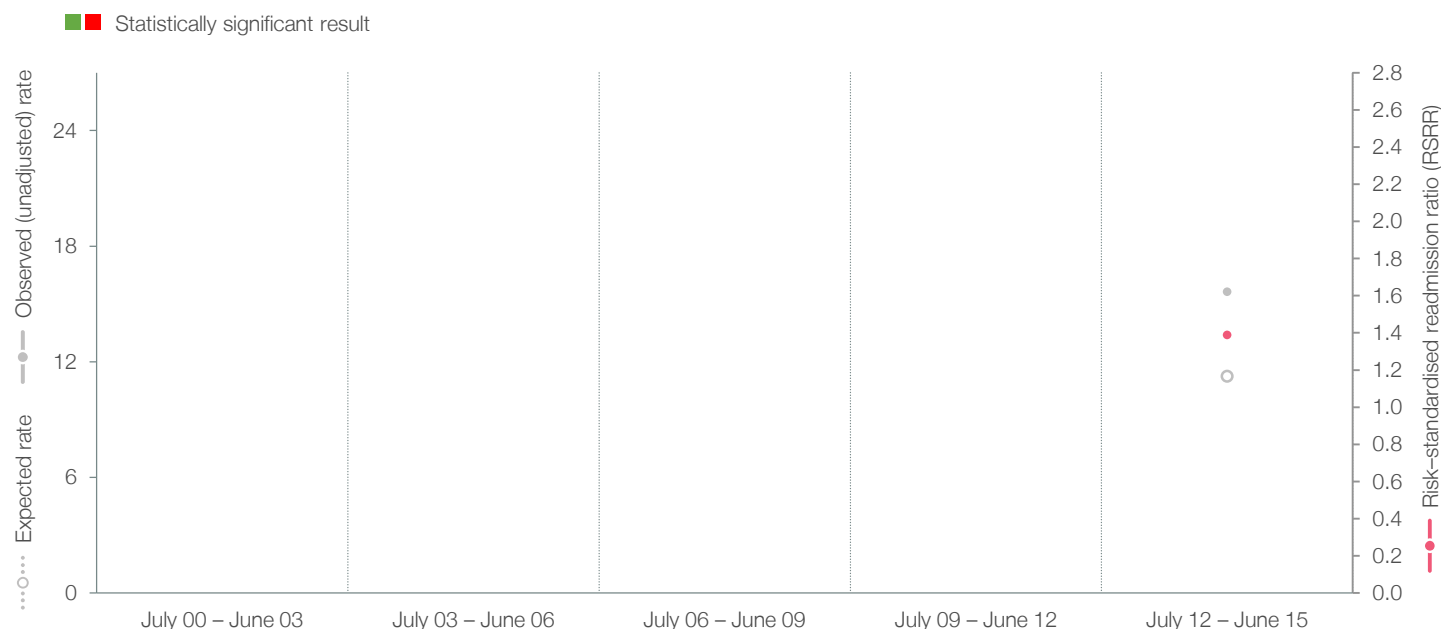
Notes

1. Data refer to patients who were discharged from this hospital, between July 2012 and June 2015, following an acute hospitalisation with pneumonia as principal diagnosis (ICD-10-AM codes J13, J14, J15, J16, J18).

2. Returns to acute care are to any NSW hospital in the 30 days (for acute conditions) or 60 days (for elective surgeries) following discharge, and are attributed to the last discharging hospital. For patients whose acute hospitalisation ended in discharge home, a return to acute care involves readmission to hospital; while for patients whose acute hospitalisation ended with a 'discharge' to non-acute care, a return involved a move back into an acute care setting regardless of whether they physically left the hospital.

3. For calculation of average length of stay, index admissions that were transferred in from, or transferred out to, another acute care hospital were excluded. Unreasonably long episodes are trimmed on the basis of the Diagnosis Related Group (DRG) of the episode. The trim point is the third quartile plus 1.5 x the interquartile range of all in-scope episodes in each DRG.

4. Discharge destinations are based on the mode of separation of the index case. For episodes coded as 'Discharged by hospital' or 'Discharged on leave', patients are considered to be destined for their place of usual residence. All other modes of separation are deemed to indicate a discharge destination other than a patient's place of usual residence.

5. Age at admission date.

6. Comorbidities are identified from the hospital discharge records using the Elixhauser comorbidity set (plus dementia) with a one year look-back from the admission date of the index case. Only those conditions that were shown to have a significant impact on readmission (P<0.05) are shown.

7. Hospitals are classified as urban and regional/rural using the geocoded address of the hospital assigned to ABS statistical areas (SA2) and the Australian remoteness index for areas.

8. Reasons for return to acute care are classified according to a draft specification made available to BHI by the Australian Institute of Health and Welfare. Principal diagnoses for the return to acute care episode, are stratified as: the same as the index hospitalisation; related to that of the index hospitalisation (same ICD-10-AM chapter); potentially related to hospital care (i.e. complications and adverse events) using various time horizons; and, other reasons. Percentages may not add to 100% due to rounding.

9. Results for hospitals with <1 expected readmission are not shown. Peer hospitals are identified according to the NSW Ministry of Health's peer grouping as of April 2012.

10. The depth of coding has been defined as the average number of secondary diagnosis coded for the index cases. The one year look back method which is used for risk adjustment, to some extent accounts for possible lower depth of coding in some hospitals.

Details of analyses are available in *Spotlight on Measurement: Measuring return to acute care following discharge from hospital, 2nd edition*.

Data source: SAPHaRI, Centre for Epidemiology and Evidence, NSW Ministry of Health.
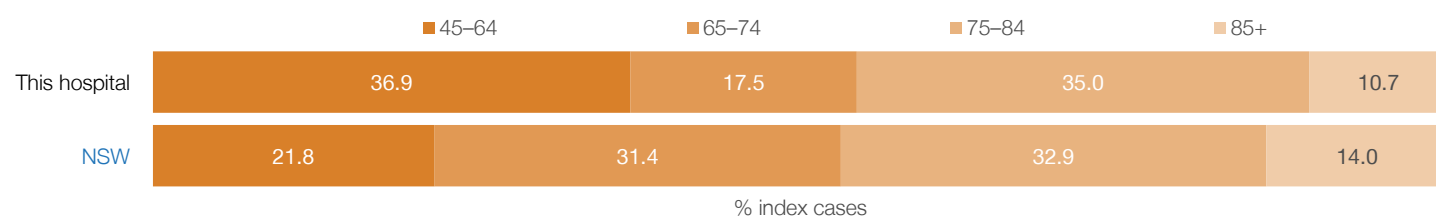
Narrabri District Hospital

30-day return to acute care following hospitalisation for chronic obstructive pulmonary disease
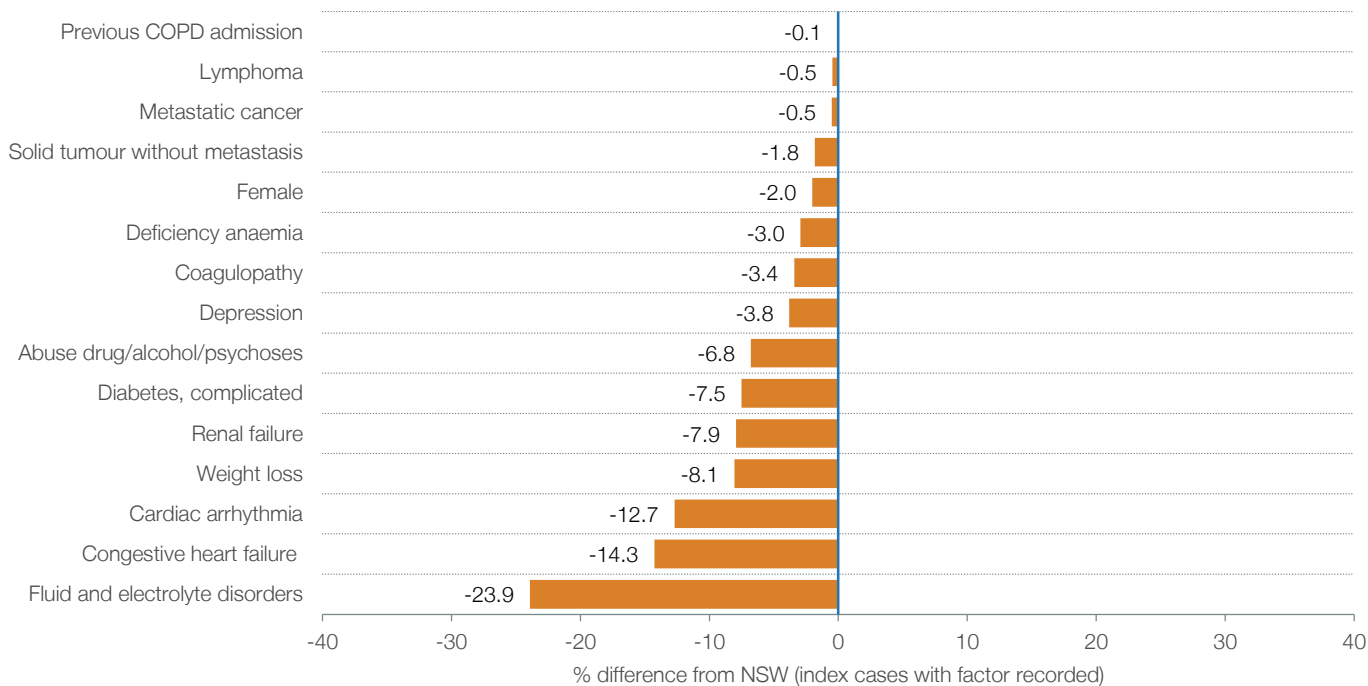
Patient cohort, index cases[3,4]

	This hospital	NSW
Total index cases for chronic obstructive pulmonary disease	103	47,359
Average length of stay (days)	4.8	5.3
Patients transferred in from acute care in another hospital	3	3,367
Discharge destination:		
Home	95	42,937
Other	8	4,422

Age profile for index cases (years)*[5]

■ 45–64 ■ 65–74 ■ 75–84 ■ 85+

	45–64	65–74	75–84	85+
This hospital	36.9	17.5	35.0	10.7
NSW	21.8	31.4	32.9	14.0

% index cases

Factors associated with 30-day chronic obstructive pulmonary disease return to acute care[6]

Factor	% difference from NSW
Previous COPD admission	-0.1
Lymphoma	-0.5
Metastatic cancer	-0.5
Solid tumour without metastasis	-1.8
Female	-2.0
Deficiency anaemia	-3.0
Coagulopathy	-3.4
Depression	-3.8
Abuse drug/alcohol/psychoses	-6.8
Diabetes, complicated	-7.5
Renal failure	-7.9
Weight loss	-8.1
Cardiac arrhythmia	-12.7
Congestive heart failure	-14.3
Fluid and electrolyte disorders	-23.9

% difference from NSW (index cases with factor recorded)

*Age was a significant factor in the final model of 30-day readmission following hospitalisation for chronic obstructive pulmonary disease.
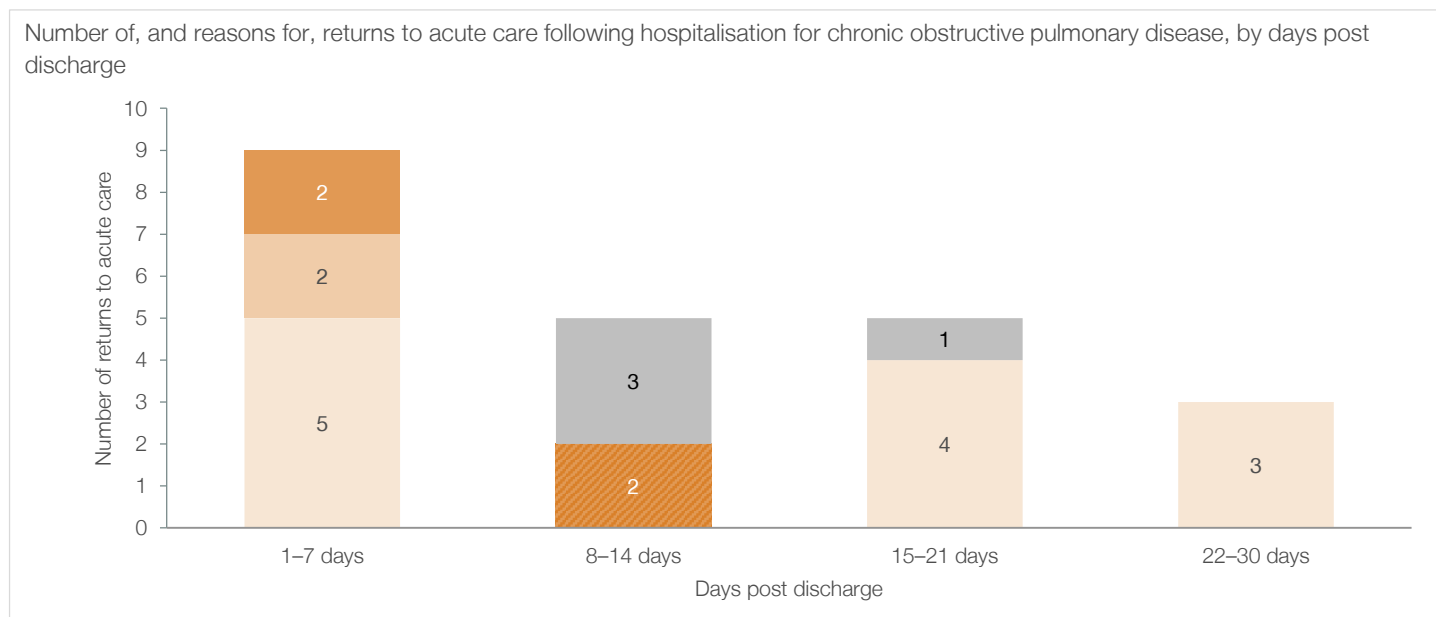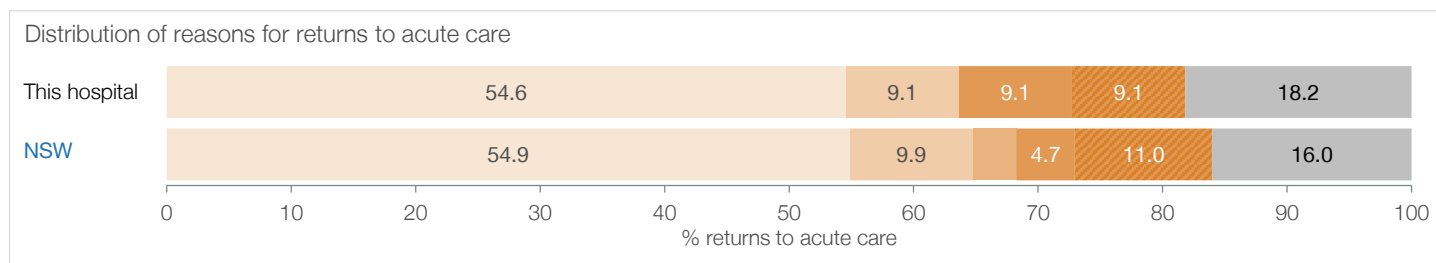
Narrabri District Hospital

30-day return to acute care following hospitalisation for chronic obstructive pulmonary disease

Location of returns to acute care[7]

	This hospital	NSW
Total readmissions following index hospitalisation for chronic obstructive pulmonary disease	22	10,293
Readmitted to the hospital where acute care was completed	20	8,696
Readmitted to a different hospital	2	1,597
Of these:		
To an urban public hospital	0	
To a regional or rural public hospital	2	
To a private hospital	0	

Reasons for and time to returns to acute care[8]

- Same principal diagnosis
- Condition related to principal diagnosis
- Potentially related to hospital care (relevant at any time)
- Potentially related to hospital care (time sensitive, ≤ 7 days post discharge)
- Potentially related to hospital care (time sensitive, 8–30 days post discharge)
- Other conditions

Distribution of reasons for returns to acute care

	Same principal diagnosis				Other conditions
This hospital	54.6	9.1	9.1	9.1	18.2
NSW	54.9	9.9	4.7	11.0	16.0

% returns to acute care

Number of, and reasons for, returns to acute care following hospitalisation for chronic obstructive pulmonary disease, by days post discharge

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Narrabri District Hospital

30-day return to acute care following hospitalisation for chronic obstructive pulmonary disease

Hospital-specific RSRRs report the ratio of actual or 'observed' number of returns to acute care to the 'expected' number of returns. A competing risk regression model draws on the NSW patient population's characteristics and outcomes to estimate the expected number of returns for each hospital, given the characteristics of its patients.

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Hospital level chronic obstructive pulmonary disease RSRR by number of expected returns to acute care (readmissions)[9]
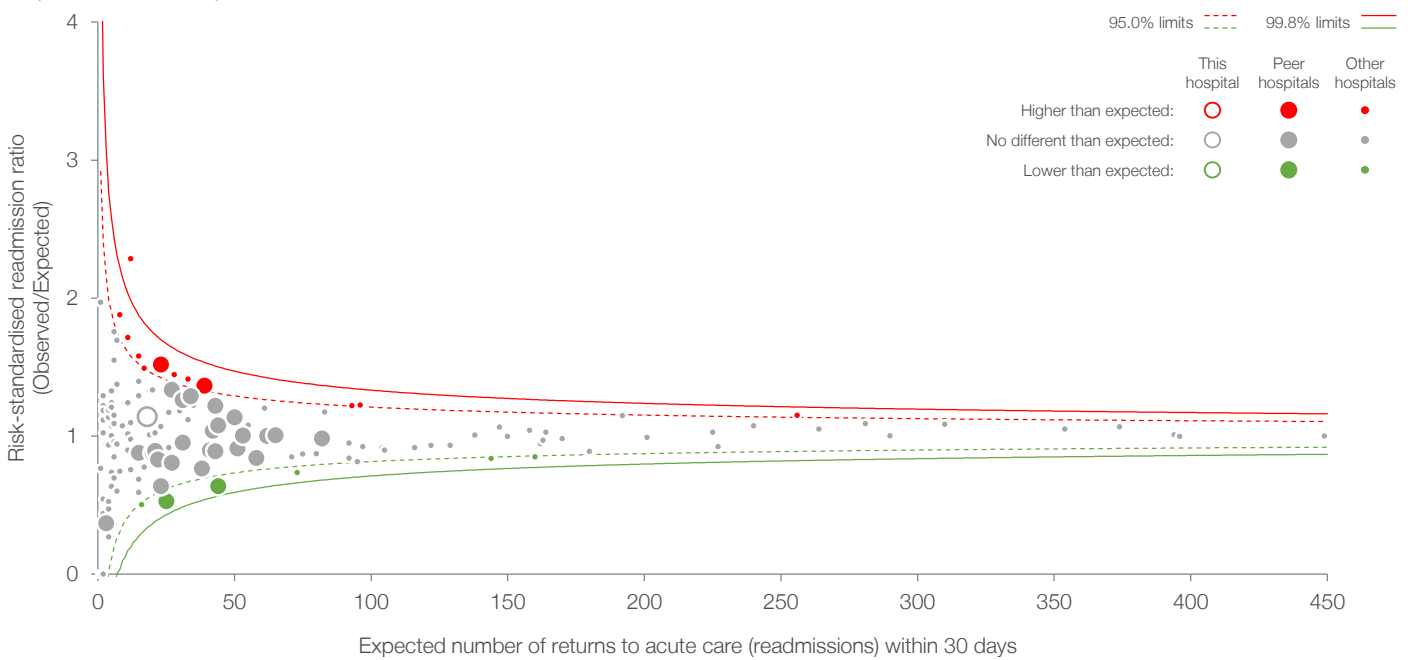
Illustrating the effect of standardisation, July 2012 – June 2015

In order to make fair comparisons, a number of risk adjustments are made to readmission data. These take into account patient factors that influence the likelihood of returning to acute care within 30 days. The table below illustrates the effect of statistical adjustments on this hospital's results.
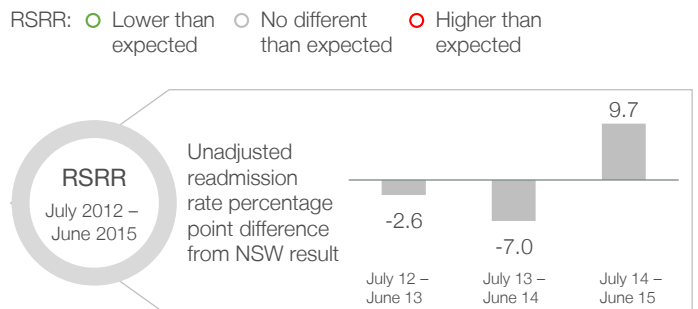
Unadjusted ratio	Age and sex standardised ratio	Risk-standardised readmission ratio
0.98	0.99	1.14

Ratio: ▬ Lower than expected   ▬ No different than expected   ▬ Higher than expected

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## Three-yearly RSRR and annual unadjusted readmission rates

The RSRR is calculated on the basis of three years of data. It takes account of differences in patient characteristics so that assessments of hospital performance are fair. To give an indication of results within the three-year period, the figure below shows the RSRR result for July 2012 – June 2015 alongside differences between this hospital and the NSW result for annual unadjusted readmission rates.

RSRR: ○ Lower than expected   ○ No different than expected   ○ Higher than expected

Narrabri District Hospital

30-day return to acute care following hospitalisation for chronic obstructive pulmonary disease

Chronic obstructive pulmonary disease, this hospital's risk-standardised readmission ratio, expected readmission rates and observed (unadjusted) readmission rates, July 2000 – June 2015

■■ Statistically significant result
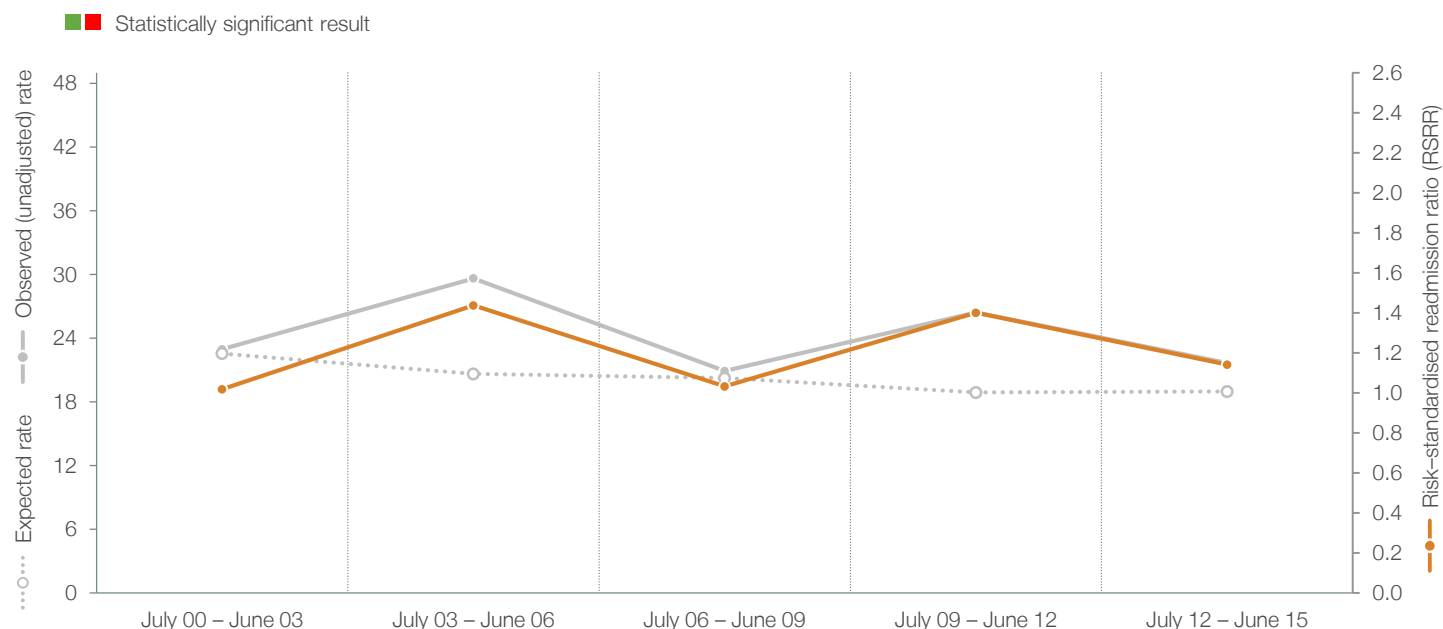
Notes

1. Data refer to patients who were discharged from this hospital, between July 2012 and June 2015, following an acute hospitalisation with COPD as principal diagnosis (ICD-10-AM code J41, J42, J43, J44, J47, and J20 and J40 if accompanied by J41, J42, J43, J44 and J47 in any secondary diagnoses).

2. Returns to acute care are to any NSW hospital in the 30 days (for acute conditions) or 60 days (for elective surgeries) following discharge, and are attributed to the last discharging hospital. For patients whose acute hospitalisation ended in discharge home, a return to acute care involves readmission to hospital; while for patients whose acute hospitalisation ended with a 'discharge' to non-acute care, a return involved a move back into an acute care setting regardless of whether they physically left the hospital.

3. For calculation of average length of stay, index admissions that were transferred in from, or transferred out to, another acute care hospital were excluded. Unreasonably long episodes are trimmed on the basis of the Diagnosis Related Group (DRG) of the episode. The trim point is the third quartile plus 1.5 x the interquartile range of all in-scope episodes in each DRG.

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5. Age at admission date.

6. Comorbidities are identified from the hospital discharge records using the Elixhauser comorbidity set (plus dementia) with a one year look-back from the admission date of the index case. Only those conditions that were shown to have a significant impact on readmission (P<0.05) are shown.

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10. The depth of coding has been defined as the average number of secondary diagnosis coded for the index cases. The one year look back method which is used for risk adjustment, to some extent accounts for possible lower depth of coding in some hospitals.

Details of analyses are available in *Spotlight on Measurement: Measuring return to acute care following discharge from hospital, 2nd edition*.

Data source: SAPHaRI, Centre for Epidemiology and Evidence, NSW Ministry of Health.

Narrabri District Hospital

30-day return to acute care following hospitalisation for hip fracture surgery

<50 index hospitalisations,
results not shown

Narrabri District Hospital

60-day return to acute care following hospitalisation for total hip replacement

<50 index hospitalisations,
results not shown

Narrabri District Hospital

60-day return to acute care following hospitalisation for total knee replacement

<50 index hospitalisations,
results not shown