

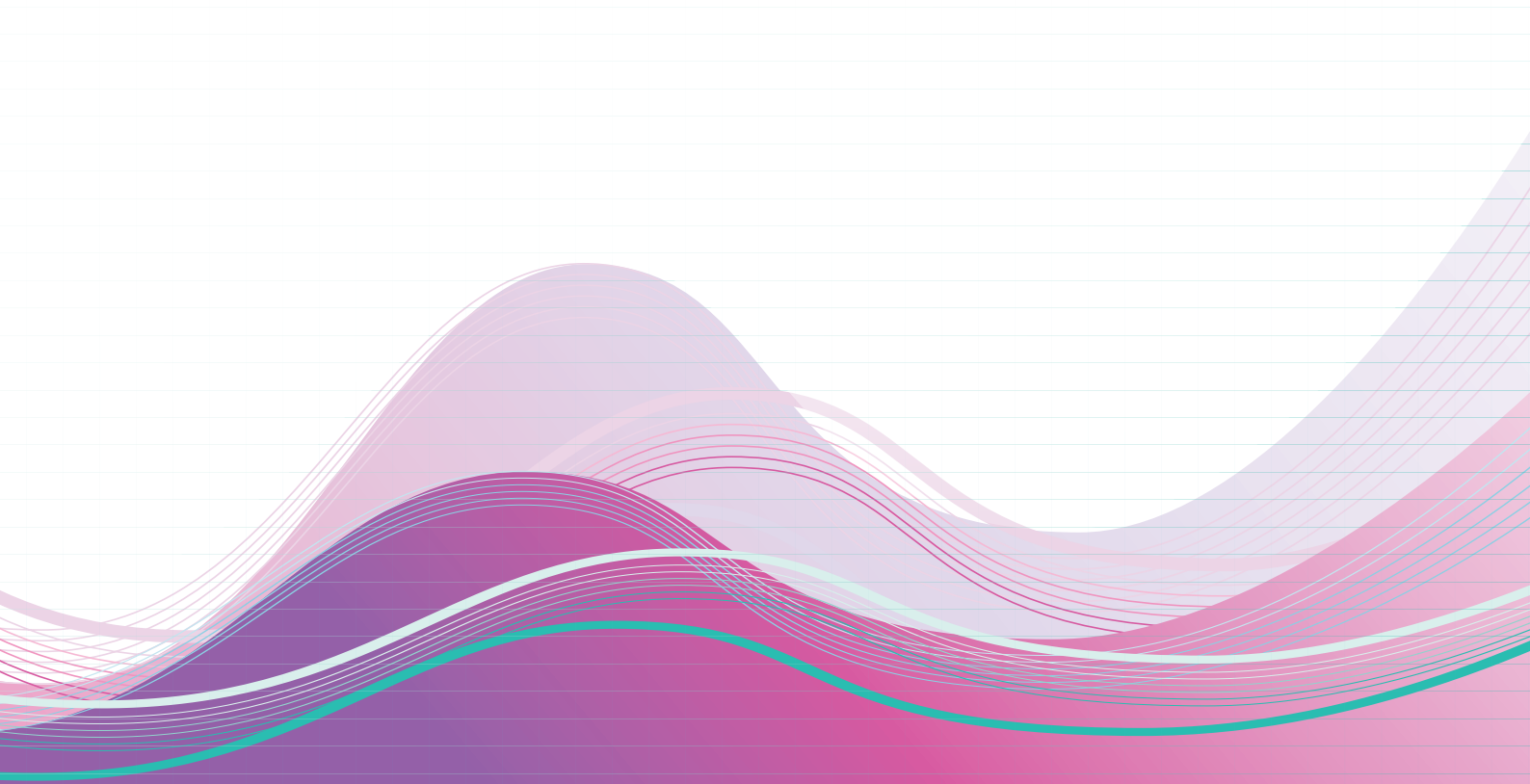
# The Insights Series

## Chronic Disease Care: A piece of the picture

Admissions for Chronic Obstructive Pulmonary  
Disease (COPD) and Congestive Heart Failure (CHF)

July 2009 to June 2010

Volume 2, PART 1



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## Chronic obstructive pulmonary disease (COPD) – a brief description

Chronic obstructive pulmonary disease (COPD) is a long-term lung disease marked by shortness of breath. Breathlessness initially occurs with exertion and becomes progressively worse. COPD most commonly arises from the gradual destruction of lung tissue due to a process initiated by inhaled irritants (most importantly, tobacco smoke). This destruction of lung tissue, known as emphysema, makes the lungs 'floppy' and less able to move air in and out, thereby limiting the ability of the lungs to exchange oxygen and carbon dioxide.

No existing treatment reverses the destruction of lung tissue underlying COPD. Cessation of smoking has been shown to slow progression of the disease. Exercise-based rehabilitation programs improve the quality of life and exercise capacity of people with COPD. For people with more severe forms of the disease, certain medications improve exercise capacity and quality of life and reduce the frequency of disease exacerbations.

COPD was responsible for more than 1,700 deaths in NSW in 2007.<sup>1</sup>

## Congestive heart failure (CHF) – a brief description

Congestive heart failure (CHF) is a complex syndrome that can result from a structural or functional cardiac disorder. CHF is a progressive condition in which the heart is unable to pump sufficient blood fast enough to meet the body's needs. It can result from diseases that damage or overload the heart, including myocardial infarction (heart attack), hypertension (high blood pressure) or damaged heart valves. It can occur suddenly but more commonly develops over several years.

CHF is characterised by:

- **Reduced blood flow:** the heart cannot pump enough blood to the muscles and organs, resulting in difficulty exercising, fatigue and dizziness. In early stages of the disease, these signs are apparent only when physical activity is increased. In advanced heart failure, many tissues and organs may not receive enough oxygen to function at rest
- **Fluid congestion:** as the heart's pumping becomes less efficient, the body tries to compensate, increasing blood volume through fluid retention in the kidneys. Blood and fluid pressure result in excess fluid entering the lungs and other body tissues. Symptoms associated with fluid retention include shortness of breath and oedema (pooling of fluid in the tissues).

CHF was the principal cause of just over 1,000 deaths in NSW in 2007 and was a contributing cause in many more.<sup>1</sup>

# Chronic Disease Care: A piece of the picture

## Executive Summary: Potentially avoidable admissions for COPD and CHF, NSW public hospitals, July 2009 to June 2010

*Chronic Disease Care: A piece of the picture* provides information about two chronic conditions that affect patients in NSW: chronic obstructive pulmonary disease (COPD) and congestive heart failure (CHF).

The report focuses on potentially avoidable admissions (PAAs) for COPD and CHF. PAAs are hospital admissions that could have been avoided either through disease prevention, or more timely or improved care processes.

In 2009-10, COPD and CHF together accounted for nearly 30,000 PAAs and 170,000 bed days in NSW public hospitals. Average length of stay was 5.9 days for COPD and 6.7 days for CHF. Most PAAs for these diseases were unplanned and from an emergency department (ED) ([Summary table](#)).

A range of factors influence admission rates, including access to community and primary care services and patient circumstances. There are marked seasonal patterns, with higher admissions in winter suggesting secondary prevention strategies may have greater impact if targeted at these times.

Bed days for each condition have decreased by around 10% in the past five years. Nevertheless, there remain communities that would benefit from reducing admissions. The report informs hospital managers and clinical staff about the COPD and CHF patients they serve. It draws attention to communities most likely to benefit from models of care that could help prevent the escalation of COPD and CHF so people can stay well and at home.

Summary table: Potentially avoidable admissions for COPD and CHF, NSW public hospitals, July 2009 to June 2010

	COPD	CHF
Number of people in NSW who report being diagnosed	174,100 people 2.6% of NSW population	83,100 people 1.2% of NSW population
Number of potentially avoidable admissions (PAAs)	16,774	11,390
PAA rate per 1,000 select medical admissions*	35.0	23.8
Differences in the standardised PAA rate* across hospital peer groups (highest and lowest variation)	Highest variation: Major metropolitan (BM peer group) hospitals (7-fold) Lowest variation: Major non-metropolitan (BNM peer group) hospitals (2-fold)	Highest variation: Smaller district (C2 peer group) hospitals (11-fold) Lowest variation: Principal referral (A peer group) hospitals (3-fold)
Total number of bed days	96,119	72,804
Average length of stay	5.9 days	6.7 days
Number of unplanned PAAs	16,067 96% of PAAs for COPD	11,035 97% of PAAs for CHF
Number of PAAs admitted from an ED	12,988 77% of PAAs for COPD	9,083 80% of PAAs for CHF

\* Standardised for age, sex and socioeconomic status. Rates do not necessarily reflect appropriateness of admissions or quality of care.

# Introduction

The NSW public health system faces many challenges, including an aging population, patients with increasingly complex health problems, and growing prevalence of chronic diseases.

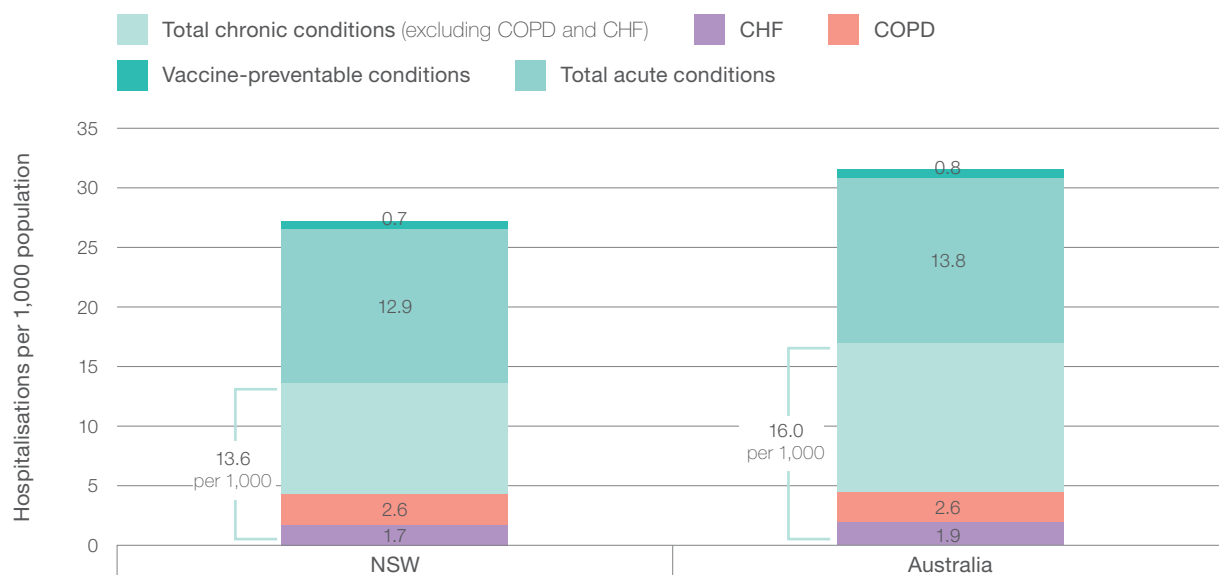
In response to these challenges, the Bureau has introduced *The Insights Series*, which will provide professionals in community and hospital settings with information to help them improve care. This issue in the series, *Chronic Disease Care: A piece of the picture*, provides detailed information about admissions for patients diagnosed with two chronic conditions: chronic obstructive pulmonary disease (COPD) or congestive heart failure (CHF). For more information about these diseases see [Page i](#).

An important first step in improving care and preventing unnecessary admissions is to produce information about current hospitalisation patterns. Most hospital admissions for COPD and CHF are considered to be 'potentially preventable'.

Potentially preventable hospitalisations (PPHs)\* refer to hospital admissions that could have been avoided through better prevention or more timely or improved care processes.

This report draws attention to communities most likely to benefit from models of care that could help prevent the development and escalation of COPD and CHF so people can stay well and at home.

Figure 1: Potentially preventable hospitalisations rates per 1,000 population in public and private hospitals, NSW and Australia, 2009–10



Note. Select potentially preventable hospitalisations as defined by the National Healthcare Agreement.  
 Note. More than one condition may be reported for a single hospitalisation.  
 Note. Rates are directly age standardised using estimated resident population as at 31 December 2008.  
 Source: Australian Institute of Health and Welfare. *Australian Hospital Statistics*, 2011.

\* Referred to in research and policy documents as either Potentially Preventable Hospitalisations (PPHs), or Ambulatory Care Sensitive Conditions (ACSCs); this measure is a National Healthcare Agreement performance indicator.

In Australia, PPHs are associated with three main types of conditions:

- *vaccine preventable conditions*, which could be avoided with immunisation
- *acute conditions*, which could be avoided with appropriate and timely treatment to prevent rapid onset of symptoms and marked deterioration
- *chronic or persistent conditions*, for which appropriate care can prevent or reduce the severity of disease flare-ups.

In NSW, PPHs per 1,000 population are lower than in Australia as a whole, although rates for COPD and CHF are similar (Figure 1).

Chronic conditions are responsible for around 80% of the disease burden nationwide<sup>2</sup> and represent the largest proportion of PPHs.<sup>3,4</sup>

Australian Bureau of Statistics estimates<sup>5</sup> show almost 4 million people in NSW report having a chronic disease\*, **174,100 people** report having bronchitis or emphysema (both are classified as COPD) and **83,100 people** report having heart failure.

According to the Australian Institute of Health and Welfare, COPD and CHF accounted for 17% of PPHs and 33% of chronic condition PPHs in NSW in 2009-10.<sup>3</sup>

Age-standardised admission rates for COPD and CHF have been shown to differ markedly across communities in NSW, raising questions about the potential to avoid at least some admissions in communities with high rates.<sup>6</sup>

*Chronic Disease Care: A piece of the picture* focuses on a subset of PPHs – termed potentially avoidable admissions (PAAs). Based on advice from clinical and policy experts, PAAs focus on patients aged 45 years or over and exclude admissions for dialysis, surgery, obstetrics and mental health. The report provides the following information on PAAs for COPD and CHF:

- The number, rate and standardised admission rate per 1,000 select medical hospitalisations (i.e. excludes surgical, obstetric, mental health and dialysis hospitalisations)
- Patient characteristics, such as age, socioeconomic status (SES), residential community and smoking status, which may have an impact on the severity of disease
- Hospital use data, including number of bed days and length of stay. It also reports on the extent to which admissions are planned or unplanned: and whether they originated from an emergency department (ED).

This information is provided for the state\*\*, Local Health Networks\*\*\* and 79 NSW public hospitals. Performance Profiles containing information on individual hospitals are available at [www.bhi.nsw.gov.au](http://www.bhi.nsw.gov.au)

\* Includes arthritis, asthma, diabetes, heart / stroke / vascular disease, hypertension, mental illness, osteoporosis, cancer (3.93 million; without cancer 3.82 million).

\*\* State-level results are for all hospitals, not just the 79 NSW public hospitals individually reported.

\*\*\* To be known as Local Health Districts following enactment of legislation.



# Potentially avoidable admissions: Comparing hospitals

Between July 2009 and June 2010, 93% of potentially avoidable admissions (PAAs) for COPD and 89% of potentially avoidable admissions for CHF occurred in NSW public hospitals. The remainder were in private hospitals.<sup>7</sup>

## Number of admissions

In 2009-10, there were 16,774 PAAs for COPD and 11,390 for CHF in NSW public hospitals. For COPD, the highest number of PAAs was at Blacktown (582), Wyong (575), and Liverpool (521) hospitals. For CHF, the highest number of PAAs was at Westmead (456), St George (404) and Liverpool (400) hospitals.

While counts provide information on the number of admissions, it is more appropriate to compare hospitals on the basis of standardised rates since these figures take account of differences in the size of hospitals and the types of patients served.

## Standardised rates of admission for COPD

**Figure 2** illustrates standardised rates for potentially avoidable COPD admissions for geographic communities in rural and urban LHNs, and hospital peer groups.

Markers representing NSW hospitals are:

- Colour-coded according to peer group (as defined by NSW Health)
- Sized according to the total number of COPD admissions recorded in the year (high >400; medium 201–400; low <200)
- Sorted according to geographic location.

**Interpreting Figure 2:** This report describes admission patterns for COPD and CHF. When comparing hospital-level data, the following factors should be considered:

1. Admission rates are influenced by many factors outside a hospital's control, e.g. referral practices, access to community and primary care services, and patient characteristics not included in standardisation
2. Rates are expressed as per 1,000 select medical hospitalisations so may be affected by admission patterns for other conditions, such as diabetes
3. Rates will be predictably high in hospitals that have specialised clinics and tertiary services.

*Rates do not necessarily reflect appropriateness of admissions or quality of care.*

In 2009–10, NSW admission rates per 1,000 select medical hospitalisations were 35.0 for potentially avoidable COPD.

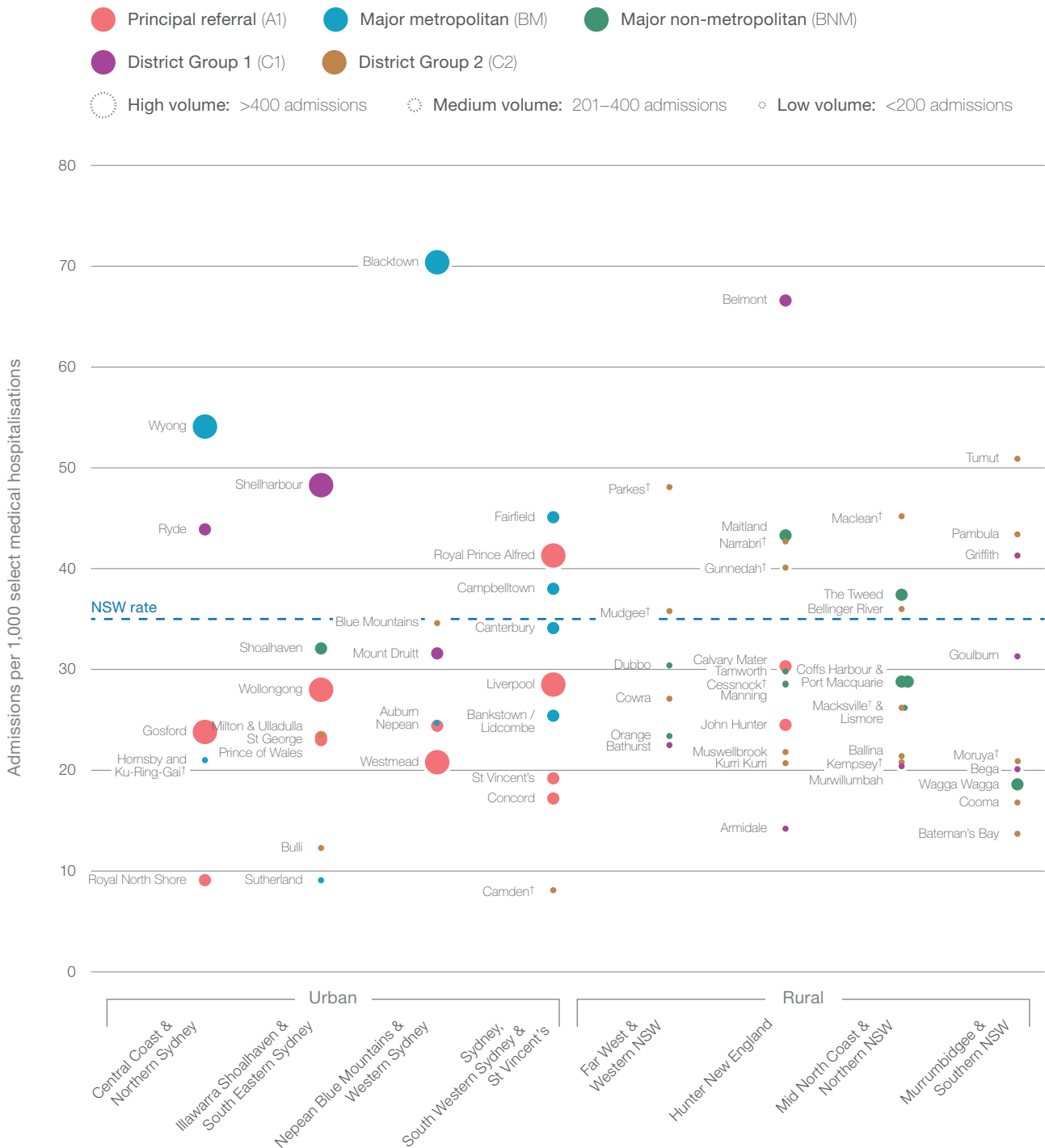
Within peer groups, the highest standardised rates of potentially avoidable admissions for COPD in referral hospitals (A1 and A3) were at Royal Prince Alfred (41.3 per 1,000 select medical hospitalisations) and Calvary Mater (31.6 per 1,000).

For major metropolitan hospitals (BM), the highest standardised rates were at Blacktown (70.4 per 1,000) and Wyong (54.1 per 1,000).

At major non-metropolitan hospitals (BNM), the highest rates were at Maitland (43.3 per 1,000) and Tweed (37.4 per 1,000).



Figure 2: Potentially avoidable admission rates per 1,000 select medical hospitalisations for COPD (standardised for age, sex and SES), **urban** (left) and **rural** (right) districts, 2009–10



(†) Interpret with caution: rates with a relative standard error (RSE)  $\geq 30\%$  and  $< 40\%$  (rates with RSE of  $\geq 40\%$  are suppressed).

**Note.** Counts and rates are for admissions in the relevant time period; a single patient can have multiple admissions.

**Note.** Rates are directly standardised to the NSW admitted patient population 2009–10 on the basis of age, sex and socioeconomic status (SES).

**Note.** For inclusion criteria and cohort definitions, see Appendix 2.

**Source:** Admitted Patient Data Collection, Health Information Exchange, NSW Health. Data extracted on 28 February 2011.

Among larger district public hospitals (C1), the highest standardised rates were at Belmont (66.6 per 1,000) and Shellharbour (48.7 per 1,000). For smaller district public hospitals (C2), the highest standardised rate was at Tumut (50.9 per 1,000).

The highest variation was among BM peer group hospitals (7-fold) and the lowest variation was among BNM peer group hospitals (2-fold).

## Standardised rates of admission for CHF

In 2009–10, NSW admission rates per 1,000 select medical hospitalisations were 23.8 for potentially avoidable CHF.

The highest standardised PAA rates for CHF in principal referral hospitals (A1) were at Liverpool (36.8 per 1,000 select medical hospitalisations) and Royal Prince Alfred (30.1 per 1,000).

For major metropolitan hospitals (BM), the highest standardised rates were at Blacktown (31.6 per 1,000) and Fairfield (30.8 per 1,000).

Among major non-metropolitan hospitals (BNM), the highest standardised rates were recorded in Port Macquarie (39.1 per 1,000) and Maitland (33.7 per 1,000).

Among larger district hospitals (C1), the highest standardised rates were recorded in Belmont (45.0 per 1,000) and Mt Druitt (32.1 per 1,000). For smaller district hospitals (C2), the highest standardised rates were at Pambula (43.6 per 1,000).

Comparing across peer groups, the highest variation was among C2 hospitals (11-fold) and the lowest variation was among A-group hospitals (3-fold).

Figure 3 illustrates standardised rates for potentially avoidable CHF admissions for geographic communities and peer groups.

Markers representing NSW hospitals are:

- Colour-coded according to peer group (as defined by NSW Health)
- Sized according to the total number of CHF admissions recorded in the year (high >400; medium 201–400; low <200)
- Sorted according to geographic location.

Interpreting Figure 3: This report describes admission patterns for COPD and CHF. When comparing hospital-level data, the following factors should be considered:

1. Admission rates are influenced by many factors outside a hospital's control, e.g. referral practices, access to community and primary care services, and patient characteristics not included in standardisation
2. Rates are expressed as per 1,000 select medical hospitalisations so may be affected by admission patterns for other conditions, such as diabetes
3. Rates will be predictably high in hospitals that have specialised clinics and tertiary services.

*Rates do not necessarily reflect appropriateness of admissions or quality of care.*

Figure 3: Potentially avoidable admission rates per 1,000 select medical hospitalisations for CHF (standardised for age, sex and SES), *urban* (left) and *rural* (right) districts, 2009–10



(†) Interpret with caution: rates with a relative standard error (RSE)  $\geq 30\%$  and  $< 40\%$  (rates with RSE of  $\geq 40\%$  are suppressed).

**Note.** Counts and rates are for admissions in the relevant time period; a single patient can have multiple admissions.

**Note.** Rates are directly standardised to the NSW admitted patient population 2009-10 on the basis of age, sex and socioeconomic status (SES).

**Note.** For inclusion criteria and cohort definitions, see Appendix 2.

**Source:** Admitted Patient Data Collection, Health Information Exchange, NSW Health. Data extracted on 28 February 2011.

# Potentially avoidable admissions: Patient characteristics

Patient characteristics, such as age, SES, and behaviour and lifestyle, affect the likelihood of developing a chronic disease as well as disease progression and severity.

**Figure 4** summarises Bureau analyses of potentially avoidable COPD and CHF admissions in NSW, illustrating patients' age profile, SES, smoking status, rurality, and Aboriginality.

**Age profile.** In 2009–10 across NSW, 14% of potentially avoidable admissions for COPD were for patients aged 85 years or over. For potentially avoidable CHF admissions, 34% were for patients in the 85+ age bracket (**Figure 4**).

**Socioeconomic status.** For both COPD and CHF, the highest percentage of potentially avoidable admissions were for patients living in areas of greatest socioeconomic disadvantage. Of potentially avoidable COPD admissions in NSW, 32% were for patients in the most disadvantaged quintile. Of potentially avoidable CHF admissions in NSW, 28% were for patients in the most disadvantaged quintile (**Figure 4**).

**Smoking status.** Across NSW, 59% of potentially avoidable admissions for COPD and 27% for CHF recorded that the patient was either a current (patient smoked tobacco within previous month) or a previous smoker (patient smoked tobacco in past but excluding last month) (**Figure 4**).

**Rurality.** About one in five (23%) potentially avoidable COPD admissions were for patients living in outer regional and remote areas. For CHF, a similar proportion (19%) were for patients living in outer regional and remote areas (**Figure 4**).

**Aboriginality.** For COPD, 4% of potentially avoidable admissions were for Aboriginal patients. For CHF, 2% of potentially avoidable admissions were for Aboriginal patients.

## Demographics in context

The information in this report describes potentially avoidable *admissions* for COPD and CHF. A single patient may have multiple admissions within the relevant time period. While we do not report on numbers of *patients*, some information about NSW population demographics<sup>1</sup> may aid interpretation:

- 2% of NSW adults are aged 85+ years
- 20% of the NSW population is in the most disadvantaged SES quintile
- 19% of NSW people aged 16+ years currently smoke
- 2% of the NSW population is Aboriginal
- 7% of the NSW population live in outer regional and remote areas.

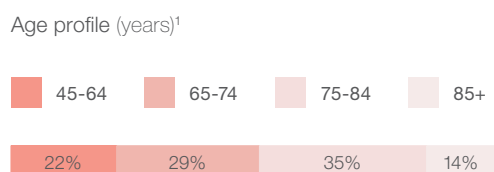
### Want more information?

For details about  
potentially avoidable admissions  
for chronic obstructive pulmonary  
disease (COPD) and congestive  
heart failure (CHF)  
in 79 NSW public hospitals.

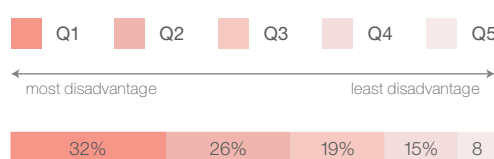
Visit [www.bhi.nsw.gov.au](http://www.bhi.nsw.gov.au)

Figure 4: Potentially avoidable admissions for COPD and CHF, showing **age profile, socioeconomic status, smoking status at admission, Aboriginal status** and **rurality** 2009–10

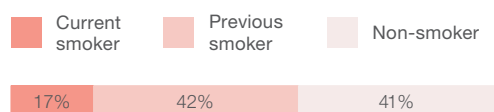
Potentially avoidable COPD admissions



Socioeconomic status (quintile of disadvantage)<sup>2</sup>



Smoking status at admission<sup>3</sup>



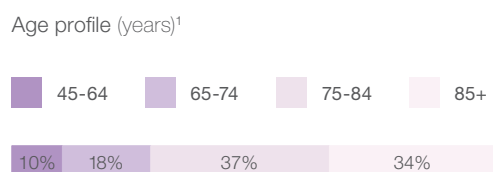
Aboriginal status<sup>4</sup>



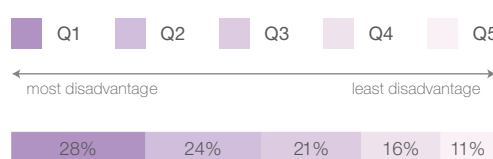
Rural postcode<sup>5</sup>



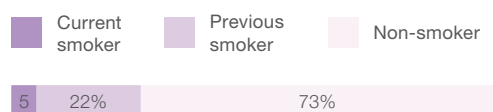
Potentially avoidable CHF admissions



Socioeconomic status (quintile of disadvantage)<sup>2</sup>



Smoking status at admission<sup>3</sup>



Aboriginal status<sup>4</sup>



Rural postcode<sup>5</sup>



1. Age at admission date.
2. Socioeconomic status defined as per Index of Relative Disadvantage (IRSD) and grouped by quintile.
3. Smoking status at admission, termed **current** if patient smoked tobacco within last month; **previous** if patient smoked in past but excluding last month.
4. We use the term Aboriginal, rather than Aboriginal and Torres Strait Islander in line with NSW Health usage, which recognises that Aboriginal people are the original inhabitants of NSW.
5. Postcode of usual residence at time of admission, classified as outer regional or remote.

**Note.** Percentages are for admissions in the relevant time period; a single patient can have multiple admissions.

**Note.** All percentages rounded to whole numbers and therefore percentages may not add to 100%.

**Note.** For inclusion criteria, and cohort definitions, see Appendix 2.

**Source:** Admitted Patient Data Collection, Health Information Exchange, NSW Health. Data extracted on 28 February 2011.

# Potentially avoidable admissions: Use of hospitals

## Hospital bed days

From July 2009 to June 2010, potentially avoidable admissions (PAAs) for COPD accounted for 96,119 bed days and PAAs for CHF accounted for 72,804 bed days. Over the past five years, the number of bed days for both conditions has decreased. There are marked seasonal patterns, with higher admissions in winter, so secondary prevention strategies might have greater impact if targeted at these times (Figure 5).

In 2009–10, NSW public hospitals with the highest number of bed days for potentially avoidable COPD admissions were Blacktown (3,744 days), Wyong (3,689 days) and Royal Prince Alfred (3,217 days). For potentially avoidable CHF admissions, hospitals with the highest number of bed days were Westmead (3,098 days), Concord (2,738 days) and Royal Prince Alfred (2,648 days).

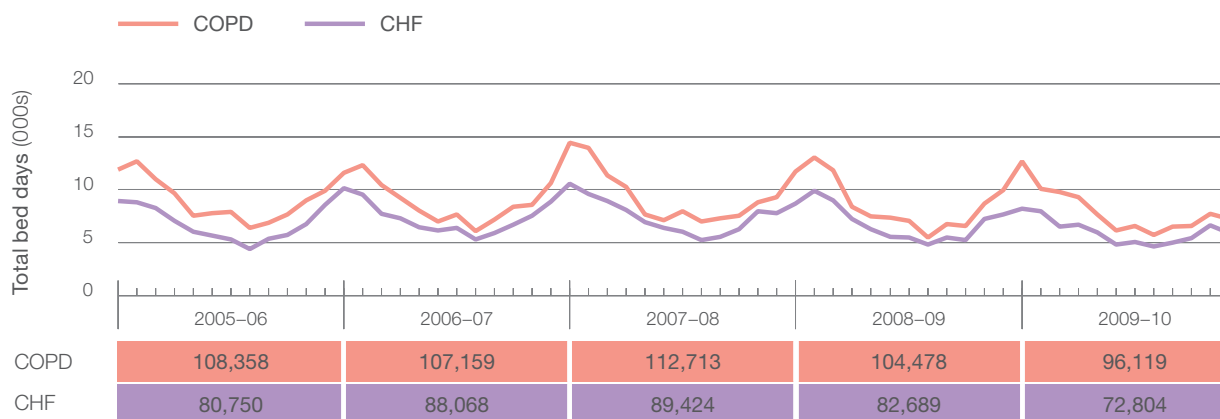
## Length of stay

In 2009–10, the state-wide average length of stay for PAAs was 5.9 days for COPD and 6.7 days for CHF. Across hospitals (peer groups A-C), the average length of stay for COPD ranged from 1.2 days at Mt Druitt to 14.0 days at Bulli; and for CHF from 3.5 days at Deniliquin to 23.4 days at Bulli.

For COPD, 14% of PAAs were for 11 days or more, while 16% were one day or less. For CHF, 18% of PAAs were stays of 11 days or more and 15% were one day or less (Figure 6).

Performance Profiles (see [www.bhi.nsw.gov.au](http://www.bhi.nsw.gov.au)) allow clinicians and managers to examine their hospital's COPD and CHF length of stay profiles. These profiles may help identify those admissions that could be targeted for alternatives to hospitalisation, improved disease management or prevention strategies.

Figure 5: Potentially avoidable admissions for COPD and CHF, total bed days, July 2005 to June 2010



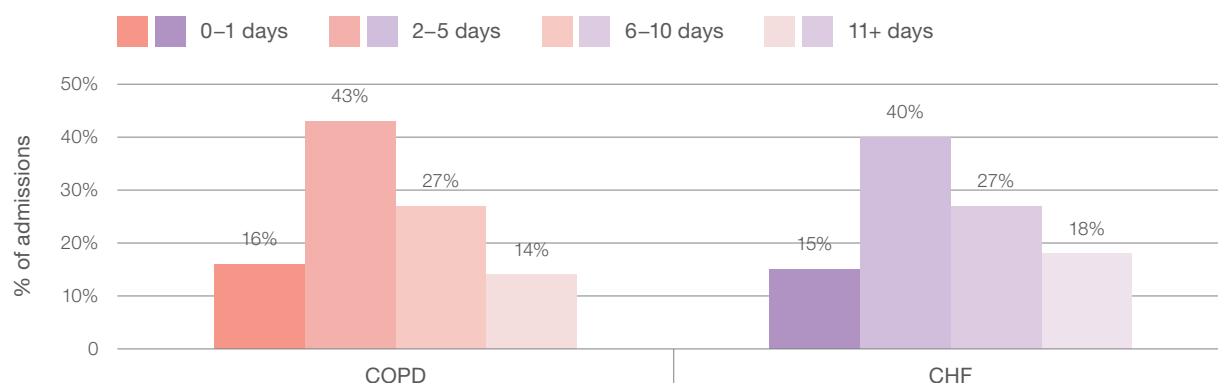
Note. Data are for admissions in the relevant time period; a single patient can have multiple admissions.

Note. For inclusion criteria and cohort definitions, see Appendix 2.

Source: Admitted Patient Data Collection, Health Information Exchange, NSW Health. Data extracted on 28 February 2011.



Figure 6: Potentially avoidable admissions for COPD and CHF, length of stay profile, 2009–10



Note. Data are for admissions in the relevant time period; a single patient can have multiple admissions.

Note. All percentages rounded to whole numbers and therefore percentages may not add to 100%.

Note. For inclusion criteria and cohort definitions, see Appendix 2.

Source: Admitted Patient Data Collection, Health Information Exchange, NSW Health. Data extracted on 28 February 2011.

## Unplanned admissions

There is evidence that unplanned admissions are driven by patient concerns about the seriousness and urgency of their health condition.<sup>8</sup> In NSW, a high percentage of potentially avoidable admissions are unplanned and come from an emergency department (ED).

In 2009–10, 96% of potentially avoidable COPD admissions and 97% of potentially avoidable CHF admissions were unplanned. Together the two conditions accounted for 27,102 unplanned admissions across the state.

**Admissions through EDs.** The majority of potentially avoidable admissions for COPD (77%) and CHF (80%) occurred through an ED. In total, the two conditions accounted for 22,071 admissions through EDs in a 12-month period (12,988 COPD and 9,083 CHF).

## What's next?

Improvements in community and hospital care can help people who have COPD or CHF better manage their disease and avoid unplanned admission to hospital. Identifying hospitals and geographic areas that have high PAAs can help focus and inform efforts to improve patient care.

This report informs hospital managers and clinical staff about the COPD and CHF patients they serve and how they compare with their peers. It also draws attention to communities most likely to benefit from models of care that could help prevent the escalation of these conditions so people can stay well and at home.

The Bureau plans to release a second report on this topic later in 2011. That report will include information updates and additional analysis to explore variation in potentially avoidable COPD and CHF admissions.



# Appendix 1: Hospital-level comparisons (urban and rural LHNs)

Appendix table 1: Potentially avoidable admissions (PAAs) for COPD and CHF, *urban* LHNs, July 2009 to June 2010

	COPD <sup>1</sup>			CHF <sup>2</sup>		
	Number PAAs	Admission rate (standardised) <sup>3</sup>	Average length of stay (days)	Number PAAs	Admission rate (standardised) <sup>3</sup>	Average length of stay (days)
<b>New South Wales</b>						
Total New South Wales	16,774	35.0	5.9	11,390	23.8	6.7
<b>Central Coast Local Health Network (CCLHN)</b>						
Gosford Hospital	478	23.8	6.7	288	14.1	6.6
Wyong Hospital	575	54.1	6.6	250	19.2	7.1
Other CCLHN	22	27.9	13.9	14	13.9	12.8
Total CCLHN	1,075	46.2	6.8	552	19.9	6.9
<b>Illawarra Shoalhaven Local Health Network (ISLHN)</b>						
Bulli District Hospital	23	12.7	14.0	29	*	23.4
Milton and Ulladulla Hospital	66	23.9	5.5	29	6.9	5.7
Shellharbour Hospital	444	48.7	7.0	182	21.4	8.2
Shoalhaven and District Memorial Hospital	245	32.5	5.6	189	28.9	5.8
Wollongong Hospital	440	28.4	5.4	339	29.0	7.0
Other ISLHN	23	7.7	18.1	25	15.3	25.3
Total ISLHN	1,241	35.8	6.3	793	28.4	7.6
<b>Nepean Blue Mountains Local Health Network (NBMLHN)</b>						
Blue Mountains District Anzac Memorial Hospital	75	34.6	5.5	59	27.2	9.2
Lithgow Health Service	83	*	6.1	44	6.2	6.3
Nepean Hospital	378	24.4	4.9	273	23.1	6.0
Other NBMLHN	*	*	14.7	*	*	9.5
Total NBMLHN	539	31.6	5.2	379	24.1	6.6
<b>Northern Sydney Local Health Network (NSLHN)</b>						
Hornsby and Ku-Ring-Gai Hospital	137	21.0 <sup>†</sup>	5.8	149	24.0 <sup>†</sup>	8.3
Manly District Hospital	167	*	6.0	119	*	8.3
Mona Vale and District Hospital	149	*	7.2	144	6.7	7.6
Royal North Shore Hospital	231	9.1	7.2	296	15.7	7.9
Ryde Hospital	205	43.9	7.6	162	16.5	6.7
Other NSLHN	227	38.5	9.1	39	4.5	5.9
Total NSLHN	1,116	30.3	7.3	909	15.1	7.8
<b>South Eastern Sydney Local Health Network (SESLHN)</b>						
Prince of Wales Hospital	369	23.4	5.7	271	23.2	6.5
St George Hospital	352	23.7	5.9	404	21.7	5.8
Sutherland Hospital	185	9.5	5.8	223	11.9	6.8
Other SESLHN	31	3.2	6.9	31	9.1	9.6
Total SESLHN	937	19.7	5.8	929	19.8	6.3

	COPD <sup>1</sup>			CHF <sup>2</sup>		
	Number PAAs	Admission rate (standardised) <sup>3</sup>	Average length of stay (days)	Number PAAs	Admission rate (standardised) <sup>3</sup>	Average length of stay (days)
<b>St Vincent's Health Network (SVHN)</b>						
St Vincent's Hospital, Darlinghurst	227	19.2	6.1	248	23.0	7.2
Other SVHN	16	6.0	0.0	12	6.3	0.0
<b>Total SVHN</b>	<b>243</b>	<b>15.9</b>	<b>6.1</b>	<b>260</b>	<b>18.5</b>	<b>7.2</b>
<b>South Western Sydney Local Health Network (SWSLHN)</b>						
Bankstown / Lidcombe Hospital	395	25.4	5.5	283	19.5	6.1
Bowral and District Hospital	129	*	4.3	65	6.5 <sup>†</sup>	5.2
Camden Hospital	22	8.1 <sup>†</sup>	5.5	14	*	15.5
Campbelltown Hospital	333	38.0	6.1	177	27.9	5.9
Fairfield Hospital	260	45.1	5.7	208	30.8	6.1
Liverpool Hospital	521	28.5	5.9	400	36.8	6.5
Other SWSLHN	12	2.4	0.0	*	*	0.0
<b>Total SWSLHN</b>	<b>1,672</b>	<b>30.7</b>	<b>5.7</b>	<b>1,150</b>	<b>25.0</b>	<b>6.2</b>
<b>Sydney Local Health Network (SYDLHN)</b>						
Canterbury Hospital	217	34.1	5.5	195	27.5	6.1
Concord Hospital	289	17.2	6.1	303	16.7	9.4
Royal Prince Alfred Hospital	514	41.3	6.4	359	30.1	7.6
Other SYDLHN	29	14.4	8.1	26	7.3	11.8
<b>Total SYDLHN</b>	<b>1,049</b>	<b>28.5</b>	<b>6.2</b>	<b>883</b>	<b>23.8</b>	<b>8.0</b>
<b>Western Sydney Local Health Network (WSLHN)</b>						
Auburn Hospital	196	24.7	5.7	180	26.8	6.3
Blacktown Hospital	582	70.4	6.7	308	31.6	7.7
Mount Druitt Hospital	237	31.6	1.2	169	32.1	4.9
Westmead Hospital (all units)	431	20.8	6.5	456	24.1	7.2
<b>Total WSLHN</b>	<b>1,446</b>	<b>34.7</b>	<b>5.6</b>	<b>1,113</b>	<b>29.1</b>	<b>6.8</b>

1. Chronic obstructive pulmonary disease (COPD). For inclusion criteria, see page 15.
2. Congestive heart failure (CHF). For inclusion criteria, see page 15.
3. Rate per 1,000 select medical hospitalisations. Select medical hospitalisations exclude renal dialysis, obstetrics, psychiatry, and surgery. Age, sex and socioeconomic status (SES) standardised to the NSW select medical hospitalisations reference population 2009–10.
  - (\*) Suppressed due to small numbers or relative standard error  $\geq 40\%$ .
  - (†) Interpret with caution: relative standard error  $\geq 30\%$  and  $< 40\%$ .

Appendix table 2: Potentially avoidable admissions (PAAs) for COPD and CHF, *rural* LHNs, July 2009 to June 2010

	COPD <sup>1</sup>			CHF <sup>2</sup>		
	Number PAAs	Admission rate (standardised) <sup>3</sup>	Average length of stay (days)	Number PAAs	Admission rate (standardised) <sup>3</sup>	Average length of stay (days)
<b>Far West Local Health Network (FWLHN)</b>						
Broken Hill Base Hospital	83	*	6.0	57	*	7.7
Other FWLHN	36	46.0	7.6	13	22.9	9.0
<b>Total FWLHN</b>	<b>119</b>	<b>45.9</b>	<b>6.5</b>	<b>70</b>	<b>19.9</b>	<b>7.9</b>
<b>Hunter New England Local Health Network (HNELHN)</b>						
Armidale and New England Hospital	47	14.2	6.5	56	15.2	7.5
Belmont Hospital	161	66.6	5.7	176	45.0	6.4
Calvary Mater Newcastle	288	31.6	4.8	208	22.1	6.1
Cessnock District Hospital	80	28.6 <sup>†</sup>	5.7	48	10.8	5.3
Gunnedah District Hospital	44	40.1 <sup>†</sup>	4.4	16	7.3 <sup>†</sup>	5.3
Inverell District Hospital	58	*	4.1	31	*	5.2
John Hunter Hospital	379	24.5	7.1	321	21.0	7.3
Kurri Kurri District Hospital	31	20.7	7.4	14	9.5 <sup>†</sup>	7.3
Maitland Hospital	236	43.3	7.2	157	33.7	7.7
Manning Base Hospital	180	28.5	7.0	136	19.0 <sup>†</sup>	7.1
Moree District Hospital	37	*	5.9	10	*	5.4
Muswellbrook District Hospital	46	21.8	6.0	20	*	6.1
Narrabri District Hospital	41	42.7 <sup>†</sup>	5.3	13	4.1	8.8
Singleton District Hospital	28	*	5.4	28	6.6	7.2
Tamworth Base Hospital	185	29.8	5.5	139	19.8	6.8
Other HNELHN	464	44.2	5.8	201	18.0	6.9
<b>Total HNELHN</b>	<b>2,305</b>	<b>37.0</b>	<b>6.1</b>	<b>1,574</b>	<b>24.6</b>	<b>6.8</b>
<b>Mid North Coast Local Health Network (MNCLHN)</b>						
Bellingen River District Hospital	54	36.0	10.8	13	*	5.3
Coffs Harbour Base Hospital	281	28.8	5.8	132	10.6	5.0
Kempsey Hospital	155	20.8 <sup>†</sup>	5.2	74	*	6.3
Macksville District Hospital	87	26.2 <sup>†</sup>	7.3	34	5.3	8.1
Port Macquarie Base Hospital	262	28.8	5.7	127	39.1 <sup>†</sup>	6.3
Other MNCLHN	64	39.1	7.6	41	21.3	6.3
<b>Total MNCLHN</b>	<b>903</b>	<b>36.6</b>	<b>6.2</b>	<b>421</b>	<b>25.6</b>	<b>6.0</b>
<b>Murrumbidgee Local Health Network (MLHN)</b>						
Deniliquin Health Service	70	38.1	4.3	37	*	3.5
Griffith Base Hospital	122	41.3	7.3	79	16.3	6.5
Tumut Health Service	82	50.9	4.4	39	11.7	5.2
Wagga Wagga Base Hospital	230	18.6	4.6	156	13.9	4.8
Young Health Service	55	*	4.4	25	*	3.6
Other MLHN	589	42.8	5.5	353	22.4	4.8
<b>Total MLHN</b>	<b>1,148</b>	<b>37.7</b>	<b>5.3</b>	<b>689</b>	<b>22.5</b>	<b>4.9</b>

	COPD <sup>1</sup>			CHF <sup>2</sup>		
	Number PAAs	Admission rate (standardised) <sup>3</sup>	Average length of stay (days)	Number PAAs	Admission rate (standardised) <sup>3</sup>	Average length of stay (days)
<b>Northern NSW Local Health Network (NNSWLHN)</b>						
Ballina District Hospital	114	21.4	5.2	58	6.6	6.4
Casino and District Memorial Hospital	42	*	6.6	38	12.3	9.4
Grafton Base Hospital	126	*	4.6	66	*	5.1
Lismore Base Hospital	180	26.2	5.9	113	17.1	7.1
Macleay District Hospital	83	45.2 <sup>†</sup>	9.8	36	9.1	9.3
Murwillumbah District Hospital	104	20.4	5.8	64	24.2 <sup>†</sup>	7.5
The Tweed Hospital	340	37.4	4.9	139	18.6	6.0
Other NNSWLHN	90	28.9	4.9	58	17.7	7.2
<b>Total NNSWLHN</b>	<b>1,079</b>	<b>32.7</b>	<b>5.6</b>	<b>572</b>	<b>19.4</b>	<b>6.9</b>
<b>Southern NSW Local Health Network (SNSWLHN)</b>						
Bateman's Bay District Hospital	78	13.7	4.1	61	*	5.6
Bega District Hospital	78	20.1	4.8	49	12.6	4.0
Cooma Health Service	48	16.8	4.8	52	17.1	8.6
Goulburn Base Hospital	118	31.3	5.9	99	*	6.8
Moruya District Hospital	69	20.9 <sup>†</sup>	5.1	49	*	5.0
Pambula District Hospital	79	43.4	5.5	51	43.6	5.7
Queanbeyan Health Service	86	*	6.2	41	33.8 <sup>†</sup>	5.2
Other SNSWLHN	59	26.0	6.1	46	16.1	7.2
<b>Total SNSWLHN</b>	<b>615</b>	<b>43.5</b>	<b>5.4</b>	<b>448</b>	<b>28.2</b>	<b>6.1</b>
<b>Western NSW Local Health Network (WNSWLHN)</b>						
Bathurst Base Hospital	106	22.5	5.3	61	12.9	5.7
Cowra District Hospital	94	27.1	5.2	34	11.2	4.4
Dubbo Base Hospital	139	30.4	4.7	118	22.3	6.2
Forbes District Hospital	37	*	4.4	29	*	5.3
Mudgee District Hospital	57	35.8 <sup>†</sup>	5.3	36	*	5.0
Orange Base Hospital	162	23.4	4.7	117	19.5	5.3
Parkes District Hospital	60	48.1 <sup>†</sup>	6.4	17	*	5.8
Other WNSWLHN	630	62.6	5.8	233	22.5	6.3
<b>Total WNSWLHN</b>	<b>1,285</b>	<b>47.2</b>	<b>5.4</b>	<b>645</b>	<b>22.2</b>	<b>5.8</b>

1. Chronic obstructive pulmonary disease (COPD). For inclusion criteria, see page 15.
  2. Congestive heart failure (CHF). For inclusion criteria, see page 15.
  3. Rate per 1,000 select medical hospitalisations. Select medical hospitalisations exclude renal dialysis, obstetrics, psychiatry, and surgery. Age, sex and socioeconomic status (SES) standardised to the NSW select medical hospitalisations reference population 2009–10.
- (\*) Suppressed due to small numbers or relative standard error  $\geq 40\%$ .
- (†) Interpret with caution: relative standard error  $\geq 30\%$  and  $< 40\%$ .

## Appendix 2: Methods

Data were extracted from the NSW Admitted Patient Data Collection on 28 February, 2011. Due to delays in coding at some hospitals, data is for the period July 2009 to June 2010.

Initial counts of potentially preventable hospitalisations (PPHs) were computed using the Australian Institute of Health and Welfare's methodology. The data comprise counts of 'episodes of care'.

A subset of PPHs was defined for this study and is referred to throughout the report as potentially avoidable admissions (PAAs).

PAAs for COPD include patients aged 45 years or over with a principal diagnosis of COPD (ICD-AM codes J41–J44, J47; and J20 if there is a secondary diagnosis of J41–J44 or J47).

PAAs for CHF include patients aged 45 years or over with a principal diagnosis of CHF (ICD-AM codes I11.0, I50, J81) but excluding procedure codes in blocks 600 to 693, 705 to 707 and 717 and procedure codes 38721-00, 38721-01 and 90226-00.

COPD and CHF patients are excluded if they were admitted for renal dialysis, obstetrics, mental health care or surgery.

For each analysis, all records for PAAs for COPD and CHF with valid and non-missing data are included. For example, if a record is missing SES information, it is excluded from analyses using SES, however, it is included in all other analyses.

The data reported are for admissions to hospital, rather than number of patients. That is, a patient admitted three times to hospital between July 2009 and June 2010 is recorded as three discrete admissions.

To calculate admission rates, the denominator comprised a subset of total hospitalisations termed select medical hospitalisations. Select medical hospitalisations exclude admissions for renal dialysis, obstetrics, mental health care and surgery. Rates are directly standardised to the NSW select medical patient population 2009-10 on the basis of age, sex and SES.

To explore the influence of patient characteristics on admission rates and standardised rates, we used SAS® to quantify smoking status, SES, rurality and Aboriginality status for PAAs separately for COPD and CHF.

For peer group analyses, Calvary Mater hospital is compared with A1 hospitals as it is a referral hospital for respiratory and cardiac conditions.

In NSW there is an option for patients with some diseases (including COPD and CHF) to receive clinical care outside the hospital setting as part of the Hospital in the Home scheme. This scheme is not uniformly available across the state. The degree to which hospitals vary in coding practices in the Admitted Patient Data Collection regarding Hospital in the Home is unknown.

In the North Sydney Central Coast region, a substantial number of COPD admissions ( $n=217$ ) occurred in the Acute Post Acute Care (APAC) unit in 2009-10. At a geographical level, this unit may have an effect on counts and rates in referral hospitals, however, the scale of this effect for each hospital is unknown.

For further details, see the Bureau's *Technical Supplement: Chronic disease care* available at [www.bhi.nsw.gov.au](http://www.bhi.nsw.gov.au)

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