Healthcare in Focus

New South Wales and the COVID-19 pandemic in 2020

Technical Supplement

March 2021

bureau of health information

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Please note there is the potential for minor revisions of data in this report.
Please check the online version at **bhi.nsw.gov.au** for any amendments or errata.

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Introduction

This document is a supplement to the Bureau of Health Information (BHI's) 11th annual performance report, *Healthcare in Focus – New South Wales and the COVID-19 pandemic in 2020*. It contains a description of the data sources and methods used to analyse and visualise the data. This supplement is technical in nature and is intended for audiences interested in the creation and analysis of similar health performance measures.

To produce the report, BHI independently calculated measures using the following data sources:

- COVID-19 tests performed and cases in NSW – data provided by the COVID-19 Public Health Response Branch, NSW Ministry of Health
- COVID-19 tests performed and cases in NSW Police-managed hotel quarantine – data provided by the COVID-19 Public Health Response Branch, NSW Ministry of Health
- Special Health Accommodation (SHA) – data provided by Sydney Local Health District (LHD)
- Exemptions to COVID-19 quarantine – data provided by Sydney LHD Demand Management Unit, NSW Ministry of Health
- Coronavirus Pandemic (COVID-19) dataset by Our World in Data
- The Commonwealth Fund's *International Health Policy Survey of General Population in 11 Countries 2020*
- NSW Health Emergency Department Data Collection (EDDC), accessed via the Health Information Exchange (HIE)
- Emergency Department Patient Survey (EDPS) 2018–19 and 2019–20
- Waiting List Collection Online System (WLCOS)
- NSW Health Admitted Patient Data Collection (APDC), accessed via HIE
- Adult Admitted Patient Survey (AAPS) 2019 and 2020
- NSW Ambulance Computer Aided Dispatch (CAD) system.

BHI used SAS version 9.4 software for all the statistical analyses (Copyright © 2019 SAS Institute Inc. SAS and all other SAS Institute Inc. product or service names are registered trademarks or trademarks of SAS Institute Inc., Cary, NC, USA. SAS 9.4 [English]).

Setting the scene

Number of COVID-19 tests and cases in NSW

Data source: COVID-19 tests performed and cases in NSW

COVID-19 information on number of tests and cases is provided by the COVID-19 Public Health Response Branch, NSW Ministry of Health.

Analytical methods

Daily pattern of COVID-19 tests performed and confirmed COVID-19 cases by symptom onset were reported from 13 January to 31 December 2020.

'COVID-19 tests performed by test date' refers to the total number of diagnostic tests done in NSW by the date the person presented for the test. This means that people who have multiple tests on different days have each test counted separately. Multiple tests on the same person on any one day are only counted as one test. All negative tests the person has had on different days are counted separately and their first positive test is also counted. All tests conducted after the first positive test are not counted.

'COVID-19 cases by symptom onset date' is based on the date the person reported that they first started to feel unwell (the symptom onset date). This is collected by public health staff via an interview at the time of diagnosis. If symptom onset date is not available, the earliest test date/specimen collection date is used. This number includes NSW residents diagnosed in NSW who were infected overseas and in Australia (in NSW and interstate), and interstate or international visitors diagnosed in NSW who are under the care of NSW Health.[1]

Hotel quarantine and special health accommodation

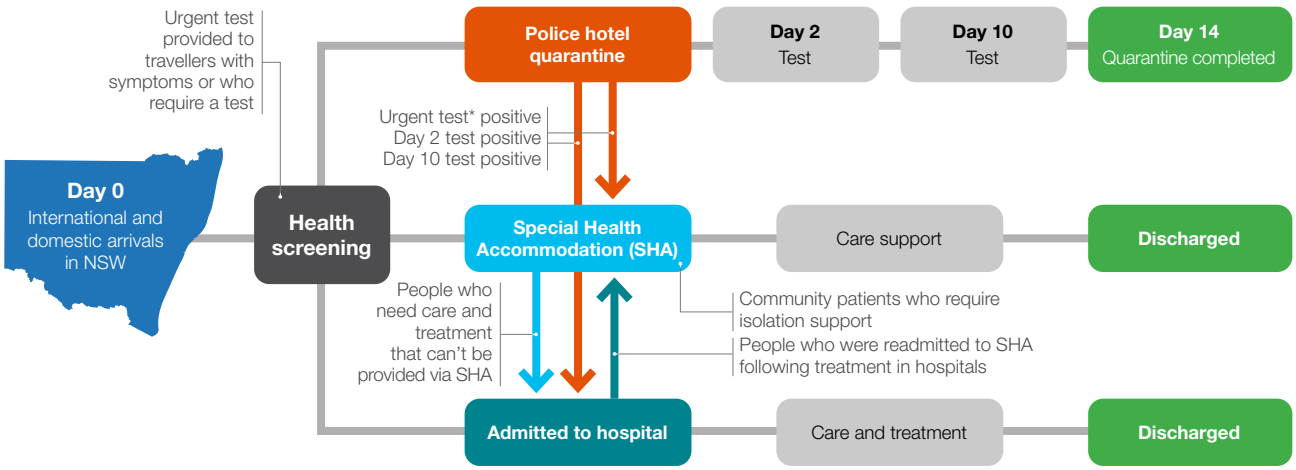
Data source

The NSW Police-managed hotel quarantine and special health accommodation (SHA) analyses draw on three main data sources:

- COVID-19 tests performed and cases in hotel quarantine – data provided by the COVID-19 Public Health Response Branch, NSW Ministry of Health
- Special Health Accommodation (SHA) – data provided by Sydney LHD
- Exemptions to COVID-19 quarantine – data provided by Sydney LHD Exemptions Unit, NSW Ministry of Health.

From 29 March, all overseas travellers were required to undertake 14 days of supervised quarantine in a designated hotel or accommodation facility, managed by NSW Police. From 7 August to 23 November, travellers from Victoria were also required to undertake quarantine. After disembarking and throughout their quarantine, people undergo health screening and are provided with COVID-19 tests. People who receive positive test results are admitted to SHA or transferred to hospitals (Figure 1). SHA provides clinical, welfare and health services for people arriving in NSW and those who are required to self-isolate in the community and need assistance to do so safely. Requests for exemptions to hotel quarantine are considered on a case-by-case basis and may be granted on medical, health or compassionate grounds, or if the traveller is transiting to another international destination.

Figure 1 NSW quarantine journey



* Urgent test provided anytime from Day 1 to 14.
Reasons include showing symptoms, feeling unwell or applying for an exemption.

Analytical methods

NSW police-managed hotel quarantine

'COVID-19 tests for returned travellers in NSW Police-managed hotel quarantine' refers to the total number of COVID-19 tests performed for travellers who undertake NSW Police-managed quarantine in a NSW Government-designated hotel or accommodation facility. These tests were performed throughout the duration of the stay as follows:

- From 29 March, COVID-19 tests were performed for travellers experiencing symptoms, feeling unwell or who had special needs.
- On 6 May, testing on Day 10 was introduced.
- On 30 June, testing on Day 2 was introduced.

Travellers considered 'in transit' are excluded from analysis. Travellers considered 'in transit' are those who spend less than 72 hours in NSW on their way to their next destination.

'Positive COVID-19 tests' refers to the total number of COVID-19 diagnosis tests with positive results. This includes positive COVID-19 results from tests performed urgently for travellers experiencing symptoms, feeling unwell or who have special needs, and/or on Day 2 or 10 of quarantine.

'COVID-19 testing positivity rate' is the percentage of COVID-19 tests in hotel quarantine with positive results. It is reported by week for COVID-19 tests performed urgently, on Day 2 and on Day 10. The denominator is the total number of tests within the category in any given week. The numerator is the number of positive tests within the category in any given week.

- Urgent/symptomatic rate = Urgent/symptomatic positive tests divided by all urgent/symptomatic tests × 100 in any given week.
- Day 2 rate = Day 2 positive tests divided by all Day 2 tests × 100 in any given week.
- Day 10 rate = Day 10 positive tests divided by all Day 10 tests × 100 in any given week.

The denominator is all COVID-19 diagnosis tests performed in quarantine, which include COVID-19 tests for all incoming travellers on Day 10 or Day 2 of their quarantine and urgent COVID-19 tests required by travellers experiencing symptoms, feeling unwell or who have special needs. The numerator is the total number of COVID-19 tests in hotel quarantine with positive results. The 'COVID-19 testing positivity rate' is reported for COVID-19 tests on Day 10 of quarantine, COVID-19 tests on Day 2 of quarantine and urgent COVID-19 tests.

The weekly activity is calculated by aggregating daily activities for a seven-day week from Sunday to Saturday. For 2020, the first complete week was Sunday 5 to Saturday 11 January 2020, and the final complete week was Sunday 20 to Saturday 26 December 2020. Data points are labelled with the last day of the week.

Special Health Accommodation (SHA)

'Number of people in SHA' is the count of all people who received care or treatment in SHA within the defined period. 'Number of people in SHA who were tested COVID-19 positive' is the count of people who were COVID-19 positive when they received care or treatment in SHA within the defined period. People could have their COVID-19 tests done during the time when they stayed in SHA or before they were admitted to SHA. For people who received multiple tests, they were considered COVID-19 positive during their stay in SHA as long as there was one test showing a positive result.

'Percentage of people in SHA who were tested COVID-19 positive' is the percentage of people who were tested COVID-19 positive out of all people who received care or treatment in SHA within the defined period. The denominator is the number of people in SHA, and the numerator is the number of people in SHA who were tested COVID-19 positive.

Exemptions

'International travellers' refers to international passengers who arrive in NSW at Sydney airport or on a boat, both private and commercial. Reasons for exemptions include examples such as:

- Medical – passengers who need medical care and treatment for a life-threatening condition, surgery or end of life care.
- Health condition – passengers who have a disability or mental health concern.
- Travellers in transit – passengers who transit out of NSW to another international destination.
- Compassionate – passengers who need to attend a funeral or care for a family member in palliative care.
- Marine crew – marine crew disembarking or joining a private or commercial shipping vessel.

'Domestic travellers' refers to passengers from Victoria who arrived in NSW at Sydney airport, by driving or by train between 7 August and 23 November 2020. Reasons for exemption include:

- Compassionate – passengers who need to attend a funeral, care for a family member in palliative care, etc.
- State border permits – changes to permit conditions for people entering NSW on critical service and resident permits were assessed individually for conditional exemption.

Coronavirus pandemic (COVID-19) dataset

Data source: Our World in Data

To provide context for the report, published counts on the number of COVID-19 confirmed cases for Australia and 10 comparator countries are used. These countries include Australia, Canada, France, Germany, the Netherlands, New Zealand, Norway, Sweden, Switzerland, the United Kingdom, and the United States. Data were downloaded from Our World in Data, available at **github.com/owid/covid-19-data/tree/master/public/data** (downloaded on 12 January 2021). Daily confirmed cases come from the COVID-19 Data Repository by the Centre for Systems Science and Engineering (CSSE) at Johns Hopkins University (JHU) which has been collecting data from a wide range of resources including JHU, the World Health Organization (WHO), the European Centre for Disease Prevention and Control (ECDC) and others. WHO defines the confirmed cases as 'a person with laboratory confirmation of 2019-nCoV infection, irrespective of clinical signs and symptoms'[2]. Note that the number of cases on a given day does not necessarily represent the actual number on that date but it could change when a country corrects historical data, probably because it had previously overestimated the number of cases.

Analytical methods

The number of confirmed COVID-19 cases per million is reported weekly from 5 January to 31 December 2020 in Australia and 10 comparator countries – Canada, France, Germany, the Netherlands, New Zealand, Norway, Sweden, Switzerland, the United Kingdom, and the United States. The last week consisted of only five days rather than seven days as in previous weeks.

2020 Commonwealth Fund International Health Policy Survey

Data source: Commonwealth Fund

The Commonwealth Fund is a philanthropic organisation in the United States. Each year, it commissions an international health policy survey of 11 countries to support the creation of public reports that benchmark the performance of comparable healthcare systems. The survey focuses on a different population each year, generally following a three-year cycle.

The Commonwealth Fund's *International Health Policy Survey of General Population in 11 Countries 2020* was conducted by Social Science Research Solutions (SSRS). Landline and mobile telephone interviews were conducted with a representative sample of adults aged 18+ in Australia, Canada, France, Germany, the Netherlands, New Zealand, Norway, the United Kingdom and the United States. Respondents in Sweden and Switzerland were provided a link to complete the survey via the web with an optional phone call. BHI, as a partner, invested in an additional sample to ensure the number of NSW participants was sufficient to compute robust estimates of performance indicators of the NSW health system, and make statistically valid comparisons to the countries participating in the survey.

Fieldwork in all countries took place from February through May 2020. The survey assessed public confidence in the health care system including access to care, cost and quality of care. Sample size and response rates for each participating country are summarised in Table 1. In this *Healthcare in Focus*, we report results of adults aged 50 years and over who had a long-term condition. This cohort should reflect the view of the population of high service users for the health care system.[3,4] Information of a long-term condition was ascertained in a question 'Have you ever been told by a doctor that you have the following condition: arthritis, asthma or chronic lung disease such as chronic bronchitis, cancer, depression, anxiety or other mental health conditions, diabetes, heart disease including heart attack, hypertension or high blood pressure, stroke?'.

Table 1 Field period, number of interviews conducted, response rate, and sample size of adults aged 50 years and over with a long-term condition in each country

Participating countries	Field period in 2020	Total interviews	Response rate (%)	Population aged 50 years and over with a long-term condition
Australia	23 Mar – 23 May	2,201	18.5	1,015
Canada (*)	6 Mar – 15 May	5,089	17.1	2,116
France	5 Mar – 22 May	3,028	22.7	975
Germany	22 Apr – 15 May	1,004	24.4	415
Netherlands	5 Mar – 19 May	753	25.6	316
New Zealand	18 Mar – 23 May	1,003	14.0	360
Norway	14 Apr – 15 May	607	19.5	265
Sweden	21 Feb – 18 May	2,513	30.4	1,086
Switzerland	5 Mar – 4 May	2,284	48.7	764
The United Kingdom	5 Mar – 26 May	1,991	14.2	855
The United States	11 Mar – 26 May	2,488	13.7	963

(*) Canada response rates in this report are calculated excluding the territory oversamples, and they are not included in this report (N=559). Response rates including that sample combined landline and cell phone are 19.1%.

NSW results are based on the responses of 693 people aged 50+ years with a long-term condition. Rest of Australia results are based on the responses of 322 people. The response rate for Australia as a whole (n=2,201) was 18.5%. The final samples were weighted to be representative of age, sex, region, education and urban status based on the 2016 Australian Census data.

Analytical methods

The performance of the NSW healthcare system was reported alongside the rest of Australia (i.e. all other states) and 10 other countries. Reported percentages are the weighted estimates for a sample of adults aged 50+ years with a long-term condition in each country.

Consistent with previous BHI's published reports, non-response options such as 'not sure', 'declined to answer', and 'not applicable' responses were excluded from denominator and all subsequent analyses. Differences in the percentages of the pre-defined top-category between NSW and rest of Australia and other countries was assessed using logistic regression in SAS procedure SURVEYLOGISTIC, adjusted for age and sex. Any country values significantly different from the NSW value at a 5% significance level are noted with an asterisk (*) in the graph.

Emergency department

NSW public hospital emergency department

Data source: Emergency Department Data Collection (EDDC)

The NSW Ministry of Health maintains a data warehouse, the Health Information Exchange (HIE), containing the most recent accumulation of NSW hospital and health facility activity data. Visits to public hospital emergency department data are uploaded twice each week. BHI also received a data file for Northern Beaches Hospital separately from the NSW Ministry of Health.

Analytical methods

All hospitals report diagnosis information in the EDDC using the following classifications:

- Systematized Nomenclature of Medicine – Clinical Terms – Australian version (SNOMED-CT-AU), Emergency Department Reference Set
- International Classification of Diseases and Related Health Problems, 10th Revision, Australian Modification (ICD 10 AM), various editions.

Hospitals in Hunter New England LHD and St Vincent's Health Network, as well as Hawkesbury District Health Service and Northern Beaches Hospital report diagnosis information in ICD-10-AM. All other hospitals report in SNOMED-CT-AU.

Diagnosis information was analysed using the 'provisional diagnosis' data elements in the EDDC. The information was captured in the 'discharge diagnosis' field for hospitals reporting using SNOMED-CT-AU and in the 'principal diagnosis' field for hospitals reporting using ICD-10-AM. BHI maps all diagnosis information to a single classification, the Emergency Department ICD-10-AM Principal Diagnosis Short List (ED Short List), which was endorsed by the National Data Governance Committee in December 2018.

The ED Short List was developed by the Independent Hospital Pricing Authority (IHPA) in 2015 and adheres to classification principles approved by the Emergency Care Advisory Working Group (ECAWG). The ED Short List replaces previous reporting inconsistencies in reporting principle diagnosis using various codes sets, including:

- SNOMED-CT-AU, Emergency Department Reference Set
- ICD 10 AM, various editions, and
- ICD 9 CM.

BHI uses two fields in the EDDC data provide information on symptoms and diagnosis for any ED attendance:

- The 'presenting problem' field in the EDDC data provides information on symptoms or condition for a patient when presenting to ED.
- The 'provisional diagnosis' field refers to diagnosis or condition established after assessment to be the main reason for the person presenting to the ED. Hospitals using SNOMED-CT-AU codes capture the diagnosis information as 'discharging diagnosis', while hospitals using ICD-10-AM codes capture it as 'principle diagnosis'.

BHI assesses data completeness for diagnosis information in ED to support fair and meaningful comparisons. The diagnosis information for ED attendances is added to the EDDC at the time of, or shortly after, the ED visit. ED data are downloaded from the HIE two to three weeks after the end of the reporting quarter. The completion rate for diagnosis information is around 98% at NSW level for any given week.

In this report, BHI describes the weekly pattern of ED activity in clinical cohorts consisting of the diagnoses covered by three of the 21 ICD-10-AM Chapters (Table 2).

Weekly activity and performance are reported for a seven-day week from Sunday to Saturday. For 2020, the first complete week was Sunday 5 to Saturday 11 January 2020, and the final complete week was Sunday 20 to Saturday 26 September 2020. Data points are labelled with the last day of the week.

Due to known variation in activity by day of the week, the daily data for 2019 were adjusted so that the same day of the week in 2019 could be compared with the corresponding day of the week in 2020. For example, Sunday 6 January 2019 is compared with Sunday 5 January 2020. Weekly activity and performance are calculated using the adjusted day unless otherwise stated. For 2019, the first week was Sunday 6 to Saturday 12 January 2019, and the final week was Sunday 20 to Saturday 26 December 2019.

The same definitions and methodology used for *Healthcare Quarterly – Activity and performance* and the *Trend report* were used to analyse weekly activity and performance in this report. For more information, refer to the technical supplement to *Healthcare Quarterly, October to December 2020* at **bhi.nsw.gov.au**

Table 2 ICD-10-AM Chapters and corresponding clinical cohorts considered in this report

ICD-10-AM Chapter name	Clinical cohort considered in this report
Chapter 5: Mental and behavioural disorders	F00-F99 Mental health
Chapter 10: Disease of respiratory system	J00-J99 Respiratory system
Chapter 19: Injury, poisoning and certain other consequences of external causes	S00-T98 Injury

Patient experience

Data source: Emergency Department Patient Survey (EDPS) 2018–19 and 2019–20

BHI conducts a regular, comprehensive state-wide patient experience survey program. The NSW Patient Survey Program measures and reports on patients' experiences of care in NSW public hospitals. It uses evidence-based, validated instruments to systematically collect feedback from large samples of patients that are representative of the patient population.

For this report, BHI compared the results from the Emergency Department Patient Surveys (EDPS) of patients who visited an emergency department in a NSW public hospital between January and June in 2020 with those from the same period in 2019. Results from the two periods should reflect the patients' view in public hospital system during and pre COVID-19 pandemic.

The sampling protocol and analytic notes for the January to June 2019 cohorts can be found in the technical supplement at **bhi.nsw.gov.au/BHI_reports/patient_survey_results**

Sampling protocols for the survey changed for the January to June 2020 period. The volume of mailings to patients attending hospitals in A1 and B peer groups was reduced and the oversampling of younger patients (18-49 years age group and under 18 years), which occurred for the January to June 2019 period, ceased. As a result, the number of respondents was lower for January to June 2020 than the corresponding period in 2019, and the age distribution changes accordingly (Table 3). However, the results take into account the change to the sampling protocols by using survey weights, thus ensuring the results are comparable between years.

Some other changes occurred in the cohort definition for EDPS that may impact the comparability of the two periods. Until June 2020, the survey did not exclude ED attendances for COVID screening. This was changed from June 2020 to exclude patients who attended ED for COVID screening and were not admitted. The proportion of ED visits that were for COVID screening is likely to be negligible in January and February 2020. Between March and May, 8% of patients included as eligible for sampling visited an ED for COVID screening. It is expected that about 4% of those who responded to the survey may have attended ED for COVID screening. Detailed information about defining the COVID-19 testing cohort can be found in *Healthcare Quarterly – Activity and performance, October to December 2020* at **bhi.nsw.gov.au**

In addition, EDPS cohort for January to June 2020 excluded a small proportion of patients with a missing or error mode of separation (less than 0.18%).

Other factors that need to be considered when comparing the 2019 and 2020 periods are as follows:

- The lockdown may have created an impact on patient mix in the 2020 period, particularly between March and June 2020.
- The reduction in response rate for 2020 may have been partly caused by a change in the questionnaire mailout process. In order to reduce the need to post the questionnaire back, patients selected for the surveys between January and June 2020 received only one hard copy of the questionnaire.

All other sampling approaches remained the same. Detailed information for sampling can be found in the technical supplement at **bhi.nsw.gov.au/BHI_reports/patient_survey_results**

Table 3 Weighted percentages of respondents in EDPS by age group

	<18	18–49	50+
Jan–Jun 2019	26%	38%	35%
Jan–Jun 2020	25%	32%	43%

Analytical methods

Table 4 shows the number of respondents and weighted response rate for each month in the period. The response rate (RR) is the percentage of patients who completed and returned the questionnaire, based on all patients who were mailed a questionnaire. In 2019, as a result of the oversampling of younger patients, the distribution of patients in the respondent cohort might not match the distribution of patients in the eligible population in terms of age groups. Therefore, response rates were adjusted to ensure the overall response rate reflected what would be observed if patients were sampled proportional to the patient mix, creating the 'weighted response rate'.

The overall weighted response rate for EDPS for the first six months of 2019 was 23%, while it was 19% in the same period in 2020. Weighted response rates for each month included in the reporting period ranged from 17% to 24% (Table 4).

Table 4 Number of respondents and weighted response rates in each month

Year	Month	Number of mailings	Number of respondents	Weighted RR (%)
2019	Jan	10,012	1,664	22
	Feb	10,022	1,705	23
	Mar	10,014	1,702	23
	Apr	10,002	1,619	22
	May	10,006	1,717	24
	Jun	9,913	1,642	22
2020	Jan	7,341	1,536	21
	Feb	7,355	1,347	18
	Mar	7,242	1,355	18
	Apr	7,287	1,399	20
	May	7,315	1,289	19
	Jun	7,321	1,263	17

Six questions representing the key measures of overall ratings of care and patient engagement were pre-selected for analysis. These questions can be viewed in *Measurement Matters – Development of emergency care patient experience key performance indicators for local health districts* in NSW at **bhi.nsw.gov.au**

For each question, the monthly weighted percentage of respondents who provided the most pre-defined positive response option was calculated using the SURVEYFREQ procedure. This is calculated as the ratio of the (weighted) number of survey respondents who selected the most positive response option to the (weighted) number of survey respondents. Missing responses or responses of 'Don't know/ Can't remember' or not applicable were excluded from the denominator. More information about how missing data was handled can be viewed in the technical supplement, available at **bhi.nsw.gov.au/ BHI_reports/patient_survey_results**

Elective surgery

Data source: Waiting List Collection On-line System

Elective surgery waiting list data was accessed via the Waiting List Collection On-line System (WLCOS). WLCOS includes information on the date a patient is listed for a surgical procedure, the type of procedure required, the specialty of the surgeon, the urgency category of their surgery and whether the patient is currently ready for surgery. Some of these factors may change during the time a patient is on the waiting list. Elective surgery waiting list data are uploaded monthly.

Analytical methods

Weekly activity and performance are reported for a seven-day week from Sunday to Saturday. For 2020, the first complete week was Sunday 5 to Saturday 11 January 2020, and the final complete week was Sunday 20 to Saturday 26 December 2020. Data points are labelled with the last day of the week.

The same definitions and methodology used for *Healthcare Quarterly – Activity and performance* and the *Trend report* were used to analyse weekly activity and performance in this report. For more information, refer to the technical supplement to *Healthcare Quarterly, October to December 2020* at **bhi.nsw.gov.au**

Admitted patients

NSW public hospital admitted patients

Data source: Admitted Patient Data Collection (APDC)

APDC accessed via HIE contains episodes of care for all patients admitted to NSW public hospitals. BHI also received a data file for Northern Beaches Hospital separately from the NSW Ministry of Health.

Analytical methods

All hospitals report diagnosis information using ICD-10-AM for admitted patients in the APDC. All diagnosis information has been mapped in the HIE to ICD-10-AM, 11th edition. Diagnosis information was analysed using the 'principle diagnosis' field in the APDC data, which refers to diagnoses assessed to be primarily responsible for occasioning hospital admissions. The diagnosis information for completed admitted patient episodes of care is added to the APDC after the end of the episode.

The diagnosis information was downloaded more than seven weeks after the end of the reporting quarter; the NSW completion rate for diagnosis information was above 95% for any week until the week ending 05 December 2020. The NSW completion rate for diagnosis information in the last three weeks of December 2020 was 92.5%, 90.5% and 89.4% respectively. Therefore, BHI recommends in the report that results presented by principal diagnosis from 06 December should be interpreted with caution.

Weekly activity is reported for a seven-day week from Sunday to Saturday. For 2020, the first complete week was Sunday 5 to Saturday 11 January 2020, and the final complete week was Sunday 20 to Saturday 26 December 2020. Data points are labelled with the last day of the week.

The same definitions and methodology used for *Healthcare Quarterly – Activity and performance* and the *Trend report* were used to analyse weekly activity in this report. For more information, refer to the technical supplement to *Healthcare Quarterly, October to December 2020* at **bhi.nsw.gov.au**

Patient experience

Data source: Adult Admitted Patient Survey (AAPS) 2019 and 2020

BHI conducts a regular, comprehensive state-wide patient experience survey program. The NSW Patient Survey Program measures and reports on patients' experiences of care in NSW public hospitals. It uses evidence-based, validated instruments to systematically collect feedback from large samples of patients that are representative of the patient population.

BHI compared the results from the Adult Admitted Patient Survey (AAPS) of patients who were admitted to a NSW public hospital between January and June in 2020 with those from the same period in 2019. Results from the two periods should reflect the patients' view in public hospital system during and pre COVID-19 pandemic.

The sampling protocol and analytic notes for the January to June 2019 cohorts can be found in the technical supplement at **bhi.nsw.gov.au/BHI_reports/patient_survey_results**

Sampling protocols for the survey changed for the January to June 2020 period. The volume of mailings to patients attending hospitals in A1 and B peer groups was reduced and oversampling of younger patients (18-49 years age group), which occurred for January to June 2019, ceased. As a result, the number of respondents was lower for January to June 2020 than the corresponding period in 2019, and the age distribution changes accordingly (Table 5). However results take into account these differences by using survey weights, thus provide results that are comparable between years.

Other factors that need to be considered when comparing the 2019 and 2020 periods are as follows:

- The lockdown may have created an impact on patient mix in the 2020 period, particularly between March and June 2020.
- The reduction in response rate for 2020 may have been partly caused by a change in the questionnaire mailout process. In order to reduce the need to post the questionnaire back, patients selected for the surveys between January and June 2020 received only one hard copy of the questionnaire.

All other sampling approaches remained the same. Detailed information for sampling can be found in the technical supplement at **bhi.nsw.gov.au/BHI_reports/patient_survey_results**

Table 5 Weighted percentages of respondents in AAPS by age group

	18–49	50+
Jan–Jun 2019	33%	67%
Jan–Jun 2020	27%	73%

Analytical methods

Table 6 shows the number of respondents and weighted response rate for each month in the period. The response rate (RR) is the percentage of patients who completed and returned the questionnaire, based on all patients who were mailed a questionnaire. In 2019, as a result of the oversampling of younger patients and Aboriginal patients, the distribution of patients in the respondent cohort did not match the distribution of patients in the eligible population in terms of age groups and Aboriginal status. Therefore, response rate were adjusted to ensure the overall response rate reflected what would be observed if patients were sampled proportional to the patient mix, creating the 'weighted response rate'.

The overall weighted response rate for AAPS for the first six months of 2019 was 36%, while it was 30% in the same period in 2020. Weighted response rates for each month included in the reporting period ranged from 27% to 37% (Table 6).

Table 6 Number of respondents and weighted response rates in each month

Year	Month	Number of mailings	Number of respondents	Weighted RR (%)
2019	Jan	7,201	1,754	33
	Feb	7,193	1,875	35
	Mar	7,250	1,972	36
	Apr	6,726	1,828	37
	May	7,086	1,899	37
	Jun	7,817	1,941	35
2020	Jan	4,143	1,319	31
	Feb	4,227	1,288	30
	Mar	4,247	1,368	32
	Apr	4,010	1,222	30
	May	4,043	1,287	31
	Jun	4,227	1,200	27

Six questions representing the key measures of overall ratings of care and patient engagement were pre-selected for analysis. These questions can be viewed in *Measurement Matters – Development of patient experience key performance indicators* at **bhi.nsw.gov.au**

For each question, the monthly weighted percentage of respondents who provided the most pre-defined positive response option was calculated using the SURVEYFREQ procedure. This is calculated as the ratio of the (weighted) number of survey respondents who selected the most positive response option to the (weighted) number of survey respondents. Missing responses or responses of 'Don't know/ Can't remember' or not applicable were excluded from the denominator. More information about how missing data was handled can be viewed in the technical supplement, available at **bhi.nsw.gov.au/ BHI_reports/patient_survey_results**

Ambulance

NSW Ambulance

Data source: Computer Aided Dispatch System

The ambulance information is based on analyses of data extracted from the NSW Ambulance Computer Aided Dispatch (CAD) system, which is used to manage and record ambulance activity and time points across the entire patient journey. The CAD system contains information from all ambulance local response areas in NSW. Information is recorded using incident, response, transport, emergency department network access, ambulance release teams and calls as the counting units.

Analytical methods

Weekly activity and performance are reported for a seven-day week from Sunday to Saturday. For 2020, the first complete week was Sunday 5 to Saturday 11 January 2020, and the final complete week was Sunday 20 to Saturday 26 December 2020. Data points are labelled with the last day of the week.

The same definitions and methodology used for *Healthcare Quarterly – Activity and Performance* and the *Trend report* were used to analyse weekly activity and performance in this report. For more information, refer to the technical supplement to *Healthcare Quarterly, October to December 2020* at **bhi.nsw.gov.au**

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bureau of health information

About the Bureau of Health Information

The Bureau of Health Information (BHI) is a board-governed organisation that provides independent information about the performance of the NSW healthcare system.

BHI was established in 2009 and supports the accountability of the healthcare system by providing regular and detailed information to the community, government and healthcare professionals. This in turn supports quality improvement by highlighting how well the healthcare system is functioning and where there are opportunities to improve.

BHI manages the NSW Patient Survey Program, gathering information from patients about their experiences and outcomes of care in public hospitals and other healthcare facilities.

BHI publishes a range of reports and information products, including interactive tools, that provide objective, accurate and meaningful information about how the health system is performing.

BHI's work relies on the efforts of a wide range of healthcare, data and policy experts. All of our assessment efforts leverage the work of hospital coders, analysts, technicians and healthcare providers who gather, codify and supply data. Our public reporting of performance information is enabled and enhanced by the infrastructure, expertise and stewardship provided by colleagues from NSW Health and its pillar organisations.

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