**Healthcare in Focus**

# New South Wales and the COVID-19 pandemic in 2021

Technical Supplement

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bureau of
**health
information**

The conclusions in this report are those of BHI and no official endorsement by the NSW
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# Contents

# Introduction

This document is a supplement to the Bureau of Health Information's (BHI) 12th annual performance report, *Healthcare in Focus – New South Wales and the COVID-19 pandemic in 2021*. 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 – calculated information provided by the COVID-19 Public Health Response Branch, NSW Ministry of Health

- COVID-19 vaccine rollout in NSW – calculated information from Australian Immunisation Register, Australian Government Department of Health

- COVID-19 tests performed and cases in NSW Police-managed hotel quarantine – calculated information provided by the COVID-19 Public Health Response Branch, NSW Ministry of Health

- COVID-19 hospitalisations and deaths in NSW public hospitals – calculated information provided by the COVID-19 Public Health Response Branch, NSW Ministry of Health

- COVID-19 tests performed, cases and vaccination in Australia and international comparator countries – calculated information from Our World in Data

- Medicare-subsidised general practitioners (GP), specialists and mental health services – calculated information from Australian Government Services Australia

- Non-admitted virtual care in NSW – calculated information from System Information and Analytics Branch, NSW Ministry of Health

- Breast screens in NSW – calculated information from BreastScreen NSW in partnership with NSW Cancer Institute

- Ambulance calls and responses – data from NSW Ambulance Computer Aided Dispatch (CAD) system

- Emergency departments – data from NSW Health Emergency Department Data Collection (EDDC), accessed via the Health Information Exchange (HIE)

- Admitted patients – data from NSW Health Admitted Patient Data Collection (APDC), accessed via HIE

- Elective surgery – data from Waiting List Collection Online System (WLCOS).

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

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

The daily pattern of COVID-19 tests performed by test date and confirmed COVID-19 cases by symptom onset date, for all people in NSW and among Aboriginal people, healthcare workers and pregnant women, were reported from 1 January to 31 December 2021.

'COVID-19 tests performed by test date' refers to the total number of nucleic acid amplification (NAA) COVID-19 tests – which include polymerase chain reaction (PCR) tests and transcription mediated amplification (TMA) – 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 counted as one test until mid-September 2021, and counted separately afterwards. 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 residents diagnosed in NSW who were infected overseas and in Australia (in NSW and interstate). From December 2021 in response to the Omicron variant, contact tracing interviews were only done for those in the highest risk categories, hence data for source of infection and date of symptom onset may not be available.

Number of cases could decrease over weekends and public holidays corresponding to the decreases in the number of tests performed.

## COVID-19 vaccination in NSW

Number of residents in NSW aged 16+ and those aged between 12 and 15 years old, who were administered at least two doses of a COVID-19 vaccine, were download from the Australian Government Department of Health.[1] Data from 25 to 26 December 2021 were unavailable for downloading at the time of the report, so these two data points were excluded from visualisation. Due to limited data availability, visualisation for the COVID-19 vaccination roll-out included 5 September to 31 December 2021. The report presents 'percentage of population with at least two vaccine doses' by age group by date.

## NSW Police-managed hotel quarantine

COVID-19 tests performed and cases in NSW Police-managed hotel quarantine are provided by the COVID-19 Public Health Response Branch, NSW Ministry of Health.

'COVID-19 tests for returned travellers in hotel quarantine' refers to the total number of COVID-19 NAA tests performed for travellers who undertook NSW Police-managed quarantine in a NSW Government-designated hotel or accommodation facility. The number of COVID-19 tests at any time varies based on the number of people in hotel quarantine, which can be impacted by factors including the cap applied to international arrivals into Sydney. From 1 November, supervised quarantine for double vaccinated people was ceased.

'Positive COVID-19 test' refers to the total number of COVID-19 NAA tests with a positive result. 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, Day 7, Day 10 or Day 12 of quarantine, and/or for the close contacts of people who have tested positive for COVID-19.

For more information on how COVID-19 tests were performed in this setting, please refer to the technical supplement to *Healthcare Quarterly, October to December 2021* at bhi.nsw.gov.au

# NSW COVID-19 hospitalisations and deaths

COVID-19 hospitalisations in NSW public hospitals information is provided by the COVID-19 Public Health Response Branch, NSW Ministry of Health.

Three measures are used to report on hospital activity for COVID-19 cases:

- 'Number of patients with COVID-19 in hospital' refers to the total number of people with COVID-19 in NSW public hospitals each day. The count includes all people who were admitted to any hospital ward, including the emergency department (ED), around the time of their COVID-19 diagnosis

- 'Number of patients with COVID-19 in the intensive care unit (ICU)' refers to the total number of people diagnosed with COVID-19 in the ICU each day. This is a subgroup of those people who were in hospital

- 'Number of patients with COVID-19 ventilated' refers to the total number of people with COVID-19 requiring ventilation each day. This is a subgroup of those people who were in the ICU.

Daily number of deaths in people diagnosed with COVID-19 is provided by the COVID-19 Public Health Response Branch, NSW Ministry of Health, and only available from 10 July till the end of the year.

# COVID-19 tests, cases and vaccination in Australia and international comparator countries

Counts of the number of COVID-19 tests, cases and vaccination for Australia and eight comparator countries including Canada, Germany, New Zealand, Switzerland, the United Kingdom, the United States, Israel and Denmark were downloaded from Our World in Data.[2] Data 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 Organisation (WHO), the European Centre for Disease Prevention and Control (ECDC) and others.

WHO defines the confirmed cases of 2019-nCoV infection as a person with a positive NAA test (e.g. PCR, RT-PCR) or a positive SARS-CoV-2 antigen rapid diagnostic test (RAT, Ag-RDT) meeting the probable case definition, irrespective of clinical signs and symptoms.[3] Note that the introduction and uptake of RATs in each country may also affect the rates of NAA testing. At the time of the report, Our World in Data aims to include only NAA testing and RATs, not the antibody tests, when the data were publicly available.

Daily pattern of COVID-19 tests performed per thousand of the population and confirmed cases per million for each selected country are reported from 1 January to 31 December 2021 with graphs visualising the seven-day rolling average. The number of confirmed cases could be lower than the true number of infections. Percent of the population fully vaccinated against COVID-19 was calculated as the total number of people who received all doses prescribed by the country-specific vaccination protocol, divided by the total population of the country.

# Community-based healthcare

## Medicare-subsidised general practitioners (GP), specialist and mental health services

Number of attendances or services per capita (per 100,000 population) by type of appointment (in-person versus virtual) in each month of 2019 and 2021 were extracted from Services Australia.[4] Data was presented by date of processing rather than date of service. A virtual appointment could range from a telephone (telehealth) or videoconference consultation with healthcare providers. Monthly figures may differ due to the varying number of processing days in a month, which depends on the number of days in the month, public holidays and overtime worked load.

Items for GP attendances were identified using Broad Type of Service groups (0101, 0102 and 0103), and specialist attendances (0200) and a flag to indicate if the items were in-person or telephone/video.

Items for mental health-specific services were provided by psychiatrists, GPs, psychologists and other allied health professionals in a range of settings, in accordance with the Australian Institute of Health and Welfare's (AIHW) report.[5] These data relate only to mental health services that are claimed under specific mental health care Medicare Benefits Scheme (MBS) item numbers, therefore, they could under-represent all patients who receive mental health care.

The data in the report include only those services that are performed by a registered provider, for services that qualify for the Medicare Benefit and for which a claim has been processed by Medicare Australia. They do not include services provided by hospital doctors to public patients in public hospitals or services that qualify for a benefit under the Department of Veterans' Affairs National Treatment Account.

## NSW non-admitted virtual care

NSW Health has developed a systematic approach to monitoring and evaluating the impact and effectiveness of the virtual care activity associated with COVID-19 among non-admitted patients and the subsequent use in the post-COVID-19 environment. Total outpatient service events, by contact mode across NSW and by metropolitan or rural and regional local health districts (LHDs) were extracted for each month in 2021 and 2019, using data from NSW Health's Virtual Care app. This application sources data from the non-admitted patient (NAP) data collection which extends into the pre-COVID period.

The report presents the total outpatient service events for 'in person', 'videoconference', 'telehealth' and 'other', where 'other' could include services delivered by electronic messaging, email or other technology.

## BreastScreen

BreastScreen NSW is part of the national breast cancer screening program designed to reduce illness and death from breast cancer by detecting the disease early. Women over 40 years old can have a free mammogram every two years and the program actively invites women aged 50 to 74 to screen. Women aged 40–49 and those 75 years and over can also participate in the program but are not included in this report.

The measures included in this report are:

- 'Screening activity for women aged 50-74 through BreastScreen, NSW' refers to number of breast screenings each month in 2021 and 2019.

- 'Participation rate of eligible NSW women aged 50–74 who were screened for breast cancer through BreastScreen, NSW'. Participation rates present the proportion of eligible women who were screened at least once in the previous 24 months. These are based on the number of women who live in NSW and are screened in NSW. Interstate clients are not included.

This data was sourced from BreastScreen NSW in partnership with the Cancer Institute NSW.

# Ambulance

Ambulance information is based on BHI 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.

For activity and performance measures used in ambulance analysis, please refer to the technical supplement to *Healthcare Quarterly, October to December 2021* at bhi.nsw.gov.au

# Emergency department

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 receives a data file for Northern Beaches Hospital separately from the NSW Ministry of Health.

Activity and performance measures are calculated by BHI using methodology outlined in the technical supplement to *Healthcare Quarterly, October to December 2021* at bhi.nsw.gov.au

## Reporting by clinical cohort

All hospitals report diagnosis information in the NSW Health Emergency Department Data Collection (EDDC) using one of 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)[6], 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 inconsistencies in reporting principal diagnosis using various codes sets, including:

- SNOMED-CT-AU, Emergency Department Reference Set

- ICD-10-AM, various editions, and

- ICD-9-AM.

BHI uses two fields in the EDDC data providing 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 the 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 'discharge diagnosis', while hospitals using ICD-10-AM codes capture it as 'principal diagnosis'.

BHI assesses data completeness for diagnosis information in the 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 for three clinical cohorts (Table 1):

Table 1    ICD-10-AM diagnostic groups and corresponding clinical cohorts included in emergency department chapter analyses

| Clinical cohort considered in this report | ICD-10-AM codes |
| --- | --- |
| Respiratory system | J00-J99 Disease of respiratory system |
| Injury | S00-T98: Injury, poisoning and certain other consequences of external causes. |
| Mental health | F1n.5, where n is an integer 0-9: Drug and alcohol use where psychotic disorder is present |
| | F20-F29: Unspecified mental disorder |
| | F30-F39: Mood (affective) disorders |
| | F40-F48: Neurotic, stress-related and somatoform disorders |
| | F50-59: Behavioural syndromes associated with physiological disturbances and physical factors |
| | F60-69: Disorders of adult personality and behaviour |
| | F80-89: Disorders of psychological development |
| | F90-F98: Behavioural and emotional disorders with onset usually occurring in childhood and adolescence |
| | F99: Unspecified mental disorder |
| | R44-R45: Symptoms and signs involving cognition, perception, emotional state and behaviour |
| | X60-X84: Intentional self-harm |

# Admitted patients

The NSW Health Admitted Patient Data Collection (APDC) is accessed via the HIE and contains episodes of care for all patients admitted to NSW public hospitals. BHI also receives a data file for Northern Beaches Hospital separately from the NSW Ministry of Health.

Activity and performance measures are calculated by BHI using methodology outlined in the technical supplement to *Healthcare Quarterly, October to December 2021* at bhi.nsw.gov.au

## Report by clinical cohort

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 'principal 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 25 December 2021.

In this report, weekly patterns of admitted patients activity are provided for three clinical cohorts (Table 2):

Table 2    ICD-10-AM diagnostic groups and corresponding clinical cohorts included in admitted patients chapter analyses

| Clinical cohort considered in this report | ICD-10-AM codes |
|---|---|
| Respiratory system | J00-J99 Disease of respiratory system |
| Injury | S00-T98: Injury, poisoning and certain other consequences of external causes. |
| Mental health | F10-F19 excluding 'F1n.5' where n is an integer 0–9: Mental and behavioural disorders due to psychoactive substance use |
| | F20-F29: Unspecified mental disorder. |
| | F1n.5, where n is an integer 0-9: Drug and alcohol use where psychotic disorder is present |
| | F30-F39: Mood (affective) disorders |
| | F40-F48: Neurotic, stress-related and somatoform disorders |
| | F50-59: Behavioural syndromes associated with physiological disturbances and physical factors |
| | F60-69 Disorders of adult personality and behaviour |
| | F80-89: Disorders of psychological development |
| | F90-F98: Behavioural and emotional disorders with onset usually occurring in childhood and adolescence |
| | F99: Unspecified mental disorder |
| | R44-R45 Symptoms and signs involving cognition, perception, emotional state and behaviour |
| | Z60 Problems related to social environment |
| | Z63 Other problems related to primary support groups, including family circumstance |

# Elective surgery

Elective surgery waiting list data was accessed via the Waiting List Collection On-line System (WLCOS) which includes information on the date a patient is listed for surgery, the type of surgery 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.

Activity and performance measures are calculated by BHI using methodology outlined in the technical supplement to *Healthcare Quarterly, October to December 2021* at bhi.nsw.gov.au

# Reporting by geography

In response to the growing number of COVID-19 cases from June 2021, stay-at-home restrictions were implemented in NSW. The starting date, duration and level of restrictions for COVID-19 varied between local government areas (LGAs) across NSW. For further information, please refer to the technical supplement to *Healthcare Quarterly, October to December 2021.*

## For ambulance analysis

Comparisons between 'metropolitan' and 'rural and regional' areas in ambulance analysis are based on grouping activity and performance for statistic areas level 3 (SA3). For consistency in analysis and reporting, SA3s are grouped so as to broadly match the areas covered by 'metropolitan' and 'rural and regional' LHDs as in the emergency department, admitted patients and elective surgery chapters (see below).

For more information regarding these statistical areas, defined in the Australian Statistical Geography Standard (ASGS), refer to the technical supplement to *Healthcare Quarterly, October to December 2021* at bhi.nsw.gov.au

## For emergency department, admitted patients, elective surgery analysis

To illustrate geographic variation in the impact of the pandemic, analyses for hospital activities and performance include comparison between 'metropolitan' and 'rural and regional' LHDs – as classified by NSW Health[7] – for the emergency department, admitted patients and elective surgery from January to December 2021. LHDs are classified as follows:

- Metropolitan LHDs: Central Coast, Illawarra Shoalhaven, Nepean Blue Mountains, Northern Sydney, South Eastern Sydney, South Western Sydney, Sydney and Western Sydney. BHI includes Sydney Children's Hospitals Network, Justice Health and Forensic Mental Health, St Vincent's Health Network in 'Metropolitan' given their location.

- Rural and regional LHDs: Far West, Hunter New England, Mid North Coast, Murrumbidgee, Northern NSW, Southern NSW, Western NSW.

# Reporting hospital activity and performance

BHI has included weekly activity analyses to illustrate the impact of the COVID-19 pandemic on the NSW public health system in 2021. Weekly patterns of activity and performance for ambulance, emergency departments, admitted patients and elective surgeries, are compared with weekly patterns of activity and performance in 2019 to enable stable comparisons with pre-pandemic activity. Reporting of patients remaining on elective surgery waiting lists who have not yet received surgery is an exception and is reported monthly.

'Elective surgeries performed', 'Patients on the waiting list for elective surgery at the end of month' and 'Patients on the waiting list ready for surgery at the end of the month who had waited longer than clinical recommended' are reported for 2019, 2020 and 2021 to provide additional context.

Weekly activity and performance are reported for a seven-day week from Sunday to Saturday. For 2021, the first complete week was Sunday 3 to Saturday 9 January 2021, and the final complete week was Sunday 19 to Saturday 25 December 2021. Data points are labelled with the last day of the week.

Due to 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 2021. For example, Sunday 6 January 2019, and Sunday 3 January 2021 are all compared with each other. Weekly activity and performance are calculated using the adjusted day unless otherwise stated.

Day adjustment for 2019 and 2021 are listed as below:

- 2019

  First week – Sunday 6 January 2019 to Saturday 12 January 2019

  Last week – Sunday 22 December 2019 to Saturday 28 December 2019

- 2021

  First Week – Sunday 3 January 2021 to Saturday 9 January 2021

  Last Week – Sunday 19 December 2021 to Saturday 25 December 2021.

The same definitions and methodology used for *Healthcare Quarterly* 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 2021* at bhi.nsw.gov.au

# References

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