

Healthcare Quarterly

Technical Supplement

Emergency department, ambulance, admitted patients, seclusion and restraint, and elective surgery

October to December 2023

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The conclusions in this report are those of BHI and no official endorsement by the NSW Minister for Health, the NSW Ministry of Health or any other NSW public health organisation is intended or should be inferred.

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Introduction

This technical supplement describes the data, methods and technical terms used to calculate descriptive statistics and performance measures reported in the Bureau of Health Information's (BHI) *Healthcare Quarterly* report.

The supplement is technical in nature and intended for audiences interested in the creation and analysis of health system performance information.

A chronological account of additions and enhancements to the data and methods is available from the *Healthcare Quarterly* section of the BHI website at bhi.nsw.gov.au

Emergency department

This section contains information about the data and methods used for calculating measures of emergency department (ED) activity and performance reported in *Healthcare Quarterly*.

Data sources

Emergency Department Data Collection

ED information in *Healthcare Quarterly* is based on analyses of attendance data in the Emergency Department Data Collection (EDDC) extracted from the centralised data warehouse, the Health Information Exchange (HIE), administered by the NSW Ministry of Health. BHI also received a data file for Northern Beaches Hospital from the NSW Ministry of Health until the April to June 2022 quarter. As of the July to September 2022 issue of *Healthcare Quarterly*, this data is extracted from the HIE. As of the October to December 2023 issue of the *Healthcare Quarterly*, ED data for St Vincent's Hospital was extracted from NSW Health's Enterprise Data Warehouse for Analysis Reporting and Decisions (EDWARD).

EDs are reported individually for hospitals in principal referral, major or district peer groups (A1, A2, A3, B, C1 and C2).

Hospitals are included in *Healthcare Quarterly* following assessment of data completeness and accuracy, and in ways that support fair and meaningful comparison.

EDs in NSW have progressively replaced historic information systems with more contemporary electronic record systems. Significant changes to electronic systems may impact the completeness and reliability of input data or extraction from local systems to the HIE for periods longer than one quarter.

Quarters affected by significant changes, for example in policies or systems, are highlighted on time-trend graphs to make readers aware when such changes have contributed to shifts in trend between quarters.

Transfer of Care Reporting System

Data for calculating the number of ambulance arrivals and transfer of care time are downloaded from the Transfer of Care Reporting System (TCRS) portal. The TCRS incorporates data drawn from the NSW Ambulance information system and from the EDDC. Transfer of care is reported for hospitals where the ambulance incident number and the date can be identified in both the NSW Ambulance data and the EDDC.

Inclusion of emergency departments in Healthcare Quarterly

The number of EDs reported in *Healthcare Quarterly* has increased over time as more EDs are included in the EDDC.

In the January to March 2014 quarter, the activity and performance measures reported in *Healthcare Quarterly* were based on 131 EDs. Between the January to March 2014 and October to December 2016 quarters, there were small changes in the number of EDs reported in *Healthcare Quarterly* from quarter to quarter due to hospital mergers and closures and/or the opening of small hospitals. However, the changes in the number of EDs do not affect the coverage of the NSW population provided by these services. These 131 EDs account for approximately 95% of all ED attendances in NSW.

From the January to March 2017 quarter, the activity and performance measures reported in *Healthcare Quarterly* were based on more than 170 EDs. 44 small EDs, classified into peer groups D and F, are included in the NSW result but not reported on individually. They serve regional populations in the following LHDs: Western NSW, Southern NSW, Northern NSW, Murrumbidgee and Far West. Inclusion of these 44 EDs increases the number of attendances statewide, but has little impact on performance trends at the NSW level.

The activity and performance measures reported in *Healthcare Quarterly* are based on all EDs reporting to the EDDC in each quarter.

Analyses by geographical areas

Hospitals are classified as 'urban' or 'rural' using Accessibility and Remoteness Index of Australia (ARIA+), which is the standard used by the Australian Bureau of Statistics (ABS).

Category 'urban' was created by mapping to

'major cities' of the ABS classification. Category 'rural' was mapped to 'inner regional', 'outer regional', and 'remote and very remote'.

Indicator specifications

For definitions of the ED indicators, see the Indicator specifications section.

Ambulance

This section contains information about the data and methods used for calculating measures of ambulance activity and performance that are reported in *Healthcare Quarterly*.

Data source

NSW Ambulance Computer Aided Dispatch System

The ambulance component of *Healthcare Quarterly* 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 calls, incidents, responses, transports, Emergency Department Network Access and Ambulance Release Teams as counting units.

The CAD system is a 'live' system and data is updated continuously. The NSW reporting system for CAD data is scheduled to refresh four times daily during business hours (at 6.30am, 10.30am, 2.30pm and 6.30pm). Records are checked for a rolling three-day period for any changes and updates are undertaken accordingly to reflect the changes. On the second day of the new

calendar month, all records in the previous month are closed off – that is, no further updating is allowed.

Priority codes P1–9 are included in *Healthcare Quarterly* as listed in Table 1. The following priority numbers are excluded for all results other than the number of calls:

- 14 (priority error)
- 35 (Inter-CAD Electronic Messaging System [ICEMS])
- 36 (ICEMS Urgent)
- 37 (area coverage).

Response grid changes and non-emergency patient transport

Changes to ambulance protocols have affected some results over time, and are re-presented as grey bars in relevant graphs throughout the *Healthcare Quarterly* report.

Changes to the way in which incidents and responses are coded are known as grid changes. Three grid changes (March 2013, April 2015 and May 2016) saw some incidents coded as priority 2 which had formerly

Table 1 Incident and response priority codes

Code	Priority	Description	Example	Response required
1	1A Emergency	Highest priority Life-threatening case	Cardiac or respiratory arrest, unconscious, ineffective breathing	Immediate response Median within 10 minutes Under 'lights and sirens'
	1B Emergency	High priority	Unconscious	Emergency response Under 'lights and sirens'
	1C Emergency	Priority	Breathing problems, chest or neck injury, serious haemorrhage	Emergency response Under 'lights and sirens'
2	Urgent	Urgent	Abdominal pain	Urgent response without 'lights and sirens' within specified timeframes
3	Time-critical	Time-critical	Medical responses requested by medical practitioners	Undelayed response within specified timeframes
4–9	Non-emergency	Non-emergency	Routine transport	Routine

been coded as priority 1. Accordingly, there was an increase in the number of priority 2 incidents and a decrease in the number of priority 1 incidents around these times.

In September 2017, a change in protocol was introduced when triaging patients for inter-facility transport. Some of these responses remain as priority 3 while others require a higher priority response.

The introduction of the Patient Transport Service in May 2014 resulted in transfer of cases requiring less urgent patient transport from NSW Ambulance to HealthShare NSW.

Statistical areas used for reporting

As of the January to March 2019 issue of *Healthcare Quarterly*, BHI replaced zone-level reporting of ambulance activity and performance with reporting by statistical geographic areas. This change was in response to the increased public interest in ambulance performance at the local level, and the introduction of the Paramedic Response Network (PRN) across metropolitan Sydney. The new operational model is made up of superstations and smaller, standby facilities called Paramedic Response Points, forming local PRNs. The new PRN structure affected the geographical boundaries of local response areas (LRAs) and, in some instances, zone boundaries.

Changes in the size of these areas affected the number of incidents reported at the zone level. Additionally, continual changes to the administrative boundaries of LRAs and zones impede time trend comparisons and render the data prone to interpretation errors.

Changes were made to report measures of ambulance activity and performance for areas that are stable geographic units and are also more meaningful for the local community. The ABS developed the Australian Statistical Geography

Standards (ASGS), which classify Australia into a hierarchy of statistical areas. The ASGS boundaries remain stable for five years, thereby allowing comparisons of data over time.²

The statistical area level 3 (SA3) and statistical area level 4 (SA4) units have been designed for the output of regional data. They have been adopted by BHI to report ambulance activity and performance as they are small enough to be meaningful to the community yet large enough to capture sufficient incidents to provide stable estimates of performance.

There are 91 SA3 geographies in NSW. Three criteria are used to define the boundaries of SA3s:³

- Regional identity – neighbouring areas are grouped according to similar geographic and socioeconomic characteristics.
- Population – the population of an SA3 generally ranges from 30,000 to 130,000 residents. Priority is given to the regional identity of an area for defining the boundaries and this can result in SA3s with smaller or larger populations.
- Functionality – the area of an SA3 is defined in relation to transport and commercial centres.

SA4s are built by aggregating whole SA3s. The SA4 regions are the largest sub-State regions in the main structure of ASGS. There are 28 SA4 geographies in NSW reported on as of the January to March 2019 quarter. Two criteria are used to define the boundaries of SA4s:⁴

- Population – a minimum of 100,000 persons was set for the SA4. It ranges from 100,000 – 300,000 in regional areas to 300,000 – 500,000 in metropolitan areas.
- Functionality – the area of an SA4 is designed to reflect the highest degree of interconnectivity between the labour supply and demand.

Reporting activity and performance measures by statistical areas

As of the January to March 2019 issue of *Healthcare Quarterly*, quarterly activity and performance measures are reported by statistical areas. Measures of activity and performance are reported by SA3 for all response priorities, with the exception of priority 1A (P1A). For P1A, the median response time is reported by SA4 as the number of P1A incidents in some SA3s is too low to permit consistent reporting of response times. Reporting by SA4 still provides local information but is based on a higher number of incidents.

As of the January to March 2022 issue of *Healthcare Quarterly*, BHI uses the ASGS Edition 3 (2021) definitions of statistical areas. Digital boundary files were accessed from the ABS website,⁵ and SAS©9 was used to map CAD data.

Analyses by geographical areas

Local areas are classified as 'urban' or 'rural' using ARIA+, which is the standard used by the ABS.

Digital boundary files for ASGS Edition 3 (2021) definitions of remoteness areas were accessed from the ABS website and SAS©9 was used to map CAD data.

Category 'urban' was created by mapping cases to 'major cities' of the ABS classification. Category 'rural' was mapped to 'inner regional', 'outer regional', and 'remote and very remote'.

A small proportion of cases (less than 1%) cannot be mapped to a location in NSW, this includes those cases that are not geocoded, and where the incident occurred interstate. These cases are not included in urban or rural reporting.

Indicator specifications

For definitions of the ambulance indicators, see the Indicator specifications section.

Admitted patients

This section contains information about the data and methods used for calculating measures of activity and performance for admitted patient episodes of care reported in *Healthcare Quarterly*.

Data source

Admitted Patient Data Collection

Admitted patient information in *Healthcare Quarterly* is based on analyses of data in the Admitted Patient Data Collection (APDC). Data are extracted from a centralised data warehouse administered by the NSW Department of Health called the Health Information Exchange (HIE). BHI also received a data file for Northern Beaches Hospital from the NSW Ministry of Health until the April to June 2022 quarter. As of the July to September 2022 issue of *Healthcare Quarterly*, this data is extracted from the HIE.

Hospitals are reported individually if they are classified as principal referral, major or district peer groups (A1, A2, A3, B, C1 and C2).

Hospitals are included in *Healthcare Quarterly* following assessment of data completeness and accuracy, and in ways that support fair and meaningful comparison.

Quarters affected by significant changes, for example in policies or systems, are highlighted on time-trend graphs to make readers aware when such changes may contribute to shifts in trend between quarters.

Forensic patients

Forensic patient admissions are included in *Healthcare Quarterly* but are not reported separately. Long Bay Hospital and the Forensic Hospital are included in totals for the 'Other' group and for NSW. There are forensic units in Cumberland Hospital, Morisset Hospital and Orange Health Service. Forensic patients are not reported separately in these hospitals. Cumberland Hospital and Morisset Hospital are from peer group F, and included in totals for the 'Other' group and for NSW. Orange Health Service is included in totals for peer group B and for NSW.

Analyses by geographical areas

Hospitals are classified as 'urban' or 'rural' using ARIA+, which is the standard used by the ABS.

Category 'urban' was created by mapping to 'major cities' of the ABS classification. Category 'rural' was mapped to 'inner regional', 'outer regional', and 'remote and very remote'.

Summary of changes

Reporting on emergency admissions involving surgery

As of the July to September 2022 issue of *Healthcare Quarterly*, BHI started reporting on 'emergency admissions involving surgery'. This refers to hospital admissions that include a surgical procedure, and for which the patient requires admission within 24 hours

Analytic methods

Urgency of admission

Urgency of admission describes the status of a hospital admission. Only admissions assigned an 'emergency' urgency status were included in this analysis.

Diagnosis codes

The Australian Refined Diagnosis Related Groups (AR-DRGs) is an admitted patient classification system that provides a clinically meaningful way of relating the number and type of patients treated in admitted acute episodes of care to the resources required in treatment.

The AR-DRG Version 10 is currently in use. The codes included in this analysis are those with the second digit from 0 to 39 inclusive, excluding codes for childbirth-related AR-DRGs.

Indicator specifications

For definitions of the admitted patient indicators, see the Indicator specifications section.

Seclusion and restraint

This section contains information about the data and methods used for calculating measures of activity and performance for seclusion and restraint reported in *Healthcare Quarterly*.

Data source

Seclusion and restraint data collection

Seclusion and restraint information in *Healthcare Quarterly* is based on analyses of data extracted from the centralised data warehouse administered by the NSW Ministry of Health, the Health Information Exchange (HIE), and a data file provided by the NSW Ministry of Health.

The HIE provides information on the number of mental health episodes of care and the number of days a mental health bed was in use. The data on seclusion and restraint are manually collected by each LHD and specialty health network (SHN) and aggregated at the mental health service unit level. The data file includes information on the number of seclusion and restraint events, the number of mental health episodes of care with at least one seclusion or restraint event, and the total duration of seclusion and restraint events at the unit level for each public hospital with one or more specialised acute mental health units.

Comparisons between facilities

Healthcare Quarterly reports seclusion and restraint measures for facilities with specialised declared and non-declared acute mental health units.

In NSW, there are more than 40 public hospitals, plus the forensic hospital, with specialised acute mental health units that treat patients with varying severities of mental illness. To support fair and meaningful comparisons, hospitals are grouped into three broad categories based on the types of services provided: hospitals with a Mental Health Intensive Care Unit (MHICU); hospitals without a MHICU; and the Justice Health and Forensic Mental Health Network (JHFMHN).

MHICUs provide specialist, intensive multidisciplinary care to people with high levels of clinical complexity and risk that cannot be safely and effectively managed in a standard acute mental health unit. Seven hospitals with a MHICU, where seclusion and restraint events are more likely to occur, are grouped together in *Healthcare Quarterly* to acknowledge their delivery of statewide tertiary mental health services.

JHFMHN provides assessment, care, treatment and other services to people with a mental illness who are, or have been, in contact with the criminal justice system. JHFMHN data are reported separately in *Healthcare Quarterly* and excluded from NSW totals because of substantial differences in model of care and patient cohort. The use of seclusion and restraint is more common in forensic services and forensic seclusion events are typically of longer duration.

For more information on peer grouping for benchmarking, see *Measurement Matters: Reporting on seclusion and restraint in NSW public hospitals*, available at bhi.nsw.gov.au

Changes in facilities

The number of public hospitals with specialised acute mental health units reported in *Healthcare Quarterly* has changed over time. Please note the following inclusion information about individual facilities:

- Byron Central Hospital was included in the data from January to December 2017.
- Manly Hospital, which was closed on 30 October 2018, has not been included from the January to March 2019 quarter onwards.
- Northern Beaches Hospital (NBH) opened on 30 October 2018. As of the July to September 2022 issue of *Healthcare Quarterly*, BHI reports seclusion and restraint results for this hospital. Its results are also included in aggregated data for hospitals without a MHICU, and NSW totals, in the five-year trends back to July to September 2020. NBH operates as a public/private partnership with NSW Health. Only public patients are included in this analysis, unlike other hospitals where both public and private admissions may be included.
- The acute mental health unit at Bathurst Hospital closed in May 2020 in response to the COVID-19 pandemic. It was later reopened as a non-acute/rehabilitation ward and no longer provides acute mental health services. Bathurst Hospital has therefore not been included from the April to June 2021 quarter onwards.
- As of the July to September 2023 quarter, Campbelltown Hospital is included in 'Events in hospitals with a MHICU' results; prior to July 2023, Campbelltown was included in 'Events in hospitals without a MHICU' results. This change has minimal impact on trend graphs across measures presented in the Seclusion and Restraint Supplement.

Indicator specifications

For definitions of the seclusion and restraint indicators, see the Indicator specifications section.

Elective surgery

Elective surgery is planned and can be booked in advance. As a result of a specialist clinical assessment, patients are placed on a waiting list and given a clinical priority category depending on the urgency of their condition. This section contains information about the data and methods used for calculating measures of activity and performance for elective surgery.

Data source

Waiting List Collection On-line System

The elective surgery component of *Healthcare Quarterly* is based on analyses from the Waiting List Collection On-line System (WLCOS), extracted from NSW Health's Enterprise Data Warehouse for Analysis Reporting and Decisions (EDWARD). WLCOS data are a monthly census, which 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.

Hospitals are included in *Healthcare Quarterly* following assessment of data completeness and accuracy, and in ways that support fair and meaningful comparison.

Quarters affected by significant changes, for example in policies or systems, are highlighted on time-trend graphs to make readers aware of changes that may contribute to shifts in trends between quarters.

Transition to EDWARD

NSW Health is rolling out EDWARD as the new single-source-of-truth, enterprise data warehouse, enabling the provision of high quality activity and performance information for emergency departments, admitted and non-admitted patients, elective surgery waiting list and operating theatre.

The staged transition to EDWARD and eventual decommissioning of the HIE and WLCOS is designed to drive improvements in data quality and standardisation; provide flexibility to expand data collections and the ability to capture new data formats; develop patient journey analysis; and realise operational efficiencies.

Data access from EDWARD

All elective surgery results for reporting periods from January 2021 onwards are based on analyses of data acquired from the WLCOS datamart in EDWARD. For all reporting periods prior to this, data were acquired from the WLCOS data portal.

Reporting to EDWARD by NSW local health districts

As part of the staged transition to EDWARD, LHDs are transitioning to reporting elective surgery data to EDWARD using newly implemented patient administration system modules. Mid North Coast LHD and Northern NSW LHD began reporting elective surgery data to EDWARD from 1 March 2021. Central Coast LHD and Northern Sydney LHD made the transition to reporting elective surgery data to EDWARD from 1 June 2022. All other LHDs continued reporting elective surgery data via a monthly census to WLCOS. The transition will be progressively implemented to all LHDs.

Following the transition to reporting to EDWARD, the data from Central Coast, Mid North Coast, Northern NSW and Northern Sydney LHDs are aggregated in EDWARD to a monthly census and combined with the WLCOS monthly census data. As of the July to September 2022 issue of *Healthcare Quarterly*, the full statewide elective surgery waiting list dataset was extracted from EDWARD.

BHI conducts additional enhanced data quality assessment for each LHD that makes the transition to reporting elective surgery data to EDWARD.

While it has been identified that reporting through EDWARD may result in slightly longer reported elective surgery waiting times than in WLCOS, BHI determined, following extensive data quality assessment, that the data reported to EDWARD for Central Coast, Mid North Coast, Northern NSW and Northern Sydney is sufficient for public reporting in *Healthcare Quarterly*.

Waiting list validity analysis

BHI performs quality assurance on the elective surgery waiting list records to assess the reliability and validity of the data. This is to ensure fair comparisons between hospitals regarding their management of elective surgery patients.

Validity analyses include, but are not limited to the:

- percentage of patients changed from Ready for Care (RFC) to Not Ready for Care (NRFC)
- percentage of patients changed from NRFC to RFC
- percentage of RFC patients changed to a higher urgency category
- percentage of RFC patients changed to a lower urgency category
- percentage of NRFC patients with listing status as staged and deferred.

Results for individual hospitals were consistent with the NSW results, demonstrating that hospitals adopted similar approaches to reporting the management of elective surgery patients following advice provided by the NSW Ministry of Health for changes to elective surgery as a result of COVID-19.

Analyses by geographic areas

Hospitals are classified as 'urban' or 'rural' using ARIA+, which is the standard used by the ABS.

Category 'urban' was created by mapping to 'major cities' of the ABS classification. Category 'rural' was mapped to 'inner regional', 'outer regional', and 'remote and very remote'.

Indicator specifications

For definitions of the elective surgery indicators, see the Indicator specifications section.

Special Reporting

Analyses of variation in average length of hospital stay across NSW public hospitals for selected clinical conditions and surgical procedures

Background

The Special Reporting section provides key findings from analyses to:

- highlight variation in average length of stay (ALOS) across public hospitals for selected clinical conditions and surgical procedures, and
- identify hospitals that have a significantly higher or lower ALOS relative to NSW for selected clinical conditions and surgical procedures.

The four clinical conditions and surgical procedures that were selected include:

- cellulitis
- heart failure
- hip replacement
- knee replacement.

Trends in annual ALOS for acute same day and overnight admissions at a state level were reported from July 2018 to June 2023 to highlight variation in ALOS among patients discharged from a public hospital. ALOS were calculated for each clinical condition and surgical procedure at each hospital from July 2022 to June 2023. Risk adjusted ALOS were calculated for each condition from July 2022 to June 2023 to identify hospitals that have a significantly higher or lower ALOS relative to NSW, taking into account patient-level risk factors associated with length of stay.

Analytical methods

Data Source, index cohorts and inclusion/exclusion criteria

De-identified linked NSW Admitted Patient Data Collection (APDC) between July 2018 – June 2023 was used - accessed from the Hospital Performance

Dataset (HoPeD) through the NSW Ministry of Health Secure Analytics for Population Health Research and Intelligence (SAPHaRI). The linkage was performed by the NSW Centre for Health Record Linkage using probabilistic methods with an estimated false-positive rate of 5 per 1000⁶.

Each condition-specific cohort included acute hospitalisation episodes with the corresponding Diagnosis Related Group (DRG) codes (refer to Table 2), who were 18 years or older and were discharged alive from a NSW public hospital between 1 July 2018 and 30 June 2023. Transfers were taken into account and multiple acute, adjacent hospitalisation episodes were considered as a single admission.

Table 2 DRGs defining the selected clinical conditions and surgical procedures

DRG	Description
J64B	Cellulitis W/O Catastrophic or Severe CC
F62B	Heart Failure and Shock W/O Catastrophic CC
I03B	Hip Replacement W/O Catastrophic CC
I04B	Knee Replacement W/O Catastrophic or Severe CC

To ensure accurate and fair attribution of the length of stay to hospitals, index admissions excluded discharges at own risk, discharges on leave, type change separations, and transfers (i.e., transfers to other hospitals, palliative care, psychiatric hospitals, residential aged care, or other accommodations). The analyses also excluded collaborative care, which were mainly within the surgical cohorts and associated with private hospitals, and admissions with any diagnosis codes of COVID-19 or ICU utilisation.

For calculation of ALOS, same-day admissions were considered with a length of stay of half day. For each condition cohort, the length of stay was trimmed to upper bound or lower bound of the relevant DRG for potential outliers⁷.

The indicator – Risk Adjusted Average Length of Stay

The risk adjusted ALOS can be used to compare a particular hospital's ALOS given its case mix with NSW. This indicator is best used as a screening tool to indicate where further, locally driven, assessment might be needed regarding potential opportunities for reducing a patient's length of stay. For each condition at a given hospital, the risk adjusted ALOS was calculated as the ratio of the total observed to the total expected length of stay (LOS), multiplied by the NSW ALOS. For each hospital, the expected LOS was based on the performance of an average NSW hospital with the same case mix.

Given the positive and right skewed distribution of LOS, the expected values were estimated by developing NSW-level condition-specific prediction models using Generalized Linear Mixed Models (GLMM) with Gamma distribution, adjusting for patient-level risk factors outside the control of the hospitals and taking into account the clustering of patients within the same hospitals. Fitting separate models for each condition cohort enhances predictive performance tailored to the diverse medical contexts.

Factors included in building the condition-specific prediction models were age (tested for curvilinearity), sex, season of the year, emergency vs planned, level of home support, 'Hospital in the Home' (HITH) usage, Charlson comorbidity score⁸ and a previous history of the clinical condition of interest with a 1-year lookback period. HITH 'delivers multidisciplinary acute care to suitable, consenting patients at their home or clinic setting as an alternative to inpatient hospital care'⁹.

Socioeconomic factors were not included in developing the final prediction models, however, the model incorporated essential and relevant factors such as comorbidities and the history of the clinical conditions. This allowed for exploring the variations considering factors directly related to patient outcomes while avoiding potential disparities and different standards based on socioeconomic status.

A backward modelling approach was used to build the multivariable parsimonious prediction models. Variables significant at 20% level in the univariate analysis were considered for inclusion in multivariable models. Only variables with a two-sided P-value of less than 0.05 in the multivariable models were retained in the final models. Variables excluded from the initial multivariable models (not significant in the univariate analysis at 20% level) were then added one by one and retained in the final multivariable models where P-value < 0.05.¹⁰

The final prediction models included age (a curvilinear association except for heart failure cohort), sex, emergency status, level of home support and Charlson comorbidity score. Interestingly, history of cellulitis was more powerful in predicting LOS than co-morbidity as measured by Charlson score. However, history of cellulitis may simultaneously measure medical and health risk factors associated with likelihood and severity. Season of the year was found associated with LOS in the multivariable models for heart failure and hip replacement cohorts. HITH was included in the final model for heart failure and cellulitis cohorts (prediction models are available upon request).

The estimated coefficients were stable when models were tested on data from the previous financial years. The mean absolute prediction errors demonstrated robust predictive performance compared with existing benchmarks available in the literature, and residual analyses using Anscombe residuals were acceptable. Given the models were not intended to be applied at the individual level, BHI further assessed their performance by calculating the square of the correlation (R²) between mean observed and mean predicted LOS values at hospital level¹¹ which was above 0.90 across all the condition cohorts. Sensitivity analyses using Linear Mixed Models (LMM) with log transformation provided similar results. One of the advantages of the GLMM with Gamma distribution is avoiding transformation bias.

Hospitals with significantly higher or lower ALOS were identified using funnel plots with 95% control limits based on normal distribution. Hospital risk adjusted ALOS results were plotted against their effective samples size, as a measure of precision, taking into account the differences between hospitals in the number of patients served and the variation in LOS within each hospital as a fraction of the estimated total variance.¹² Hospitals with less than 5 index admissions were excluded from the funnel plots. Results were publicly reported for peer group A, B and C hospitals only with at least 50 index hospitalisations for the condition of interest in the one-year period. Peer group A includes principal referral (A1), paediatric specialist (A2) and ungrouped acute tertiary hospitals (A3). Peer group B includes major hospitals and peer group C includes the district hospitals.

Sensitivity analyses - HITH

There were no HITH admissions within the hip replacement and knee replacement cohorts, and the inclusion of HITH in the prediction model had no impact on hospitals' outlier status within the congestive heart failure cohort. Among the cellulitis cohort, 14.7% of HITH admissions were recorded, with the majority (74.1%) occurring in hospitals situated in major cities. Notably, HITH was found associated with a longer LOS in the multivariable prediction model within the cellulitis cohort. In a sensitivity analysis, accounting for HITH usage, hospital rurality, and their interaction in the multivariable model was examined. This analysis led to two hospitals no longer exhibiting a significantly different result, while four additional hospitals showed significantly higher ALOS relative to NSW.

Suppression rules

Small numbers in any group need to be treated cautiously to protect patients' identities.

BHI suppresses information if it is based on very few patients. If there are fewer than five patients in any group for admitted patient and emergency department data, patient numbers are displayed as <5.

For seclusion and restraint reporting, episode numbers are displayed as <5 if there are fewer than five seclusion or physical restraint events. Average duration of seclusion and physical restraint events is suppressed if there are fewer than five seclusion or physical restraint events. Changes in average duration of seclusion and physical restraint events are suppressed if there are fewer than five seclusion or physical restraint events either in the reporting period or in the same quarter the previous year. Due to the infrequent use of mechanical restraint, it is only reported at NSW level to protect patient privacy.

For ambulance reporting at SA3 level, performance measures for two SA3s, Blue Mountains – South and Illawarra Catchment Reserve, are suppressed because the estimated resident population in the area is less than 1,000, and the very small volume of ambulance responses results in unstable estimates.

For elective surgery measures reported by urgency category, low counts have been pooled with another urgency group. Because the staged procedure category is excluded from performance measure calculations, low counts in this group are not suppressed.

If there are fewer than 10 patients in any group, on-time performance and median waiting times are suppressed. If there are fewer than 100 patients in any group, the 90th percentile is suppressed.

Indicator specifications

Emergency department: Activity measures

All ED attendances	<p>All ED attendances is the count of every record in the Emergency Department Data Collection (EDDC) of the HIE. This count includes presentations of all ED visit types including emergency presentations, planned return visits, pre-arranged admissions, some outpatient visits, private referrals, persons pronounced dead on arrival and patients in transit.</p> <p>This count excludes records entered in error (mode of separation = 99), telehealth and eHealth presentations (ED visit type = 12), and presentations by patients who are already admitted to the same hospital (ED visit type = 13).</p>
Emergency presentations	<p>Emergency presentations are records in the EDDC of the HIE of presentations with an ED visit type of: emergency (1), an unplanned return visit for a continuing condition (3) or disaster (11). Emergency presentations in <i>Healthcare Quarterly</i> are reported by triage category.</p>
Mode of arrival	<p>ED attendances by mode of arrival includes all attendances at the ED that have a mode of arrival recorded. Mode of arrival categories include:</p> <ul style="list-style-type: none">• Arrival by ambulance – presentations with mode of arrival: state ambulance vehicle (1), helicopter rescue service (4), and air ambulance service (5)• Arrival by police – presentations with mode of arrival: police/correctional services vehicle (7)• Arrival by other – presentations with mode of arrival: community/public transport (2), private vehicle (3), internal ambulance/transport (6), other, e.g. undertakers/contractors (8), no transport (walked in) (9), retrieval (including NETS) (10), and internal bed/wheelchair (11). Presentations with missing mode of arrival are also included in this cohort.
Mode of leaving ED	<p>ED attendances by mode of leaving ED includes all attendances at the ED that have a departure time recorded. Mode of leaving ED categories include:</p> <ul style="list-style-type: none">• Treated and discharged – presentations with mode of separation: admitted and discharged as patient within ED (2) or departed with treatment complete (4). The admitted and discharged as patient within ED (2) code was discontinued on 1 January 2018 due to the update to a new HIE Emergency Department Data Dictionary.• Treated and admitted to hospital – presentations with modes of separation: admitted to a ward/inpatient unit (1), admitted to a critical care ward (10), or admitted via an operating theatre (11)• Left without, or before completing, treatment – presentations with modes of separation: departed, did not wait (6), departed – left at their own risk (7) or admitted – left at own risk (13). Patients who 'did not wait' were triaged, but left the ED before treatment commenced. Patients who 'left at their own risk' were triaged and treatment had begun by a clinician or nurse, but the patient left prior to completing their treatment• Transferred to another hospital – presentations with mode of separation: transferred to another hospital (5) or admitted and then transferred to another hospital (12)• Other – presentations with modes of separation: admitted and died in ED (3), dead on arrival (8) or departed for another clinical service location (9). Presentations with missing mode of separation are also included in this cohort.
Triage category	<p>A classification system based on how urgent the patient's need is for treatment:</p> <ul style="list-style-type: none">• Triage category 1: Resuscitation (for example, cardiac arrest)• Triage category 2: Emergency (for example, chest pain, severe burns)• Triage category 3: Urgent (for example, moderate blood loss, dehydration)• Triage category 4: Semi-urgent (for example, sprained ankle, earache)• Triage category 5: Non-urgent (for example, small cuts, abrasions).

Emergency department: Performance measures

Time to starting treatment in the ED

Description of measure	<p>The time from first presenting at the ED to the time treatment started in a designated ED treatment area.</p> <p>Treatment time is the earlier of the following fields in the EDDC of the HIE:</p> <ul style="list-style-type: none">• First seen by clinician time – the date and time when the patient is first seen by a medical officer and has a physical examination or treatment performed that is relevant to their presenting problem(s)• First seen by nurse time – the date and time when the patient is first seen by a nurse and has an assessment or treatment performed that is relevant to their presenting problem(s). <p>If either 'first seen by clinician time' or 'first seen by nurse time' is more than 12 hours before presentation time or more than 31 days after presentation time, then that field is considered an error and is excluded from calculations. If both 'first seen by clinician time' and 'first seen by nurse time' are more than 12 hours before presentation time or more than 31 days after presentation time, then treatment time for that record is considered an error and excluded from calculations. If treatment time is earlier than presentation time, but 12 hours or less before presentation time, then time from presentation until treatment is set to zero.</p> <p>BHI does not report time from presentation to starting treatment for patients in triage category 1, because BHI considers waiting time for these patients to not be informative. Recording of presentation, triage and treatment times for patients who should be assessed or treated within two minutes (triage 1) is unlikely to be recorded precisely enough to report against a two-minute benchmark, particularly when clinicians are focused on providing immediate and essential care.</p>
Cohort description (numerator and denominator)	<p>Emergency presentations to NSW EDs.</p> <p>Emergency presentations are records in the EDDC of the HIE of presentations with an ED visit type of emergency (1), an unplanned return visit for a continuing condition (3) or disaster (11).</p> <p>Emergency presentations are reported by triage category.</p>
Further details (inclusions, exclusions)	<p>Inclusions:</p> <ul style="list-style-type: none">• Patients who had a valid triage category and treatment time• Records with an ED visit type of Emergency (1), Unplanned return visit for a continuing condition (3) and Disaster (11). <p>Exclusions:</p> <ul style="list-style-type: none">• Non-emergency presentations• Records with a missing treatment time• Records with missing or invalid information for triage category are excluded from reported counts of emergency presentations• Records with a mode of separation of Did not wait for treatment (6), Dead on Arrival (8) or Departed for other Clinical Service Location (9).
Data source	Emergency Department Data Collection (EDDC)

Measures used in this report

Median time to starting treatment	Time from presentation by which half of patients started their treatment. The other half of patients took equal to or longer than this time.																		
90th percentile time to starting treatment	Time from presentation by which 90% of patients started treatment. The final 10% of patients took equal to or longer than this time.																		
Percentage of patients whose treatment started within clinically recommended maximum waiting time	<p>The number of presentations where the time from presentation to treatment was less than, or equal to, the clinically recommended maximum waiting time as a percentage of the total number of presentations. The percentage is reported for emergency patients with a triage category of 2 to 5. It is reported by triage category, and for these triage categories combined.</p> <p>Denominator:</p> <ul style="list-style-type: none"> All emergency presentations to NSW public hospital EDs. <p>Numerator:</p> <ul style="list-style-type: none"> Denominator cases where the time between arrival at the ED and treatment time was within the clinically recommended maximum waiting time for the relevant triage category. A patient started treatment within the clinically recommended maximum waiting time if the time from presentation to the start of clinical treatment is less than, or equal to, the maximum waiting times recommended in the Australasian College for Emergency Medicine policy on the Australasian Triage Scale. 																		
	<table border="1"> <thead> <tr> <th>AUSTRALASIAN TRIAGE SCALE CATEGORY</th> <th>TREATMENT ACUITY (maximum waiting time for medical assessment and treatment)</th> <th>PERFORMANCE INDICATOR THRESHOLD</th> </tr> </thead> <tbody> <tr> <td>Triage 1: Resuscitation</td> <td>Immediate</td> <td>100%</td> </tr> <tr> <td>Triage 2: Emergency</td> <td>10 minutes</td> <td>80%</td> </tr> <tr> <td>Triage 3: Urgent</td> <td>30 minutes</td> <td>75%</td> </tr> <tr> <td>Triage 4: Semi-urgent</td> <td>60 minutes</td> <td>70%</td> </tr> <tr> <td>Triage 5: Non-urgent</td> <td>120 minutes</td> <td>70%</td> </tr> </tbody> </table>	AUSTRALASIAN TRIAGE SCALE CATEGORY	TREATMENT ACUITY (maximum waiting time for medical assessment and treatment)	PERFORMANCE INDICATOR THRESHOLD	Triage 1: Resuscitation	Immediate	100%	Triage 2: Emergency	10 minutes	80%	Triage 3: Urgent	30 minutes	75%	Triage 4: Semi-urgent	60 minutes	70%	Triage 5: Non-urgent	120 minutes	70%
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Time spent in the ED

Description of measure	<p>The difference between presentation time and departure time.</p> <p>Departure time is defined as:</p> <ul style="list-style-type: none"> Actual departure time – the date and time at which the patient physically leaves the ED as recorded in the actual departure time field in the emergency visit database in the HIE. If the time recorded for actual departure is before the presentation time or more than 31 days after the presentation time, then the actual departure time field is treated as missing and the record is excluded from calculations that use actual departure time. Ready for departure time – the date and time when the assessment and initial treatment of the person is completed such that if home arrangements of the person (including transport) were available, the person could leave the ED. It is recorded in the ready for departure time field in the emergency visit database in the HIE. <p>Ready for departure time is used to calculate time spent in the ED for patients who are treated and discharged. Actual departure time is used for all other patients.</p> <p>If the time recorded for ready for departure is before presentation time or more than 31 days after presentation time, then that departure time field is considered an error and treated as missing. If the time recorded for ready for departure time is missing or is later than the time recorded for actual departure time, then actual departure time is used in calculations. If both ready for departure time and actual departure time are missing, the record is excluded from calculations that use ready for departure time.</p>
Cohort description (numerator and denominator)	<p>All ED presentations with a valid departure time.</p> <p>'All presentations' is the count of every record in the EDDC of the HIE. This count includes presentations of all ED visit types including emergency presentations, planned return visits, pre-arranged admissions, some outpatient visits, private referrals, persons pronounced dead on arrival and patients in transit.</p> <p>Records are assigned to the reporting period using the arrival date and time field.</p>
Further details (exclusions)	<p>Exclusions:</p> <ul style="list-style-type: none"> Records entered in error (mode of separation = 99), telehealth and eHealth presentations (ED visit type = 12), and presentations by patients who are already admitted to the same hospital (ED visit type = 13). If the time recorded for ready for departure time is missing, is before presentation time or more than 31 days after presentation time, or is later than the time recorded for actual departure time, then actual departure time is used in calculations. Records with missing time to departure are excluded from calculations that use time to departure.
Data source	Emergency Department Data Collection

Measures used in this report

Median time spent in the ED	<p>The time half the patients spent in the ED, calculated as the difference between presentation time and departure time.</p> <p>The other half of patients spent equal to or longer than this time.</p>
90th percentile time spent in the ED	<p>The time by which 90% of patients had left the ED.</p> <p>The remaining 10% spent equal to or longer than this time.</p>
Percentage of patients who spent four hours or less in the ED	<p>Denominator:</p> <ul style="list-style-type: none"> All presentations to NSW public hospital EDs. <p>Numerator:</p> <ul style="list-style-type: none"> Denominator cases where the time between arrival at and departure from the ED was equal to or less than four hours.

Transfer of care time

Description of measure	<p>The difference between arrival time and the time responsibility for the patient's care was transferred from paramedics to ED staff in an ED treatment zone.</p> <p>For more information, see <i>Spotlight on Measurement: Measuring transfer of care from the ambulance to the emergency department</i> available at bhi.nsw.gov.au</p>
Cohort description (numerator and denominator)	All patients arriving by ambulance at hospitals with an ED which is included in <i>Healthcare Quarterly</i> and with records in the Transfer of Care Reporting System (TCRS).
Further details (exclusions)	<p>Inclusions:</p> <ul style="list-style-type: none">Matched records; those where the ambulance incident number and date can be identified in both the NSW Ambulance data and the ED data. <p>Exclusions:</p> <ul style="list-style-type: none">Hospitals with fewer than 50 matched records in the quarter. Caution is advised when interpreting performance results for hospitals where transfer of care could not be calculated for more than 30% of total records because records were not matched or transfer of care time was missing.
Data source	<p>Transfer of Care Reporting System (TCRS) portal.</p> <p>The TCRS incorporates data drawn from the NSW Ambulance information system and from the EDDC.</p>

Measures used in this report

Median transfer of care time	<p>The time between arrival of patients at the ED by ambulance and transfer of responsibility for their care, for half of the patients, from paramedics to ED staff in an ED treatment zone.</p> <p>The other half took equal to or longer than this time.</p>
90th percentile transfer of care time	<p>The time between arrival of patients at the ED by ambulance and transfer of responsibility for their care for 90% of patients from paramedics to ED staff in an ED treatment zone.</p> <p>The final 10% of patients took equal to or longer than this time.</p>
Percentage of patients whose care was transferred within 30 minutes	<p>The percentage of patients who arrived by ambulance for whom responsibility for their care was transferred from paramedics to ED staff in an ED treatment zone within 30 minutes. The denominator for the percentage is the number of matched records with a valid transfer of care time.</p>

Ambulance: Activity measures

Number of calls

Description of measure	Count of all calls requesting an ambulance vehicle, received by NSW Ambulance's Computer Aided Dispatch (CAD) system.
CAD data element description	Count of records where 'Time_CallTakingComplete' is a valid date.

Number of incidents

Description of measure	<p>Count of all events requiring one or more ambulance responses.</p> <p>An incident is a call that results in the dispatch of one or more ambulance vehicles.</p> <p>Incidents are prioritised as highest priority (priority 1A) – immediate response under lights and sirens required (incident is potentially life threatening), priority 1 (emergency response under lights and sirens required); urgent (priority 2) – undelayed response required without lights and sirens; time-critical (priority 3) – medical responses requested by health professionals, often pre-booked; undelayed response and non-emergency (priority 4–9).</p>
CAD data element description	Count of the number of calls where at least one response vehicle is assigned.

Number of responses

Description of measure	<p>Count of all dispatches of an ambulance service vehicle.</p> <p>A response is the dispatch of an ambulance vehicle. There may be multiple responses to a single incident.</p> <p>Responses are prioritised as per incidents.</p> <p>Responses include vehicles which are cancelled prior to arrival at the incident scene.</p>
CAD data element description	When 'Time_Enroute' is a valid date.

Number of patient transports

Description of measure	Count of the number of responses where a patient was transported by the ambulance service.
CAD data element description	<p>Responses where 'Time_ArrivedAt_Scene' is a valid date</p> <p>AND 'Time_Depart_Scene' is a valid date</p> <p>AND 'Time_ArrivedAtScene' is prior to 'Time_Depart_Scene'.</p>

Ambulance: Performance (timeliness) measures

Call to ambulance arrival time

Description of measure	Call to ambulance arrival time is measured from the time the call is answered (phone pickup) to the time the first ambulance service response arrives at the incident scene. No more than one call to ambulance arrival time for each incident is used.
Calculation	When: <ul style="list-style-type: none"> 'Time_PhonePickUp' is a valid date AND 'Time_ArrivedAtScene' is valid date AND 'Time_PhonePickUp' is prior to 'Time_ArrivedAtScene' AND Local Response Area has a valid Geo_Id code AND 'Time_First_Unit_Arrived' = 'Time_ArrivedAtScene' THEN calculate time difference between 'Time_PhonePickUp' and 'Time_First_Unit_Arrived'

Measures used in this report

Percentage of priority 1 incidents with call to ambulance arrival time within 15 minutes	Percentage of emergency (priority 1) incidents where it takes less than or equal to 15 minutes for the first ambulance service vehicle to arrive at the scene after the call is received.
Calculation	The number of emergency (priority 1) incidents responded to in under or equal to 15 minutes as a percentage of emergency (priority 1) incidents. Results (%) are rounded to one decimal point for reporting.
Inclusions	Responses with a priority code of 1. First ambulance service vehicle to arrive at the scene after the call answered. All values 0 and higher are acceptable.
Exclusions	N/A
Percentage of priority 1 incidents with call to ambulance arrival time within 30 minutes	Percentage of emergency (priority 1) incidents where it takes less than or equal to 30 minutes for the first ambulance service vehicle to arrive at the scene after the call is received.
Calculation	The number of emergency (priority 1) incidents responded to in under or equal to 30 minutes as a percentage of emergency (priority 1) incidents. Results (%) are rounded to one decimal point for reporting.
Inclusions	Responses with a priority code of 1. First ambulance service vehicle to arrive at the scene after the call answered. All values 0 and higher are acceptable.
Exclusions	N/A
Percentage of priority 2 incidents with call to ambulance arrival time within 30 minutes	Percentage of urgent (priority 2) incidents where it takes less than or equal to 30 minutes for the first ambulance service vehicle to arrive at the scene after the call is received.
Calculation	The number of urgent (priority 2) incidents responded to in under or equal to 30 minutes as a percentage of urgent (priority 2) incidents. Results (%) are rounded to one decimal point for reporting.

Inclusions	Responses with a priority code of 2. First ambulance service vehicle to arrive at the scene after the call answered. All values 0 and higher are acceptable.
Exclusions	N/A
Percentage of priority 2 incidents with call to ambulance arrival time within 60 minutes	Percentage of all statewide urgent (priority 2) incidents where it takes less than or equal to 60 minutes for the first ambulance service vehicle to arrive at the scene after the call is received.
Calculation	The number of urgent (priority 2) incidents responded to in under or equal to 60 minutes as a percentage of urgent (priority 2) incidents. Results (%) are rounded to one decimal point for reporting.
Inclusions	Responses with a priority code of 2. First ambulance service vehicle to arrive at the scene after the call answered. All values 0 and higher are acceptable.
Exclusions	N/A

Ambulance response time

Description of measure	Ambulance response time is measured from the time a call is placed in queue (for an ambulance to be dispatched) to the time the first ambulance service response arrives at the incident scene. No more than one response time for each incident is used.
Calculation	When: <ul style="list-style-type: none"> • 'Time_CallEnteredQueue' is a valid date • AND 'Time_ArrivedAtScene' is valid date • AND 'Time_CallEnteredQueue' is prior to 'Time_ArrivedAtScene' • AND Local Response Area maps to a valid Geo_Id code • AND 'Time_First_Unit_Arrived' = 'Time_ArrivedAtScene' • AND Local Response Area has a valid Geo_Id code • THEN calculate time difference between 'Time_CallEnteredQueue' and 'Time_First_Unit_Arrived'.

Measures used in this report

Median (50th percentile) ambulance response time	<p>The total time by which half of incidents were responded to by ambulance service vehicles. The other half took equal to or longer than this time.</p> <p>The median is a statistical measure of the midpoint of the response time distribution.</p> <p>BHI uses the data for the first vehicle to arrive at the scene and the empirical distribution function with averaging to compute the median in SAS©9.</p>
Data element description	<p>Response time is the difference in minutes between when a call is placed in queue (for an ambulance to be dispatched) to the time the first ambulance service response arrives at the incident scene.</p> <p>Results (minutes) are rounded to one decimal point for reporting.</p>
Inclusions	<p>Responses with a priority code of 1, 1A and 2.</p> <p>First ambulance service vehicle to arrive at the scene after the call is placed in queue.</p>
Exclusions	N/A
90th percentile ambulance response time	<p>The time by which 90% of incidents were responded to by ambulance service vehicles. The final 10% took equal to or longer than this time.</p> <p>The 90th percentile is a statistical measure of response time distribution. BHI uses the first vehicle to arrive at the scene and the empirical distribution function with averaging to compute the 90th percentile in SAS©9.</p>
Data element description	<p>Response time is the difference in minutes between when a call is placed in the queue (for an ambulance to be dispatched) to the time the first ambulance service response arrives at the incident scene.</p> <p>Results (minutes) are rounded to one decimal point for reporting.</p>
Exclusions	N/A
Percentage of priority 1A responses within 10 minutes	<p>Percentage of emergency (priority 1A) incidents (requiring at least one immediate response under lights and siren) responded to in under or equal to 10 minutes.</p>
Calculation	<p>The percentage is calculated as the number of priority 1A responses where the time from when a call is placed in queue (for an ambulance to be dispatched) to the time the first ambulance service response arrives at the incident scene was less than, or equal to, 10 minutes as a percentage of the total number of priority 1A responses.</p> <p>Results (%) are rounded to one decimal point for reporting.</p>
Inclusions	<p>Responses with a priority code of 1A.</p> <p>First ambulance service vehicle to arrive at the scene after the call is placed in queue.</p> <p>All values 0 and higher are acceptable.</p>
Exclusions	N/A

Admitted patients

Episode of care	<p>The period of admitted patient care between a formal or statistical admission and a formal or statistical separation, characterised by only one Care Type. It is designed to reflect the changing diagnosis and/or treatment of the patient and ends when the care type changes or the patient separates from the hospital.</p> <p>When a person is admitted to hospital they begin what is termed an admitted patient episode or 'episode of care'. Admitted patient episodes can be acute (admissions for immediate treatment) or non-acute (admissions for rehabilitation, palliative care, or other reasons). Admissions that involve treatment for mental health can be acute or non-acute. Patients may have more than one type of care during the same hospital admission, each of which is regarded as a separate 'episode of care'. For example, a patient may begin with acute care and then change to rehabilitation or palliative care.</p>
Total episodes	The count of all episodes of care which end within a defined period (i.e. with an episode end date in the defined period).
Acute episodes	The count of completed episodes of care with a care type value of 1 (acute care) or 5 (newborn care).
Non-acute episodes	The count of completed episodes of care with a care type value of 2 (rehabilitation care), 3 (palliative care), 4 (maintenance care), 7 geriatric evacuation and management) or 8 (psycho-geriatric).
Mental health episodes	The count of completed episodes of care with a care type value of M (mental health care).
Planned episodes	The count of completed episodes of care with an urgency of admission value of 2 (non-emergency/planned) or 5 (regular same-day planned admission).
Unplanned/other episodes	All completed episodes of care within a defined period minus planned episodes.
Babies born	The count of completed episodes of care with source of referral of 'born in hospital'; it is a subset of unplanned episodes. Unlike all other fields in the admitted patient dataset, babies born uses the 'episode' table of the Health Information Exchange.
Stay type	<p>Episodes of care can be for 'same-day' or 'overnight' care. Same-day refers to patients who are admitted and discharged on the same day. Overnight refers to patients who spend at least one night in hospital.</p> <p>Episodes of care can be either 'planned' or 'unplanned'. Planned refers to admissions that are arranged in advance (for example, patients who are admitted for planned elective surgery) Unplanned refers to emergency admissions (for example, for unplanned surgical patients).</p>
Same-day episodes	The count of completed episodes of care with an episode start date equal to the episode end date.
Overnight episodes	The count of completed episodes of care with an episode start date that is earlier (not equal) to the episode end date.
Bed days	<p>Bed days are calculated for all episodes of care completed during the reference period.</p> <p>Bed days for an overnight episode is the difference, in days, between the episode start date and the episode end date, minus the number of episode leave days recorded. Same-day episodes count as one bed day.</p>
Acute bed days	The sum of bed days for all completed acute episodes within the defined period.
Non-acute bed days	The sum of bed days for all completed non-acute episodes within the defined period.
Mental health bed days	The sum of bed days for all completed mental health episodes within the defined period.
Average length of stay	The mean of total bed days for all completed episodes of care within the defined period. That is, the total number of days in hospital for all episode of care (including same-day and overnight patients) divided by the total number of episodes of care. The average length of stay is usually measured from midnight.
Emergency surgery	Emergency surgery is reported as emergency admissions involving surgery. This refers to hospital admissions for which the urgency of admission is reported as emergency (admission required within 24 hours) and where the assigned AR-DRG is surgical (excluding childbirth-related AR-DRGs).

Seclusion and restraint

Number of seclusion events

Description of measure	Count of all seclusion events occurring in public specialised acute mental health inpatient units, manually collected by each local health district at mental health service unit level and reported to the NSW Ministry of Health.
Inclusions	All specialised declared and non-declared acute mental health units. Same-day and overnight separations. Complete and non-complete episodes in the reporting period.
Exclusions	N/A

Number of restraint events

Description of measure	Count of all restraint events occurring in public specialised acute mental health inpatient units, manually collected by each local health district at mental health service unit level and reported to NSW Ministry of Health.
Inclusions	All specialised declared and non-declared acute mental health units. Same-day and overnight separations. Complete and non-complete episodes in the reporting period. Mechanical and physical types of restraints.
Exclusions	N/A

Rate of seclusion

Description of measure	Number of seclusion events per 1,000 bed days.
Calculation	Denominator: <ul style="list-style-type: none">Number of accrued mental health care days in public specialised acute mental health inpatient units in the reporting period. Numerator: <ul style="list-style-type: none">Number of seclusion events in public specialised acute mental health inpatient units in the reporting period. Results are rounded to one decimal point for reporting.
Inclusions	All specialised declared and non-declared acute mental health units. Same-day and overnight separations. Complete and non-complete episodes in the reporting period.
Exclusions	Leave days.

Rate of physical restraint

Description of measure	Number of physical restraint events per 1,000 bed days.
Calculation	<p>Denominator:</p> <ul style="list-style-type: none"> Number of accrued mental health care days in public specialised acute mental health inpatient units in the reporting period. <p>Numerator:</p> <ul style="list-style-type: none"> Number of physical restraint events occurring in public specialised acute mental health inpatient units in the reporting period. <p>Results are rounded to one decimal point for reporting.</p>
Inclusions	<p>All specialised declared and non-declared acute mental health units.</p> <p>Same-day and overnight separations.</p> <p>Complete and non-complete episodes in the reporting period.</p>
Exclusions	Leave days.

Frequency of seclusion

Description of measure	Percentage of mental health admitted episodes of care where at least one seclusion event occurred.
Calculation	<p>Denominator:</p> <ul style="list-style-type: none"> Number of admitted mental health episodes of care in public specialised acute mental health inpatient units in the reporting period. <p>Numerator:</p> <ul style="list-style-type: none"> Number of admitted mental health episodes of care with at least one seclusion event in public specialised acute mental health inpatient units in the reporting period. <p>Results (%) are rounded to one decimal point for reporting.</p>
Inclusions	<p>All specialised declared and non-declared acute mental health units.</p> <p>Same-day and overnight separations.</p> <p>Complete and non-complete episodes in the reporting period.</p>
Exclusions	N/A

Frequency of physical restraint

Description of measure	Percentage of mental health admitted episodes of care where at least one physical restraint event occurred.
Calculation	Denominator: <ul style="list-style-type: none"> Number of admitted mental health episodes of care in public specialised acute mental health inpatient units in the reporting period. Numerator: <ul style="list-style-type: none"> Number of admitted mental health episodes of care with at least one physical restraint event in public specialised acute mental health inpatient units in the reporting period. Results (%) are rounded to one decimal point for reporting.
Inclusions	All specialised declared and non-declared acute mental health units. Same-day and overnight separations. Complete and non-complete episodes in the reporting period.
Exclusions	N/A

Average duration of seclusion

Description of measure	The average duration in hours and minutes of seclusion events.
Calculation	Total duration of seclusion events divided by the number of seclusion events in public specialised acute mental health inpatient units.
Inclusions	All specialised declared and non-declared acute mental health units. Same-day and overnight separations. Complete and non-complete episodes in the reporting period.
Exclusions	N/A

Average duration of restraint

Description of measure	The average duration in minutes of restraint events.
Calculation	Total duration of restraint events divided by the number of restraint events in public specialised acute mental health inpatient units.
Inclusions	All specialised declared and non-declared acute mental health units. Same-day and overnight separations. Complete and non-complete episodes in the reporting period. Mechanical and physical types of restraints.
Exclusions	N/A

Elective surgery: Activity measures

The number of patients who received elective surgery	The count of patients who were removed from the waiting list during the reporting period because they were a routine admission for surgery, an admission for their listed procedure as an emergency admission, an admission contracted to another hospital, or an admission for surgery contracted to a private hospital or private day procedure centre.
The number of patients who were added to the elective surgery waiting list	The number of patients who were added to the waiting list during the reporting period. The count is the number of patients whose listing date was within the reporting period. The cohort is any patient who was on the waiting list during the reporting period. That is: <ul style="list-style-type: none"> count of patients who were added to the waiting list during the reporting period count of patients who may have received surgery during the reporting period or still be on the waiting list at the end of reporting period.
The number of patients ready for elective surgery, on the waiting list at the end of the reporting period, who had not received elective surgery within clinically recommended maximum waiting time for their urgency category	The number of patients who were on the waiting list and ready for care at the end of the reporting period, and who had waited longer than clinically recommended maximum waiting times, which are defined as: <ul style="list-style-type: none"> Urgent surgery: patients had accrued more than 30 days ready for care Semi-urgent surgery: patients had accrued more than 90 days ready for care Non-urgent surgery: patients had accrued more than 365 days ready for care. <p>This measure appears in <i>Healthcare Quarterly</i> at NSW level from April to June 2020.</p>
The number of patients waiting for elective surgery	The count of patients who were on the waiting list and ready for care at the end of the reporting period.
Not ready for care	'Not ready for care' patients are those who are not in a position to be admitted to hospital. Patients not ready for surgery on the waiting list includes those waiting for staged procedures, non-urgent cystoscopy, and patients currently not available for personal reasons.
Urgency category	A classification system based on how urgent the patient's need for surgery is: <p>Urgent surgery: Admission within 30 days is desirable for a condition that has potential to deteriorate quickly and become an emergency.</p> <p>Semi-urgent surgery: Admission within 90 days is desirable for a condition unlikely to deteriorate quickly.</p> <p>Non-urgent surgery: Admission within 365 days acceptable for a condition unlikely to deteriorate quickly.</p>
Staged surgery	Surgery that, for medical reasons, cannot take place before a certain amount of time has elapsed. BHI uses this term to define all patients that could be identified as being a staged patient for most of their time on the waiting list and all non-urgent cystoscopy patients.
Common procedure	Commonly performed elective surgical procedures. As of July-September 2023 issue of <i>Healthcare Quarterly</i> , procedure codes – 280 (Transcatheter Aortic Valve Implantation (TAVI) - High Risk) and 281 (Transcatheter Aortic Valve Implantation (TAVI) - Low to Medium Risk) have been excluded from the analyses.
Specialty	The area of clinical expertise held by the doctor who performed the surgery. Medical (specialty) refers to any surgery performed by a non-specialist medical practitioner.

Elective surgery: Performance measures

Elective surgery waiting time

Description of measure	The waiting period for a particular patient is defined as the time between the list date and the removal date. The time a patient waited for the initial appointment with a specialist is not included in the time a patient spent on the waiting list for elective surgery. Waiting time is calculated using the Commonwealth waiting time definition. The number of days is calculated by subtracting the listing date for care from the removal date, minus any days when the patient was 'not ready for care', and also minus any days the patient was waiting with a less urgent clinical urgency category than their clinical urgency category at removal from the waiting list.
Cohort description (numerator and denominator)	All patients removed from the waiting list during the reporting period because they were a routine admission for surgery, an admission for their listed procedure as an emergency admission, or an admission for surgery contracted to a private hospital or private day procedure centre.
Further details (inclusions, exclusions)	Exclusions: <ul style="list-style-type: none">• Patients who were coded as not ready for surgery (NRFC) at the time of surgery• Patients who were recorded as NRFC on the day they were entered on to the waitlist and who had a single urgency change to their final urgency category• Patients who received a cystoscopy and were in the non-urgent category• The count for a hospital does not include admissions contracted to another public hospital.
Data source	Waiting List Collection On-line System (WLCOS).

Measures used in this report

Median waiting time in days	The number of days it took for half of patients who received elective surgery during the reporting period to be admitted and receive their surgery. The other half took equal to or longer than this time. Median waiting time is calculated using the Commonwealth waiting time definition. BHI reports the median by urgency category, surgical specialty and common procedure.
90th percentile waiting time in days	The number of days it took for 90 percent of patients who received elective surgery during the reporting period to be admitted and receive their surgery. The 90th percentile waiting time is also reported using the Commonwealth waiting time definition. BHI reports the 90th percentile by urgency category.

Percentage of patients admitted and who received surgery within the clinically recommended maximum waiting time

Description of measure	The proportion of patients admitted within the clinically recommended maximum waiting time for each of the elective surgery urgency categories.
Cohort description (numerator and denominator)	Numerator : <ul style="list-style-type: none">• Number of patients admitted to hospital for their elective surgery within the clinically recommended maximum waiting time, i.e. in 30 days or less for category A patients, 90 days or less for category B patients and 365 days or less for category C patients. Denominator: <ul style="list-style-type: none">• Total number of patients admitted for elective surgery in each urgency category.

List of statistical areas level 4 (SA4s) by statistical areas level 3 (SA3s)

SA4	SA3s
Capital Region	Goulburn – Mulwaree, Queanbeyan, Snowy Mountains, South Coast and Young – Yass
Central Coast	Gosford and Wyong
Central West	Bathurst, Lachlan Valley, Lithgow – Mudgee and Orange
Coffs Harbour – Grafton	Clarence Valley and Coffs Harbour
Far West and Orana	Bourke – Cobar – Coonamble, Broken Hill and Far West and Dubbo
Hunter Valley excl. Newcastle	Lower Hunter, Maitland, Port Stephens and Upper Hunter
Illawarra	Dapto – Port Kembla, Illawarra Catchment Reserve, Kiama – Shellharbour and Wollongong
Mid North Coast	Great Lakes, Kempsey – Nambucca, Port Macquarie and Taree – Gloucester
Murray	Albury, Lower Murray and Upper Murray excl. Albury
New England and North West	Armidale, Inverell – Tenterfield, Moree – Narrabri and Tamworth – Gunnedah
Newcastle and Lake Macquarie	Lake Macquarie – East, Lake Macquarie – West and Newcastle
Richmond – Tweed	Richmond Valley – Coastal, Richmond Valley – Hinterland and Tweed Valley
Riverina	Griffith – Murrumbidgee (West), Tumut – Tumbarumba and Wagga Wagga
Southern Highlands and Shoalhaven	Shoalhaven and Southern Highlands
Sydney – Baulkham Hills and Hawkesbury	Baulkham Hills, Dural – Wisemans Ferry, Hawkesbury and Rouse Hill – McGraths Hill
Sydney – Blacktown	Blacktown, Blacktown – North and Mount Druitt
Sydney – City and Inner South	Botany, Marrickville – Sydenham – Petersham and Sydney Inner City
Sydney – Eastern Suburbs	Eastern Suburbs – North and Eastern Suburbs – South
Sydney – Inner South West	Bankstown, Canterbury, Hurstville and Kogarah – Rockdale
Sydney – Inner West	Canada Bay, Leichhardt and Strathfield – Burwood – Ashfield
Sydney – North Sydney and Hornsby	Chatswood – Lane Cove, Hornsby, Ku-ring-gai and North Sydney – Mosman
Sydney – Northern Beaches	Manly, Pittwater and Warringah
Sydney – Outer South West	Camden, Campbelltown (NSW) and Wollondilly
Sydney – Outer West and Blue Mountains	Blue Mountains, Blue Mountains – South, Penrith, Richmond – Windsor and St Marys
Sydney – Parramatta	Auburn, Carlingford, Merrylands – Guildford and Parramatta
Sydney – Ryde	Pennant Hills – Epping and Ryde – Hunters Hill
Sydney – South West	Bringelly – Green Valley, Fairfield and Liverpool
Sydney – Sutherland	Cronulla – Miranda – Caringbah and Sutherland – Menai – Heathcote

List of hospitals by local health district and hospital peer group, A1–C2 only

Hospital	Local health district	Hospital peer group
Armidale Hospital	Hunter New England	C1
Auburn Hospital	Western Sydney	B
Ballina District Hospital	Northern NSW	C2
Bankstown–Lidcombe Hospital	South Western Sydney	A1
Batemans Bay District Hospital	Southern NSW	C2
Bathurst Health Service	Western NSW	C1
Belmont Hospital	Hunter New England	C1
Blacktown Hospital	Western Sydney	B
Blue Mountains District Anzac Memorial Hospital	Nepean Blue Mountains	C2
Bowral and District Hospital	South Western Sydney	C1
Broken Hill Health Service	Far West	C1
Byron Central Hospital	Northern NSW	C2
Calvary Mater Newcastle	Hunter New England	A3
Campbelltown Hospital	South Western Sydney	B
Canterbury Hospital	Sydney	B
Casino & District Memorial Hospital	Northern NSW	C2
Cessnock Hospital	Hunter New England	C2
Coffs Harbour Health Campus	Mid North Coast	B
Concord Repatriation General Hospital	Sydney	A1
Cooma Hospital and Health Service	Southern NSW	C2
Cowra Health Service	Western NSW	C2
Deniliquin Hospital and Health Services	Murrumbidgee	C2
Dubbo Base Hospital	Western NSW	B
Fairfield Hospital	South Western Sydney	B
Gosford Hospital	Central Coast	A1
Goulburn Base Hospital and Health Service	Southern NSW	C1
Grafton Base Hospital	Northern NSW	C1
Griffith Base Hospital	Murrumbidgee	C1
Gunnedah Hospital	Hunter New England	C2
Hawkesbury District Health Services	Nepean Blue Mountains	C1
Hornsby Ku-ring-gai Hospital	Northern Sydney	B
Inverell Hospital	Hunter New England	C2
John Hunter Hospital	Hunter New England	A1
Kempsey District Hospital	Mid North Coast	C2
Kurri Kurri Hospital	Hunter New England	C2
Lachlan Health Service – Forbes	Western NSW	C2
Lismore Base Hospital	Northern NSW	B
Lithgow Hospital	Nepean Blue Mountains	C2
Liverpool Hospital	South Western Sydney	A1
Macksville District Hospital	Mid North Coast	C2
Maclean District Hospital	Northern NSW	C2
Maitland Hospital	Hunter New England	B

Hospital	Local health district	Hospital peer group
Manning Hospital	Hunter New England	B
Milton Ulladulla Hospital	Illawarra Shoalhaven	C2
Moree Hospital	Hunter New England	C2
Moruya District Hospital	Southern NSW	C2
Mount Druitt Hospital	Western Sydney	C1
Mudgee Health Service	Western NSW	C2
Murwillumbah District Hospital	Northern NSW	C1
Muswellbrook Hospital	Hunter New England	C2
Narrabri Hospital	Hunter New England	C2
Nepean Hospital	Nepean Blue Mountains	A1
Northern Beaches Hospital	Northern Sydney	B
Orange Health Service	Western NSW	B
Port Macquarie Base Hospital	Mid North Coast	B
Prince of Wales Hospital	South Eastern Sydney	A1
Queanbeyan Hospital and Health Service	Southern NSW	C2
Royal North Shore Hospital	Northern Sydney	A1
Royal Prince Alfred Hospital	Sydney	A1
Ryde Hospital	Northern Sydney	C1
Shellharbour Hospital	Illawarra Shoalhaven	C1
Shoalhaven District Memorial Hospital	Illawarra Shoalhaven	B
Singleton Hospital	Hunter New England	C2
South East Regional Hospital	Southern NSW	C1
St George Hospital	South Eastern Sydney	A1
St Vincent's Hospital Sydney	St Vincent's Health Network	A1
Sutherland Hospital	South Eastern Sydney	B
Sydney Children's Hospital, Randwick	Sydney Children's Network	A2
Sydney Hospital and Sydney Eye Hospital	South Eastern Sydney	A3
Tamworth Hospital	Hunter New England	B
The Children's Hospital at Westmead	Sydney Children's Network	A2
The Tweed Hospital	Northern NSW	B
Wagga Wagga Rural Referral Hospital	Murrumbidgee	B
Westmead Hospital	Western Sydney	A1
Wollongong Hospital	Illawarra Shoalhaven	A1
Wyong Hospital	Central Coast	B
Young Health Service	Murrumbidgee	C2

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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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