

Hospital Quarterly

Technical Supplement

Emergency department measures

July to September 2016

BUREAU OF HEALTH INFORMATION

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Summary

This technical supplement describes the methods and technical terms used to calculate NSW public hospital emergency department (ED) activity and performance measures reported in the Bureau of Health Information (BHI) *Hospital Quarterly* report. Recent changes to methods are also described.

ED information in *Hospital Quarterly* is based on analyses of attendance data in the Emergency Department Data Collection (EDDC). Data are extracted from the centralised data warehouse, the Health Information Exchange (HIE), administered by the NSW Ministry of Health.

The activity and performance measures reported in *Hospital Quarterly* are currently based on 132 hospital EDs which have had an electronic records system in place and reliable data in the EDDC for five or more quarters. These 132 EDs comprise the 'NSW totals' reported in *Hospital Quarterly*. They account for approximately 95% of all ED presentations in NSW and 98% of records in the EDDC.

EDs are reported individually for hospitals in principal referral, major or district peer groups (A1, A2, A3, B, C1 and C2). A total of 75 EDs met the reporting criteria in the July to September 2016 quarter.

Peer group changes

In *Hospital Quarterly*, July to September 2016, ED data are no longer individually reported for five hospitals due to their reallocation from peer group C2, to lower peer groups (smaller facilities including community and multi-purpose service peer groups)¹ (Table 1). For the purposes of reporting in *Hospital Quarterly*, data for these hospitals are included in NSW and local health district (LHD) totals, and in 'Other' peer group totals.

Table 1 Changes to hospital peer group allocation and reporting, July to September 2016¹

Hospitals no longer individually reported	2016 peer group	2016 peer group name	Local health district	2011 peer group
Bellinger River District Hospital	D1a	Community hospitals with surgery	Mid North Coast	C2
Bulli District Hospital	F4	Sub-acute	Illawarra Shoalhaven	C2
Camden Hospital	D1b	Community hospitals without surgery	South Western Sydney	C2
Parkes District Hospital	D1a	Community hospitals with surgery	Western NSW	C2
Tumut Health Service	D1a	Community hospitals with surgery	Murrumbidgee	C2

Effect of peer group changes

The exclusion of five previously C2 hospitals from individual hospital reporting has had no effect on aggregated NSW and LHD reporting, or peer group reporting for hospital peer groups A1, A2, A3, B and C1.

This change has the effect of reducing the number of EDs for which data are reported individually in *Hospital Quarterly* from 80 to 75. It also has the effect of reducing the number of C2 hospitals for which ED data are reported individually from 28 to 23 (Table 2).

In order to make fair comparisons with the same quarter in the previous year, data in *Hospital Quarterly, July to September 2016* are based on recalculations that exclude these hospitals from C2 peer group for 21 quarters. This means that measures reported in the current edition may differ slightly from previous editions of the report. Therefore caution is advised when interpreting any comparisons using previous editions.

The effect of reallocation of five previously C2 hospitals to the 'Other' peer group is shown in Appendix tables 3–5.

Percentage of patients who started treatment within clinically recommended timeframes

Performance measures reporting the percentage of patients who started treatment within clinically recommended timeframes for each triage category and overall were included from *Hospital Quarterly*, January to March 2016.

Time to treatment is measured from presentation time (the earlier of arrival and triage time) to the start of clinical treatment by a doctor or nurse.

Arrival time was used for 99.6% of records.

The clinically recommended maximum waiting times for triage categories from the Australasian College of Emergency Medicine are²:

T1: Resuscitation	2 minutes
T2: Emergency	10 minutes
T3: Urgent	30 minutes
T4: Semi-urgent	60 minutes
T5: Non-urgent	120 minutes

Changeover to a new records system

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

At a facility level, during a changeover period, the only information from the EDDC reported by BHI is the total number of ED presentations. For aggregated NSW reporting (for example, for NSW, LHDs or peer groups), data from affected hospitals are included in total counts but are excluded from calculation of all performance measures.

Activity and performance measures

This section contains the definitions used for calculating measures of ED activity and performance reported in *Hospital Quarterly*.

In the following definitions, numbers in brackets indicate the HIE database field code used to identify records by ED visit type or mode of separation (as appropriate). The arrival date and time field is used to select records from the HIE for each quarter. Unless explicitly stated, records with incomplete information in the fields required for a calculation are excluded.

All presentations

'All presentations' is the count of every record in the ED visit database 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. 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).

Records are assigned to quarters of the year using the arrival date and time field.

Emergency presentations

'Emergency presentations' are records in the ED visit database 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 *Hospital Quarterly* are reported by triage category.

Records with missing or invalid information for triage category are excluded from reported counts of emergency presentations.

Emergency presentations by quarter

The time series graphs in *Hospital Quarterly* present the number of emergency presentations to an ED during each quarter for the past 21 quarters.

All presentations by mode of separation

Presentations are reported based on the mode of separation field: treated and discharged, treated and admitted to hospital, left without, or before, completing treatment, transferred to another hospital and other modes of separation. Records with a missing mode of separation are included in the 'other' cohort.

The mode of separation cohorts are:

- **Treated and discharged** – presentations with mode of separation: departed with treatment complete (4)
- **Treated and admitted to hospital** – presentations with modes of separation: admitted to a ward/inpatient unit (1), admitted and discharged as an inpatient within ED (2), admitted and died in ED (3), admitted to a critical care ward (10), admitted via an operating theatre (11) or admitted – left at own risk (13)
- **Left without, or before completing, treatment** – presentations with modes of separation: departed, did not wait (6) and departed – left at their own risk (7). Patients who 'did not wait' were triaged, but left the ED before treatment was commenced. Patients who 'left at their own risk' were triaged and treatment was 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: dead on arrival (8) or departed for another clinical service location (9). Presentations with missing mode of separation are also included in this cohort.

Presentation time

Presentation time is the earlier of the following fields in the emergency visit database of the HIE:

- **Arrival time** – the date and time the patient presented at the ED
- **Triage time** – the date and time when the patient was assessed by a triage nurse.

If triage time is more than 12 hours before arrival time, then the triage time field is considered an error and presentation time is set equal to arrival time.

Treatment time

Treatment time is the earlier of the following fields in the ED visit database of the HIE:

- **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).

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.

Ready for departure time

Ready for departure time is 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. 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.

Actual departure time

Actual departure time is 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 presentation time or more than 31 days after presentation time, then the actual departure time field is treated as missing and the record is excluded from calculations that use actual departure time.

Time from presentation to starting treatment

Time from presentation to starting treatment is calculated as the difference between presentation time and treatment time. It is reported by triage category for emergency presentations. Records with an ED visit type of Emergency (1), Unplanned return visit for a continuing condition (3) and Disaster (11) are included. 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) are excluded, since patients in these categories do not receive clinical treatment in the ED.

If treatment time is more than 12 hours before presentation time or more than 31 days after presentation time, then that time from presentation until treatment is considered an error and set to missing. If treatment time is before presentation time by 12 hours or less, then time from presentation until treatment is set to zero.

Records with a missing treatment time are excluded from calculations that use treatment time.

BHI does not report time from presentation to starting treatment for patients in triage category 1, since BHI considers that waiting time measures are not informative for these patients. Recording of presentation, triage and treatment time 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.²

Time spent in the ED

Time spent in the ED is calculated as the difference between presentation time and departure time. Departure time is defined as:

- **Actual departure time** – for all patients other than those who were treated and discharged
- **Ready for departure time** – for patients who were treated and discharged.

If the time recorded for actual 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, 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.

Median

The median is a statistical measure of the midpoint of the waiting times distribution. This measure is used in *Hospital Quarterly* to describe time from presentation until treatment and time spent in the ED. The median is the time by which half of patients started treatment or left the ED. The other half of patients took equal to or longer than this time. BHI uses the data for each patient and the empirical distribution function with averaging to compute the median in SAS®5. Results are rounded to the nearest whole minute for reporting.

95th percentile

The 95th percentile is a statistical measure of the waiting time distribution. It is used in *Hospital Quarterly* to describe time from presentation until treatment, and time spent in the ED. The 95th percentile is the time by which 95% of patients started treatment or left the ED. The final 5% of patients took equal to or longer than this time. BHI uses the data for each patient and the empirical distribution function with averaging to compute the 95th percentile in SAS®5. Results are rounded to the nearest whole minute for reporting.

Percentage of patients who started treatment within clinically recommended timeframes

This percentage is calculated as the number of presentations where the time from presentation to treatment was less than, or equal to, the clinically recommended time as a percentage of the total number of presentations.

A patient started treatment within the clinically recommended timeframe 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 of Emergency Medicine policy on the Australasian Triage.²

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%

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.

Calculation of the time elapsed is described in more detail in the sections Presentation time, Treatment time, and Time from presentation to starting treatment.

Percentage of patients who started treatment, by time

The distribution curve in *Hospital Quarterly* shows the cumulative percentage of emergency presentations by minutes from presentation until treatment by triage category. The cumulative percentage is computed by summing the proportions of patients whose treatment started in one minute intervals of time elapsed since presentation within each triage category.

Emergency patients who received treatment are patients with visit type = 1, 3 or 11 and mode of separation = 1, 2, 3, 4, 5, 7, 10, 11, 12 and 13. This cohort only includes patients who had a valid triage category and treatment time. Calculation of the time elapsed is described in the section Time from presentation to starting treatment.

If the cumulative distribution does not reach 100%, it indicates that some patients in that triage category waited longer than the maximum time shown on the horizontal axis for their treatment to start.

Percentage of patients who spent four hours or less in the ED

The percentage of patients who spent four hours or less in the ED is calculated as the number of patients with time from presentation to leaving the ED of four hours or less as a percentage of the total number of patients.

Records with missing time to departure are excluded from calculations of percentage leaving the ED within four hours.

Percentage of patients by time spent in the ED

The distribution curve in *Hospital Quarterly* shows the cumulative percentage of patients and time spent in the ED by the number of hours from presentation until leaving the ED. The cumulative percentage is computed by summing the percentage of patients and time spent in the ED in one minute intervals of time elapsed from presentation to departure. Records that do not have a valid time from presentation to departure are excluded from calculation. Calculation of the time elapsed is described in the section Time from presentation to leaving the ED.

If the cumulative distribution does not reach 100%, it indicates that some patients waited longer than the maximum time shown on the horizontal axis to leave the ED.

Percentage of patients by time spent in the ED and mode of separation

The distribution curve in *Hospital Quarterly* shows the cumulative percentage of patients by the number of hours spent in the ED by mode of separation. The cumulative percentage is computed by summing the percentage of patients and time spent in the ED in one minute intervals of time elapsed from presentation to departure for each mode of separation. Records that do not have a valid departure time are excluded from calculation. Calculation of the time elapsed is described in the section Time spent in the ED.

If the cumulative distribution does not reach 100%, it indicates that some patients in that mode of separation waited longer than the maximum time shown on the horizontal axis of the graph, to leave the ED.

Arrivals by ambulance and transfer of care time

Data for calculating 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.

Overall results for NSW, peer group and LHD use records for patients arriving at hospitals with an ED which is included in *Hospital Quarterly* and has records in the TCRS. The TCRS does not include all hospitals with EDs which are reported in *Hospital Quarterly*. Records in the TCRS for any hospitals where the EDs are not reported in *Hospital Quarterly* are excluded from all calculations of ambulance arrivals and transfer of care time.

Ambulance arrivals is the count of all cases recorded in the TCRS as arriving at a hospital with an ED which is included in *Hospital Quarterly*. Ambulance arrivals include all emergency and priority medical patients transported by ambulance.

Transfer of care time is the time from arrival of patients at the ED by ambulance and transfer of responsibility for their care from ambulance to ED staff in an ED treatment zone. Transfer of care time can only be calculated for matched records. These are records where the ambulance incident number and date can be identified in both the NSW Ambulance data and the ED data. Records which cannot be matched are excluded from all calculations that use transfer of care time.

If the time recorded for transfer of care is earlier than ambulance arrival time, then transfer of care time is calculated starting from ED triage time. If the time of transfer of care is earlier than both arrival and triage time, then transfer of care time is set to missing and the record is excluded from all calculations requiring transfer of care time.

Transfer of care performance is reported as:

- Median time for transfer of care (minutes)
- 95th percentile time for transfer of care (minutes)
- Percentage of ambulance arrivals with transfer of care time within 30 minutes. The denominator for the percentage is the number of matched records with a valid transfer of care time.

Transfer of care performance is not reported for hospitals with less than 50 matched records in the quarter. Records from these hospitals are excluded from calculation of performance measures.

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.

For more information, see *Spotlight on Measurement: Measuring transfer of care from the ambulance to the emergency department* available at bhi.nsw.gov.au

Appendix

Table 2 Peer group C2 hospitals and changes, July to September 2016

C2 cohort	Hospital	Local health district	Peer group
Up to April to June 2016	Ballina	Northern NSW	C2
	Batemans Bay	Southern NSW	C2
	Bellingen	Mid North Coast	C2
	Bulli	Illawarra Shoalhaven	C2
	Camden	South Western Sydney	C2
	Casino	Northern NSW	C2
	Cessnock	Hunter New England	C2
	Deniliquin	Murrumbidgee	C2
	Forbes	Western NSW	C2
	Gunnedah	Hunter New England	C2
	Inverell	Hunter New England	C2
	Kempsey	Mid North Coast	C2
	Kurri Kurri	Hunter New England	C2
	Lithgow	Nepean Blue Mountains	C2
	Macksville	Mid North Coast	C2
	Maclean	Northern NSW	C2
	Milton	Illawarra Shoalhaven	C2
	Moree	Hunter New England	C2
	Moruya	Southern NSW	C2
	Mudgee	Western NSW	C2
	Muswellbrook	Hunter New England	C2
	Narrabri	Hunter New England	C2
	Parkes	Western NSW	C2
	Queanbeyan	Southern NSW	C2
	Singleton	Hunter New England	C2
	Tumut	Murrumbidgee	C2
Young	Murrumbidgee	C2	
July to September 2016	Ballina	Northern NSW	C2
	Batemans Bay	Southern NSW	C2
	Bellingen	Other Mid North Coast	D1a
	Bulli	Illawarra Shoalhaven	F4
	Camden	Other South Western Sydney	D1b
	Casino	Northern NSW	C2
	Cessnock	Hunter New England	C2
	Deniliquin	Murrumbidgee	C2
	Forbes	Western NSW	C2
	Gunnedah	Hunter New England	C2
	Inverell	Hunter New England	C2
	Kempsey	Mid North Coast	C2
	Kurri Kurri	Hunter New England	C2
	Lithgow	Nepean Blue Mountains	C2
	Macksville	Mid North Coast	C2
	Maclean	Northern NSW	C2
	Milton	Illawarra Shoalhaven	C2
	Moree	Hunter New England	C2
	Moruya	Southern NSW	C2
	Mudgee	Western NSW	C2
	Muswellbrook	Hunter New England	C2
	Narrabri	Hunter New England	C2
	Parkes	Other Western NSW	D1a
	Queanbeyan	Southern NSW	C2
	Singleton	Hunter New England	C2
	Tumut	Other Murrumbidgee	D1a
Young	Murrumbidgee	C2	

Table 3 Effect of reallocation of four hospitals from C2 peer group to 'Other' peer group on median, 95th percentile time to starting treatment in the ED and percentage of patients whose treatment started within clinically recommended timeframes, Hospital Quarterly, July to September 2016

	Measure after change	Measure before change	Difference
Triage 2			
Median (minutes) time	8m	7m	1m
95th percentile time	35m	34m	1m
Percentage on time (%)	66.9	68.2	-1.3 percentage points
Triage 3			
Median (minutes) time	19m	18m	2m
95th percentile time	84m	81m	3m
Percentage on time (%)	72.2	74.0	-1.8 percentage points
Triage 4			
Median (minutes) time	26m	24m	2m
95th percentile time	128m	123m	5m
Percentage on time (%)	78.9	80.9	-2.0 percentage points
Triage 5			
Median (minutes) time	25m	22m	3m
95th percentile time	146m	140m	6m
Percentage on time (%)	91.8	92.9	-1.1 percentage points

Table 4 Effect of reallocation of four hospitals from C2 peer group to 'Other' peer group on number of ED presentations, median and 95th transfer of care times and percentage of patients whose care was transferred within 30 minutes, Hospital Quarterly, July to September 2016

Peer group	Measure after change	Measure before change	Change
C2	Number of presentations	68,325	77,836 -9,511
	Median (minutes) transfer of care time	11 m	11 m Unchanged
	95th percentile transfer of care time	39m	39m Unchanged
	Percentage whose care was transferred within 30 minutes	90.3%	90.1% 0.2 percentage points

Table 5 Effect of reallocation of four hospitals from C2 peer group to 'Other' peer group on time spent in the ED and percentage of patients who spent four hours of less in the ED, Hospital Quarterly, July to September 2016

Peer group	Measure after change	Measure before change	Change
C2	Median (hours and minutes) time spent in the ED	1h 43m	1h 38m 5 m
	95th percentile time spent in the ED	6h 46m	6h 34m 12 m
	Percentage who spent four hours or less in the ED	84.7%	85.7% -1 percentage point

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

BHI was established in 2009 to provide system-wide support through transparent reporting.

BHI 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 in public hospitals and other healthcare facilities.

BHI publishes a range of reports and tools that provide relevant, accurate and impartial information about how the health system is measuring up in terms of:

- Accessibility – healthcare when and where needed
- Appropriateness – the right healthcare, the right way
- Effectiveness – making a difference for patients
- Efficiency – value for money
- Equity – health for all, healthcare that's fair
- Sustainability – caring for the future.

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 report 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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Hospital Quarterly

Technical Supplement

Measures of admitted patient activity

July to September 2016

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Summary

This technical supplement describes the methods and technical terms used to calculate NSW public hospital admitted patient measures reported in the Bureau of Health Information (BHI) *Hospital Quarterly* report. Recent changes to methods are also described.

Admitted patient information in *Hospital 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). Measures of admitted patient activity reported in *Hospital Quarterly* (Table 2) are currently based on 200 public hospitals which have had an electronic records system in place and reliable data in the APDC for five or more quarters.

Hospitals are reported individually for hospitals in principal referral, major or district peer groups (A1, A2, A3, B, C1 and C2). In July to September 2016, a total of 78 hospitals met this reporting criteria.

Peer group changes

In *Hospital Quarterly, July to September 2016*, admitted patient data are no longer individually reported for five hospitals due to their reallocation, from peer group C2, to lower peer groups (smaller facilities including community and multi-purpose service peer groups) (Table 1). For the purposes of reporting in *Hospital Quarterly*, data for these hospitals are included in NSW and local health district (LHD) totals, and in 'Other' peer group totals.

Table 1 Changes to hospital peer group allocation and reporting, July to September 2016¹

Hospitals no longer individually reported	2016 peer group	2016 peer group name	Local health district	2011 peer group
Bellinger River District Hospital	D1a	Community hospitals with surgery	Mid North Coast	C2
Bulli District Hospital	F4	Sub-acute	Illawarra Shoalhaven	C2
Camden Hospital	D1b	Community hospitals without surgery	South Western Sydney	C2
Parke District Hospital	D1a	Community hospitals with surgery	Western NSW	C2
Tumut Health Service	D1a	Community hospitals with surgery	Murrumbidgee	C2

Effect of peer group changes

The exclusion of five previously C2 hospitals from individual hospital reporting has had no effect on aggregated NSW and LHD reporting, or peer group reporting for hospital peer groups A1, A2, A3, B and C1.

This change has the effect of reducing the number of hospitals for which admitted patient data are reported individually in *Hospital Quarterly* from 83 to 78. It also has the effect of reducing the number

of C2 hospitals for which admitted patient data are reported individually from 30 to 25 (Table 2).

In order to make fair comparisons with the same quarter in the previous year, data in *Hospital Quarterly, July to September 2016* are based on recalculations that exclude these hospitals from peer group C2 for 21 quarters. This means that measures reported in the current edition may differ slightly from previous editions of the report. Therefore caution is advised when interpreting any comparisons using previous editions.

The effect of reallocation of five previously C2 hospitals to the 'Other' peer group is shown in Appendix table 4.

Appendix

Admitted patient activity

Table 2 includes the definitions used for the calculations of measures of admitted patient activity reported in *Hospital Quarterly*.

SAS* (currently SAS V9.3™) is used for the statistical analysis of data for *Hospital Quarterly*.

Table 2 Admitted patient measures

Total episodes	The count of all records with an episode end date in the defined period.
Planned episodes	The count of all recorded admissions with an emergency status of 'non-emergency / planned' or 'regular same-day planned admission'.
Unplanned / other episodes	All episodes with an episode end date in the defined period minus planned episodes.
Babies born	The count of records 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.
Acute episodes	The count of records with episode of care type values of 1 (acute care) and 5 (newborn care) – see Glossary: Acute episode.
Acute same day episodes	The count of acute episode records with an episode start date equal to the episode end date.
Acute overnight episodes	The count of the acute episode records with an episode start date earlier (not equal) to the episode end date.
Total acute bed days	The sum of bed days for all acute episodes with an episode end date within the defined period. Total acute 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.
Average length of stay	The mean of total bed days for all acute episodes with an episode end date in the defined period.

Table 3 Peer group C2 hospitals and changes, July to September 2016

C2 cohort	Hospital	Local health district	Peer group
Up to April to June 2016	Ballina	Northern NSW	C2
	Batemans Bay	Southern NSW	C2
	Bellinger River	Mid North Coast	C2
	Blue Mountains	Nepean Blue Mountains	C2
	Bulli	Illawarra Shoalhaven	C2
	Camden	South Western Sydney	C2
	Casino	Northern NSW	C2
	Cessnock	Hunter New England	C2
	Cooma	Southern NSW	C2
	Cowra	Western NSW	C2
	Deniliquin	Murrumbidgee	C2
	Forbes	Western NSW	C2
	Gunnedah	Hunter New England	C2
	Inverell	Hunter New England	C2
	Kempsey	Mid North Coast	C2
	Kurri Kurri	Hunter New England	C2
	Lithgow	Nepean Blue Mountains	C2
	Macksville	Mid North Coast	C2
	Maclean	Northern NSW	C2
	Milton	Illawarra Shoalhaven	C2
	Moree	Hunter New England	C2
	Moruya	Southern NSW	C2
	Mudgee	Western NSW	C2
	Muswellbrook	Hunter New England	C2
	Narrabri	Hunter New England	C2
	Parkes	Western NSW	C2
	Queanbeyan	Southern NSW	C2
	Singleton	Hunter New England	C2
	Tumut	Murrumbidgee	C2
	Young	Murrumbidgee	C2
July to September 2016	Ballina	Northern NSW	C2
	Batemans Bay	Southern NSW	C2
	Bellinger River	Other Mid North Coast	D1a
	Blue Mountains	Nepean Blue Mountains	C2
	Bulli	Illawarra Shoalhaven	F4
	Camden	Other South Western Sydney	D1b
	Casino	Northern NSW	C2
	Cessnock	Hunter New England	C2
	Cooma	Southern NSW	C2
	Cowra	Western NSW	C2
	Deniliquin	Murrumbidgee	C2
	Forbes	Western NSW	C2
	Gunnedah	Hunter New England	C2
Inverell	Hunter New England	C2	

C2 cohort	Hospital	Local health district	Peer group
	Kempsey	Mid North Coast	C2
	Kurri Kurri	Hunter New England	C2
	Lithgow	Nepean Blue Mountains	C2
	Macksville	Mid North Coast	C2
	Macleay	Northern NSW	C2
	Milton	Illawarra Shoalhaven	C2
	Moree	Hunter New England	C2
	Moruya	Southern NSW	C2
	Mudgee	Western NSW	C2
	Muswellbrook	Hunter New England	C2
	Narrabri	Hunter New England	C2
	Parkes	Other Western NSW	D1a
	Queanbeyan	Southern NSW	C2
	Singleton	Hunter New England	C2
	Tumut	Other Murrumbidgee	D1a
	Young	Murrumbidgee	C2

Table 4 Effect of peer group change for five C2 hospitals, July–September 2016

Total C2 peer group, July to September 2016¹

	All admitted patient episodes			Acute episodes			
	Total admitted patient episodes	Planned	Unplanned	Acute same-day episodes	Acute overnight episodes	Total acute bed days	Average length of stay (days)
Measure after change	30,470	13,914	16,556	16,157	13,123	68,818	2.4
Measure before change	33,338	14,894	18,444	17,376	14,147	75,440	2.4
Difference	-2,868	-980	-1,888	-1,219	-1,024	-6,622	0

1. Bulli District Hospital, Bellinger River District Hospital, Camden Hospital, Parkes District Hospital and Tumut Health Service move from C2 to 'Other' peer group.
2. Totals include other small groups (smaller facilities including community and multi-purpose service peer groups) (data not shown).

References

1. Health System Information & Performance Reporting, NSW Ministry of Health, NSW Hospital peer groups 2016, 06 April 2016 [online] [cited 04 November 2016]. Available from http://www0.health.nsw.gov.au/policies/ib/2016/IB2016_013.html

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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 report 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.

bhi.nsw.gov.au

Hospital Quarterly

Technical Supplement

Elective surgery measures

July to September 2016

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Please also note that there is the potential for minor revisions of data in this report.

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Summary

This supplement to the Bureau of Health Information's (BHI) public hospital elective surgery performance report describes the methods and technical terms used to calculate descriptive statistics and performance indicators reported in *Hospital Quarterly*. Recent changes to methods are also described.

Measures of elective surgery activity and performance reported in *Hospital Quarterly* are currently based on 96 public hospitals which have had an electronic records system in place and reliable data in the APDC for four or more quarters. These 96 hospitals comprise the 'NSW totals' reported in *Hospital Quarterly*. Hospitals are reported individually for hospitals in principal referral, major or district peer groups (A1, A2, A3,

B, C1 and C2). In July to September 2016, a total of 79 hospitals met this reporting criteria.

Peer group changes

In *Hospital Quarterly, July to September 2016*, elective surgery data are no longer individually reported for three hospitals due to their reallocation, from peer group C2, to lower peer groups (smaller facilities including community and multi-purpose service peer groups)¹ (Table 1). For the purposes of reporting in *Hospital Quarterly*, data for these hospitals are included in NSW and local health district (LHD) totals, and in 'Other' peer group totals.

Table 1 Changes to hospital peer group allocation and reporting, July to September 2016¹

Hospitals no longer individually reported	2016 peer group	2016 peer group name	Local health district	2011 peer group
Bellinger River District Hospital	D1a	Community hospitals with surgery	Mid North Coast	C2
Parkes District Hospital	D1a	Community hospitals with surgery	Western NSW	C2
Tumut Health Service	D1a	Community hospitals with surgery	Murrumbidgee	C2

Effect of peer group changes

The exclusion of three previously C2 hospitals from individual hospital reporting has had no effect on aggregated NSW and LHD reporting, or peer group reporting for hospital peer groups A1, A2, A3, B and C1.

This change has the effect of reducing the number of hospitals for which elective surgery data are reported individually in *Hospital Quarterly* from 82 to 79. It also has the effect of reducing the number of C2 hospitals for which emergency department data are reported individually from 28 to 25 (Table 2).

In order to make fair comparisons with the same quarter in the previous year data in *Hospital Quarterly, July to September 2016* are based on recalculations that exclude these hospitals from C2 peer group for 21 quarters. This means that measures reported in the current edition may differ slightly from previous editions of the report. Therefore caution is advised when interpreting any comparisons using previous editions.

The effect of peer group changes on selected elective surgery activity and performance measures of reallocation of four previously C2 hospitals to the 'Other' peer group is shown in Appendix tables 3 and 4.

Surgical activity and performance indicators

Data used for calculation of surgical activity and performance

The elective surgery component of *Hospital Quarterly* is based on analyses of data extracted from the central data warehouse, the Waiting List Collection On-line System (WLCOS).

WLCOS includes information on the date a patient is listed for a surgical procedure, the type of procedure required, the specialty of the surgeon, the urgency category of their surgery and whether the patient is currently ready for surgery. Some of these factors may change during the time a patient is on the waiting list.

The WLCOS system is described in greater detail in the *Data Quality Assessment: information systems for elective surgery in NSW* at bhi.nsw.gov.au

Elective surgery activity and performance indicators in *Hospital Quarterly* include:

- The number of patients who received elective surgery during the quarter
- The percentage of patients admitted within the recommended timeframe
- The median waiting time in days
- The 90th percentile waiting time in days
- The number of patients waiting for elective surgery at the end of the quarter
- Waiting list measures by specialty of surgeon
- Waiting list measures for common procedures.

SAS* (currently SAS V9.3™) is used for the statistical analysis of data for *Hospital Quarterly*.

Hospitals included in Hospital Quarterly

Hospital Quarterly reports on all public hospitals which are included in WLCOS. Information is provided for individual hospitals in peer groups A1, A2, A3, B, C1 and C2. Information is suppressed for an individual hospital if patient numbers are too small to report.

Urgency category

Patients are assigned to a clinical priority or urgency category, by their surgeon, according to rules described in the NSW Ministry of Health's *Waiting Time and Elective Patient Management Policy*. That document was developed 'to promote clinically appropriate, consistent & equitable management of elective patients and waiting lists in public hospitals across NSW'.

WLCOS uses alphabetical codes to define surgical priority categories; 'A' is urgent, 'B' is semi-urgent, 'C' is non-urgent and 'D' is not ready for care (NRF). Additional information about 'not ready for care' days can be found in Appendix 1.

Some elective surgery reporting uses numbers for urgency category and these are interchangeable with the alphabetical coding used in this document; 1 = A, 2 = B, 3 = C and 4 = D.

(*) SAS Institute. The SAS System for Windows version 9.3 Cary, NC, USA.

Ready for care (surgery)

A patient is termed **'ready for care'** or **'not ready for care'**. Ready for care patients are those who are prepared to be admitted to hospital or to begin the process leading directly to admission.

These could include procedures done on an outpatient basis, such as autologous blood collection, pre-operative diagnostic imaging or blood tests. Not ready for care patients are those who are not in a position to be admitted to hospital. These patients are either:

- Staged patients whose medical condition will not require or be amenable to surgery until some future date; for example, a patient who has had internal fixation of a fractured bone and who will require removal of the fixation device after a suitable time
- Deferred patients who for personal reasons are not yet prepared to be admitted to hospital; for example, patients with work or other commitments which preclude their being admitted to hospital for a time.

Patients who are not ready for surgery are coded as urgency D (NRFC) in WLCOS, with the reason recorded in the listing status variable.

Patients are not coded NRFC if their operation is postponed for reasons other than their own unavailability, for example; their surgeon is unavailable, or operating theatre time is unavailable owing to emergency workload. These patients are still **'ready for care'**.

Calculation of waiting time and ready for care days

The waiting period for a particular patient is defined as the time between the list date and the removal date. Patient records are provided with a list date when added to WLCOS and a removal date when they are taken off the hospital's booking list. Patients who are not ready for surgery are recorded as NRFC. The number of days ready for care is calculated by subtracting any days that the patient is recorded as being NRFC from the total waiting time of each patient.

There are differences between hospitals in the way hospitals calculate waiting time for patients who are considered NRFC for part of their time on the waiting list. These differences may arise from patient administration software and/or in the interpretation of NSW Ministry of Health policies on the elective surgery waiting list.

To enable fair comparisons of waiting time measures between hospitals, BHI uses three decision rules to determine whether patients should be included in elective surgery waiting time calculations. This is particularly important for measures of waiting times for elective surgery, such as median and 90th percentile waiting time and percentage of patients seen on time.

The following patients are deemed to be staged and are not included in calculation of waiting times:

- Patients who were coded as NRFC at the time of surgery
- Patients who were recorded as NRFC on the day they were entered onto the wait list and who were transferred to another urgency category within a day or two of removal date
- Patients who received cystoscopy and were in the non-urgent category.

BHI deemed patients who met these criteria to have had **'staged surgery'**.

Waiting times are not appropriate measure of hospital performance when surgery is staged. The reasons for this decision, details of the analyses and historical comparisons are presented in Appendix 1.

BHI reports counts for these patients in a category deemed **'staged surgery'**.

Median and 90th percentile waiting times

Median 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. The median is the number of days it took for half of patients who received elective surgery during the period to be admitted and receive their surgery. The other half took equal to or longer than the median to be admitted for surgery. BHI reports the median by urgency category, surgical specialty and common procedure.

The 90th percentile waiting time is also reported using the Commonwealth waiting time definition. The 90th percentile is the number of days it took for 90 percent of patients who received elective surgery during the period to be admitted and receive their surgery. The other 10 percent took equal to or longer than the 90th percentile to be admitted for surgery. BHI reports the 90th percentile by urgency category. The current median and 90th percentile waiting times are compared with waiting times during the same quarter last year. In addition median and 90th percentile waiting times are compared with the median and 90th percentile waiting times of other hospitals in their peer group.

Surgical specialty

Surgical specialty in this report is the clinical expertise of the surgeon who will perform the elective surgery. The category **'Other medical'** includes medical practitioners who are not specialist surgeons.

Procedure

Procedures reported include the 15 procedures listed by the Australian Institute for Health and Welfare (AIHW) in December 2011.

See

www.meteor.aihw.gov.au/content/index.phtml/itemId/472513

In addition, BHI reports information for two other procedures, which are among the four most common procedures in NSW but are not already included in the AIHW list.

Patients who received elective surgery by urgency category

This indicator includes a count of patients who were removed from the waiting list during the quarter 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. The count for a hospital does not include admissions contracted to another public hospital.

Prior to July 2012, patients with a condition requiring surgery within 24 hours (removal status coded 2) were excluded. These patients are included in the count from July 2012.

From July 2012 counts are also presented for the same quarter in the previous five years.

The records of these patients all have the following information in WLCOS:

- A valid removal date
- A code of **'S'** for elective surgery
- Codes **'1'** or **'2'** or **'8'** for removal status.

Percentage of patients admitted within the recommended timeframe, by urgency category

This indicator provides the proportion of patients admitted within the clinically recommended timeframe for each of the elective surgery urgency categories.

The numerator is the number of patients admitted to hospital for their elective surgery within the clinically recommended timeframe, 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. The denominator is the total number of patients admitted for elective surgery in each urgency category.

The indicator is presented at hospital, peer group, local health district and state level.

More information about clinically recommended time frames can be found in the NSW Ministry of Health's *Waiting Time and Elective Patient Management Policy*.

Percentage of patients who received elective surgery by waiting time (cumulative)

The number of 'ready for care' days that NSW patients waited for their surgery is presented graphically as the cumulative percentage of patients who received elective surgery by the number of days 'ready for care' (up to 420 days).

Patients ready for surgery on waiting list

BHI reports on patients who are on the waiting list at the end of the quarter and who are ready for their surgery. Patients whose urgency category at the end of the quarter is 'D', whose surgery is deemed staged as described in Appendix 1, or who are waiting for a non-urgent cystoscopy are not included.

The waiting time reported for these patients is the number of days ready for care, as recorded in WLCOS. Days when the patient was not ready for care are not included.

The number of patients ready for surgery on the waiting list and their waiting time is reported by urgency, specialty of surgeon and for common procedures.

Patients not ready for surgery on waiting list

BHI reports the number of patients who are on the waiting list at the end of the quarter but are not ready for surgery. The patients in this group are patients whose urgency category at the end of the quarter is 'D', whose surgery is deemed staged.

Patients ready for elective surgery, on the waiting list for longer than 12 months

This count is the number of patients who were on the waiting list and ready for care at the end of the quarter, and who had accrued more than 365 days ready for care.

Suppression rules

Some hospitals conduct few surgical procedures. Small numbers in any group need to be treated cautiously to protect patients' identity. BHI suppresses information based on very few patients. If there are fewer than five patients in any group, patient numbers are displayed as < 5. For measures reported by urgency category, 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.

Appendix

Table 2 Peer group C2 hospitals and changes, July to September 2016

C2 cohort	Hospital	Local health district	Peer group	
Up to April to June 2016	Ballina	Northern NSW	C2	
	Batemans Bay	Southern NSW	C2	
	Bellinger River	Mid North Coast	C2	
	Blue Mountains	Nepean Blue Mountains	C2	
	Casino	Northern NSW	C2	
	Cessnock	Hunter New England	C2	
	Cooma	Southern NSW	C2	
	Cowra	Western NSW	C2	
	Deniliquin	Murrumbidgee	C2	
	Forbes	Western NSW	C2	
	Gunnedah	Hunter New England	C2	
	Inverell	Hunter New England	C2	
	Kempsey	Mid North Coast	C2	
	Kurri Kurri	Hunter New England	C2	
	Lithgow	Nepean Blue Mountains	C2	
	Macksville	Mid North Coast	C2	
	Macleay	Northern NSW	C2	
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	Moree	Hunter New England	C2	
	Moruya	Southern NSW	C2	
	Mudgee	Western NSW	C2	
	Muswellbrook	Hunter New England	C2	
	Narrabri	Hunter New England	C2	
	Parkes	Western NSW	C2	
	Queanbeyan	Southern NSW	C2	
	Singleton	Hunter New England	C2	
	Tumut	Murrumbidgee	C2	
	Young	Murrumbidgee	C2	
	July to September 2016	Ballina	Northern NSW	C2
		Batemans Bay	Southern NSW	C2
		Bellinger River	Other Mid North Coast	D1a
		Blue Mountains	Nepean Blue Mountains	C2
Casino		Northern NSW	C2	
Cessnock		Hunter New England	C2	
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Moruya		Southern NSW	C2	
Mudgee		Western NSW	C2	
Muswellbrook		Hunter New England	C2	
Narrabri		Hunter New England	C2	
Parkes		Other Western NSW	D1a	
Queanbeyan		Southern NSW	C2	
Singleton		Hunter New England	C2	
Tumut		Other Murrumbidgee	D1a	
Young		Murrumbidgee	C2	

Table 3 Effect of peer group change for four C2 hospital on selected elective surgery activity measures, July to September 2016

Total C2 peer group, July to September 2016

	Total number of elective surgical procedures	Urgent elective surgical procedures	Semi-urgent elective surgical procedures	Non-urgent elective surgical procedures	Staged elective surgical procedures
Measure after change	4,169	544	1,200	2,303	122
Measure before change	4,346	556	1,239	2,429	122
Difference (%)	-4.1	-2.2	-3.1	-5.2	0.0

Table 4 Effect of peer group change for four C2 hospital on selected elective surgery performance measures, July to September 2016

C2 peer group, July to September 2016

	Measure after change	Measure before change	Difference
Percentage of elective surgical procedures performed on time (%)			
All procedures	99.4	98.8	0.6 percentage points
Urgent (%)	99.6	100.0	-0.4 percentage points
Semi-urgent (%)	99.2	98.8	0.4 percentage points
Non-urgent (%)	99.4	98.5	0.9 percentage points
Median waiting time (days)			
Urgent	11	11	unchanged
Semi-urgent	35	35	unchanged
Non-urgent	159	163	-4 days
90th percentile waiting time (days)			
Urgent	26	27	-1 day
Semi-urgent	76	76	unchanged
Non-urgent	334	336	-2 days

References

1. Health System Information & Performance Reporting, NSW Ministry of Health, NSW Hospital peer groups 2016, 06 April 2016 [online] [cited 04 November 2016]. Available from http://www0.health.nsw.gov.au/policies/ib/2016/IB2016_013.html

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