Technical Supplement:

Measures of admitted patient activity

Hospital Quarterly: April to June 2010

Bureau of Health Information

Summary

This supplement to the Bureau of Health Information's recurrent public hospital performance reports describes the methods and technical terms used to compute descriptive statistics and performance indicators reported in *Hospital Quarterly.* Due to the technical nature of this narrative, it is intended for audiences interested in the creation of health information.

Until March 2010, the NSW Department of Health published the *Quarterly Hospital Performance Report* which presented a selection of measures for admitted patient activity in NSW public hospitals.* These performance indicators are now reported by the Bureau of Health Information in the *Hospital Quarterly* report.

Admitted patient data is extracted from a centralised data warehouse administered by the NSW Department of Health called the Health Information Exchange (HIE). These records are held in the Episode ATS (Admissions, Transfers and Separations) database. Public hospital records of admitted patients are uploaded from each facility's patient administration systems to the HIE weekly, via centralised area health service information systems. Most facilities submit admitted patient records to the area health service information systems daily to allow sufficient time to identify and correct errors in accordance with data quality assurance procedures.

The Department of Health also conducts regular data quality assurance procedures and requires corrected data be resubmitted by the end of the month following the initial submission. Currently, 279 separate facilities that submit admitted patient data to the HIE are included in the admitted patient activity measures in *Hospital Quarterly.*

The Bureau of Health Information used SAS# V9.1.3™ for the statistical analysis of data for the *Hospital Quarterly*.

* New South Wales Health. *Monthly Hospital Performance Reports January 2008 to March 2010* [Internet] [cited 2010 August 23]. Available from **www.health.nsw.gov.au/reports/reports.asp**

\# SAS Institute. *The SAS System for Windows version 9.1.3.* Cary (NC): SAS Institute; 2005.

Activity indicators

This section contains details about the definitions used for the calculations of measures of admitted patient activity reported in the *Hospital Quarterly: April to June 2010*.

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

The count of all recorded admissions with an emergency status of 'emergency', 'urgency not assigned' or 'maternity/newborn'.

Babies born

The count of records with source of referral of 'born in hospital'; it is a subset of unplanned episodes.

Acute episodes

The count of records with episode of care type values of 1 (acute care) and 5 (newborn care) - see Glossary: Care type.

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.

Glossary

Admission(s) – refers to the process, using registration procedures, under which a person is accepted by a hospital or an area or district health service facility as an inpatient.

Acute episode – a period of time when patients receive hospital care that is considered short-term and requiring immediate care. Acute episodes can be care types 1 or 5 which are described by METeOR* as:

- Type 1 episodes are where "the principal clinical intent is to do one or more of the following: manage labour (obstetric), cure illness or provide definitive treatment of injury, perform surgery, relieve symptoms of illness or injury (excluding palliative care), reduce severity of illness or injury, protect against exacerbation and/or complication of an illness and/or injury which could threaten life or normal functions, or perform diagnostic or therapeutic procedures".
- Type 5 is defined as "care and/or accommodation to a patient born in the hospital or who is nine days old or less at the time of admission".

Average length of stay – the total number of days for all admissions (same day and overnight) divided by the number of admissions. See also length of stay.

Care type – the type of service provided by the hospital. The ten possible care types (as defined in the HIE) are:

1. Acute care
2. Rehabilitation care
3. Palliative care
4. Maintenance care
5. Newborn care
6. Other care
7. Geriatric evaluation and management
8. Psychogeriatric care
9. Organ procurement – posthumous
10. Hospital boarder

Episode of care – defined as a period of admitted patient care characterised by a single care type. A change of care type starts a new episode of care.

Episode start date – refers to the point in time that an episode of care begins. An episode of care commences with a formal admission or a change in care type.

* Australian Institute of Health and Welfare. *METeOR: Metadata Online Registry* [Computer Software] [cited 2010 September 9]. Available from www.meteor.aihw.gov.au

Episode end date – refers to the point in time that an episode of care ceases. An episode of care ceases with a formal discharge, death, or a change in care type.

Episode leave day – when a patient leaves a facility to return at a later date for continuation of care (the episode of care does not end).

Health Information Exchange (HIE) – better known by the abbreviation HIE, this is a store of health records and information.

Length of stay – is defined, for an overnight patient, as the number of days between the episode start date and the episode end date, less the number of episode leave days. The length of stay of a same day episode is one day.

Other admission – refers to an admission that is neither a planned admission or an unplanned admission. It includes admissions for normal delivery (obstetric), admissions which begin with the birth of the patient (or when it was intended that the birth occur in the hospital) and admissions which commence shortly after the birth of the patient. It also includes planned readmissions for the patient to receive limited care or treatment for a current condition, for example, dialysis or chemotherapy.

Overnight episode – any episode where a patient is admitted to a public hospital and stays one or more nights before being discharged. For the purposes of this report, all overnight admissions reported are for acute episodes only.

Planned episode – refers to an admission of a patient which, in the opinion of the treating clinician, is necessary and for which admission can be delayed for 24 hours. Planned episodes include elective surgery as well as regular planned same-day episodes, such as renal dialysis and chemotherapy.

Same day episode – an episode where a patient is admitted to a public hospital, receives treatment and is discharged on the same calendar day. For the purposes of this report, all same day admissions reported are for acute episodes only.

Total acute bed days – number of hospital beds in a given period of time that were occupied by acute patients. For overnight admissions, bed days refer to the number of days between admission and discharge, excluding any leave days. Same day episodes count as one bed day.

Unplanned admission – an unplanned admission is an admission to a hospital ward that was not arranged prior to admission.

About the Bureau

The Bureau of Health Information was established in 2009 as an independent, board-governed organisation established by the NSW Government to be the leading source of information on the performance of the public health system in NSW.

Our Mission

The Bureau provides the community, healthcare professionals and the NSW Parliament with timely, accurate and comparable information about the performance of the NSW public health system in ways that enhance the system's accountability and inform efforts to increase its beneficial impact on the health and well being of people in NSW.

The Bureau of Health Information is a statutory health corporation. The conclusions in this report are those of the Bureau of Health Information and no official endorsement by the NSW Minister for Health, the NSW Department of Health or any other NSW statutory health corporation is intended or should be inferred.

Our Board

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- Professor Jane Hall
- Mrs Liz Rummery AM
- Dr Don Weatherburn
- Ms Sue West
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Technical Supplement:

Measures of elective surgery activity

Hospital Quarterly: April to June 2010

Bureau of Health Information

Summary

This supplement to the Bureau of Health Information's recurrent public hospital performance reports describes the methods and technical terms used to compute descriptive statistics and performance indicators reported in *Hospital Quarterly.* Due to the technical nature of this narrative, it is intended for audiences interested in the creation of health information.

The elective surgery component of the *Hospital Quarterly* report is based on analyses of data extracted from a central data warehouse. The Bureau reports two performance indicators, the proportion of patients admitted within the recommended timeframe for each elective surgery urgency category and the median waiting time in days. More detail is provided in the activity indicators and the glossary pages. Indicators are presented by hospital, area health service and for NSW.

The Bureau of Health Information used SAS* V9.1.3™ for the statistical analysis of data for the *Hospital Quarterly: April to June 2010*.

The Waiting List Collection On-line System

The Waiting List Collection On-line System (WLCOS) contains a census of patients waiting for planned treatment at the end of each month and a record of patients admitted to the facility for the planned procedure or removed from the waiting list during each month. It is provided by NSW public hospitals, public psychiatric hospitals, public multi-purpose services, and for public patients who received treatment at private hospitals and private day procedures centres.

Waiting list data is extracted from the hospital's electronic patient records system and loaded locally into the Health Information Exchange (HIE) of each area health service (Area HIE). The frequency at which these extracts occur varies from site to site (Figure 1) depending on the patient record systems in place at each hospital:

1. At some sites, the waiting list extract is manually initiated and then subsequently transferred to the HIE server for that area health service via the HIE file transfer utility, HIEBatch and Reflection FTP
2. At other sites, a locally provided script performs the waiting list extract and transfer to the HIE server for that area health service. This is automatically initiated at a frequency decided by each area health service.

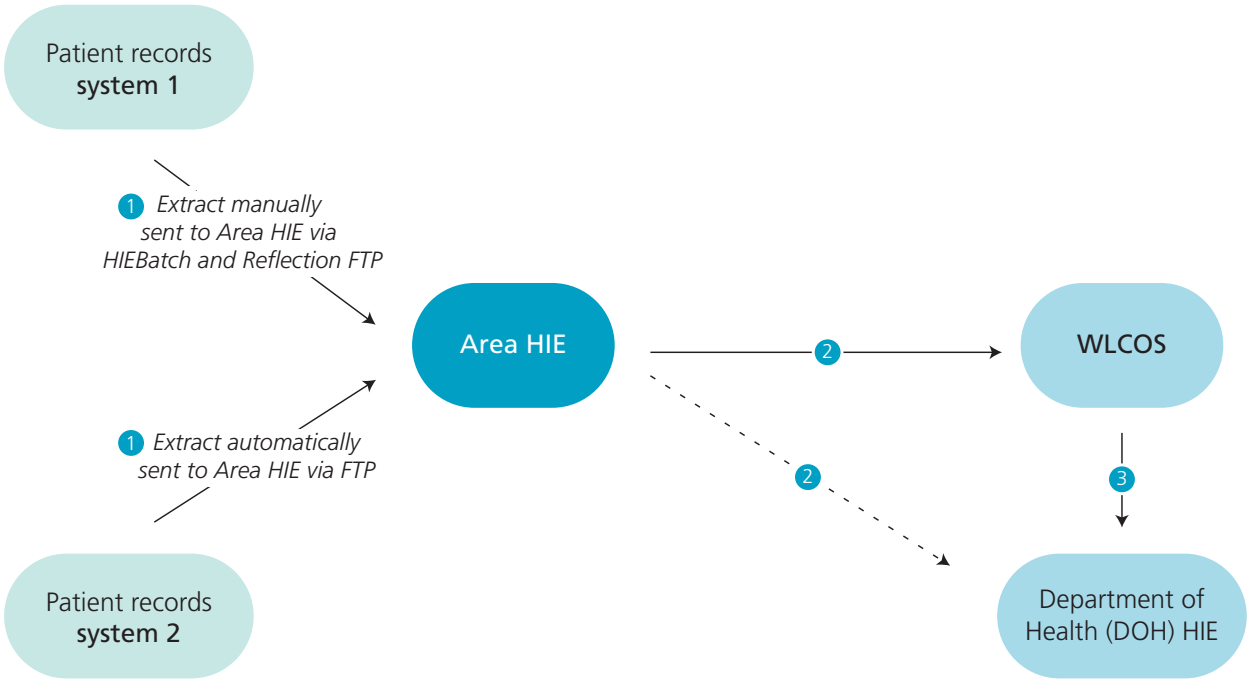
Data is automatically sent from the Area HIEs directly to WLCOS. Data is also periodically loaded into a temporary (non-useable) placeholder file in the HIE maintained by the Department of Health (DOH) from the Area HIEs.

* SAS Institute. *The SAS System for Windows version 9.1.3.* Cary (NC): SAS Institute; 2005.

A system of checks (for logic errors and missing data) is applied to the data held in WLCOS. If a discrepancy in the data is detected, this is communicated to staff in the area health service (AHS) for the affected hospital. The AHS then contacts those hospital staff responsible for the quality of the patient records at each hospital. If these discrepancies are actual errors, then the information is corrected in the patient record system by staff from the hospital and amended in WLCOS by AHS staff. Once the data checks and amendments have been completed, this validated data set is copied to the DOH HIE.

Although WLCOS contains many fields relevant to patients undergoing elective surgery, the Bureau required only a selection to allow it to calculate the elective surgery performance indicators for NSW public hospitals.

Figure 1: Populating HIE elective surgery waiting data from hospital record systems



Activity indicators

The Bureau has reported two performance indicators, both by urgency category:

- The percentage of patients admitted on time for category A, category B, category C and all categories
- Median waiting time (in days) for: category A, category B and category C.

Only patients who have been admitted for their surgery are included in the analysis of these indicators.

This section contains details about the definitions used for the calculations of measures of elective surgery activity reported in the *Hospital Quarterly: April to June 2010.*

Patients admitted within the recommended timeframe

This indicator provides the proportion of patients admitted within the recommended timeframe for each of the elective surgery urgency categories, at each hospital, area health service and for NSW. It includes only records which have a valid Removal Date, are coded as 'S' for Elec Surg and are coded as '1' or '8' for Removal Status.

Per cent of patients admitted within the recommended timeframe, by urgency category

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.

Per cent of patients admitted within the recommended timeframe, all urgency categories

The numerator is the sum of the number of urgency category A patients admitted in 30 days or less plus the number of urgency category B patients admitted in 90 days or less plus the number of urgency category C patients admitted in 365 days or less. The denominator is the sum of all patients admitted from urgency category A plus all patients admitted from urgency category B plus all patients admitted from urgency category C.

Median waiting time

Includes only those records which have a valid Removal Date, are coded as 'S' for Elec Surg and are coded as '1' or '8' for Removal Status. If the Flag Urgency for a patient is set to 'D' (not ready for care), then the wait time variable for calculation is Ready for Care Days; otherwise the wait time variable is Commonwealth Waiting Time. Median Waiting Time is the median (calculated in SAS V9.1.3™) of the appropriate wait time variable for each of the three urgency categories.

Glossary

Admission(s) – refers to the process, using registration procedures, under which a person is accepted by a hospital or an area or district health service facility as an inpatient.

Elective surgery – any form of surgery that a patient's doctor believes to be necessary but which can be delayed by at least 24 hours.

Health Information Exchange (HIE) – better known by the abbreviation HIE, this is a store of health records and information. Data from the Area HIE are used to populate the Waiting List Collection On-line System (WLCOS), which provides the data for the Bureau's reports.

Median waiting time (days) – this is the number of days it took for half of the patients who received elective surgery in the period to be admitted for, and receive, their surgery.

Patients treated on time – refers to the percentage of patients who received elective surgery within the recommended timeframe for their urgency category.

Removal status – describes the reason for the patient's removal from the waiting list; codes of 1 (routine admit) and 8 (admission contracted to a private hospital) mean that the patient received elective surgery and is therefore included in the analysis.

Removal date – the date the patient on the waiting list was admitted to the facility for the planned procedure or was removed from the waiting list.

Urgency categories – all patients on the elective surgery waiting list are allocated to an urgency category by the surgeon to whom they were referred. These categories provide a timeframe for how soon the doctor recommends the patient be admitted for their procedure:

Category 1 **(A)**	Admission within **30 days** desirable
Category 2 **(B)**	Admission within **90 days** desirable
Category 3 **(C)**	Admission within **365 days** desirable

Waiting List Collection On-line System (WLCOS) – this contains a census of patients waiting for elective surgery and a record of all patients from the waiting list who received elective surgery or were removed from the waiting list.

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Technical Supplement:

Measures of emergency department performance and activity

Hospital Quarterly: April to June 2010

Bureau of Health Information

Summary

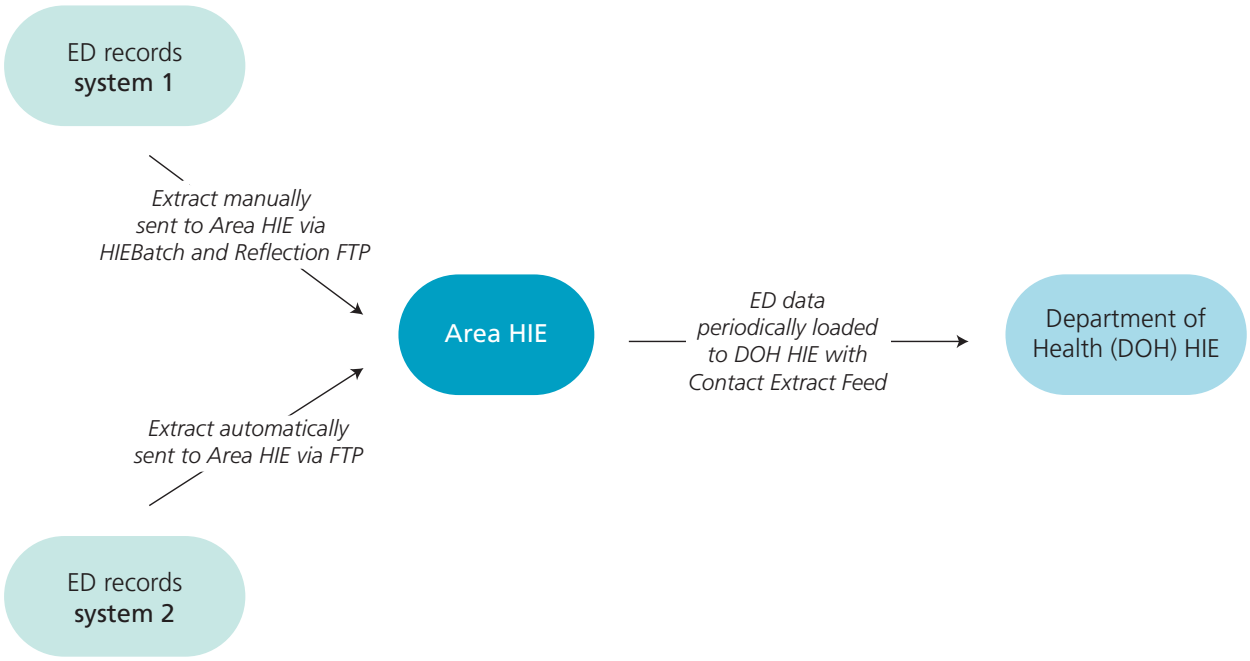
This supplement to the Bureau of Health Information's recurrent public hospital performance reports describes the methods and technical terms used to compute descriptive statistics and performance indicators reported in *Hospital Quarterly.* Due to the technical nature of this narrative, it is intended for audiences interested in the creation of health information.

Emergency department attendance data is extracted from a centralised data warehouse administered by the NSW Department of Health called the Health Information Exchange (HIE). Public hospitals with emergency departments upload records of emergency department presentations to this data warehouse regularly, via centralised area health service information systems **(Figure 1)**. Public hospitals in the greater metropolitan area submit emergency department records on a weekly basis while most other hospitals submit records monthly.

NSW Health* requires that data quality checks are conducted at local, area and state levels. Emergency department performance and activity measures rely on patient-level information. The performance measures in this report are based on 85 hospital emergency departments which currently have computerised information systems which contain patient-level information for two or more years. From April to June 2010, these 85 emergency departments accounted for 83 per cent of all emergency department attendances in NSW.

A staggered rollout of a new electronic information system in NSW public hospital emergency departments has affected completeness of data extracts from the source systems, starting from the first quarter of 2007. The records uploaded may be unrepresentative of the true performance and activity in the hospitals implementing the new system, due to the length of time staff need to learn to use it.

Figure 1: Populating HIE emergency department data from hospital emergency department record systems



* New South Wales Health. *Emergency Department Collection (EDC) – Reporting requirements* [Internet] [cited 2010 Aug 19]. Available from www.health.nsw.gov.au/policies/PD/2005/pdf/PD2005_198.pdf

In *Hospital Quarterly,* records from such hospitals have been excluded from the calculation of state level, hospital peer group level and area health service level performance statistics. The calculation of counts at both the state and at area health service level include records from all hospital emergency departments with electronic information systems. At a facility level, only the fields of all attendances and off stretcher time performance are presented for hospitals undergoing a system update in the current quarter. For the quarter following implementation a cautionary note is displayed next to potentially affected results.

Prior to June 2010, the NSW Department of Health reported on the performance of NSW public hospital emergency departments with a selection of performance indicators. The Bureau is now tasked with reporting these indicators for NSW public hospitals, which include:

- All attendances
- Emergency admissions
- Triage performance (for each triage category)
- Emergency admission performance
- Off stretcher time.

The Bureau has expanded the scope of the emergency care performance indicators. A descriptive analysis of emergency attendances by triage category is included as a special feature of *Hospital Quarterly: April to June 2010*.

Emergency attendances are a subset of all attendances and include those with visit types classified as emergency, re-presentation for a continuing condition or pre-arranged admission for a medical reason. Emergency attendances comprise the bulk of all attendances to NSW public hospital emergency departments. The Bureau's *Hospital Quarterly* reports information about:

- How long patients wait to receive treatment after being triaged
- How long those patients who were admitted waited in the emergency department, starting from the beginning of treatment and ending with arrival on a ward, at an operating suite or at a critical care area
- How long non-admitted patients spent in the emergency department (from the start of treatment) before being discharged or transferred to another hospital
- How patients conclude their emergency department journey before, during or after completing treatment.

The Bureau of Health Information used SAS* V9.1.3™ for the statistical analysis of data for the *Hospital Quarterly: April to June 2010*.

A data quality assessment of information systems in NSW emergency departments is available at www.bhi.nsw.gov.au

* SAS Institute. *The SAS System for Windows version 9.1.3.* Cary (NC): SAS Institute; 2005.

Activity and performance indicators

Numbers in brackets in the following definitions indicate the HIE database field code used to identify records by emergency department visit type or mode of separation (as appropriate).

This section contains details about the definitions used for the calculations of measures of emergency department activity and performance reported in the *Hospital Quarterly: April to June 2010.*

Attendances / all attendances

All attendances is a count of all records in the emergency department visit database of the HIE. This count includes all records of attendances regardless of emergency department visit type and includes planned return visits, pre-arranged admissions, outpatient clinic visits, private referrals, persons pronounced dead on arrival and patients in transit in addition to emergency presentations. Records are not excluded based on missing or invalid fields.

Admissions from the emergency department

Admissions from the emergency department is a count of all records in the emergency department visit database of the HIE with a mode of separation recorded as admitted to a ward (1), admitted to a critical care ward (10), or admitted via an operating theatre (11). No records are excluded on the basis of any other fields with missing or invalid data.

Emergency attendances by triage category

Emergency attendances are the count of all records from the emergency department visit database of the HIE with an emergency department visit type of emergency (1), re-presentation for a continuing condition (3) or pre-arranged medical admission (8). Emergency attendances in the *Hospital Quarterly: April to June 2010* are reported by triage category. Records with missing or invalid information for emergency department visit type or triage category are excluded from this count.

Triage to treatment performance indicator

Triage performance is computed as the percentage of patients in a triage category that were treated within the recommended waiting time for that triage category. The denominator is defined as all emergency attendances in a triage category. The numerator is the number of emergency attendances in a triage category with a waiting time less than or equal to the recommended waiting time for that triage category. Records with missing or invalid information for triage category, triage time, or treatment time fields are excluded from both the numerator and denominator.

Emergency admission performance

Emergency Admission Performance (EAP) is computed as the percentage of all emergency attendances who were admitted to hospital within eight hours. The denominator is the count of all records that were an emergency admission. The numerator is a count of emergency admission records with a difference between treatment time and actual departure time of less than or equal to eight hours. Records with missing or invalid information in triage category, mode of separation, treatment time or actual departure time are excluded from both the numerator and denominator. The target for NSW is 80% of patients admitted within eight hours.

Off stretcher time performance indicator

Off Stretcher Time (OST) is the time in minutes between the time of arrival of an emergency patient by ambulance and the time they are transferred to the care of the emergency department. The denominator is all off stretcher cases, which include all emergency and priority medical patients transported by ambulance and delivered to an emergency department. The numerator is all off stretcher cases transferred to the care of an emergency department within 30 minutes of arrival. The target for NSW is 90 per cent of patients arriving by ambulance to be transferred within 30 minutes.

Emergency attendances by triage category and mode of separation

Counts of emergency department attendances are reported by triage category for three cohorts, defined by how they leave the emergency department. The reported total count is the sum of these three cohorts (listed below). The reported percentages are the count of records in a cohort in a triage category divided by the total count for that cohort. Records with missing information for triage category or mode of separation are excluded for all cohorts.

- The **treated and admitted to hospital cohort** includes emergency department records with a mode of separation of admission to acute inpatient ward (1), a critical care unit (10) or an operating theatre (11)
- The **treated and discharged or transferred cohort** includes emergency attendances with modes of separation of departed with treatment complete (4), admitted and discharged as inpatient within emergency department (2), treated then transferred to another hospital without admission (5) and treated and transferred for admission at another facility (12)
- Patients who **left without, or before completing treatment** (cohort 3) include attendances with modes of separation of departed, did not wait (6) and departed, left at their own risk (7). Attendances that 'did not wait' were triaged but left the emergency department before treatment was commenced. Attendances that 'left at their own risk' were triaged and treatment was begun by a clinician, but the patient left prior to completion of their treatment.

Cumulative distribution: time from triage to treatment

This graph presents the percentage of patients who received treatment by time and triage category. It shows a cumulative distribution of triaged emergency attendances by the number of minutes that elapse between triage time and the start of treatment by a nurse or clinician. The cumulative percentage is computed by taking the number of patients treated by each minute since triage to a triage category and dividing by the total number of patients triaged into that triage category. This cohort only includes patients who had a recorded triage category, triage time and treatment time.

A cumulative distribution that does not reach 100 per cent by 180 minutes indicates that there were some patients in a triage category that waited longer than 180 minutes for treatment.

Cumulative distribution: time from treatment to admission

This graph presents the percentage of patients who were treated and admitted by time and triage category. It shows a cumulative distribution of emergency admissions by the number of hours that elapse between the start of treatment by a clinician and actual departure time. The cumulative percentage is computed by taking the number of patients admitted from a triage category in six minute intervals of time elapsed since treatment began and dividing by the total number of patients admitted from that triage category. This cohort only includes patients who had a recorded triage category, treatment time and actual departure time.

A cumulative distribution that does not reach 100 per cent by 12 hours indicates that there were some patients in a triage category that waited longer than 12 hours to be admitted.

Cumulative distribution: time from treatment to discharge or transfer

This graph presents the percentage of patients who were treated and discharged or treated and transferred by time and triage category. It shows a cumulative distribution of non-admitted emergency attendances with completed treatment by the number of hours that elapse between the start of treatment by a clinician and actual departure time. The cumulative percentage is computed by taking the number of patients admitted from a triage category in six minute intervals of time elapsed since treatment began and dividing by the total number of patients admitted from that triage category. This cohort only includes patients who had a recorded triage category, treatment time and actual departure time.

A cumulative distribution that does not reach 100 per cent by 12 hours indicates that some patients in a triage category waited longer than 12 hours for their treatment to be completed and to leave the emergency department.

Glossary

Actual departure time – actual departure time for an admitted patient is the time the patient is transferred to a ward, operating theatre/suite or intensive care unit in that hospital. Actual departure time for a non-admitted patient or a patient transferred to another hospital is the time at which the assessment and initial treatment of the patient is recorded as having been completed.

Admission(s) – refers to the process, using registration procedures, under which a person is accepted by a hospital or an area or district health service facility as an inpatient. In the context of admission from the emergency department, the person is transferred to a hospital ward, an intensive care unit or an operating theatre.

Admission from the Emergency department – an admission from the emergency department is identified by the mode of separation and is defined as admitted to a hospital ward (1), admitted to a critical care unit (10) or admitted to an operating theatre (11) in the same hospital as the emergency department the patient visited for care.

Attendance – an 'attendance' is the presentation of a patient to the emergency department and is the earliest occasion of the patient being registered clerically or being triaged. An 'attendance' is also referred to as a 'visit' or 'presentation' at the emergency department.

Emergency Admission Performance (EAP) – in the context of care in emergency departments, this is a measure of the time from when the patient begins receiving treatment until the time they arrive on a ward, operating theatre/suite or intensive care unit in that hospital. The target for NSW is 80% admitted within eight hours.

Health Information Exchange (HIE) – better known by the abbreviation HIE, this is a store of health records and information. Data from the Area HIE are used to populate the Waiting List Collection On-line System (WLCOS), which provides the data for the Bureau's reports.

Mode of separation – the mode of separation is the status of the patient when they depart from the emergency department and, in some cases, the location to which patient is released. The thirteen possible modes of separation, as defined in HIE, are:

1. Admitted to ward / inpatient unit, not a critical care ward
2. Admitted and discharged as inpatient within emergency department
3. Admitted: died in emergency department
4. Departed: treatment completed
5. Departed: transferred to another hospital without first being admitted to hospital transferred from
6. Departed: did not wait
7. Departed: left at own risk
8. Dead on arrival
9. Departed: for other clinical service location
10. Admitted: to critical care ward or unit
11. Admitted: via operating suite
12. Admitted: transferred to another hospital
13. Admitted: left at own risk

Non-emergency attendance – these are non-emergency attendances to the emergency department. The two largest groups are planned returns to the emergency department for further treatment and private referral for treatment in the emergency department by a private medical officer.

Off Stretcher Time (OST) – the time between when a patient arrives at an emergency department by ambulance and when they are transferred into the care of the emergency department. In NSW the target for this is 90% of patients arriving by ambulance transferred within 30 minutes.

Pre-arranged admission – in the context of care in emergency departments, this is a planned visit to the emergency department that results in the patient being admitted to hospital and allocated a bed on a ward.

Start of treatment time – in the context of care in emergency departments, the recorded time of when treatment begins, i.e. typically when the patient was first seen by a healthcare professional after being triaged.

Triage – from the French verb *'trier'*, meaning *'to sort'*. Australian emergency departments classify, or triage, patients based on the urgency of their condition or how soon they need to receive care. Emergency departments use a five-point scale where '1' is most urgent and '5' is least urgent. Triage is usually carried out by a registered nurse when the patient arrives in the emergency department. Examples of conditions categorised in each triage group can be found at: www.wacebnm.curtin.edu.au/workshops/Triage.pdf

Triage categories – there are two main triage scales:

- The first Australian five-point triage scale originated at Ipswich Hospital, Queensland during the 1980s and was found to be "a valid and reliable measure of medical urgency". The Ipswich Triage Scale was the basis for the National Triage Scale (NTS) produced by the Australasian College for Emergency Medicine (ACEM) in 1993.

- The ACEM released a revised scale in 2001 (renamed as the Australasian Triage Scale) which was endorsed by the Commonwealth Department of Health and Aging in 2002 for use in all Australian emergency departments.

Triage level	National Triage Scale	Australasian Triage Scale	Recommended maximum waiting time (Target time)
Triage 1	Resuscitation	Immediately life-threatening	2 minutes
Triage 2	Emergency	Imminently life-threatening	10 minutes
Triage 3	Urgent	Potentially life-threatening	30 minutes
Triage 4	Semi-urgent	Potentially serious	60 minutes
Triage 5	Non-Urgent	Less urgent	120 minutes

Triage time – this is the time recorded for when the patient is triaged.

Visit type – the reason the patient presents to an emergency department. The possible visit types, as defined in HIE, are:

1. Emergency presentation
2. Return visit - planned
3. Unplanned return visit for continuing condition
4. Outpatient clinic
5. Privately referred, non-admitted person
6. Pre-arranged admission: without emergency department workup
8. Pre-arranged admission: with emergency department workup
9. Person in transit
10. Dead on arrival
11. Disaster

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Our Mission

The Bureau provides the community, healthcare professionals and the NSW Parliament with timely, accurate and comparable information about the performance of the NSW public health system in ways that enhance the system's accountability and inform efforts to increase its beneficial impact on the health and well being of people in NSW.

The Bureau of Health Information is a statutory health corporation. The conclusions in this report are those of the Bureau of Health Information and no official endorsement by the NSW Minister for Health, the NSW Department of Health or any other NSW statutory health corporation is intended or should be inferred.

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Technical Supplement:

Measures of patient experience of emergency department care

Hospital Quarterly: April to June 2010

Bureau of Health Information

Summary

This technical supplement summarises the research methods and statistical analyses used to measure patient care experiences in the Bureau of Health Information's report *Hospital Quarterly: Performance of NSW Public Hospitals, April to June 2010.* It is written for audiences interested in the creation of health information.

Hospital Quarterly contains a special feature focusing on the patient's experience of their emergency department care, based on analyses of survey data derived from a random sample of non-admitted emergency department patients.

The NSW Department of Health commissioned IPSOS/Eureka to conduct the NSW Health Patient Survey Program 2009. This was a cross-sectional mailed survey to assess patients' experiences with care at state, area health service, peer group and hospital levels. Seven patient groups were surveyed separately – overnight patients, day only patients, paediatric patients, adult rehabilitation patients, non-admitted outpatients, community health patients and non-admitted emergency patients. Each group received a slightly different survey, though many questions were the same (such as overall rating of care).

Hospital Quarterly reports the responses of the non-admitted emergency patients who presented at 89 emergency departments across NSW during February 2009.

A data quality assessment of the NSW Health Patient Survey 2009 is available at www.bhi.nsw.gov.au

The survey analyses were designed to:

- Identify the healthcare experiences that matter most to patients attending an emergency department so healthcare workers can focus efforts to improve care and assess the performance of emergency departments in providing care. This includes comparison with similar hospitals (termed peer groups) so the system can learn from above average performers
- Inform the people of NSW about patients' perspectives of their care experiences in public emergency departments across NSW
- Inform healthcare professionals and providers about their emergency departments' performance so that they may focus efforts to improve care.

The Bureau's analyses initially focused on identifying care experiences underlying excellent patient ratings of overall care to learn what people working in emergency departments did well and should continue to do. Then, it focused on people who offered fair or poor ratings of care to identify circumstances healthcare workers should avoid if they are to improve care experiences for their patients. Finally, the Bureau focused on making the fairest possible comparisons by comparing emergency departments across NSW with hospitals within their peer group.

This supplement describes the statistical analyses undertaken by the Bureau to identify the care experiences that underlie positive and negative patient ratings of overall care, as well as the methods used to standardise patient ratings so that meaningful and fair comparisons can be made at hospital and local levels.

Non-admitted emergency department – patient eligibility

People deemed eligible to participate in the survey were limited to those who attended a public hospital emergency department during February 2009 and were not admitted to hospital, deceased or born during February 2009 (to exclude births in the sampling month).

The survey was completed by 21,548 non-admitted, emergency department patients, achieving a 32 per cent response rate. The Bureau excluded 286 patients who did not answer the survey question rating overall care. Furthermore, the Bureau excluded 347 records from Albury hospital because, since July 2009, Albury does not come under the jurisdiction of NSW for public reporting purposes. This is due to the establishment of the integrated Albury-Wodonga Health Service, managed by the State of Victoria. The Bureau's report relied on data from 20,915 people.

Patients who visited any of the 89 NSW emergency departments participated in the survey, although only the emergency departments of 66 hospitals are presented in the individual hospital performance reports contained in *Hospital Quarterly: April to June 2010*.

An assessment of the scientific rigour of the 2009 NSW Health Patient Survey Program is available in the *Data Quality Assessment: NSW Health Patient Survey 2009*, available at www.bhi.nsw.gov.au

Non-admitted emergency department – survey and sampling

The NSW Health Patient Survey 2009 used patient survey questionnaires developed by NRC+Picker from the United States. The questionnaires are based on qualitative research that identifies eight dimensions of care important to patients. These dimensions include:

- Access to care
- Co-ordination and integration of care
- Information and education
- Physical comfort
- Emotional support and alleviation of fear and anxiety
- Family and friends
- Transitions and continuity of care
- Respect for preferences including values and expressed needs.

The survey used for non-admitted emergency department patients included 85 questions.

A stratified random sampling strategy was used to select eligible emergency department patients. Sample size estimates were based on historic variations of care experiences and information about emergency department volumes. The age or gender structure of the population was not used in the stratification process and the final data set did not include hospital record information on patient age or gender. Case weights were calculated by IPSOS/Eureka to account for differences in response rates and emergency department volumes but not for age or gender response bias. The case weight data was verified prior to analysis.

Analytical framework

The Bureau used statistical methods to identify the care experiences that matter most to patients to identify where quality improvement initiatives could be of most value. The following sections outline the bivariate, multivariate and standardisation techniques undertaken to identify and report the care experiences that underlie excellent and fair or poor* patient ratings of overall care. All analyses allowed for the stratified sampling and the finite population size.

We report the results for seven hospital peer groups: principal referral, paediatric specialist–tertiary referral, ungrouped acute, major metropolitan and major non-metropolitan, and district groups 1 and 2. The Bureau was able to calculate reliable estimates for these emergency departments because of their large sample sizes and low standard errors of emergency department parameters within the statistical models.

Proc Survey Logistic in SAS# V9.1.3™ was used for all statistical analyses.

Independent and dependent variables and bivariate analyses

The analyses centred on the question: *"Overall, how would you rate the care you received at the emergency department?"* The response options were 'excellent', 'very good', 'good', 'fair' and 'poor'. The Bureau identified care experiences that were statistically significant determinants of excellent ratings ('positive') and determinants of fair or poor ('negative') ratings of overall care.

We undertook two separate analyses as it was assumed, prospectively, that the determinants of excellent ratings could be quite different from the determinants of fair or poor ratings.

To identify the factors underlying positive ratings, the first analysis focused on patients who reported the overall care they received in emergency department as excellent. Then statistical techniques were used to identify the factors and experiences that differentiated this group from patients who reported the overall care was very good, good, fair or poor (i.e. all remaining respondents).

The same approach was used to identify the factors driving negative ratings of overall care, that is, the factors and experiences that differentiated the group of patients who reported fair or poor ratings of overall care from those who offered excellent, very good or good ratings (all remaining respondents). Patients who offered fair or poor ratings were considered together, as few patients offered poor ratings and it was considered poor and fair ratings both represented negative experiences.

International research evidence suggests that patients' characteristics are associated with their ratings of quality of care. Therefore, the degree to which patient characteristics and presenting characteristics were statistically significant predictors of patients' ratings of overall care were assessed and statistically significant factors considered in tandem with information on care experiences to determine:

- Which experiences most influence the likelihood that a patient will report excellent or fair/poor ratings of overall care
- The magnitude of the influence that care experiences have on excellent or fair/poor patient ratings
- The relative magnitude of the influence of patients' and presenting characteristics as well as experiences with care.

* Fair and poor ratings of overall care were combined to achieve sufficient statistical group size for analysis.

\# SAS Institute. *The SAS System for Windows version 9.1.3.* Cary (NC): SAS Institute; 2005.

We sorted questions from the survey into three groups:

- Patient characteristics; specifically age, gender, self reported health status, education, language spoken at home, gender, days that illness or injury kept the respondent in bed all or part of the day in February 2009, times in hospital overnight in past six months and socioeconomic circumstance
- Patient presenting characteristics; circumstances at the time of the emergency department encounter such as severity of pain
- Patient care experiences; patient perceptions about the nature and process of their care such as waiting time and staff courtesy.

Grouping the variables in this way allowed the Bureau to determine the influence of each group on patients' ratings of overall care.

Individual data was collected on all patient characteristics variables, except personal socioeconomic status. Each patient's socioeconomic circumstance was estimated from his or her residential postcode. The Australian Bureau of Statistics publishes the Socioeconomic Information for Areas (SEIFA) based on aggregated census information. The Bureau used the 2006 SEIFA at postcode level, which consists of five indices; the index of relative socio-economic of advantage and disadvantage was selected for this analysis.*

Multivariate analyses

Forward stepwise logistic regression analysis was used to identify the most important independent variables, including care experiences, for the following outcomes (dependent variables) considered separately:

- Excellent ratings of overall care (refer to Appendix 1 for results)
- Poor/fair ratings of overall care (refer to Appendix 2 for results).

At each stage of the forward stepwise regression analysis, the selection of the next variable to be included in the model was based on choosing the model with the lowest Akaike's Information Criterion (AIC). This process continued until the model no longer benefited from the addition of any further patient characteristics – either the AIC increased or the Wald chi square for addition of the variable was not significant at the five per cent level. Variables were added in three groups as follows:

- **First step** – There were 10 questions about patient characteristics in the emergency department survey; each variable in the patients' characteristics group was considered for inclusion in the model
- **Second step** – There was one question about presenting characteristics. Starting from the model developed in the first step, the presenting characteristics' variable was considered for inclusion in the model, using the same stepwise regression methods
- **Third step** –There were 64 care experience variables (i.e. survey questions) in the emergency department survey. Beginning with the model developed in the second step, the care experience variables were considered for inclusion in the model.

* For more information about this index, refer to www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/2039.0Appendix82006?opendocument&tabname=Notes&prodno=2039.0&issue=2006&num=&view

A total of 19 care experience variables entered the stepwise model for excellent ratings of overall care and 22 care experience variables entered the stepwise model predicting fair or poor ratings. Appendix 1 in *Hospital Quarterly* lists the care experience variables that were statistically significant in the final models.

Appendices 1 and 2 list the statistically significant patient and presenting characteristics with their corresponding p-values and odds ratios in the bivariate and multivariate models. Also shown are the three care experience variables most important in determining the ratings are also shown.

Standardised patient ratings

The process of standardisation is important to support comparisons of care experiences as peer groups and emergency departments provide services to different types of people. These differences may predispose patients to offer higher or lower ratings and are beyond the control of emergency department healthcare workers. To support fair comparisons between different hospital emergency departments, patients' ratings of care experiences were standardised. Standardisation illustrates how area health services, hospital peer groups or emergency departments would rate if they all served the same standard patient population. Actual and standardised results for emergency department patients and their ratings of overall care and other care experiences are available in *Hospital Quarterly* at www.bhi.nsw.gov.au

The first step in standardisation establishes a base model using information from the survey to identify the patient and presenting characteristics that potentially influenced overall ratings of care. Then statistical analyses to standardise performance measures for area health services, hospital peer groups and emergency departments were undertaken.

There was consistency between the stepwise regression models for significant patient and presenting characteristics among patients who offered excellent or fair/poor ratings; therefore, the following explanatory covariates were used to standardise area health services, peer groups and individual hospital emergency departments. The explanatory patient characteristic variables included in the models were age group, self reported health status, education, language spoken at home, gender, days that illness or injury kept the respondent in bed all or part of the day in February 2009, times in hospital overnight in past six months, socioeconomic circumstance and severity of pain if any.

To calculate the standardised estimates for each care experience profiled in *Hospital Quarterly*, terms for area health services, peer groups and for emergency departments were added to the base model. The model was fitted using the cumulative logit link function. All respondents for NSW who were included in the analyses were used as the standard population. Appendices 1 and 2 show the proportion of respondents in each category for each variable who were included in the base model. These proportions were used to standardise peer groups and emergency departments.

Glossary

Actual results – numbers that have not been standardised to account for differences in the characterisitcs of patients (e.g. age or health status) who attend each hospital (as opposed to 'standardised results' below).

Case weights – are numeric values used by analysts to account mathematically for the degree to which participants in the survey are representative of the underlying population.

Peer group – NSW public hospitals have been grouped into similar types of hospitals which are called peer groups. Peer grouping is based on the number of patients discharged each year (size of hospital), the primary role of the hospital (such as specialist paediatric or principal referral) and whether it is in a metropolitan or rural area.

Socio-Economic Indexes for Areas (SEIFA) – this was developed by the Australian Bureau of Statistics (ABS) to allow ranking of regions/areas, providing a method of determining the level of social and economic well-being in that region. The SEIFA indices are created by combining information collected in the five-yearly Census of Population and Housing. The SEIFA indices show where the affluent (as opposed to just high income earning) live; where disadvantaged (as opposed to the unemployed) live: and where the highly skilled and educated (as opposed to the tertiary educated people) live. The index used in this report was the Index of Relative Socio-economic Advantage and Disadvantage 2006. More information can be found on the ABS website: www.abs.gov.au/websitedbs/D3310114.nsf/home/Seifa_entry_page

Standardised results – to support fair comparisons between hospitals, the patient ratings of care experiences reported have been standardised statistically to show how hospitals would perform if they served very similar populations of patients.

Appendix 1: **Excellent ratings of overall care**

To identify what underlies positive patient ratings of overall care for non-admitted emergency department patients, we used logistic regression to identify factors that are associated with the likelihood that a survey respondent would rate care as excellent (26 per cent of all non-admitted emergency department patients).

Patient and presenting characteristics, as shown in Table 1, had relatively little power to predict positive patients' ratings of care (pseudo R^2=0.26). When courtesy of emergency room staff came into the model, it increased the pseudo R^2 to 0.95. The second and third experience variables, completeness of care and waiting time increased it to 0.97.The pseudo R^2 for the full model was 0.98.

Table 1: Results of logistic regression statistical model for excellent patient ratings of overall care among emergency department patients, 2009

		Bivariate		Patient and presenting characteristics and 3 experience variables	
	%	Odds ratio	Overall p value	Adjusted odds ratio	Overall p value
Patient characteristics					
In general, how would you rate your health?			<.0001		0.071
Missing	0.9	0.38		0.63	
Poor	4.4	0.43		0.79	
Fair	14.7	0.42		0.86	
Good	31.9	0.38		0.77	
Very good	32.2	0.53		0.82	
Excellent*	15.9				
To which age group do you (the patient) belong?			<.0001		<.0001
Missing	0.9	0.50		0.79	
Up to 9 years	15.1	0.69		0.59	
10 to 14 years	5.4	0.66		0.66	
15 to 19 years	5.7	0.48		0.57	
20 to 29 years	8.9	0.40		0.70	
30 to 39 years	11.9	0.52		0.68	
40 to 49 years	11.8	0.71		0.88	
50 to 59 years	12.4	0.79		0.85	
60 to 69 years	11.7	0.95		0.88	
70 to 79 years	9.3	1.07		1.12	
80 years or older*	6.8				
Are you male or female?			<.0001		0.396
Missing	1.1	0.96		0.84	
Male	44.0	1.13		1.07	
Female*	54.9				

		Bivariate		Patient and presenting characteristics and 3 experience variables	
	%	Odds ratio	Overall p value	Adjusted odds ratio	Overall p value
What was the highest level of education you completed?			0.001		0.247
Missing	10.0	1.12		1.09	
Less than Year 12 at secondary school	38.9	1.11		0.96	
Completed Year 12 at secondary school	13.7	1.02		1.03	
Trade or technical certificate or diploma	19.0	0.98		0.84	
University graduate	11.5	0.93		0.93	
Post graduate/higher degree*	6.8				
What language do you normally speak at home?			<.0001		0.140
Missing	6.3	0.62		0.93	
Non-English	7.6	0.42		0.76	
English*	86.1				
SEIFA quintiles using NSW scores			0.001		0.063
Missing	1.7	0.69		1	
Most disadvantaged	11.5	0.93		0.88	
2nd quintile	13.9	0.94		1.01	
3rd quintile	33.3	0.86		0.82	
4th quintile	21.5	0.86		0.99	
Least disadvantaged*	18.1				
During the month of February this year, how many days did illness or injury keep you in bed all or part of the day?			<.0001		0.018
Missing	1.8	1		0.74	
None	43.6	1.49		1.04	
One day	13.6	1.24		0.84	
Two days	11.6	1.08		1	
Three days	7.5	0.96		1.09	
Four days	4.8	1.11		1.28	
Five-to-seven days	7.6	0.97		0.76	
Eight-to-ten days	2.9	1.05		0.99	
More than ten days*	6.4				
How many times in the last six months have you been in a hospital overnight or longer?			<.0001		0.588
Missing	24.3	1.36		1.04	
Only this time	55.3	1.24		1.02	
This time and one other time	13.2	1.11		1.15	
This time and more than one other time*	7.2				

		Bivariate		Patient and presenting characteristics and 3 experience variables	
	%	Odds ratio	Overall p value	Adjusted odds ratio	Overall p value
Presenting characteristics					
Was your pain severe, moderate or mild?			<.0001		0.113
Missing	2.5	0.84		1.32	
Severe	24.1	0.79		1.20	
Moderate	29.2	0.72		1.11	
Mild	9.9	0.89		1.05	
No pain*	34.4				
Care experiences					
How would you rate the completeness of the care you received for your problem?			<.0001		<.0001
Missing	0.4	46.98		18.89	
Poor*	6.2				
Fair	11.9	2.19		2.75	
Good	25.5	5.79		6.24	
Very Good	30.4	53.6		17.02	
Excellent	25.7	>999		139.83	
How would you rate the courtesy of the emergency room staff?			<.0001		<.0001
Missing	0.4	22.75		1.77	
Poor*	3.0				
Fair	10.1	0.52		0.45	
Good	25.2	0.82		0.25	
Very Good	31.8	12.68		0.96	
Excellent	29.6	611.05		16.27	
How would you rate your waiting time?			<.0001		<.0001
Missing	0.7	7.85		2.99	
Poor*	21.8				
Fair	20.8	2.24		1.27	
Good	21.2	5.07		2.21	
Very Good	18.1	16.18		3.69	
Excellent	17.3	81.76		9.62	

* Reference category

Appendix 2: **Poor or fair ratings of overall care**

In order to identify what underlies negative patient ratings of care for non-admitted emergency department patients, we used logistic regression to identify factors that are associated with the likelihood that a survey respondent would rate care as fair or poor (17 per cent of all non-admitted emergency department patients).

Patient and presenting characteristics, as shown Table 2, had relatively little power to predict positive patient ratings of care (pseudo R^2 =0.27). When completeness of care came into the model, it increased the pseudo R^2 to 0.91. The next experience variable, courtesy of emergency room staff, increased it to 0.94 and then the third increased it to 0.95. The pseudo R^2 for the full model was 0.96.

Table 2: Results of logistic regression statistical model for poor or fair patient ratings of overall care among emergency department patients, 2009

		Bivariate		Patient and presenting characteristics and 3 experience variables	
	%	Odds ratio	Overall p value	Adjusted odds ratio	Overall p value
Patient characteristics					
In general, how would you rate your health?			<.0001		0.001
Missing	0.9	1.44		0.54	
Poor	4.4	2.37		0.69	
Fair	14.7	1.67		0.89	
Good	31.9	1.29		0.76	
Very Good	32.2	0.89		0.68	
Excellent*	15.9				
To which age group do you (the patient) belong?			<.0001		0.115
Missing	0.9	3.18		1.64	
Up to 9 years	15.1	2.14		1.27	
10 to 14 years	5.4	1.94		1.12	
15 to 19 years	5.7	3.16		1.25	
20 to 29 years	8.9	4.13		1.37	
30 to 39 years	11.9	3.36		1.38	
40 to 49 years	11.8	2.44		1.13	
50 to 59 years	12.4	2.11		1.19	
60 to 69 years	11.7	1.53		1.16	
70 to 79 years	9.3	1.08		0.82	
80 years or older*	6.8				
Are you male or female?			<.0001		0.253
Missing	1.1	1.11		0.91	
Male	44.0	0.86		1.11	
Female*	54.9				

		Bivariate		Patient and presenting characteristics and 3 experience variables	
	%	Odds ratio	Overall p value	Adjusted odds ratio	Overall p value
What was the highest level of education you completed?			<.0001		0.940
Missing	10.0	0.87		0.99	
Less than Year 12 at secondary school	38.9	0.73		0.94	
Completed Year 12 at secondary school	13.7	0.89		0.95	
Trade or technical certificate or diploma	19.0	0.86		0.93	
University graduate	11.5	1.03		1.03	
Post graduate/higher degree*	6.8				
What language do you normally speak at home?			<.0001		0.191
Missing	6.3	1.47		0.89	
Non-English	7.6	1.49		0.83	
English*	86.1				
SEIFA quintiles using NSW scores			<.0001		0.970
Missing	1.7	1.80		1.13	
Most disadvantaged	11.5	1.24		0.95	
2nd quintile	13.9	1.20		0.98	
3rd quintile	33.3	1.23		0.94	
4th quintile	21.5	1.26		0.96	
Least disadvantaged*	18.1				
During the month of February this year, how many days did illness or injury keep you in bed all or part of the day?			<.0001		0.492
Missing	1.8	0.59		0.78	
None	43.6	0.36		0.81	
One day	13.6	0.42		0.92	
Two days	11.6	0.51		0.74	
Three days	7.5	0.72		0.95	
Four days	4.8	0.65		0.88	
Five-to-seven days	7.6	0.65		0.80	
Eight-to-ten days	2.9	0.74		0.89	
More than ten days*	6.4				
How many times in the last six months have you been in a hospital overnight or longer?			<.0001		0.662
Missing	24.3	0.53		0.93	
Only this time	55.3	0.59		0.92	
This time and one other time	13.2	0.76		0.85	
This time and more than one other time*	7.2				

		Bivariate		Patient and presenting characteristics and 3 experience variables	
	%	Odds ratio	Overall p value	Adjusted odds ratio	Overall p value
Presenting characteristics					
Was your pain severe, moderate or mild?			<.0001		0.427
Missing	2.5	1.78		1.26	
Severe	24.1	2.45		1.12	
Moderate	29.2	1.71		1.15	
Mild	9.9	1.18		1.10	
No pain*	34.4				
Care experiences					
How would you rate the completeness of the care you received for your problem?			<.0001		<.0001
Missing	0.4	115.90		30.64	
Poor	6.2	>999		334.91	
Fair	11.9	669.35		61.72	
Good	25.5	40.91		6.87	
Very Good	30.4	4.37		2.12	
Excellent*	25.7				
How would you rate the courtesy of the emergency room staff?			<.0001		<.0001
Missing	0.4	65.01		12.77	
Poor	3.0	>999		49.66	
Fair	10.1	362.71		22.88	
Good	25.2	20.60		2.76	
Very Good	31.8	3.00		1.35	
Excellent*	29.6				
How would you rate your waiting time?			<.0001		<.0001
Missing	0.7	11.79		2.33	
Poor	21.8	105.25		11.33	
Fair	20.8	22.87		3.41	
Good	21.2	5.23		1.50	
Very Good	18.1	1.61		1.20	
Excellent*	17.3				

* Reference category

About the Bureau

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