



Technical Supplement:

Measures of patient experience
of emergency department care

Hospital Quarterly: April to June 2010

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.*

* 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

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.

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 characteristics 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				

Patient and presenting characteristics and 3 experience variables

	%	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				

Patient and presenting characteristics and 3 experience variables

	%	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

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.

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