

Sampling Overview

Emergency Department Patient Survey (April 2013-March 2014)

Revision History

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Please note that there is the potential for minor revisions of data in this report. Please check the online version at www.bhi.nsw.gov.au for any amendments.

Introduction

The Bureau of Health Information (BHI), with the assistance of Ipsos Social Research Institute (Ipsos SRI), has developed a suite of surveys relating to patients' experience of care in public health facilities in New South Wales (NSW) on behalf of the NSW Ministry of Health and local health districts (LHDs). The Emergency Department Patient Survey (EDPS) is one of the surveys in this suite. BHI reports these results publicly via written reports and the online portal *Healthcare Observer*, found on the BHI website www.bhi.nsw.gov.au

BHI, Ipsos SRI and the NSW Ministry of Health (The Health System Information & Performance Reporting Branch (HSIPRB)) were all involved in the development and implementation of the sampling process.

This document defines the reference population and sampling frame for the EDPS and details the methods used for calculating sample size and drawing the sample.

Sampling of emergency department patients

The number of ED attendances was obtained by BHI from the ED visit table on the Health Information Exchange (HIE). The presentation date was used to define eligible records, with the population defined separately for each month. Sample sizes were calculated on the basis of either quarterly or annual reporting, as defined later in this report.

Security of patient identifiers and patient data were maintained with utmost care at all stages of this process.

Stage 1: First phase of screening

In the first phase of screening, BHI defined the sampling frame and strata variables.

Sample inclusion/exclusion decision rules

- Facilities from a peer group lower than C2 were excluded.
 - Many of the facilities with a hospital classification lower than C2 do not have enough patients for robust sampling and reporting in the manner suggested below. For this reason, they were excluded from the sample.
- Patients who were dead on arrival or died in ED (mode of separation of 8 and 3 respectively) were excluded from the sample.

In addition:

- patients were categorised into three age groups (under 17, 17 to 49 and 50+) – one of the strata variables.
- only the record for the most recent ED visit for each de-identified Medical Record Number (MRN) within an individual hospital was kept
- where a patient had multiple visits within the sampling period they were included once in the sampling frame, and were asked to respond to the survey based on the most recent visit in the particular month
- the mode of separation was used to categorise patients into a departure status of admitted following their ED attendance and non-admitted, as per Table 1 (next page) – the second strata variable.

Table 1: Mode of separation used to categorise patients into admitted and non-admitted departure status

Admitted Patients		Non-Admitted Patients	
Code	Label	Code	Label
1	Admitted to ward inpatient unit, not a critical care ward	2	Admitted and discharged as inpatient within ED
10	Admitted to critical care ward including HDU/CCU/NICU	4	Departed – treatment completed
11	Admitted via operating suite	5	Departed – transferred to another hospital without first being admitted to hospital transferred from
12	Admitted – transferred to another hospital	6	Departed – did not wait
13	Admitted left at own risk	7	Departed – left at own risk
		9	Departed – for other clinical service location

The de-identified data in this interim sampling frame are then transferred to the HSPiRB within the Ministry of Health for further screening.

Stage 2: Second phase of screening

The data were passed through a series of screening steps by the HSPiRB in MS Access. This involved applying a series of further exclusion criteria to take into account a range of factors including: the potentially high vulnerability of particular patient groups and/or patients with particularly sensitive reasons for admission; certain patients' ability to answer questions about their experiences; and the relevance of the survey questions to particular patient groups. The effectiveness of this screening is reduced for the EDPS compared to the Adult Admitted Patient Survey (AAPS) due to the variables in the dataset. For example, the ED dataset does not contain robust diagnosis (ICD-10-AM) information that allows these exclusions. Because of this, the usual second phase of screening to exclude sensitive groups can only be done for patients subsequently admitted to hospital.

ED patients subsequently admitted to hospital (mode of separation of 1,10,11,12 or 13) with the following procedures or diagnoses that was recorded for their inpatient stay were omitted:

- admitted for a termination of pregnancy procedure [35643-03];
- treated for maltreatment syndromes [T74] in any diagnosis field, including neglect or abandonment, physical abuse, sexual abuse, psychological abuse, other maltreatment syndromes and maltreatment syndrome, unspecified;
- treated for contraceptive management [Z30] in any diagnosis field, including general counselling and advice on contraception, surveillance of contraceptive drugs, surveillance of contraceptive device, other contraceptive management and contraceptive management, unspecified;
- patients with a diagnosis of stillborn baby [Z37] in any diagnosis field (including single stillbirth, twins, one liveborn and one stillborn, twins, both stillborn and other multiple births, some liveborn) were excluded.

In addition, where ED patients were admitted to hospital (mode of separation 1,10,11,12 or 13), they were excluded if in the subsequent admission they had a mode of separation of death.

The following exclusion criteria were also applied:

- patients with invalid addresses (including those with addresses listed as hotels, motels, nursing homes, Community Services, Mathew Talbot hostel, 100 William Street, army quarters, jails, unknown, NFA);
- patients with an invalid name (including twin, baby of, etc.);
- patients with an invalid date of birth;
- patients on the 'do not contact' list;
- patients who have been sampled in the previous six months in any of the BHI patient surveys currently underway;
- patients where death was recorded according to birth, death and marriage records and/or Agency Performance and Data Collection prior to the sample being provided to Ipsos.

The result is defined by BHI as the final sampling frame.

Stage 3: Drawing of the sample

Survey design, 2013-14

The final sampling frame included EDs with a hospital classifications of A, B and C that reported ED visits in the state-wide HIE system during the 2012/13 financial year, plus Hawkesbury District Health Service, which commenced reporting ED visits in the state-wide HIE system prior to a revision of sample size calculations for sampling from July 2013 onwards.

A stratified sample design was applied, with each facility being defined as a stratum. Within each facility patients were further stratified by age (under 17, 17–49, 50+ years) and ED departure status (admitted vs. non-admitted) with simple random sampling without replacement applied within each stratum. The sampling fraction is the same for each stratum within a facility, but sampling fractions differ between facilities as per details below.

Although sampling is undertaken monthly, sample size calculations are based on whether reporting is on a quarterly or annual basis. All facilities in C1 or C2 peer groups were sampled for annual reporting, whereas facilities in the remaining peer groups were sampled for quarterly reporting. For the purposes of sampling, the population of Sydney and Sydney Eye Hospitals were combined. In addition:

- all patients at the two children's hospitals were included in the 'under 17' stratum for sampling purposes
- children under 17 years admitted to A3 (Ungrouped Acute - tertiary referral) facilities were included in the '17 to 49' age stratum because of very small numbers in the under 17 age group for these three hospitals.

For the first six months of sampling, BHI calculated a sampling proportion as a percentage of the number of patients within each facility to be sampled. These sampling proportions were calculated on the basis of historic data as described as follows. To create the sample, the Ministry applied the facility-level sampling proportion to the sampling frame within each of the six strata (based on the age and departure status strata).

The file, with details of patients selected for sampling, was transferred securely from the Ministry of Health to Ipsos for processing, posting of the survey and collection of responses.

Calculation of sampling proportion and reporting frequency

In order to reduce the lag between the ED visit and survey fieldwork, the sampling proportion was determined ahead of time in the following manner for each facility:

1. The eligible population (N_i) was estimated as the number of patients from each quarter for the 2012/13 financial year from the HIE, using the same code as used in the usual sampling process
2. The response rate (r_i) from the 2011 ED patient survey was obtained for each facility. For both annual and quarterly reporting, the historic rate was used. The exception to this was in peer group C2 where the response rate was set to the historic rate, subject to a minimum of 20% and a maximum of 26%. This was done to increase the probability of having sufficient sample size to report annually for C2 facilities
3. Equation 1 was used to estimate the sample size. It aimed to give a confidence interval around an expected proportion of 0.8 of ± 0.07 . The calculation was performed for each quarter for facilities in peer groups A1 to B and for the year as a whole for facilities in peer groups C1 and C2

Equation 1

$$s_i = \frac{\chi^2 NP(1 - P)}{d^2(N_i - 1) + \chi^2 P(1 - P)} \times \frac{1}{r_i}$$

Where:

s_i = estimated sample size for facility i

χ^2 = tabulated value of chi-squared with one degree of freedom at 5% level of significance (3.841)

N_i = population in facility i during corresponding period of interest (quarter or year) in the previous year

P = expected proportion giving positive response to the question on satisfaction with overall care (0.8), based on previous levels of response to patient surveys

d = degree of accuracy of the 95% confidence interval expressed as a proportion (± 0.07)

r_i = response rate for the EDPS in facility i during most recent survey year

4. The sampling proportion was calculated as the ratio of the sample size to the total number of patients in the quarter or year (as appropriate). That is:

Equation 2

$$p_i = \frac{s_i}{N_i}$$

5. The actual sample size for non-admitted patients was calculated as follows:
 - a. For facilities with annual reporting, the annual sampling proportion was applied to each age strata of eligible patients for that facility each month.
 - b. For facilities with quarterly reporting, the sampling proportion for the appropriate quarter was applied to each age strata of the eligible patients for that facility for the months in the particular quarter.
6. The sampling proportion for the admitted strata were adjusted to account for some of the eligible sampling frame that had already been selected for the admitted patient survey. The adjusted ratio was calculated as:

Equation 3

$$p_{(adj)} = \frac{p_{(raw)}}{(1 - p_{(AAPS)})}$$

Examples of the calculations of sampling proportion are provided in *Appendix 1*.

It should be noted that sample size calculations based on Equation 1 assume simple random sampling, whereas a stratified survey design was used within each facility. This may result in standard errors being larger than expected. In addition, differences in response rates between strata may result in sample sizes being lower than anticipated.

Changes made to sampling procedures in September 2013

From the September 2013 patient cohort onwards, BHI provided target numbers of patients to the Ministry of Health for each stratum within each facility, rather than the proportion of patients to sample. BHI based the target numbers on the sampling proportions previously provided to the Ministry, but adjusted them to take into account the increased patient population over time. This was done with consideration to keeping the number of questionnaires mailed within a narrow band around the *expected* number of mailings, to ensure contract costs remained within budget estimates.

Appendix 1 - Example of calculation of sample size

Examples given are for two facilities.

1. The number of patients from each quarter for the previous year (N_i) is obtained, together with response rates (r_i) from previous year of patient survey for each facility (Table 2).

Table 2: Number of patients by quarter

Facility	Survey response rate (r_i)*	Population (N_i), using 2012-13 data				Total
		By quarter				
		Q1	Q2	Q3	Q4	
1	25%	1923	2111	1384	1733	7251
2	24%	2585	3247	1739	2268	9839

* Determined from previous NSW Emergency Department surveys

2. Use Equation 1 to estimate the sample size

Table 3: Estimated sample size by quarter

Facility	Estimated sample size				Annual reporting #*
	By quarter				
	Q1	Q2	Q3	Q4	
1	476	479	465	473	498
2	489	494	478	486	506

*Number required to report facility annually

3. Calculate the sampling proportion by quarter and year

Table 4: Sampling proportion by reporting frequency

Facility	Sampling proportion when using...				
	Quarterly reporting				Annual reporting
	Q1	Q2	Q3	Q4	
1	25%	23%	34%	27%	7.0%
2	19%	15%	28%	21%	5.1%

4. Adjust the sampling proportion for the sample already removed for the AAPS

Table 5: Sampling proportion by quarter

Facility	Cohort	Quarterly reporting			
		Q1	Q2	Q3	Q4
1	% sampled for non-admitted and admitted under 17	25%	23%	34%	27%
	% sampled for admitted 17+, following exclusion of those sampled for AAPS	34%	31%	46%	37%
2	% sampled for non-admitted and admitted under 17	19%	15%	28%	21%
	% sampled for admitted 17+, following exclusion of those sampled for AAPS	42%	29%	48%	43%

5. The *actual* sample size will depend on the frequency of reporting and the number in the eligible patient data file for the facility.

Assuming the number of eligible patients for one month is as follows:

Table 6: Number of eligible patients

Fac	Number of eligible patients, Month 1, Q1						Total
	Admitted			Non-Admitted			
	U 17	17-49	50+	U 17	17-49	50+	
1	<5	<5	<5	327	374	196	-
2	4	38	93	341	462	225	-

The sampling proportion is applied to each strata and rounded UP to the nearest integer (Table 7).

Table 7: Number of survey mailouts

Fac	Number of surveys mailed, Month 1, Q1						Total
	Admitted			Non-Admitted			
	U 17	17-49	50+	U 17	17-49	50+	
1	n/a	n/a	n/a	82	94	50	226
2	2	16	39	65	88	43	253

In this case, a total of 226 surveys would be mailed out to patients from Facility 1 and 253 to patients from Facility 2. Although the number of surveys mailed in some strata is very low, it should be remembered that the data are collapsed for estimation purposes, with the estimation using three months of data for Facility 2. The estimates for Facility 1 will only be available for non-admitted patients because of the small numbers of patients admitted from the ED at this facility.