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# Sampling Overview

## Adult Admitted Patient Survey, 2013

### Revision History

| Version | Issue Date | Author | Comments |
|---|---|---|---|
| 1.0 | July 2014 | Diane Hindmarsh | Drafted for release of six months AAPS data at LHD and NSW state level only |
| 2.0 | November 2014 | Diane Hindmarsh | Modifications made to update for the release of 12 months of AAPS data at hospital, peer group, LHD and NSW state level. |

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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.

## THE NSW PATIENT SURVEY PROGRAM

The NSW Ministry of Health coordinated the NSW Patient Survey from 2007 and 2011 to measure patients' experience of care in public health facilities in New South Wales (NSW) on behalf of local health districts[1] (LHDs). This suite of surveys was used as the source of performance measures for individual hospital facilities and LHDs. Ipsos Social Research Institute (Ipsos SRI) was contracted to manage the logistics of mailing surveys to nine specific patient types, each with a relevant NRC Picker questionnaire. These patient groups were:

1. Overnight Inpatient
2. Day-only Inpatient
3. Adult Rehabilitation Inpatient
4. Emergency department
5. Child and youth inpatient
6. Outpatient
7. Community Health
8. Mental Health Outpatient
9. Mental Health Inpatient

Responsibility for the patient surveys was transferred from the Ministry of Health to the Bureau of Health Information (BHI) in July 2012 and was renamed as the NSW Patient Survey Program. Following a tender process, Ipsos SRI continued as the contracted partner to develop surveys and manage logistics.

BHI has progressively redeveloped each survey before continuing sampling and mailing them. The Adult Admitted Patient Survey (AAPS) was the first survey in this revised suite to be sent to patients and to have the data publicly reported. It combines patient groups that were previously included in the Overnight, Same Day and Adult Rehabilitation Inpatient survey modules of the 2007–11 patient surveys.

The purpose of the surveys is to provide information on how hospitals and LHDs are performing. BHI publicly reports these results using reports and on the online portal Healthcare Observer on their website at www.bhi.nsw.gov.au.

[1]See the Adult Admitted Patient Survey Development Report for more information (www.bhi.nsw.gov.au)

## THE PATIENT SURVEY SAMPLING METHODS WORKING GROUP

The Patient Survey Sampling Methods Working Group (the 'Working Group') – comprising members of BHI and Ipsos SRI– met throughout the months of July, August and September 2012 to liaise and finalise the methods of sampling and stratification for the survey.

This document defines the population and sampling frame of the AAPS and details the methods that were used to calculate sample size and to draw the sample.

### Specific roles of the organisations involved in sampling

BHI, Ipsos SRI and the NSW Ministry of Health collaborated in developing the following sampling processes and responsibilities:

- BHI led on defining the population and sampling frame – including inclusion and exclusion rules – and provided overall direction with regard to methods.
- BHI conducted all sample size calculations and generated the population dataset to the point where it was ready for Stage 2 of screening (detailed below).
- BHI calculated the survey weights and undertook all data analysis. See Technical Documents – AAPS Report – Weighting and Statistical Analysis.
- The Health System Information and Performance Reporting Branch within the Ministry of Health generated the sampling frame by applying phase 2 screening to the population dataset, created the sample and provided patients' details for the selected sample to Ipsos SRI.
- Ipsos SRI assisted in defining sample inclusion and exclusion rules and methods for drawing the sample.
- Ipsos SRI liaised with the Ministry of Health to receive the monthly sample and was responsible for the administration of the survey to the point where the results were provided to BHI for analysis.

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, a series of rules were applied by BHI to define the sampling frame. These criteria took into account a range of factors including: the potentially high vulnerability of particular patient groups and/or patients with particularly sensitive reasons for admission; these patients' ability to answer questions; and the relevance of the survey questions to particular patient groups.

### Sample inclusion/exclusion decision rules

- Patients who were **not** recorded as having a procedure in the Health Information Exchange were inadvertently excluded. From 2014 onwards, survey samples include the necessary information to identify patients who had procedures to allow future comparisons.
- Patients aged less than 17 years were excluded.
    - The experiences of patients aged less than 18 years will be captured in the Children & Young Patient Surveys in 2014. Therefore, the working group decided that patients less than 17 years will be excluded from the sample.
- Patients with a mode of separation of death were excluded
- Patients who were admitted to a psychiatric unit were excluded
- Same day haemodialysis patients (high frequency) were excluded
    - Patients receiving care involving same day haemodialysis are admitted to hospital very frequently, averaging 13 admissions per month. As a result of the frequency of admission and the short length of stay, haemodialysis patients' experiences of care in hospital are fundamentally different to the average patient. Consequently, much of the content of the 2013 survey was not applicable to these patients (for instance, questions relating to treatment, discharge and their condition).

      Further, the inclusion of these patients in the sample for the 2013 survey would dramatically increase the probability of haemodialysis patients being surveyed several times. For these reasons, the working group decided to exclude these patients.

      Patients receiving haemodialysis who were hospitalised overnight *were* included in the sampling frame because these patients would have sufficient interaction with hospital staff and services to be able to respond usefully to an admitted patient survey.

- Same day patients who stayed for less than three hours were excluded

    - Eight percent of patients in 2011 and 2012 had stays less than three hours in duration. Not only do facilities differ in their categorisation of these patients (some facilities admit these patients while others consider them outpatient episodes), but these patients often have difficulty answering survey questions and consider them largely irrelevant to their patient experience. Considering these two points, the working group decided that short stay patients be excluded from the sample.

- Same day episodes with a mode of separation of transfer were excluded

    - It was noted by the working group that same day patients who were transferred between facilities had stated in the testing phase that they were unsure about which facility they should respond about. As a result, they felt that they were unable to adequately comment on their experiences of that hospital. For this reason, the working group decided that these patients should be excluded from the sample.

- Patients admitted for a termination of pregnancy procedure [35643-03] were excluded

- Patients 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 were excluded

- Patients 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) were excluded

- Maternity patients were excluded

    - According to international survey literature, maternity patients' experiences of care should be measured using a specialised maternity survey because they are undergoing a physiological rather than pathological process. Further, obstetrics patients' experiences of care will be captured in a Maternity Patient Survey, due to commence in early 2015.

- Patients with a stillborn baby were excluded

- Patients treated for stillborn babies [Z37] in any diagnosis field, including single stillbirth, twins, one live born and one stillborn, twins, both stillborn and other multiple births, some live born) were excluded.

- Facilities with peer group lower than C2 were excluded

    - Many facilities with a hospital classification lower than C2 have insufficient patients for robust sampling and reporting in the manner suggested below. For this reason, they were excluded and will be examined in a separate survey designed for small facilities.

- Where a patient has multiple visits within the sampling period they were included once in the population, and were asked to respond to the survey based on the most recent visit in the particular month.

## STAGE 2: SECOND PHASE OF SCREENING

Following the first phase of screening, a series of step-by-step edit checks of the sample were performed by the Ministry in MS Access. This phase was used to apply a series of further exclusion criteria to the sample.

The exclusion criteria applied in this phase were as follows:

- 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 overseas address
- Patients with an invalid name (including 'twin', 'baby of', 'baby Jones')
- Patients with an invalid date of birth
- Patients on the do not contact list
- Patients who have been sampled in previous six months in any of BHI's patient surveys
- Patients who have died according to birth, death and marriage records and Agency Performance and Data Collection
- Emergency department patients who were not admitted to a ward.

# STAGE 3: DRAWING OF THE SAMPLE

### Survey design, 2013

A stratified survey design was implemented where the population was stratified by facility, age (17–49, 50+ years) and stay type (same day vs. more than one day), using Simple Random Sampling without Replacement applied within each stratum.

The sampling fraction was the same for each stratum within a facility. Sample size calculations were based on whether the reporting frequency was quarterly or annual, depending on criteria outlined in step 4 of the sample size calculation procedure.

The population included all facilities with a hospital classification of C2 and above with the exception of Forster Private Hospital and both The Children's Hospital at Westmead and Sydney Children's Hospital, for the following reasons:

- Although *Forster Private Hospital* is an A3 facility, to date it has only treated a small number of public patients. This decision will be reviewed annually and the hospital will be included if the number of public patients increases to similar levels to that of other A3 facilities.
- *Westmead and Sydney Children's Hospitals* treat a low number of adult patients. They will be included in the Children and Young Patient Surveys which commenced in 2014.

The eligible records obtained for each facility following phase 1 of screening are referred to below as the *eligible population*. The sampling frame is defined following phase 2 screening.

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 data extracted from the HIE for the period from July 2011 to June 2012. To create the sample, the Ministry applied the facility-level sampling proportion to the sampling frame within each of the four strata. The process is described in more detail below.

## Calculation of sampling proportion and reporting frequency

In order to reduce the lag between the hospital stay and survey distribution, the sampling proportion was determined ahead of time in the following manner for each facility.

1. The eligible population ($N_i$) is estimated from data from the previous year, reported for each quarter separately as well as an overall yearly total. In addition, the response rate ($r_i$) was obtained from the most recent year of patient survey results for each facility.

2. Equation 1 was applied to both the quarterly and yearly population estimates to determine the sample size that would give a confidence interval around an expected proportion of 0.8 of ±0.07[2].

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

Where:

$s_i$ = estimated sample size for facility $i$

$\chi^2$ = 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 survey in facility $i$ during most recent survey year

3. The sampling proportion was calculated as the ratio of the estimated sample size to the population in the quarter or year (as appropriate). That is,

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

[2]The 2008 "positive" response percentage for the Overall Care question surpassed 0.8 for each patient category

4. It was assumed that quarterly reporting would be implemented unless the average sampling proportion for quarterly reporting was greater than 70%, at which point the sampling proportion based on annual reporting was used to determine the sample size.

   Therefore the *actual* sample size was calculated as follows:

   a. For facilities with **annual reporting** the *annual* sampling proportion was applied to each strata of the eligible population for that facility for each month.

   b. For facilities with **quarterly reporting** the sampling proportion for the appropriate *quarter* was applied to each strata of the eligible population for that facility for each of the months in the particular quarter.

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

It should be noted that sample size calculation based on equation 1 assumes simple random sampling, whereas a stratified survey design was used. This, and differences in the response rate between strata, may result in some estimates having wider confidence intervals than expected, even when the prevalence is 80%. In addition, response options that have a lower prevalence, particularly those with a prevalence of less than 10–15%, may have a precision, as measured by a relative standard error (the ratio of estimate to the estimated standard error) of greater than 25%, and wide confidence intervals.

### Changes made to provide reporting for cancer patients

From July 2013 to July 2014 (inclusive), cancer patients were oversampled in selected facilities. This oversampling was expected to provide sufficient sample for facility-level reporting of cancer patients once a full year of oversampling had occurred. In these facilities, patients were identified as eligible for the cancer strata if the ICD-10 code of the primary or secondary diagnosis code was between C00 and D50. They were then also stratified by the two age groups (17–49, 50+ years) and by stay type (overnight and same day). Separate sampling proportions were calculated for the cancer strata using the same methods as used previously.

### Changes made to sampling procedures in September 2013

From the September patient cohort, 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 that differ markedly in the number of patient visits.

1. Estimate the eligible population ($N_i$) from each quarter and for the overall year using data for the previous year. In addition, record the response rate ($r_i$) from the most recent year of the patient survey for each facility

| Facility | Survey response rate (*r*) (previous year) | Population (*N*), 2011–2012 | | | | |
|---|---|---|---|---|---|---|
| | | By quarter | | | | |
| | | Q1 | Q2 | Q3 | Q4 | Total |
| 1 | .38 | 249 | 263 | 291 | 304 | 1107 |
| 2 | .41 | 755 | 797 | 763 | 739 | 3054 |

2. Use equation 1 to estimate the sample size

| Facility | Estimated sample size | | | | |
|---|---|---|---|---|---|
| | By quarter | | | | |
| | Q1 | Q2 | Q3 | Q4 | Annual |
| 1 | 220 | 224 | 231 | 234 | 297 |
| 2 | 266 | 268 | 266 | 265 | 298 |

3. Calculate the sampling proportion by quarter and year

| Facility | Sampling proportion when using… | | | | |
|---|---|---|---|---|---|
| | Quarterly reporting | | | | Annual reporting |
| | Q1 | Q2 | Q3 | Q4 | |
| 1 | 88% | 85% | 80% | 77% | 27% |
| 2 | 35% | 34% | 35% | 36% | 10% |

4. Because Facility 1 has a sampling proportion for quarterly reporting of greater than 70%, annual reporting will be used. For Facility 2, the sampling proportion for quarterly reporting is less than 70% so quarterly reporting will occur.

5. As well as depending on the reporting frequency, the *actual* sample size will depend on the actual eligible population for the facility.

Assume the eligible population, by strata within these two facilities, for one month in Quarter 1 of the current year are as follows:

| Facility | Number of eligible patients for survey, Month 1, Q1 | | | | Total |
|---|---|---|---|---|---|
| | Overnight | | Same Day | | |
| | 17–49 | 49+ | 17–49 | 49+ | |
| 1 | 9 | 32 | 21 | 68 | 130 |
| 2 | 30 | 115 | 36 | 90 | 271 |

The appropriate (annual or quarterly) facility-specific sampling proportion is applied to each stratum and rounded UP to the nearest integer.

| Facility | Reporting frequency | Sampling proportion for reporting frequency | Number of survey mail-outs, Month 1, Q1 | | | | Total mail-out for month |
|---|---|---|---|---|---|---|---|
| | | | Overnight | | Same Day | | |
| | | | 17–49 | 49+ | 17–49 | 49+ | |
| 1 | annual | 27% | 2 | 9 | 6 | 18 | 35 |
| 2 | quarter | 35% | 11 | 40 | 13 | 32 | 95 |

In this case, a total of 35 surveys would be mailed out to patients from Facility 1 and 95 to patients from Facility 2. Although the number of mail-outs in some strata is very low, it should be remembered that the data are collapsed for estimation purposes, with the estimation using an entire year's worth of data for Facility 1 and three months of data for Facility 2.

Please note: For the January to August 2013 patient sampling process, step 5 was undertaken by the Ministry of Health. From September to December 2013, step 5 was undertaken by BHI and the NSW Ministry of Health then used this number for the required sample sizes.