Case study 9 – Cataracts/lens procedures
Hospital costs and outcomes study for NSW Health

Other Industries
July 2010
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1 Introduction and executive summary

NSW Health is currently coordinating a project that ultimately aims to improve clinical practice and efficiency consistently across the NSW hospital system. The project involves 6 components, and is designed to enable development of a methodology that makes better use of available data to compare patient mix, costs, clinical practice and outcomes and which can then be applied across other hospitals to improve performance. (See Box 1.1 for more information.)

NSW Health asked the Independent Pricing and Regulatory Tribunal of NSW (IPART) to conduct a costs and outcomes study that encompasses 3 components of this larger project. The aim of the study was to provide information and analysis that can be used by clinical experts to better understand the variation in clinical practice in NSW hospitals, and the extent to which this variation can lead to differences in hospital costs and clinical outcomes.

IPART’s study involved comparing costs, configurations of care and outcomes in 5 selected NSW hospitals:

- Royal Prince Alfred Hospital (RPAH)
- Royal North Shore Hospital (RNSH)
- John Hunter Hospital (JHH)
- Bankstown-Lidcombe Hospital (BLH), and
- Gosford Hospital (GH).

To do this, we analysed management practices at the hospital-wide level, and did detailed case studies of 11 specific clinical areas. As costs, configurations of care and relevant indicators of outcome vary significantly depending on the condition of the patient and/or the procedure undertaken, these case studies allowed us to compare the hospitals on a more like-with-like basis. This document discusses our findings in one of these 11 clinical areas – cataract/lens replacement. (See Box 1.2 for the full list of clinical areas we examined, how they were selected, and how we conducted the case studies.)
Box 1.1 NSW Health project

IPART’s hospital costs and outcomes study is part of a larger, multi-stage project NSW Health is coordinating with the assistance of other organisations. The terms of reference for this project set out 6 components:

1. Audit the quality of current coding and costing data.
2. Analyse differences in costs between 3 principal tertiary referral hospitals and 2 other principal referral hospitals.
3. Describe the different configurations of care that underpin different cost profiles.
4. Analyse available data on differences in adjusted admission rates and clinical outcomes for the 5 selected hospitals.
5. Determine whether variations in configurations of care lead to different clinical outcomes.
6. Identify the extent to which clinical variation exists, with the aim of achieving clinical best practice and maximum efficiency.

The first component is being completed by Health Outcomes International (audit of costing) and Pavilion Health (audit of coding). The results will assist the NSW Department of Health in further developing episode funding, in line with the national agreement by the Council of Australian Governments (COAG) to move to a more nationally consistent approach to activity-based funding. IPART has completed the second, third and fourth components through our hospital costs and outcomes study. The results of this study will be used by clinical experts in completing the fifth and sixth components.

The NSW Health project is part of its response to the findings and recommendations made in the Report of the Special Commission of Inquiry into Acute Care Services by Commissioner Garling.\(^a\)

\(^a\) Flowing from the NSW Government’s response to the Garling Inquiry (Caring Together - The Health Action Plan for NSW (2009)), ‘four pillars’ of clinical improvement have been established – Clinical Excellence Commission (CEC), Agency for Clinical Innovation (ACI), Bureau of Health Information (BHI) and Clinical Education and Training Institute (CETI). IPART’s analysis on costs, clinical practice and outcomes is to be considered by the NSW Department of Health and clinical experts in these agencies to assess whether variations in configurations of care lead to different clinical outcomes and to identify the extent to which clinical variation exists, with the aim of achieving clinical best practice and maximum efficiency.
Box 1.2  IPART’s case studies

To compare costs, configurations of care and outcomes in the 5 study hospitals, we focused on 11 specific conditions or procedures in detail (as well as undertaking a broad, hospital-wide analysis). These conditions/procedures are:

- Hip joint replacement
- Major chest procedures
- Breast surgery
- Cholecystectomy
- Appendicectomy
- Stroke
- Cardiology – stents, pacemakers and defibrillators
- Tracheostomy, or ventilation for greater than 95 hours
- Cataract/lens procedures
- Hysterectomy, and
- Obstetric delivery.

In selecting these conditions/procedures, and the relevant indicators to compare for each, we were advised by a clinical consultant (Dr Paul Tridgell) and a clinical reference group (Professor Bruce Barraclough, Dr Anthony Burrell, Dr Patrick Cregan, Professor Phillip Harris, Professor Clifford Hughes, Professor Brian McCaughan, Professor Peter McClusky, Dr Michael Nicholl, Professor Ron Penny, Professor Carol Pollock and Dr Hunter Watt).

The case studies were selected to provide a range of surgical procedures and a range of medical conditions that met one or more of the following criteria:

- high volumes
- high reported costs
- high variability in reported costs
- apparent differences in clinical practice, or
- a range of models of care.

To conduct the case studies, we visited each of the hospitals and spoke with a range of staff, including clinical, nursing, management, finance, coding and administrative staff. We also collected a range of clinical and financial data from NSW Health, relevant area health services and hospitals. By analysing the data and speaking with clinical experts, we established the most suitable data available for comparing hospitals on a like-with-like basis.

For further information on our methodology and broad findings on costs, outcomes and configurations of care, see our main report, *NSW Health costs and outcomes study by IPART for selected NSW hospitals*. Our detailed findings on the other case study areas can be found in our reports on each area.
1.1 Why did we select cataracts as one of the case studies?

Cataracts can be surgically treated by replacing the lens in the eye with a prosthesis – an intraocular lens. Lens replacement was selected as one of the clinical areas for detailed study because:

- It is one of the most common procedures performed in Australian hospitals.\(^1\)
- It is a relatively straightforward and highly protocol-driven procedure so the costs are easier to compare.
- There are material differences in reported costs between hospitals.\(^2\)

1.2 What was the scope of the cataract case study?

The cataract case study compared the costs and configurations of care related to lens replacement. We used diagnostic related groups (DRGs) to define the procedures and identify the data included in the scope of the case study (see Table 1.1).

There are 2 DRGs for this case study distinguished according to whether or not patients are having same day procedures (that is, the patient does not stay overnight in hospital).

<table>
<thead>
<tr>
<th>DRG</th>
<th>Number of cases in study hospitals</th>
</tr>
</thead>
<tbody>
<tr>
<td>C16A</td>
<td>Lens procedures</td>
</tr>
<tr>
<td></td>
<td>116</td>
</tr>
<tr>
<td>C16B</td>
<td>Lens procedures, same day</td>
</tr>
<tr>
<td></td>
<td>2,872</td>
</tr>
</tbody>
</table>

For this case study, we found that the DRG classifications can be used to compare costs, configurations of care and outcomes on a like-with-like basis. Lens procedures are protocol-driven, and that the likelihood of complications is lower than for many of our other case study groupings. The difference between the DRGs is whether the patient stays in hospital overnight.\(^3\) The vast majority of patients in DRG C16A spend only 1 night in hospital. (See section 2.4 for more details).

Unless specified otherwise in this case study, the data we analysed related to the 12-month period from 1 July 2008 to 30 June 2009.

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1 Over 50,000 are performed in Australian public hospitals each year and another 48,000 are performed in the private sector. Source: AIHW, National Hospital Cost Data Collection, Cost Report Round 12 (2007-08), September 2009, pp 26 and 45.

2 Our initial investigation found large differences in average costs reported by study hospitals for the National Hospital Cost Data Collection (NHCDC), even though there is not much variation in the procedures and more than 95% of patients stayed for less than 1 day at all the study hospitals. (See Chapter 4 of our main report, *NSW Health costs and outcomes study by IPART for selected NSW hospitals*, July 2010.)

3 This is mainly affected by factors such as, whether the clinician considers that a patient requires a general anaesthetic (eg, children or confused elderly patients).
1.3 What were the key findings of the cataract case study?

To compare the costs, configurations of care and outcomes of cataract procedures at the study hospitals, we collected, analysed and compared data on:
- the number, type and mix of cataract patients at each hospital
- the average length of stay for these patients at each hospital
- the lens (ie, prosthesis) costs and theatre time
- National Hospital Cost Data Collection (NHCDC) costs compared with our costs (including imaging and pathology costs)
- the configurations of care used for lens replacement at each hospital.

Our key findings are summarised below.

1.3.1 Number, type and mix of patients

We found that the 5 study hospitals treated a total of 3,607 cataract cases during the study period. BLH treated more cataract patients than any of the other hospitals. However, over half of the patients at BLH were privately referred outpatients who were treated in the hospital’s eye clinic. We excluded these outpatients from further analysis because we did not have any information for them. The other study hospitals each treated a fairly similar number of cataract cases (roughly 650), and treated all cases as inpatients except JHH which treated a few patients as privately referred non-inpatients.

We found that almost all lens procedures were planned procedures, and that very few patients stayed in hospital overnight. Cataract patients undergoing lens procedures were on average 74 years old, with very little variation between the hospitals.

1.3.2 Average length of stay

We found that almost all overnight patients (DRG C16A) spent a single night in hospital. Patients who were discharged on the same day as the procedure (DRB C16B) stayed in hospital for about 5 hours (on average) at all the study hospitals.

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4 This figure includes both outpatients and inpatients. With respect to inpatients only, the 5 study hospitals treated 2,988 cases (see Table 2.1).
1.3.3 Costs of inpatient care

To compare the costs related to the case study areas at the study hospitals, we examined the management and use of a selection of clinical resources used directly for patient care in that area. For cataract patients, the main clinical resources we examined were prostheses (ie, lenses) and operating theatre time. We had aimed to also estimate medical staff costs and pharmacy costs for this case study, but were unable to obtain consistent comparisons within the timeframe for this review.5

Prosthesis costs (lenses)

We found that the hospitals pay different prices for the same lenses, but the differences are small in dollar terms because the lenses are comparatively inexpensive.

We also found that different charging arrangements for private self-insured inpatients introduce anomalies into the hospitals’ costing data for prostheses. (We did not use the hospitals’ expenditure data for our analysis of prostheses use.)

Operating theatre times

We found that operating theatre times were significantly lower at GH than at the other study hospitals. One reason may be that the other hospitals provide training for junior medical officers. We found that operating theatre times were lower at JHH than at the remaining study hospitals, possibly because it provides fewer training opportunities than the remaining hospitals.

National Hospital Cost Data Collection

The NHCDC reports estimates of average hospital costs based on data it collects from hospitals around Australia.6 In this study, we had access to the study hospitals’ final patient-level data for 2008/09 which was reported to the NHCDC, as well as the overall averages publicly reported by the NHCDC for different hospital groupings in 2007/08.7

We were able to compare study hospitals’ NHCDC estimates with our estimates of costs, and for this comparison we included imaging and pathology costs. We found that there is less variation in resource use between the study hospitals than implied by the costs reported for the NHCDC. The reported costs for RPAH and BLH were furthest from our estimates of actual costs.

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5 Medical staff costs and pharmacy are discussed in Chapters 9 and 14 of our main report, *NSW Health costs and outcomes study by IPART for selected NSW hospitals.*

6 In NSW, these cost estimates are often compiled by area health services, rather than individual hospitals.

1.3.4 Configurations of care

We found that the study hospitals differed in:

- How theatres were managed.
- Opportunities for medical training.
- The selection of lens types.
- The provision of medication and pre-and post-operative care.

Theatre management

Cataracts are almost all planned cases. However, cataract surgery can either be performed in dedicated planned surgery theatres, or in theatres which are used for both planned and emergency cases. Where there is a mix of emergency and planned activity, urgent emergency cases may take precedence over planned cases like cataracts. Theatre arrangements will depend on a range of factors, including hospitals’ theatre availability and theatre configuration, as well as hospitals’ networking arrangements, clinician preferences and training requirements. GH, for example is part of a networked arrangement on the Central Coast and most cataract procedures are performed in Wyong Hospital (where there is more planned surgery). However, cataract activity is retained at GH (where there are both emergency and planned cases) to maintain theatre staff skills for the occasional trauma patient. In contrast, JHH performs its planned cataract surgery cases at the Royal Newcastle Centre.

We found that all the hospital mainly use half-day theatre lists. However, BLH and RNSH sometimes do two half day lists on the same day.

Medical training

GH uses only visiting medical officers (VMO) on a fee-for-service basis, and does not provide training opportunities for junior medical staff (registrars). JHH provides less training than the remaining study hospitals because about 75% of procedures at this hospital are provided by VMOs on a fee-for-service basis. As noted above, the efficiency in operating theatre time at GH and JHH may be achieved at the expense of training.

Lens type

There were variations in toric lens use at the study hospitals. Toric lenses are used for visual correction where there is astigmatism, and are more expensive than other lenses. Some hospitals use them sparingly, while other hospitals do not use them at all.
Medication on discharge and pre- and post-operative care

Unlike the other hospitals, at GH all pre- and post-operative care is provided in the VMOs’ rooms.

Some of the hospitals, such as RPAH and RNSH provide eye medication (eg, drops) to patients on discharge. At GH, the VMOs provide patients with prescriptions for medication in advance of surgery.

1.3.5 Indicators of outcome, safety and quality

Lens procedures are protocol-driven and the likelihood of complications is lower than for many other surgical procedures. Based on this, and the limited time available for the project, the case study focuses on costs rather than indicators of outcomes, safety and quality.

However, during consultation for this case study we compiled a list of potentially useful indicators for future work, in particular post operative infection rates, visual outcomes, returns to theatre and rupture of the posterior lens capsule.

Clinicians routinely review visual outcomes for patients at a follow-up visit after surgery. Further, some hospitals (eg, GH) conduct regular audits of their surgical cases, as well as peer review meetings to analyse any complications arising from these cases. However, other hospitals do not appear to be reporting or auditing their outcomes or providing feedback on benchmarking or performance to their clinicians.

1.4 What are the key implications of these findings?

Prostheses purchasing

The price differences on lenses are fairly small, and are far smaller than the differences reported in the NHCDC. It might nevertheless be possible to achieve some saving by negotiating better prices for lenses. Prostheses purchasing and opportunities for savings are discussed in more detail in Chapter 10 of our main report, NSW Health costs and outcomes study by IPART for selected NSW hospitals.

Training requires time and resources

Hospitals that provide training opportunities for junior medical staff, theatre nurses and paramedical staff may appear to be ‘less efficient’ than hospitals that don’t because training requires additional time and resources.
Use of toric lenses

Although toric lenses are more expensive than others, they serve a different function (visual correction for astigmatism). We suggest that NSW Health assess the costs and benefits of toric lenses and develop guidelines for their use in public hospitals.

There is scope for improved information flows

There is potentially scope to collect, audit and report visual outcomes data for patients undergoing lens procedures, to provide performance benchmarking and feedback for clinicians.

1.5 List of recommendations

1. That NSW Health arranges for appropriate clinical expert groups to assess the costs and benefits of toric lenses and develop guidelines for their use in public hospitals. 27

2. That NSW Health considers the costs and benefits of collecting data and monitoring performance against visual outcomes for patients undergoing lens procedures. 29

1.6 What does the rest of this report cover?

The rest of this report discusses the findings of the cataract case study in more detail:

• Chapter 2 compares the characteristics of patients at the study hospitals, including the case volume, emergency admission and transfers, average age and length of stay.

• Chapter 3 describes how we analysed the costs of prostheses and theatre time and explains why we did not compare staff costs. It also compares our cost estimates with estimates based on the final data reported to NSW Health as part of the NHCDC.

• Chapter 4 compares the configurations of care for cataract replacement at the study hospitals and highlights key differences.

• Chapter 5 presents the indicators of outcome, safety and quality for cataract that we identified as potentially useful for future work.

• The appendices contain the complete list of recommendations for our hospital costs and outcomes study and provide more detailed information on lens prices paid by the study hospital in 2008/09. A glossary is also included at the end of this report.
2 Characteristics of patients across study hospitals

Once we had established that the DRG groupings could be meaningfully used to compare the costs, configurations of care and outcomes across the study hospitals, we identified the total number of cataract cases at each hospital during the study period. We also identified the proportion of planned procedures, the average age of patients and the average length of stay across the study hospitals.

The sections below discuss our analysis of these patient characteristics.

2.1 Number of cataract cases at each study hospital

Our data indicate that the 5 study hospitals treated a total of 3,607 cataract cases during the study period. Of the total number of patients treated, 2,988 were treated as admitted patients (Table 2.1).

BLH differed from the other hospitals in that it treated over half of its patients as privately referred outpatients in its eye clinic. The other study hospitals treated all their cataract cases as inpatients, except for a few privately referred outpatients at JHH. We excluded these patients from further analysis because we did not have any information for them.

While BLH treated more cataract patients than any of the other study hospitals (1,026 cases, including the privately referred outpatients), it treated fewer inpatients than the other study hospitals (462 cases). The other study hospitals each treated a fairly similar number of cataract cases as inpatients (around 600 to 700 cases).
Table 2.1 Cataract surgery cases at study hospitals, DRGS C16A and C16B (no.)

<table>
<thead>
<tr>
<th>Hospital</th>
<th>Overnight</th>
<th>Same day admitted</th>
<th>Same day not admitted</th>
<th>Total admitted</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DRG C16A</td>
<td>DRG C16B</td>
<td>All</td>
<td>DRG C16B</td>
<td>All</td>
</tr>
<tr>
<td>RPAH</td>
<td>45</td>
<td>550</td>
<td>595</td>
<td>0</td>
<td>595</td>
</tr>
<tr>
<td>GH</td>
<td>3</td>
<td>686</td>
<td>689</td>
<td>0</td>
<td>689</td>
</tr>
<tr>
<td>RNSH</td>
<td>19</td>
<td>609</td>
<td>628</td>
<td>0</td>
<td>628</td>
</tr>
<tr>
<td>BLH</td>
<td>15</td>
<td>447</td>
<td>462</td>
<td>564</td>
<td>1,026</td>
</tr>
<tr>
<td>JHH</td>
<td>34</td>
<td>580</td>
<td>614</td>
<td>55</td>
<td>669</td>
</tr>
<tr>
<td>All study hospitals</td>
<td>116</td>
<td>2,872</td>
<td>2,988</td>
<td>619</td>
<td>3,607</td>
</tr>
</tbody>
</table>

a BLH treats a number of privately referred patients as outpatients in the Eye Clinic. JHH treated 55 privately referred non-inpatients in 2008/09.

Note: See Box 2.1 for details on how we calculated the number of cases.

Source: HIE inpatient statistics, 2008/09 and IPART analysis.

Box 2.1 How we calculated the number of cataract surgery cases

To calculate the number of cataract cases at the study hospitals, we:

- used patient episode data for 2008/09
- counted adjoining episodes as part of the same stay (ie, adjoining episodes counted as one case)
- only included patient data where the whole patient stay occurred within 2008/09 (ie, all episodes and adjoining episodes had to start on or after 1 July 2008 and end on or before 30 June 2009 to be counted)
- only included patient data where the first episode in the year in the study hospital was coded as a DRG for lens procedures (episode sequence number had to be 1).

The approach prevented double counting. It excluded cases where the patients were admitted for a different condition and later reclassified to a lens procedure DRG.

Note that our approach means that the number of cases we identified will be less than the number of separations in 2008/09.

2.2 Admissions and transfers

Our analysis shows that almost all lens procedures were planned procedures, and no patients were transferred in from other hospitals. A very small number (3) were transferred out to other hospitals after the procedure (Table 2.2).
2 Characteristics of patients across study hospitals

Table 2.2 Number of emergency admissions and transfers

<table>
<thead>
<tr>
<th>Hospital</th>
<th>Emergency admissions</th>
<th>Transferred in from another hospital</th>
<th>Transferred out to another hospital</th>
</tr>
</thead>
<tbody>
<tr>
<td>RPAH</td>
<td>2</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>GH</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>RNSH</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>BLH</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>JHH</td>
<td>1</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>All study hospitals</td>
<td>5</td>
<td>-</td>
<td>3</td>
</tr>
</tbody>
</table>

Note: See Box 2.2 for details on how we identified emergency admissions and transfers.
Source: HIE inpatient statistics, 2008/09 and IPART analysis.

Box 2.2 How we identified emergency admissions and transfers

Emergency admissions were identified by linking emergency department attendance data with admitted patient data where the time of arrival and departure in the emergency department matched with the admission time.

Due to data quality issues with the transfer in and transfer out fields in the admitted patient data, transfers were calculated using a linkage key developed by the Australian Institute of Health and Welfare.

2.3 Average patient age

Table 2.3 shows the average age of patients who had cataract procedures at each of the study hospitals.

Table 2.3 Average age of admitted patients

<table>
<thead>
<tr>
<th>Hospital</th>
<th>Overnight DRG C16A</th>
<th>Same day DRG C16B</th>
<th>Total admitted</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>years</td>
<td>years</td>
<td>years</td>
</tr>
<tr>
<td>RPAH</td>
<td>76</td>
<td>72</td>
<td>72</td>
</tr>
<tr>
<td>GH</td>
<td>74</td>
<td>75</td>
<td>75</td>
</tr>
<tr>
<td>RNSH</td>
<td>77</td>
<td>74</td>
<td>74</td>
</tr>
<tr>
<td>BLH</td>
<td>74</td>
<td>73</td>
<td>73</td>
</tr>
<tr>
<td>JHH</td>
<td>72</td>
<td>74</td>
<td>74</td>
</tr>
<tr>
<td>All study hospitals</td>
<td>75</td>
<td>74</td>
<td>74</td>
</tr>
</tbody>
</table>

Note: Age at date of admission.
Source: HIE inpatient statistics, 2008/09 and IPART analysis.
The average age of admitted patients across all study hospitals was 74 years, and was similar for all hospitals. Overnight patients were slightly older than same day patients at all the hospitals. Patients ranged in age from 9 years old to 97 years old.

### 2.4 Length of stay

For each of our clinical case studies, we calculated 3 different lengths of stay measures. These are LOS1, which is the acute episode; LOS2, which is the total length of stay in study hospital; and LOS3, which is LOS2 plus allowance for time in other hospitals - 1 transfer in and 1 transfer out.

However, in the case of lens procedures, we found that almost all patients have planned rather than emergency surgery and there are very few transfers in and out of the study hospitals. Almost all patients are discharged after the acute episode. This means that there is no observable difference in the acute episode length of stay (LOS1), the hospital length of stay (LOS2) and the total number of days in hospital (LOS3). The measure often used in NHCDC and DRG benchmarking – the average ‘acute episode length of stay’, is therefore appropriate for the lens procedure DRGs.

Our data show that almost all overnight patients (DRG C16A) spent a single night in hospital. The average length of stay for these patients was 25 hours. Patients who were discharged on the same day as the procedure (DRB C16B) stayed in hospital for about 5 hours (on average) at all the study hospitals (see Table 2.4).

#### Table 2.4 Average length of stay of admitted patients by DRG (hours)

<table>
<thead>
<tr>
<th>Hospital</th>
<th>Overnight DRG C16A</th>
<th>Same day DRG C16B</th>
</tr>
</thead>
<tbody>
<tr>
<td>RPAH</td>
<td>24</td>
<td>5</td>
</tr>
<tr>
<td>GH</td>
<td>24</td>
<td>5</td>
</tr>
<tr>
<td>RNSH</td>
<td>28</td>
<td>5</td>
</tr>
<tr>
<td>BLH</td>
<td>24</td>
<td>5</td>
</tr>
<tr>
<td>JHH</td>
<td>25</td>
<td>5</td>
</tr>
<tr>
<td>All study hospitals</td>
<td>25</td>
<td>5</td>
</tr>
</tbody>
</table>

*Source: HIE inpatient statistics, 2008/09 and IPART analysis.*

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8 Only 2 patients spent more than 1 night at any of the study hospitals.
3 Costs of providing inpatient care

The main costs involved in lens replacement are for operating theatre time, medical staff and prostheses. For this case study, we only examined prosthesis costs and operating theatre time. We were unable to examine medical staff costs for any of our case studies due to the lack of consistent data (see Chapter 9 in our main report, NSW Health costs and outcomes study by IPART for selected NSW hospitals). We did not examine ward nursing costs for this case study because of inconsistencies between the hospitals in the way data are captured in the day surgery units. Also, ward nursing costs are relatively low because of the short time cataract patients spend in hospital.

We also compared our costs with those of the NHCDC, and for this comparison we included imaging and pathology costs. We used the final 2008/09 NHCDC costs for this comparison.

3.1 Prosthesis costs (lenses)

In cataract surgery, an intraocular lens (IOL) is usually implanted into the eye to replace the existing crystalline lens which has been clouded over by a cataract. In general, this prosthesis consists of a small plastic lens with plastic side struts, called haptics, to hold the lens in place within the capsular bag inside the eye.9

To analyse the costs of lenses, we examined information from study hospitals’ purchasing databases and determined the types of lenses being purchased, how frequently different types were purchased and what prices were paid. More detail on IPART’s approach in analysing prosthesis costs is provided in Chapter 10 of our main report, NSW Health costs and outcomes study by IPART for selected NSW hospitals. Box 3.1 provides an overview of our approach to analysing the prosthesis costs, including lens costs for cataract surgery.

9 N Ahmedabad, Medical Devices Sector Analysis for Department of Pharmaceuticals, 8 May 2009.
Box 3.1 How we analysed prosthesis costs

For each prosthesis we examined as many of each study hospital’s purchases (including supplier, model and price paid) as possible in 2008/09. Then we compared:

- the relative use of different types of the item across study hospitals
- the prices paid for the item, including for the same or similar models of the item, across hospitals
- the prices paid for each hospital’s most frequently purchased model of the item.

Given that we did not have complete information on the hospitals’ volumes of prosthesis purchases, we asked hospitals to check which particular type of prosthesis they purchased most frequently in 2008/09.

We also:

- ranked the study hospitals in terms of the prices paid for directly comparable types/models of the item
- calculated the percentage differences between the prices paid by the hospitals for their most frequently purchased models of the item and the lowest price paid for that same model by a study hospital
- estimated the potential annual savings available to each hospital if it used only its most frequently purchased model of the item in 2008/09 and purchased this model at the lowest price paid for that same model by any study hospital (as per the previous calculation).

To rank the study hospitals, we used data on each model purchased by more than one study hospital. For each of these models, we ranked the hospitals as either paying the lowest price, second lowest, third lowest or fourth lowest, depending on the relative prices they paid. If 2 or more hospitals paid the same price, we gave them the same ranking (except where one hospital had purchased the item on behalf of the other(s) - in this case, only the purchasing hospital was included in the analysis). If only one hospital had purchased a particular model, this model was excluded from the analysis.

We cannot be sure that all item purchases and prices were included in this process. For example, some may have been omitted because they were called something other than the particular item name we searched for in the hospitals’ purchasing databases (eg, something other than lens). In addition, as noted above, others were omitted because only one hospital purchased a particular model. However, we are confident that most purchases were included in the analysis, and that the results provide a useful indication of which study hospitals are paying more or less than others for the selected prosthesis.

Finally, we drew conclusions on the factors which influence prosthesis costs and made recommendations on observed cost variations related to prosthesis usage and hospital’s purchasing approaches.

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*a* For example, consider if one hospital purchased Item X more than any other lens and purchased it for $220, while another study hospital purchased it for $190. The first hospital could potentially save $30 or 14% on every purchase of that item. This could translate to a total of $20,670 in annual savings based on a volume of 689 cases that would require lenses.
3 Costs of providing inpatient care

We found that the study hospitals have different approaches to purchasing, with some engaged in regular supplier price agreements and tight controls on product choice while others were less centralised and were largely driven by clinician preference. We recognise that different types of lenses may be better suited to some patients than others, depending on their condition and diagnosis.

3.1.1 Types of lenses used in cataract surgery

Lenses differ in terms of the material they are made from. Most IOLs fitted today are either acrylic or silicone (both of which are flexible). Some are still made of polymethylmethacrylate (PMMA), but this inflexible type has largely been superseded. However, many surgeons still prefer PMMA lenses where complications such as posterior capsule rupture\(^\text{10}\) have occurred.

Lenses also differ in terms of how they correct vision. The most common type are fixed monofocal lenses, which are matched to the patient’s distance vision. Other types include:

- multifocal IOLs, which provide the patient with multiple-focused vision at far and reading distance
- toric IOLs, which correct for specific problems such as astigmatism\(^\text{11}\).

Of these, toric lenses tend to be used the most sparingly. For example, RPAH staff advised that the hospital uses around 3 toric lenses per month in total\(^\text{12}\).

Box 3.2 provides more information on these 3 types of lenses.

Ophthalmologists’ preferences for a particular type of lens are based on the ease of use in surgery and quality issues (such as if the lens has a higher of lower risk of the patient requiring a laser capsulotomy\(^\text{13}\)).

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\(^{10}\) This refers to a rupture or tear in the membrane that surrounds the lens (http://www.aboutcataractsurgery.com/cataract-surgery-complications.html). Alternative surgical techniques are required to deal with this rupture or tear. Further, different IOLs may need to be used.

\(^{11}\) Allaboutvision.com (http://www.allaboutvision.com/conditions/iols.htm).

\(^{12}\) IPART visit to RPAH, December 2009.

\(^{13}\) Laser capsulotomy is a non-invasive procedure performed on the eye to remove the cloudiness that develops on the posterior capsule of the lens of the eye after extraction of a cataract (http://www.answers.com/topic/laser-posterior-capsulotomy).
Box 3.2  Main types of IOLs in terms of vision-correction capability

Monofocal or traditional IOLs

These may be rigid lenses that provide clear vision at only one distance. Individuals with these types of lenses are required to wear external lenses for clear vision at other distances.

Multifocal IOLs

Multifocal IOLs have the ability to correct visions at all distances and come in 3 main types:

- **Multifocal refractive IOLs**, which are designed with several optical zones on the intraocular lens. These zones provide various focal points, allowing for an improvement in distance, intermediate, and near vision.

- **Multifocal apodized diffractive multifocal IOLs**, which have gradual diffractive steps on the intraocular lens implant that create a smooth transition between focal points. They also bend incoming light to the multiple focal points to increase vision in various lighting situations.

- **Multifocal accommodative IOLs**, which are designed to be flexible like a natural lens, changing shape as the distance of an object to the eye changes.

Toric IOLs

These lenses have a surface which is a combination of a sphere and a cylinder. They are used to correct specific vision problems, such as astigmatism.


### 3.1.2 Relative use of different types of lenses by the study hospitals

The study hospitals purchased many more lenses than any of the other prostheses we examined, given the significant number of DRG episodes of cataract surgery. In terms of the types used, we found that the most frequently purchased types were acrylic monofocal lenses and silicone multifocal lenses. JHH and BLH purchased a higher proportion of silicone multifocal lenses than the other study hospitals.

### 3.1.3 Prices paid for lenses by the study hospitals

We found that the study hospitals used 3 companies to source the majority of the lenses they purchased, although a handful of other companies were also used. The prices they paid per lens were much lower than prices for the other prosthesis items we examined, and so the price variations we identified were also lower:14

- For the acrylic monofocal and the silicone multifocal lens, the price paid by each hospital varied from $180 to $220.

- For the toric lens, the price paid was around $450.

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14 For same-day cataract procedures where costs are low overall, the lens costs are around 13% of total costs, excluding overheads and depreciation.
Prices for sample of lens models

Appendix B compares the prices the hospitals paid for a sample of specific lens models (identified by product number and supplier). Our main observations in relation to this sample were that:

- The prices the hospitals paid for the same model of lens (both for the acrylic and silicone type) varied by $20 or less per lens.
- JHH paid the lowest prices for both acrylic and silicone lenses ($180 and $190, respectively).
- RPAH and BLH appeared to be the only hospitals to purchase the PMMA lenses. RPAH paid $140 to $156 for this type of lens, while BLH paid $220.

Prices for most frequently purchased lens models

Figure 3.1 compares the prices the hospitals paid for their most frequently purchased model of lens (including all types). It shows that these prices varied by $30 per lens. They ranged from $190 (paid by JHH) to $220 (paid by RPAH and BLH). RNSH also paid a relatively low price for its most frequently purchased lens ($205).

Data source: Study hospitals’ purchasing databases. All frequent purchases and prices were checked by study hospitals.

These price differentials for the most frequently purchased lenses tend to demonstrate less variation than that implied by the NHCDC estimates of cataract surgery prosthesis costs for the study hospitals, shown in Figure 3.2.
3.1.4 Rankings of study hospitals based on prices paid for comparable lenses

We used the ranking process described in Box 3.1 to provide a broad indication of whether the study hospitals tended to pay relatively high or low prices for the same products. This analysis indicated that:

- JHH paid the lowest prices for 100% of the comparable lenses it purchased.
- GH paid the lowest price for 33% of the comparable lenses it purchased, and RPAH paid the lowest price for 25%.
- RNSH did not pay the lowest price for any of the comparable lenses it purchased, but paid second lowest price for 100% of these lenses.
- BLH did not pay the lowest price for any of the comparable lenses it purchased, and paid the highest price for 25% of these lenses.

3.1.5 Estimated potential annual saving from paying lowest price for most frequently purchased lenses

As for the other prosthesis items, we used scenario analysis to estimate the hypothetical annual savings available to each hospital if they had negotiated better prices for lenses. For each hospital, the estimated saving is equal to the difference between the price it paid for its most frequently purchased model of lens and the lowest price for that model, multiplied by the estimated volume of lenses it required in 2008/09. We calculated this volume of lenses by summing the total number of cases in the cataract surgery DRGs in that year (C16A and C16B).
We found that:

- RPAH could save 9% on multifocal, silicone lenses (for a hypothetical annual saving of $11,880).
- RNSH could save 2% on monofocal, acrylic lenses (for a hypothetical annual saving of $3,235).
- BLH could save 14% on multifocal, silicone lenses (for a hypothetical annual saving of $13,860).

Compared with the other prosthesis items we examined, the potential annual savings for hospitals through lower prices are much lower for lenses.

The analysis also suggests that JHH and GH could not make any savings, as they both paid the lowest price for their most frequently purchased lens model. However, we note that GH also purchased a high number of a model of silicone lenses, for which it paid $210. As the lowest price paid for this lens model was $190 (by JHH), our analysis indicates that GH could save 10% on these lenses.

These findings on lens purchases have informed our broader findings and recommendations on prostheses purchasing as presented in Chapter 10 of the main report.\(^\text{15}\)

### 3.2 Operating theatre time

We analysed operating theatre time for lens procedures to provide an indication of the relative efficiency of operating theatre use at the different hospitals. We also compared operating theatre times with NHCDC operating theatre costs. The first column of data in Table 3.1 shows the average time for a lens procedure at each of the study hospitals. The second column shows the average number of minutes between one patient leaving the operating room and start of the next lens procedure. The third column shows the NHCDC operating theatre costs.

We found that each lens procedure took roughly 30 minutes at RPAH, RNSH and BLH. Surgeons at GH took about half the time, on average (17 minutes), while surgeons at JHH took on average 20 minutes. Similarly, we found that the time between the end of one procedure and the beginning of the next procedure was significantly shorter at GH (7 minutes) than at RPAH, RNSH and BLH (18 to 19 minutes). The time between procedures was 11 minutes at JHH.

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\(^{15}\) IPART, *NSW Health costs and outcomes study by IPART for selected NSW hospitals*, July 2010.
Table 3.1 Operating theatre time and NHCDC operating theatre costs

<table>
<thead>
<tr>
<th>Hospital</th>
<th>Time in surgery</th>
<th>Time between procedures</th>
<th>NHCDC operating theatre costs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>minutes</td>
<td>minutes</td>
<td>$</td>
</tr>
<tr>
<td>RPAH</td>
<td>27</td>
<td>18</td>
<td>1,093</td>
</tr>
<tr>
<td>GH</td>
<td>17</td>
<td>7</td>
<td>605</td>
</tr>
<tr>
<td>RNSH</td>
<td>30</td>
<td>19</td>
<td>669</td>
</tr>
<tr>
<td>BLH</td>
<td>33</td>
<td>18</td>
<td>1,346</td>
</tr>
<tr>
<td>JHH</td>
<td>20</td>
<td>11</td>
<td>748</td>
</tr>
</tbody>
</table>

* Time from one patient leaving the room to the start of the next lens procedure.

**Note:** Operating theatre times may not be fully comparable between hospitals because they use different systems to capture their theatre times.

**Source:** IPART analysis using data from hospital operating theatres, 2008/09 and final NHCDC cost data, 2008/09.

One reason for the short time in surgery and time between procedures at GH may be that the other hospitals provide training for junior medical officers.

The lower operating times at JHH may be because they provided fewer training opportunities than the remaining hospitals. About 75% of procedures at JHH were undertaken by VMOs on a fee-for-service basis, who did not provide training for junior medical staff.

We cannot directly compare our analysis of operating theatre times with the NHCDC operating theatre costs, because the NHCDC costs include items that are not related to time spent in surgery (such as goods and services and some anaesthetic department costs)\(^\text{16}\). However, to the extent that there is some relationship between time spent in surgery and operating theatre costs, the NHCDC hospital rankings are difficult to understand in the light of our analysis of operating theatre times, particularly for RNSH. For example, NHCDC operating theatre costs at RNSH are only 10% higher than at GH, while our analysis indicates that each procedure takes (on average) nearly twice as long at RNSH as at GH. Similarly, RPAH’s NHCDC costs are almost 70% higher than those at RNSH even though there is not much difference in the average operating theatre times between the 2 hospitals (see Figure 3.3).

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3 Costs of providing inpatient care

Figure 3.3 Operating theatre time and NHCDC operating theatre costs

![Operating theatre time and NHCDC operating theatre costs](image)

**Data source:** IPART analysis using data from hospital operating theatres and final NHCDC cost data, 2008/09.

### 3.3 Imaging and pathology costs

Table 3.2 shows the value we have attributed for imaging and pathology costs for cataract patients, and the 2008/09 NHCDC costs. Our methodology for attributing imaging costs and pathology costs is explained in Box 3.3.

We found that there was virtually no use of imaging and very little use of pathology services for cataract patients. The NHCDC costs for RNSH, GH and JHH similarly showed no use of imaging and very little use of pathology services. However, the NHCDC costs for RPAH and BLH imply significant levels of both imaging and pathology use.
### Table 3.2  Average value attributed to imaging and pathology for cataract patients

<table>
<thead>
<tr>
<th></th>
<th>Imaging</th>
<th>Pathology</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IPART attributed value</td>
<td>NHCDC direct and indirect costs</td>
</tr>
<tr>
<td>$</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td><strong>Overnight patients (DRG C16A)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RPAH</td>
<td>13</td>
<td>118</td>
</tr>
<tr>
<td>GH</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>RNSH</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>BLH</td>
<td>0</td>
<td>147</td>
</tr>
<tr>
<td>JHH</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Same day patients (DRG C16B)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RPAH</td>
<td>0</td>
<td>78</td>
</tr>
<tr>
<td>GH</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>RNSH</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>BLH</td>
<td>0</td>
<td>97</td>
</tr>
<tr>
<td>JHH</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Source: IPART analysis using data from hospital imaging services and hospital pathology services, 2008/09 and final NHCDC cost data, 2008/09.

### Box 3.3  Our approach to estimating imaging and pathology costs

We did not use a bottom-up costing approach to calculate imaging or pathology costs.

- For imaging costs, we used detailed information from imaging services on the number and type of tests performed, the time and date. We use data for ‘acute’ episodes in 2008/09. As a proxy for cost, we attribute a value based on the Medicare Benefits Schedule (MBS). Each test is valued at 100% of the MBS fee.

- For pathology costs, we attributed a value for pathology tests based on internal billing data between the hospitals and the pathology services. We also used information on the time and date of tests. Charging arrangements at each hospital are similar, but are not identical. All pathology services base their charges on the MBS.

More information is included in Chapter 11 and Chapter 12 of our main report, *NSW Health costs and outcomes study by IPART for selected NSW hospitals*.
3.4 Anomalies in cost data due to different charging arrangements

About 32% of patients at RPAH are private ‘self-insured’ patients (ie, private patients who do not have private health insurance). These patients pay an accommodation bond of $294 (as well as the fees charged by the surgeon or anaesthetist), but the hospital waives the cost of the lenses. This means the RPAH does not record prosthesis costs for these patients, which introduces an anomaly into the expenditure data on prostheses.17

The other hospitals treat very few patients as private ‘self-insured’ patients (see Figure 3.4).

Figure 3.4 Proportion of private self-insured and public patients

![Bar chart showing the proportion of private self-insured and public patients across different hospitals.]

Note: There were 188 self-insured patients at RPAH, 3 at GH, 27 at RNSH, 1 at BLH and 0 at JHH.

Data source: HIE inpatient statistics, 2008/09 and IPART analysis.

17 We did not use the hospitals’ expenditure data for our analysis of prostheses use, as explained in section 3.1.
4 Configurations of care

The term ‘configurations of care’ refers to the way that hospitals choose to manage and provide patient care, including their clinical practices. The particular configurations of care within a hospital can be influenced by a complex array of factors, including national or state-wide guidelines or protocols, the culture, practices and controls of the individual hospital, the culture and practices of each clinical unit and its leadership and the preferences of each clinician. Differences in the way hospitals manage and provide patient care can also lead to differences in the costs and outcomes of that care.

During our hospital visits, we discussed major differences in the way the study hospitals managed and provided care for cataract patients. These included differences in:

- How theatres were managed.
- Opportunities for medical training.
- The selection of lens types.
- The provision of medication and pre-and post-operative care.

4.1 Theatre management

4.1.1 Separation of emergency and planned surgical workloads

Cataracts are almost all planned cases. However, cataract surgery can either be performed in dedicated planned surgery theatres, or in theatres which are used for both planned and emergency cases. Where there is a mix of emergency and planned activity, urgent emergency cases may take precedence over planned cases like cataracts. Theatre arrangements will depend on a range of factors, including hospitals' theatre availability and theatre configuration, as well as hospitals' networking arrangements, clinician preferences and training requirements.
We found that two study hospitals undertake their cataract cases in theatres predominantly for planned cases:

- JHH was able to largely separate planned and emergency cases by using the Royal Newcastle Centre for its planned cases.
- GH is located on the Central Coast, which uses a networked arrangement with much planned activity performed at Wyong Hospital. Most of the cataract procedures are performed at Wyong Hospital. Staff observed that some cataract activity is retained at GH to retain skills of theatre staff for the occasional trauma patient.

One reason for adopting the dedicated elective surgery centre model is so that elective surgery can be undertaken as planned, without the risk of patients being ‘bumped’ so the hospital can deal with emergency cases (which are unpredictable). Another reason is to separate patients where there is a greater risk of infection from those where this risk is lower (such as those undergoing elective procedures).

### 4.1.2 Networked service models

Another way hospitals might manage their planned and emergency surgery workload is through a networked service model. For example, under this model, some facilities within the network may handle more of the emergency work while other focus on the planned. As discussed above, the Central Coast hospitals use this model.

### 4.1.3 Theatre lists

All the hospital use half-day theatre lists. However, BLH and RNSH sometimes do two half day lists on the same day.

### 4.2 Medical training

All the study hospitals except GH provide training opportunities for junior medical staff (registrars) on planned surgical procedures. At GH, only VMOs perform lens procedures, while at the other hospitals more junior staff also performed these operations under the supervision of senior medical staff. As a result, the average length of these procedures was shorter at GH than at the other hospitals.
GH uses only VMO staffing on a fee-for-service basis, and does not provide training opportunities for junior medical staff (registrars). JHH provides less training than the remaining study hospitals because about 75% of procedures at this hospital are similarly provided by VMOs on a fee-for-service basis. As noted in Chapter 3 above, the efficiency in operating theatre time at GH and JHH may be achieved at the expense of training. The other study hospitals all provide training for registrars, who are supervised or observed by specialists.

There is clearly a cost in efficiency involved in training, not only of junior medical staff but also of theatre nurses and paramedical staff. This cost should be accounted for in the development of any models of care for cataract surgery, as training is a critically important need for the future.

### 4.3 Lens type and managing selection of these types

As section 3.1 discussed, there was some variation in the lenses used at each hospital.

One notable difference was the use of toric lenses at the study hospitals. Toric lenses are used for visual correction where there is astigmatism, and are more expensive than other lenses. For example, the price paid for silicone/acrylic lenses ranges from around $180 to $220, while toric lenses cost around $450 (see section 3.1.3). Some hospitals use toric lenses sparingly. For example, RPAH staff advised that the hospital uses around 3 toric lenses per month in total. Some other hospitals did not use them at all.

There is currently a lack of good evidence in the literature to construct solid guidelines for the use of toric lenses (and multi-focal lenses) in public hospitals. However, we were advised that clinical experience indicates great advantages for toric lenses (and multi-focal lenses) for selected patients.

We consider there is a case for NSW Health to arrange for appropriate clinical expert groups to assess the costs and benefits of toric lenses and develop guidelines for their use in public hospitals.

**Recommendation**

1. That NSW Health arranges for appropriate clinical expert groups to assess the costs and benefits of toric lenses and develop guidelines for their use in public hospitals.

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18 This analysis refers to procedures on inpatients only. As noted in Chapter 2, patients may also be treated as privately referred non-inpatients, mainly at BLH.

19 IPART visit to RPAH, December 2009.
NSW Health may also wish to explore providing patients with the option of having toric lenses inserted, instead of the more commonly used silicone/acrylic lenses, by the patients making co-payments to the hospitals. These co-payments would cover the average cost differential between silicone/acrylic lenses and toric lenses, currently around $200 per lens (see section 3.1.3). This option would allow patients to choose to deal with specific vision problems, such as astigmatisms, using toric lenses rather than by purchasing external lenses (ie, ‘glasses’).

4.4 Medication on discharge and pre- and post-operative care

Unlike the other hospitals, at GH all pre- and post-operative care is provided in the VMOs’ rooms. GH also does less administrative work than the other hospitals because bookings, listings etc are done by staff in the VMOs’ rooms.

The other study hospitals manage their own bookings and theatre lists. They also provide patients with the option of follow-up care at the hospital.

Some of the hospitals, such as RPAH and RNSH provide eye medication (ie, drops etc) to patients on discharge. At GH, the VMOs provide patients with prescriptions for medication in advance of surgery.
5 Outcome, safety and quality indicators

Lens procedures are very protocol-driven and the likelihood of complications is very low. Because of this, and the limited time available for the project, the focus of our cataracts case study was on costs rather than indicators of outcomes, safety and quality.

However, during consultation for this case study we compiled a list of potentially useful indicators for future work. These indicators are listed in Table 5.1, along with comments on when the appropriate measurements could be made and the acceptable or likely incidence of the problem.

Table 5.1 Proposed outcome, safety and quality indicators for lens procedures

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Time after procedure</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post operative infection rates</td>
<td>Infection will show up within 2 weeks, usually 3-5 days</td>
<td>An acceptable rate of infection is 1/800 to 1/1500</td>
</tr>
<tr>
<td>Visual outcome rates</td>
<td>Measured at 4 week follow-up appointment</td>
<td></td>
</tr>
<tr>
<td>Return to theatre revision rate</td>
<td></td>
<td>Very low incidence observed</td>
</tr>
<tr>
<td>Rupture of posterior lens capsule</td>
<td>During procedure</td>
<td>Acceptable rate is 1% to 2%</td>
</tr>
</tbody>
</table>

This refers to a rupture or tear in the membrane that surrounds the lens (http://www.aboutcataractsurgery.com/cataract-surgery-complications.html). Alternative surgical techniques are required to deal with this rupture or tear. Further, different IOLs may need to be used.

Safety and outcome indicators for ophthalmology are currently not well documented in Australian hospitals.

Clinicians routinely review visual outcomes for patients at a follow-up visit after surgery. Further, some hospitals (eg, GH) conduct regular audits of their surgical cases, as well as peer review meetings to analyse any complications arising from these cases. However, other hospitals do not appear to be reporting or auditing their outcomes or providing feedback on benchmarking or performance to their clinicians.

Recommendation

2 That NSW Health considers the costs and benefits of collecting data and monitoring performance against visual outcomes for patients undergoing lens procedures.
Outcome, safety and quality indicators

CASE STUDY 9 – CATARACTS/LENS PROCEDURES

IPART
A List of full recommendations from main report

Consistency of DRG groupings

Our recommendations in this area are mainly aimed at making users of hospital data aware of some of the limitations of using DRG groupings for hospital comparisons in certain clinical areas.

1. That users of hospital cost and outcome data note that DRGs may contain a range of patient types with varying clinical resource requirements, costs of care and expected clinical outcomes. Therefore DRGs may not always provide the optimal basis for comparing costs and outcomes among hospitals.

2. In light of Recommendation 1, that the NSW Department of Health, and other health research bodies at both the state and national level, consider whether DRGs are a suitable basis for determining funding and comparing performance among hospitals (for various different types of hospital activity). Where they are not suitable, continue research to develop better approaches for these areas.

Consistency of patient numbers

Our recommendations on patient numbers are aimed at making users of hospital data aware of differences in patient counting practices and patient datasets between hospitals that can affect hospital comparisons, to improve consistency of patient counting practices between hospitals and lead to better integration of patient datasets.

3. That users of hospital data note that there are differences in practices relating to counting of patients that can affect hospital patient numbers and average cost comparisons eg, counting differences relating to admission status, billing status, location of care and collaborative care arrangements.

4. In light of Recommendation 3, that NSW Health clarifies and standardises administrative procedures including guidelines for recording of non-inpatients of various types, as well as ‘collaborative care’ patients.

5. That NSW Health considers ways of better integrating patient information held locally by hospital clinical units (such as eye clinics and cardiac catheter labs) with the HIE data set.
**Consistency of lengths of stay**

Our recommendations aim to improve consistency between hospitals on length of stay measures, and to make users of hospital data aware of the limitations of measures based on ‘acute episodes’.

6 That NSW Health monitors hospital practices relating to the classification of episodes into care types and type-changing practices (e.g., timing of type changes from acute to rehabilitation care) and provide clear and consistent guidelines to hospitals, so episode measures are more consistent among hospitals.

7 That users of hospital data note that ‘acute episodes’ often only represent a part of a patient’s hospital stay. Therefore, comparisons among hospitals using acute length of stay measures or acute costs may produce misleading results. This is particularly important for conditions that involve both acute and sub-acute care and/or transfers between facilities.

**Coding**

We have made recommendations aimed at improving the quality of medical records documentation and clinical coding in hospitals to both improve the quality of data for clinical research as well as to more accurately reflect casemix complexity.

8 That NSW Health should continue to improve the quality of medical record documentation and the accuracy and consistency of coding.

9 That hospitals should encourage consistent education on coding and facilitate communication between clinical staff and coders regarding both the coding process and the documentation required to code common clinical conditions, diagnoses or complications, such as AMI, angina and chest pain.

10 Where pathology test information can be readily extracted (e.g., Cerner sites), that systems be developed so this information can be used to validate coding and support work on variation in clinical practice and measuring clinical quality.

11 That NSW Health considers undertaking further analysis to identify pathology or imaging tests that can be used to help target audits of coding and support work on variation in clinical practice and measuring clinical quality – such as identifying types of pathology tests that correspond closely with diagnosis coding.
Clinical costing

Our recommendations are aimed at improving the quality and consistency of clinical costing data, and helping to ensure that quality costing data and clinical inputs to the costing process (such as data from prosthesis, pathology and imaging systems) can be used to inform hospital management about resource use, and clinicians about clinical practice.

12 That the NSW Department of Health works with the area health services and hospitals to apply a consistent set of rules for clinical costing covering cost centres and IFRACs so that data are consistent and comparable between the hospitals.

13 That NSW Health regularly audits the accuracy of cost centres and IFRACs used for clinical costing.

14 That NSW Health uses standard clinical data feeds (actual patient data) for clinical costing where this is feasible and useful.

15 That the data used for clinical costing purposes be available to hospitals and clinicians so they can undertake comparative analysis on clinical practices and performance.

Medical staff costs

Given our finding that there was a lack of consistency in the treatment of medical staff costs and the difficulty this created in estimating medical staff costs for our case study areas, we recommend:

16 That further work be undertaken to strengthen the quality and consistency of available information on medical staff costs.

Prosthesis costs

Our recommendations on prosthesis costs are aimed at improving prosthesis purchasing and making cost savings in this area. These should be considered in conjunction with our recommendation that clinical experts should review the appropriateness of clinical variation in prosthesis use and address this variation (see Recommendation 31).

17 That NSW Health notes the variation in protheses use among the study hospitals including:
   - drug-eluting stents versus bare metal stents
   - single chamber pacemakers versus dual chamber pacemakers
   - different types of components for hip replacement procedures.

18 That NSW Health notes the range of approaches to prosthesis controls and the variation in prices currently paid for protheses, including for exactly the same models.
19 That NSW Health facilitates sharing of information on purchase prices for prostheses to assist price negotiations with suppliers.

20 That NSW Health optimises prosthesis cost savings through tenders, supplier price agreements and controlled approaches to prosthesis purchasing, noting that clinical consultation and cooperation is essential as is retaining some flexibility to allow for special orders when clinically indicated.

**Imaging and pathology costs**

Our recommendations are aimed at encouraging better use of imaging and pathology data, and consideration of whether there should be standard treatment of imaging and pathology within clinical costing and whether internal charges should reflect actual costs. These recommendations should be considered in conjunction with our clinical case studies, which include comparisons of imaging use, and Recommendation 31, relating to clinical variation in imaging use for diagnosing appendicitis.

21/25 That NSW Health notes that imaging and pathology data can be used to monitor changes in imaging use and inform clinical practice, and that:

- All hospitals obtain detailed reports from pathology and imaging services on their test ordering patterns, including the number of tests by major test type and the cost of these tests.

- Hospitals routinely provide data to heads of clinical units to help inform them on resource use and provision of care to improve patient outcomes and discuss trends at management meetings – for example, summary reports that include both the number of tests by test type, and the value (or preferably cost) of these tests.

- NSW Health develops reports comparing the use of imaging and pathology tests for clinical groupings and circulates these to area health services and hospitals.

22. That NSW Health considers whether, for clinical costing purposes, it is appropriate for hospitals and area health services to base the value of imaging tests on the MBS rate for these tests and, if so, what standard percentage of this rate is appropriate for use by all hospitals given the actual costs of providing the test.

23. That NSW Health seeks to obtain detailed information from the pathology services on the number and type of tests and the actual cost of undertaking a range of typical tests for future comparisons of pathology costs.

24. That NSW Health addresses issues that prevent the actual costs associated with specific pathology tests and ordering patterns being disclosed by pathology services.

26. That NSW Health considers whether the detailed cost estimates that pathology services prepare as part of the benchmarking pathology project could be used for more accurate pricing between pathology services and hospitals, to enable clinicians to consider the actual cost of their clinical decisions.
Operating theatre costs

Our recommendations in relation to operating theatres aim to facilitate improvements in theatre management arrangements, and the quality and consistency of theatre data.

27 That NSW Health notes the differences in approaches to theatre management among hospitals and consider if there is scope to share information about how the better theatre arrangements are organised.

28 That NSW Health notes the issues regarding theatre data and work with the hospitals to improve the completeness of datasheets and apply a consistent set of rules for recording operating theatre times.

29 That NSW Health considers routine auditing of the quality of data on returns to theatre and considers the best way for achieving accuracy and consistency in this indicator.

Pharmacy costs

As we were not able to undertake a detailed comparison of pharmacy services and costs, our recommendations focus on encouraging further analysis in this area.

30 That NSW Health:

- Notes the wide variation in the proportion of drugs dispensed versus held on imprest across the study hospitals.
- Monitors the value of expired pharmacy stock and compares this among hospitals.
- Considers standardised guidelines for the return of unused medication, principally to ensure patient safety but also to minimise wastage and reduce costs.
- Considers whether antimicrobial stewardship programs should be implemented at the major hospitals where such programs are not currently in place. The purpose of these programs would be to help prevent antimicrobial resistance and reduce costs by preventing inappropriate use of antimicrobials.
**Configurations of care – Review of clinical variations during Stages 5 and 6 of the wider NSW Department of Health study**

Our case studies identified a number of differences in the way care is provided among study hospitals in specific clinical areas. We recommend that clinical experts consider these clinical differences or clinical issues as part of Stages 5 and 6 of the wider health study. This recommendation should be dealt with in conjunction with Recommendation 36, relating to variation in indicators of safety, quality and outcomes.

31. That NSW Health arranges for appropriate clinical expert groups to consider the following clinical issues identified in our case studies; and that where appropriate, NSW Health and the expert groups take steps to address clinical differences.

- **Hip joint replacement:**
  - Note that separation of planned and emergency cases may reduce lengths of stay for planned (arthritis) cases.
  - Address the variation in the selection of hip prosthesis components (including press fit, cementless hip stems versus cemented hip stems and ceramic femoral heads versus metal femoral heads) among study hospitals.

- **Major chest procedure:**
  - Note the different clinical pathways and high day of surgery admission rates for thoracic surgery patients at RPAH compared with other study hospitals.
  - Consider whether aspects of the model of care at RPAH are suitable to be used in other hospitals.

- **Breast surgery:**
  - Note the early discharge models at RNSH for breast surgery patients having mastectomies and
  - Consider whether such models should be followed more widely in NSW hospitals and the types of patient cases they should be used for (eg, simpler, unilateral cases or younger patients).

- **Cholecystectomy:**
  - Note the variation in the proportion of patients with cholelithiasis or cholecystitis who are operated on acutely as emergency admissions.
  - Consider whether this variation has significant quality of care implications.
  - Consider the relative costs and benefits of an emergency surgical services team model for ensuring early diagnosis and treatment of conditions like cholecystectomy and whether it should be more widely applied.
  - Note that costing of cholecystectomy should take into account the costs of prior related emergency department attendances. A similar approach should be adopted for other clinical conditions that are likely to involve multiple prior emergency department attendances.
- Appendectomy
  - Consider the relative costs and benefits of cholecystectomies with and without the use of fluoroscopy.
  - Note the variation in the use of imaging tests for diagnosing appendicitis.
  - Consider establishing standard protocols for diagnosing appendicitis, indicating when it is appropriate to use CT scans, MRIs and ultrasounds.
  - As part of establishing standard protocols for diagnosing appendicitis, consider whether CT scans, MRIs and ultrasounds should only be used for certain patient groups (e.g., older patients who are more likely to be suffering from other conditions with symptoms similar to appendicitis).
  - Consider the relative costs and benefits of laparoscopic versus open surgery for appendicitis.

- Stroke
  - Consider ways to reduce the proportion of stroke patients coded with a principal diagnosis of 'stroke, not specified as haemorrhage or infarction' (ICD10 code I64).
  - Consider developing consistent guidelines for the administration of tPA.
  - Consider including tPA administration as a procedure in coding standards.
  - Consider ways to improve transfers of suspected stroke patients to stroke units with minimum delay, including consultation with the Ambulance Service and Emergency Departments.
  - Investigate whether it is useful and possible to combine Ambulance Service data on response time with hospital patient data to monitor time from call to ambulance to arrival at an appropriate hospital.
  - Consider the costs and benefits of providing more rehabilitation care in the home.
  - Pursue the collection of the data on outcome indicators from the National Stroke Research Institute.

- Cardiology – Stents, Pacemakers and Defibrillators:
  - Address the variation in the use of drug-eluting stents versus bare metal stents among study hospitals.
  - Address the variation in the types of pacemakers used among study hospitals.
  - Investigate whether there are differences in treatment procedures, or waiting times between presentation and procedure, for patients who present to hospitals without a 24 hour cardiac catheter laboratory, compared to patients who present to hospitals with a 24 hour cardiac catheter laboratory, and whether any differences in procedure or waiting times have implications for clinical outcomes.
Consider ways of better integrating information held in cardiac catheter laboratories with the HIE data set.

- Tracheostomy or ventilation greater than 95 hours:
  - Note that at BLH, clinicians tend to perform surgical tracheostomies, whereas at the other hospitals, these are usually performed percutaneously.

- Cataract/lens procedure:
  - Assess the costs and benefits of toric lenses and develop guidelines for their use in public hospitals.

- Hysterectomy:
  - That any future studies of hysterectomy compare the costs and outcomes for hysterectomies with the costs and outcomes of other procedures such as endometrial ablation and uterine artery embolisation.

**Improving outcome, safety and quality indicators**

While current Commonwealth and State initiatives will improve outcomes data, we have made recommendations that will assist this process.

32 That NSW Health enhances understanding and use of mortality, survival, unplanned readmission and wound infection indicators and their risk adjustment by:

- continuing to contribute to the development of ACSQHC’s safety and quality standards for these indicators
- refining the methodology used for standardising or risk-adjusting these indicators
- continuing to consult with clinicians regarding the agreed presentation of mortality, survival unplanned readmission and wound infection information
- reporting this information on a more routine and regular basis consistent with ACSQHC data sets.

33 That NSW Health encourages hospitals to put in place systems to facilitate accurate coding of comorbidities and ensures that coding practices are consistent across hospitals.

34 That NSW Health works with ACSQHC to negotiate more streamlined arrangements for access to data held by third parties (such as clinical registries) for clinical analysis, and makes these data available to hospitals and clinicians.

35 That NSW Health explores the possibility of providing outcomes information to clinicians in a more systematic way as an aid to clinical improvement and a key indicator of performance.
**Indicators of safety, quality or outcomes, - review of clinical variations during stages 5 and 6 of the wider NSW Department of Health project**

We have also made a number of findings relating to variations in indicators of safety, quality or outcomes. Where we have observed apparent differences among hospitals, these should be considered by clinical expert groups in completing stages 5 and 6 of the Department of Health’s wider project. These differences should be considered in conjunction with differences in clinical practice (Recommendation 31).

36. That clinical expert groups consider the following clinical issues; and where appropriate, NSW Health and clinical expert groups take steps to address clinical variations as part of Stages 5 and 6 of the broader NSW Health review:

- Review the variations in outcome, safety and quality indicators among study hospitals, including their:
  - unplanned readmission rates
  - wound infection rates for selected surgical procedures.

- Review the variation in mortality and survival rates for all major chest surgery patients and consider whether to recommend changes to clinical practice or conduct further investigation involving:
  - a larger sample of hospitals, and
  - more detailed analyses for ‘like patients’ (ie, lung cancer, infection-related abscess/pyothorax and collapsed/punctured lung patients).

- Review the variation in the following clinical indicators for hip joint replacement surgery at the study hospitals:
  - wound infection rates
  - unplanned readmission rates.

- Review the variation in wound infection rates for appendicectomy and cholecystectomy surgery at the study hospitals.

- Note the variation in the following clinical indicators relating to obstetric delivery:
  - caesarean section rates for ‘selected primipara’
  - vaginal delivery rates following primary caesarean section
  - caesarean section rates after induction of labour for ‘selected primipara’
  - repeat caesarean section rates
  - significant tear rates

and monitor changes arising from the implementation of the NSW Health policy directive, *Maternity – Towards Normal Birth in NSW*, to determine whether this policy effectively addresses the variation.
Additional outcome indicators

We made recommendations to consider the costs and benefits of collecting data for the following areas where indicators are not commonly used.

37 That NSW Health considers the costs and benefits of collecting data and monitoring performance against the following indicators:
   - warfarin management
   - visual outcomes for patients undergoing lens procedures.

We also made a recommendation to develop a set of standard indicators for measuring care and/or outcomes in ICUs.

38 That NSW Health undertakes further work to develop a set of standard indicators for measuring care and/or outcomes in ICUs.

Time Out audits

Finally, we made a recommendation to improve consistency in the number of cases audited as part of the Time Out process relative to the number of separations.

39 That NSW Health specifies the number or proportion of patient cases that should be audited as part of the Time Out process.

Next steps - wider application of this study

40 That NSW Health refines and develops useful aspects of this study for application more widely to other hospitals, other health settings and other clinical conditions.
Sample of lens prices

The table below provides a sample of prices paid for lenses by our study hospitals in 2008/09.

Table B.1 Sample lens prices paid by study hospitals, 2008/09

<table>
<thead>
<tr>
<th>Product</th>
<th>Supplier</th>
<th>RPAH</th>
<th>GH</th>
<th>RNSH</th>
<th>BLH</th>
<th>JHH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polymethyl Methacrylate (PMMA)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PMMA Lens A</td>
<td>Supplier 1</td>
<td>156</td>
<td>na</td>
<td>na</td>
<td>220</td>
<td>na</td>
</tr>
<tr>
<td>Acrylic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acrylic Lens A</td>
<td>Supplier 1</td>
<td>220</td>
<td>205</td>
<td>205</td>
<td>220</td>
<td>na</td>
</tr>
<tr>
<td>Acrylic Lens B</td>
<td>Supplier 1</td>
<td>200</td>
<td>200</td>
<td>na</td>
<td>200</td>
<td>180</td>
</tr>
<tr>
<td>Acrylic Lens C</td>
<td>Supplier 2</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>220</td>
<td>na</td>
</tr>
<tr>
<td>Acrylic Lens D</td>
<td>Supplier 3</td>
<td>na</td>
<td>210</td>
<td>210</td>
<td>na</td>
<td>210</td>
</tr>
<tr>
<td>Acrylic Lens E</td>
<td>Supplier 4</td>
<td>210</td>
<td>na</td>
<td>na</td>
<td>200</td>
<td>190</td>
</tr>
<tr>
<td>Silicone</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Silicone Lens A</td>
<td>Supplier 2</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>190</td>
<td>na</td>
</tr>
<tr>
<td>Silicone Lens B</td>
<td>Supplier 2</td>
<td>na</td>
<td>210</td>
<td>205</td>
<td>220</td>
<td>190</td>
</tr>
<tr>
<td>Silicone Lens C</td>
<td>Supplier 3</td>
<td>na</td>
<td>180</td>
<td>na</td>
<td>na</td>
<td>na</td>
</tr>
<tr>
<td>Toric</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Toric Lens A</td>
<td>Supplier 1</td>
<td>na</td>
<td>na</td>
<td>450</td>
<td>450</td>
<td>na</td>
</tr>
<tr>
<td>Toric Lens B</td>
<td>Supplier 2</td>
<td>na</td>
<td>430</td>
<td>na</td>
<td>na</td>
<td>na</td>
</tr>
</tbody>
</table>

Note: This sample does not include all study hospitals’ purchased lenses - just those where we could usefully compare prices. Most frequent purchases are highlighted in yellow. If a hospital is not highlighted for an item, we were not able to find that product in other hospital’s purchasing data.

Source: Study hospitals’ purchasing databases and direct advice to IPART. Hospitals were also asked to check prices.
<table>
<thead>
<tr>
<th>Term</th>
<th>Abb.</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>95% confidence interval</td>
<td></td>
<td>A statistical term describing a range of values within which we are 95% certain that the true population value lies.</td>
</tr>
<tr>
<td>Activity-based funding</td>
<td>ABF</td>
<td>Funding that is based on the projected amount and type of work of a facility, where standard prices are set for similar work undertaken. This has also been referred to as casemix or episode funding.</td>
</tr>
<tr>
<td>Acute care</td>
<td></td>
<td>Clinical services provided to admitted or non-admitted patients, including managing labour, curing illness or treating injury, performing surgery, relieving symptoms and/or reducing the severity of illness or injury, and performing diagnostic and therapeutic procedures. Most patients have acute or temporary ailments. The average length of stay is relatively short.</td>
</tr>
<tr>
<td>Admission</td>
<td></td>
<td>The process by which a person commences a period of residential care in a health facility.</td>
</tr>
<tr>
<td>Admitted Patient Data Collection</td>
<td>APDC</td>
<td>A database that covers all inpatient separations (discharges, transfers and deaths) from all Public (including Psychiatric), Private, and Repatriation Hospitals, Private Day Procedures Centres and Public Nursing Homes in NSW.</td>
</tr>
<tr>
<td>Agency for Clinical Innovation</td>
<td>ACI</td>
<td>A board-governed statutory health corporation that reports to the NSW Minister for Health and the Director-General of NSW Health.</td>
</tr>
<tr>
<td>Appendicectomy</td>
<td></td>
<td>Surgical excision of the patient’s appendix.</td>
</tr>
<tr>
<td>Assistant In Nursing</td>
<td>AIN</td>
<td>An employee that is not a registered nurse, enrolled nurse or trainee nurse, who assists the Enrolled Nurses and Registered Nurses by providing basic nursing care, working within a plan of care under the supervision and direction of a Registered Nurse.</td>
</tr>
<tr>
<td>Australian Council on Healthcare Standards</td>
<td></td>
<td>An independent organisation dedicated to improving the quality of health care through performance reviews, assessment and accreditation.</td>
</tr>
<tr>
<td>Average length of stay</td>
<td>ALOS</td>
<td>The average number of days each admitted patient stays in hospital. This is calculated by dividing the total number of occupied bed days for the period by the number of actual separations in the period.</td>
</tr>
<tr>
<td>Bankstown-Lidcombe Hospital</td>
<td>BLH</td>
<td>One of the study hospitals included in the review.</td>
</tr>
<tr>
<td>Term</td>
<td>Abb.</td>
<td>Definition</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Bureau of Health Information</td>
<td>BHI</td>
<td>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.</td>
</tr>
<tr>
<td>Casemix</td>
<td></td>
<td>The range and types of episodes of care of patients (the mix of cases) treated by a hospital. This provides a way of describing and comparing hospitals and other services for planning and managing health care. Casemix classifications put patients into DRGs with similar conditions that use similar health-care resources, so that the activity and cost-efficiency of different hospitals can be compared.</td>
</tr>
<tr>
<td>Casemix funding</td>
<td></td>
<td>See Activity-based funding.</td>
</tr>
<tr>
<td>Cataract</td>
<td></td>
<td>A cloudy or opaque area in the lens of the eye.</td>
</tr>
<tr>
<td>Cholecystectomy</td>
<td></td>
<td>Excision of the gallbladder.</td>
</tr>
<tr>
<td>Clinical Excellence Commission</td>
<td>CEC</td>
<td>A board-governed statutory health corporation with the CEO reporting directly to the NSW Minister for Health. A key role of the Clinical Excellence Commission is building capacity for quality and safety improvement in Health Services.</td>
</tr>
<tr>
<td>Clinical Nurse Specialist</td>
<td>CNS</td>
<td>A Registered Nurse/Midwife who applies a high level of clinical nursing knowledge, experience and skills in providing complex nursing/midwifery care directed towards a specific area of practice, a defined population or defined service area, with minimum direct supervision.</td>
</tr>
<tr>
<td>Comorbidity</td>
<td></td>
<td>When a person has two or more health problems at the same time.</td>
</tr>
<tr>
<td>Computed tomography</td>
<td>CT scan</td>
<td>A non-invasive medical imaging method using X-rays and computer processing.</td>
</tr>
<tr>
<td>Diagnosis Related Group</td>
<td>DRG</td>
<td>A system used to classify hospital admissions into groups with similar clinical conditions (related diagnoses) and similar resource usage (hospital services). There are approximately 500 coding classes. In Australian acute hospitals, Australian refined DRGs are used (AR-DRGs). The classification categorises episodes into groups with similar conditions and similar usage of hospital resources, using information in the hospital morbidity record such as the diagnoses, procedures and demographic characteristics.</td>
</tr>
<tr>
<td>Enrolled Nurse</td>
<td>EN</td>
<td>A person holding an Enrolled Nurse qualification who works under the supervision of a registered nurse to provide nursing care for patients in hospitals, nursing homes and a variety of other health care organisations.</td>
</tr>
<tr>
<td>Episode funding</td>
<td></td>
<td>See Activity-based funding.</td>
</tr>
<tr>
<td>Fluoroscopy</td>
<td></td>
<td>An imaging technique that provides real-time moving images of the internal structures of a patient through the use of a fluoroscope.</td>
</tr>
<tr>
<td>Gosford Hospital</td>
<td>GH</td>
<td>One of the study hospitals included in the review.</td>
</tr>
<tr>
<td>Term</td>
<td>Abb.</td>
<td>Definition</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Health Information Exchange</td>
<td>HIE</td>
<td>A database maintained by the NSW Department of Health that contains a range of financial, patient and clinical information from hospitals and area health services.</td>
</tr>
<tr>
<td>High dependency unit</td>
<td>HDU</td>
<td>An area or environment in a hospital that provides a higher level of critical care and monitoring than is provided in a general ward, but a lower level of care provided by an intensive-care unit.</td>
</tr>
<tr>
<td>Hysterectomy</td>
<td></td>
<td>Surgical removal of the uterus.</td>
</tr>
<tr>
<td>Independent Pricing and Regulatory Tribunal of NSW</td>
<td>IPART</td>
<td>The independent economic regulator for NSW that is undertaking this hospital study.</td>
</tr>
<tr>
<td>Inpatient fraction</td>
<td>IFRAC</td>
<td>A measure used in casemix costing. The proportion of total (or operating) costs that are attributed to admitted patients. Also known as the inpatient fraction.</td>
</tr>
<tr>
<td>Intensive care unit</td>
<td>ICU</td>
<td>An area or environment in a hospital that provides the highest level of critical care and monitoring.</td>
</tr>
<tr>
<td>Intraocular lens</td>
<td>IOL</td>
<td>An artificial lens implanted in the eye, usually replacing the existing natural lens because it has been clouded over by a cataract.</td>
</tr>
<tr>
<td>Intraocular lens procedure</td>
<td></td>
<td>A procedure where an artificial lens (intraocular) is placed in the lens capsule when the cataract is removed.</td>
</tr>
<tr>
<td>John Hunter Hospital</td>
<td>JHH</td>
<td>One of the study hospitals included in the review.</td>
</tr>
<tr>
<td>Length of stay 1</td>
<td>LOS1</td>
<td>LOS1 is the episode length of stay in study hospital, ie, from the start of the episode to the end of the episode of care.</td>
</tr>
<tr>
<td>Length of stay 2</td>
<td>LOS2</td>
<td>LOS2 is the total length of stay in study hospital, ie, from admission to discharge at the study hospital.</td>
</tr>
<tr>
<td>Length of stay 3</td>
<td>LOS3</td>
<td>LOS3 is the total length of stay in study hospital plus up to 2 other hospitals - one transfer in and one transfer out.</td>
</tr>
<tr>
<td>Medical resonance imaging</td>
<td>MRI</td>
<td>A medical imaging technique most commonly used in radiology to visualise detailed internal structures of the body using a magnetic field.</td>
</tr>
<tr>
<td>Medicare Benefits Schedule</td>
<td>MBS</td>
<td>A listing of the Medicare services subsidised by the Australian government.</td>
</tr>
<tr>
<td>Multifocal IOLs</td>
<td></td>
<td>A type of corrective lens which allows the patient to focus vision at different distances.</td>
</tr>
<tr>
<td>National Hospital Cost Data Collection</td>
<td>NHCDC</td>
<td>The NHCDC contains component costs per DRG based on patient-costed and cost-modelled information. The NHCDC enables DRG Cost Weights and average costs for DRGs for acute in-patients to be produced.</td>
</tr>
<tr>
<td>NSW Health</td>
<td></td>
<td>The broad term encompassing operational and other structures including the NSW Department of Health, Area Health Services, the Agency for Clinical Innovation, the Clinical Excellence Commission and a range of clinical taskforces.</td>
</tr>
<tr>
<td>Term</td>
<td>Abb.</td>
<td>Definition</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>--------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Open Surgery</td>
<td></td>
<td>An invasive medical procedure where an incision is required for direct surgical access to the organs.</td>
</tr>
<tr>
<td>Ophthalmology</td>
<td></td>
<td>A medical specialty dealing with eye diseases.</td>
</tr>
<tr>
<td>Polymethylmethacrylate IOL</td>
<td>PMMA</td>
<td>A lens made out of thermoplastic acrylic resin.</td>
</tr>
<tr>
<td>Posterior lens capsule</td>
<td></td>
<td>A membrane that surrounds the lens</td>
</tr>
<tr>
<td>Principal referral hospital</td>
<td></td>
<td>Hospital within peer group (principal referral hospitals 1b) classified as an acute hospital, treating 25,000 or more acute casemix weighted separations per annum, with an average cost weight greater than 1 and 1 or fewer specialty services.</td>
</tr>
<tr>
<td>Principal tertiary referral hospital</td>
<td></td>
<td>Hospital within peer group (principal referral hospitals 1a) classified as an acute hospital, treating 25,000 or more acute casemix weighted separations per annum, with an average cost weight greater than 1 and having more than 1 specialty service.</td>
</tr>
<tr>
<td>Prophylaxis</td>
<td></td>
<td>Disease prevention, also called preventive treatment.</td>
</tr>
<tr>
<td>Registered nurse</td>
<td>RN</td>
<td>A qualified nurse who provides care for patients in a variety of healthcare settings. These include public and private hospitals, community and home-based services, nursing homes and industry.</td>
</tr>
<tr>
<td>Royal North Shore Hospital</td>
<td>RNSH</td>
<td>One of the study hospitals included in the review.</td>
</tr>
<tr>
<td>Royal Prince Alfred Hospital</td>
<td>RPAH</td>
<td>One of the study hospitals included in the review.</td>
</tr>
<tr>
<td>Tracheostomy</td>
<td></td>
<td>A surgical procedure to cut an opening into the trachea (windpipe) so that a tube can be inserted into the opening to assist breathing.</td>
</tr>
<tr>
<td>Toric lens/IOLs</td>
<td></td>
<td>A type of corrective lens where its surface's shape is both spherical and cylindrical.</td>
</tr>
<tr>
<td>Visiting medical officers</td>
<td>VMO</td>
<td>A medical practitioner appointed by the hospital board to provide medical services for hospital (public) patients on an honorary, sessionally paid, or fee for service basis.</td>
</tr>
</tbody>
</table>