



**H e a l t h M a r k e t I n q u i r y**

Promoting Healthy Competition

REPORT ON ANALYSIS OF MEDICAL SCHEMES CLAIMS DATA  
– A FOCUS ON FACILITIES

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15 DECEMBER 2017

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This report relies upon the information supplied to the HMI by various stakeholders and it takes no account of subsequent developments after the date of the submission of that data. The HMI Panel, with the assistance of WTW, has exercised reasonable professional skill and care in evaluating the information and data provided by the stakeholders accurately. Nevertheless, WTW and its directors, officers, employees, sub-contractors and affiliates accept no responsibility and will not be held liable for any errors, omissions or misrepresentations made by stakeholders and/or any other third party, or for any resulting errors or misrepresentations in the work undertaken. The HMI has ultimate responsibility for any findings it makes regarding the subject matter of this report.

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## INTRODUCTION

1. This report, one of a series from the WTW analysis process, is intended to provide results of a number of analyses which have been undertaken in respect of facilities, notably private hospitals.

The report is also intended to provide some insight into the utilisation and cost of hospital services specifically, as well as in-hospital costs more generally. It is specifically noted that price increases above inflation, although mentioned in this report, will be dealt with more specifically in future analyses.

The report should be read in conjunction with the previous analysis reports published, which dealt in detail with the dataset being used for analysis conducted for the Health Market Inquiry (HMI), the methodology used to build the analysis dataset and the overall industry cost trends over the analysis period.

## DATA AND METHODOLOGIES

### Data Used

2. For the facility analyses outlined in the later sections of this report, the analysis datasets which have been described in the **Report on Analysis of Medical Schemes Claims Data – Descriptive Statistics** (the Descriptive Statistics Report) have been used. The process of building these datasets was outlined in detail in the Descriptive Statistics Report. The datasets were built using the detailed claims and membership data which was requested by the HMI from medical schemes and their administrators.

### *In-Hospital Attribution Analyses*

3. The overall in-hospital attribution analysis, as well as the utilisation analysis, outlined in this report use individual medical scheme beneficiaries as the base unit of the statistical analyses. These analyses therefore use the beneficiary file built by WTW for the HMI analysis as a base. This file is structured at an individual beneficiary level and contains demographic information about each beneficiary in each year analysed, summary details of their claims for that year and some other usage indicators which have been built off the claims and membership databases. Of specific interest for the attribution analyses are:
  - 3.1. The demographic information about each beneficiary, specifically age and gender;

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- 3.2. The clinical profile and reporting status indicators, which are built using claims and utilisation data with the associated medicines and diagnoses and aim to build two different pictures of the disease burden within the industry;
  - 3.3. The member movement indicator (joiner, stayer, leaver, switcher) which was built to assess how benefit option selections by members impact healthcare costs; and
  - 3.4. The medical scheme and medical scheme plan selected, which have been grouped using the methodology described in **Report on Analysis of Claims Data – Initial Cost Attribution Analysis** (the Cost Attribution Report) and used as analysis variables.
4. The length of stay and level of care attribution analyses on the other hand use individual admissions as the base unit of the statistical analyses. These analyses therefore use the admission file built by WTW for the HMI analysis as a base. This file is structured with one line for each hospital admission, and contains some demographic information about the patient as well as information about the facilities and medical practitioners treating the patient, some clinical information about the admission itself as well as cost and utilisation factors within each admission. Of specific interest for the analyses contained in this report are:
- 4.1. Again, the demographic information about the patients, specifically age and gender;
  - 4.2. The clinical profile indicator as outlined above, which is transferred from the beneficiary file;
  - 4.3. The diagnoses provided and procedures performed by the treating medical practitioners, which are used to build a so-called 'case-mix' indicator; and
  - 4.4. A Prescribed Minimum Benefit (PMB) diagnosis indicator, built using the claims data and the PMB diagnosis list published by the Council for Medical Schemes (CMS) and taking into account the PMB flags provided by the medical scheme administrators.

### ***Other Analyses***

5. The other facility analyses, notably the ARM analysis and the discretionary spend analysis, are descriptive in nature, and use the various indicators built into the analysis data files created by WTW for the HMI analyses. As a result, no new analysis data or variables needed to be defined for these analyses. These were run using the

beneficiary, admission and discipline files created for the WTW analyses as outlined in **Descriptive Statistics Report**.

## Methodologies

6. For this facility report, no new methodologies have been defined, and the methodologies used in the first two analysis reports produced, i.e. the **Descriptive Statistics Report and the Cost Attribution Report**, are applied to specific aspects of facility claims. However, additional specific variables of interest to the facility analysis have been defined as follows:
  - 6.1. Length of Stay (LoS) is defined as the number of days spent in hospital (inclusive of admission and discharge dates) and is therefore calculated by subtracting the admission date from the discharge date and adding one i.e. a single day admission would have an LoS of 1;
  - 6.2. Level of Care (LoC) is analysed in two ways;
    - 6.2.1. As outlined in previous reports, the admission dataset contains an indicator showing how many days were claimed for in each ward type (day ward, general ward, maternity ward, high care and intensive care). To the extent that no days are claimed or the days claimed do not match to the Length of Stay defined above, the extra days are assumed to be spent at the lowest possible level of care i.e. those for a same-day admission are assumed to have been spent in the emergency room (no ward) and those for an overnight admission are assumed to have been spent in a general ward;
    - 6.2.2. In order to attribute Level of Care, each of these ward types have been assigned a numeric 'acuity factor' based on the tariffs charged under the erstwhile National Health Reference Price List (NHRPL) structure, relative to a general ward e.g. a general ward has an acuity factor of 1, high care 2.65 and intensive care 4.1;
  - 6.3. Case Mix is defined as outlined in **The Cost Attribution Report**;
  - 6.4. The hospitals have been grouped into their respective hospital groups using a mapping built by the HMI from the submissions made by each hospital group and provided to us (to provide reasonable sample sizes the smaller hospital groups outside of the three large corporate groups and the National Hospital Network (NHN) have been combined into 'Other');

- 6.5. An Alternative Reimbursement Model (ARM) claim is identified using a set of ARM codes provided by the medical scheme administrators (which we note is not exhaustive), and an ARM admission is defined as any admission where one or more ARM claims is present; and
- 6.6. Geographical regions will be defined by aggregating so called Enumeration Area (EA) codes, noting that a complete geocoded dataset was not available to us at the time of preparing this version of this facility report. An updated version of this report will be scheduled as soon as a complete geocoded dataset becomes available.

### ***Some Methodological Considerations***

7. When calculating the figures contained in this report, the following further definitions have been applied:
  - 7.1. When the report refers to members or beneficiaries, it counts total covered lives on any scheme in a given year, as opposed to the average exposed membership used in financial reporting.
  - 7.2. Claim or 'cost' figures are calculated using fees charged as opposed to benefits paid. Thus, claim estimates will include claims rejected and paid out of pocket by beneficiaries as well as those paid from medical savings accounts. We note that true out of pocket expenditure will still be understated in our estimates since claims not submitted to medical schemes and paid out of pocket will still be excluded.
  - 7.3. 'Open' and 'Restricted' schemes are defined as in the CMS annual reports.
  - 7.4. All calculated inflation figures are annualised, i.e. when an inflation figure from 2010 to 2014 is quoted as x%, it should be read as x% per year. This will be consistent throughout all of the reports produced as part of the expenditure analysis, and any exceptions will be noted accordingly.
  - 7.5. Where claims figures are summarised by an analysis variable, the definition will correspond to those used in the published **Descriptive Statistics Report and the Cost Attribution Report**.

## **IN-HOSPITAL CLAIMS TRENDS**

### **Hospital Admissions Descriptive Statistics**

8. This sub-section outlines some descriptive statistics specifically relating to hospital admissions and the associated expenses. These trends are split into day admissions and overnight admissions, which are defined as outlined in **Descriptive Statistics Report**. Table 1 below shows a number of statistics and trends in respect of day admissions.

**TABLE 1: DAY ADMISSIONS DESCRIPTIVE STATISTICS AND TRENDS, 2010-14**

Day Admissions <sup>1</sup>	2010	2011	2012	2013	2014	Trend
Admissions per 1 000 lives	112	112	116	119	121	
- % change		-0.05%	3.11%	3.03%	1.15%	1.80%
% Admissions to Day Clinics	4.85%	5.47%	5.41%	5.78%	5.80%	
- change		0.62%	-0.06%	0.37%	0.01%	0.24%
% Admissions with Day Ward Fees	32.63%	31.39%	30.39%	30.91%	29.36%	
- change		-1.24%	-1.00%	0.52%	-1.55%	-0.82%
Total Cost per Admission	6 217	6 367	7 050	7 981	8 711	
- % change		2.42%	10.73%	13.20%	9.14%	8.80%
Hospital Cost per Admission	3 692	3 738	4 151	4 655	5 089	
- % change		1.24%	11.04%	12.15%	9.33%	8.35%

9. Table 1 shows that:

- 9.1. The admission rate in respect of day admissions has increased from 112 per 1 000 lives in 2010 to 121 per 1 000 lives in 2014;

<sup>1</sup> A 'day admission' in this context refers to any hospital service provided within the same calendar day i.e. all emergency room and out-patient services provided by hospitals are counted here. The statistics reported here will therefore differ from day admission statistics reporting using only cases where a ward fee is billed.

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- 9.2. Only around 5% of day admissions happen in registered day clinics (the rest will happen in acute facilities), and this proportion is increasing relatively slowly;
- 9.3. Only around 30% of day admissions as defined here are accompanied by claims for a day ward i.e. a large and increasing proportion of day admissions are seemingly to emergency rooms; and
- 9.4. The overall cost per admission and hospital cost per admission showed low increases from 2010 to 2011, but subsequent to that have increased at between 9% and 14% a year.

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**TABLE 2: OVERNIGHT ADMISSIONS DESCRIPTIVE STATISTICS AND TRENDS, 2010-14**

Overnight Admissions	2010	2011	2012	2013	2014	Trend
Admissions per 1 000 lives	137	144	144	145	149	
- % change		5.59%	-0.12%	0.68%	2.21%	2.07%
Average Length of Stay	5.36	5.56	5.61	5.68	5.70	
- % change		3.74%	0.92%	1.18%	0.39%	1.55%
% Admissions with ICU Claim	4.83%	4.87%	4.88%	5.05%	5.21%	
- change		0.04%	0.01%	0.16%	0.17%	0.09%
% Admissions with High Care Claim	11.02%	10.84%	11.50%	12.25%	12.42%	
- change		-0.18%	0.66%	0.75%	0.17%	0.35%
Total Cost per Admission	32 395	34 762	38 180	41 781	45 233	
- % change		7.31%	9.83%	9.43%	8.26%	8.70%
Hospital Cost per Admission	22 380	23 887	26 040	28 309	30 535	
- % change		6.73%	9.02%	8.71%	7.86%	8.08%



10. Table 2 shows that:

- 10.1. The unadjusted admission rate for overnight admissions has increased from 137 per 1 000 lives in 2010 to 149 per 1 000 lives in 2014, including a 5.6% increase from 2010 to 2011;
- 10.2. Unadjusted average length of stay has increased over the period analysed, but the changes have been at low levels since 2011;
- 10.3. The number of admissions where an intensive care or high care fee has been claimed are gradually increasing over time; and
- 10.4. Total cost and unadjusted hospital cost per admission increased by 7.31% and 6.73% respectively from 2010 to 2011, and have subsequently increased by between 7.5% and 10.0% a year.

### **Total In-Hospital Cost**

11. Table 3 and Table 4 overleaf are reproduced from **The Cost Attribution Report** and show the overall trends in in-hospital claims together with the contribution of the various explanatory factors defined. They show that, using the narrow disease burden definition, in-hospital claims have increased on average by 10.84% a year, 5.60% of which is made up of Consumer Price Index (CPI) increases, 2.01% by the various explanatory factors which mostly relate to beneficiary risk profiles and the remaining 3.23% by so-called unexplained factors. These unexplained factors could include price increases above CPI as well as increases in the volume and/or intensity of services utilised per average beneficiary. The broad disease burden model shows an explained increase of 2.96% and an unexplained increase of 2.28%.

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**TABLE 3: IN-HOSPITAL TOTAL COST PER LIFE TRENDS, ALL SCHEMES (NARROW DISEASE BURDEN)**

All Schemes, IH Claims	2011	2012	2013	2014	Average
Total Increase	10.24%	11.38%	10.95%	10.79%	10.84%
<u>CPI</u>	<u>5.00%</u>	<u>5.60%</u>	<u>5.70%</u>	<u>6.10%</u>	<u>5.60%</u>
<u>All Explanatory Factors</u>	<u>2.61%</u>	<u>2.07%</u>	<u>1.58%</u>	<u>1.80%</u>	<u>2.01%</u>
Age	0.67%	3.33%	1.02%	0.98%	1.50%
Gender	-0.04%	-0.07%	0.07%	0.02%	0.00%
Disease Profile	0.76%	-0.68%	0.49%	0.21%	0.20%
Member Profile	1.79%	0.04%	-0.13%	0.35%	0.51%
Plan Mix	-0.57%	-0.55%	0.13%	0.23%	-0.19%
<u>Unexplained Factors</u>	<u>2.63%</u>	<u>3.71%</u>	<u>3.67%</u>	<u>2.89%</u>	<u>3.23%</u>

**TABLE 4: IN-HOSPITAL TOTAL COST PER LIFE TRENDS, ALL SCHEMES (BROAD DISEASE BURDEN)**

IH Claims, All Schemes	2011	2012	2013	2014	Average
Total Increase	10.24%	11.38%	10.95%	10.79%	10.84%
<u>CPI</u>	<u>5.00%</u>	<u>5.60%</u>	<u>5.70%</u>	<u>6.10%</u>	<u>5.60%</u>
<u>Explanatory Factors</u>	<u>4.19%</u>	<u>3.09%</u>	<u>2.02%</u>	<u>2.54%</u>	<u>2.96%</u>
Age	0.67%	3.33%	1.02%	0.98%	1.50%
Gender	-0.04%	-0.07%	0.07%	0.02%	0.00%
Disease Profile	1.74%	0.06%	0.88%	0.83%	0.88%
Member Movements	2.14%	-0.01%	-0.09%	0.46%	0.63%
Plan Mix	-0.33%	-0.22%	0.13%	0.24%	-0.04%
<u>Unexplained Factors</u>	<u>1.06%</u>	<u>2.69%</u>	<u>3.23%</u>	<u>2.15%</u>	<u>2.28%</u>

12. The objective of this section of the report is to attempt to understand which cost components (utilisation, length of stay, level of care and other factors) influence the unexplained increase as well as the contributions of the explanatory factors which have been created. To this end, separate attribution analyses have been performed on admission rates (admissions per 1 000 lives), length of stay and level of care.

### Admission Rates

13. Table 5 and Table 6, again reproduced from **The Cost Attribution Report**, show the same attribution analysis for admission rates i.e. admissions per 1 000 lives. It shows that admission rates have increased on average by 2.17% a year, of which 0.99% is attributable to the explanatory factors in the narrow disease burden model (mainly ageing of the population) and the remaining 1.19% to unexplained factors. In the broad disease burden model, only 0.14% of the 2.17% remains unexplained, while the explanatory factors contribution is 2.04%.

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**TABLE 5: ADMISSION RATES TRENDS, ALL SCHEMES (NARROW DISEASE BURDEN)**

All Schemes, Admission Trends	2011	2012	2013	2014	Average
Total Increase	1.89%	1.95%	2.48%	2.37%	2.17%
<u>All Explanatory Factors</u>	<u>2.52%</u>	<u>-0.08%</u>	<u>0.76%</u>	<u>0.75%</u>	<u>0.99%</u>
Age	0.31%	1.32%	0.37%	0.36%	0.59%
Gender	-0.02%	0.00%	0.04%	0.04%	0.02%
Disease Profile	0.62%	-0.89%	0.36%	0.12%	0.05%
Member Movements	1.88%	0.08%	0.05%	0.23%	0.56%
Plan Mix	-0.27%	-0.59%	-0.06%	-0.01%	-0.23%
<u>Unexplained Factors</u>	<u>-0.63%</u>	<u>2.04%</u>	<u>1.72%</u>	<u>1.62%</u>	<u>1.19%</u>

**TABLE 6: ADMISSION RATES TRENDS, ALL SCHEMES (BROAD DISEASE BURDEN)**

All Schemes, Admission Trends	2011	2012	2013	2014	Average
Total Increase	1.89%	1.95%	2.48%	2.37%	2.17%
<u>All Explanatory Factors</u>	<u>3.06%</u>	<u>1.13%</u>	<u>1.97%</u>	<u>1.98%</u>	<u>2.04%</u>
Age	0.31%	1.32%	0.37%	0.36%	0.59%
Gender	-0.02%	0.00%	0.04%	0.04%	0.02%
Disease Profile	2.50%	0.01%	1.38%	1.40%	1.32%
Member Movements	0.59%	0.00%	0.01%	0.09%	0.17%
Plan Mix	-0.32%	-0.20%	0.17%	0.09%	-0.06%
<u>Unexplained Factors</u>	<u>-1.17%</u>	<u>0.82%</u>	<u>0.51%</u>	<u>0.38%</u>	<u>0.14%</u>

14. Table 5 and Table 6 show that, of the 3.20% unexplained increase outlined in the previous section using the narrow disease burden definition, 1.19% can be attributed to increasing admission rates. In the broad disease burden model, 0.14% of the 2.28% unexplained increase is a result of increasing admission rates. The remaining component after subtracting the residual unexplained admission rate is very similar in both scenarios, suggesting that the difference in disease burden definitions impact admission rates more than the other components analysed.
15. These unexplained effects must be differentiated from increases as a result of price increases above CPI, since number of admissions have been analysed independently of cost in this attribution. The result suggests that admission rates are increasing within the medical scheme population beyond what would be expected using the demographic indicators calculated. This effect is contributing over one third of the total unexplained increase.

### Length of Stay

16. Table 7 and Table 8, show the attribution analysis for length of stay. We note that this is an attribution analysis which is performed across admissions as opposed to beneficiaries, and the explanatory factors are therefore slightly different from those presented with respect to the beneficiary-level analyses. It shows that average length of stay has increased by 1.48% a year (with a notable increase from 2010 to 2011), of which 0.84% is attributable to the explanatory factors in the narrow disease burden model (mainly ageing of the population, as well as changes in the admission type profile) and the remaining 0.64% to unexplained factors. The results are very similar using the broad disease burden model, with identical overall explained and unexplained contributions.

**TABLE 7: LENGTH OF STAY TRENDS, ALL SCHEMES (NARROW DISEASE BURDEN)**

All Schemes, LoS <sup>2</sup> Trends	2011	2012	2013	2014	Average
Total Increase	5.10%	-0.31%	0.12%	1.00%	1.48%
<u>Explanatory Factors</u>	<u>0.28%</u>	<u>0.35%</u>	<u>1.61%</u>	<u>1.13%</u>	<u>0.84%</u>
Age	0.27%	0.84%	0.64%	0.51%	0.56%
Gender	0.01%	0.02%	0.01%	0.00%	0.01%
Disease Profile	0.06%	0.00%	-0.06%	-0.05%	-0.01%
Case Mix	0.16%	-0.29%	0.70%	0.39%	0.24%
PMB Diagnoses	-0.22%	-0.23%	0.33%	0.28%	0.04%
<u>Unexplained Factors</u>	<u>4.82%</u>	<u>-0.66%</u>	<u>-1.49%</u>	<u>-0.12%</u>	<u>0.64%</u>

<sup>2</sup> Length of Stay

**TABLE 8: LENGTH OF STAY TRENDS, ALL SCHEMES (BROAD DISEASE BURDEN)**

All Schemes, LoS Trends	2011	2012	2013	2014	Average
Total Increase	5.10%	-0.31%	0.12%	1.00%	1.48%
<u>Explanatory Factors</u>	<u>0.43%</u>	<u>0.26%</u>	<u>1.58%</u>	<u>1.07%</u>	<u>0.84%</u>
Age	0.27%	0.84%	0.64%	0.51%	0.56%
Gender	0.01%	0.02%	0.01%	0.00%	0.01%
Disease Profile	0.57%	0.01%	0.06%	0.05%	0.17%
Case Mix	-0.19%	-0.39%	0.56%	0.25%	0.06%
PMB Diagnoses	-0.24%	-0.23%	0.32%	0.26%	0.03%
<u>Unexplained Factors</u>	<u>4.67%</u>	<u>-0.57%</u>	<u>-1.46%</u>	<u>-0.07%</u>	<u>0.64%</u>

17. The table shows that, of the unexplained increase outlined in the previous section, 0.64% can be attributed to increasing lengths of stay. This again cannot be as a result of price increases above CPI, since this analysis is again based on utilisation rather than cost. This unexplained component is made up of a significant step change from 2010 to 2011, followed by reductions in the subsequent years.
18. The next four tables show the length of stay trends for surgical and medical admissions respectively. The tables show that lengths of stay have increased at a faster rate for surgical than medical admissions, part of which is explained by the explanatory factors used and part of which is a result of other factors. The increases from 2010 to 2011 are large in both groups, but are much more evident in the surgical than medical admissions.

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**TABLE 9: LENGTH OF STAY TRENDS, SURGICAL ADMISSIONS (NARROW DISEASE BURDEN)**

Surgical Admissions, LoS Trends	2011	2012	2013	2014	Average
Total Increase	8.36%	0.81%	-0.18%	2.55%	2.89%
<u>Explanatory Factors</u>	<u>0.81%</u>	<u>1.56%</u>	<u>2.65%</u>	<u>1.95%</u>	<u>1.74%</u>
Age	0.24%	1.23%	1.03%	0.70%	0.80%
Gender	0.01%	0.03%	0.01%	-0.01%	0.01%
Disease Profile	0.13%	0.02%	-0.03%	0.04%	0.04%
Case Mix	0.64%	0.34%	0.84%	0.49%	0.58%
PMB Diagnoses	-0.21%	-0.05%	0.81%	0.73%	0.32%
<u>Unexplained Factors</u>	<u>7.55%</u>	<u>-0.74%</u>	<u>-2.83%</u>	<u>0.60%</u>	<u>1.14%</u>



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**TABLE 10: LENGTH OF STAY TRENDS, SURGICAL ADMISSIONS (BROAD DISEASE BURDEN)**

Surgical Admissions, LoS Trends	2011	2012	2013	2014	Average
Total Increase	8.36%	0.81%	-0.18%	2.55%	2.89%
<u>Explanatory Factors</u>	<u>1.03%</u>	<u>1.51%</u>	<u>2.71%</u>	<u>1.97%</u>	<u>1.80%</u>
Age	0.24%	1.23%	1.03%	0.70%	0.80%
Gender	0.01%	0.03%	0.01%	-0.01%	0.01%
Disease Profile	0.86%	0.06%	0.20%	0.39%	0.38%
Case Mix	0.17%	0.25%	0.71%	0.18%	0.33%
PMB Diagnoses	-0.25%	-0.05%	0.78%	0.70%	0.30%
<u>Unexplained Factors</u>	<u>7.33%</u>	<u>-0.69%</u>	<u>-2.90%</u>	<u>0.58%</u>	<u>1.08%</u>

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**TABLE 11: LENGTH OF STAY TRENDS, MEDICAL ADMISSIONS (NARROW DISEASE BURDEN)**

Medical Admissions, LoS Trends	2011	2012	2013	2014	Average
Total Increase	3.87%	-0.73%	0.33%	0.48%	0.99%
<u>Explanatory Factors</u>	<u>0.13%</u>	<u>-0.22%</u>	<u>1.27%</u>	<u>0.89%</u>	<u>0.52%</u>
Age	0.31%	0.70%	0.48%	0.40%	0.47%
Gender	0.01%	0.03%	0.01%	0.01%	0.02%
Disease Profile	0.02%	-0.05%	-0.08%	-0.10%	-0.05%
Case Mix	-0.03%	-0.57%	0.74%	0.45%	0.15%
PMB Diagnoses	-0.18%	-0.34%	0.11%	0.12%	-0.07%
<u>Unexplained Factors</u>	<u>3.74%</u>	<u>-0.51%</u>	<u>-0.94%</u>	<u>-0.41%</u>	<u>0.47%</u>

**TABLE 12: LENGTH OF STAY TRENDS, MEDICAL ADMISSIONS (BROAD DISEASE BURDEN)**

Medical Admissions, LoS Trends	2011	2012	2013	2014	Average
Total Increase	3.87%	-0.73%	0.33%	0.48%	0.99%
<u>Explanatory Factors</u>	<u>0.23%</u>	<u>-0.32%</u>	<u>1.23%</u>	<u>0.84%</u>	<u>0.50%</u>
Age	0.31%	0.70%	0.48%	0.40%	0.47%
Gender	0.01%	0.03%	0.01%	0.01%	0.02%
Disease Profile	0.44%	-0.09%	0.03%	-0.10%	0.07%
Case Mix	-0.33%	-0.63%	0.61%	0.42%	0.02%
PMB Diagnoses	-0.19%	-0.34%	0.10%	0.11%	-0.08%
<u>Unexplained Factors</u>	<u>3.64%</u>	<u>-0.40%</u>	<u>-0.90%</u>	<u>-0.36%</u>	<u>0.49%</u>

### Level of Care

19. Table 13 and Table 14 show the attribution analysis for level of care, converted to acuity factors as outlined previously. The analysis shows, using the narrow disease burden approach, that average level of care has increased by 0.60% a year (with a notable increase from 2013 to 2014), of which 0.45% is attributable to the explanatory factors (mainly ageing of the population, as well as changes in the types of admissions as determined by the admission type grouping) and the remaining 0.15% to unexplained factors. The results for the broad approach are very similar, with an explained component of 0.43% and an unexplained component of 0.17%.

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TABLE 13: LEVEL OF CARE TRENDS, ALL SCHEMES (NARROW DISEASE BURDEN)

All Schemes, LoC Trends	2011	2012	2013	2014	Average
Total Increase	-0.51%	0.61%	0.55%	1.77%	0.60%
<u>Explanatory Factors</u>	<u>0.24%</u>	<u>-0.06%</u>	<u>1.08%</u>	<u>0.55%</u>	<u>0.45%</u>
Age	0.35%	0.36%	0.41%	0.34%	0.36%
Gender	-0.05%	-0.02%	0.00%	-0.04%	-0.03%
Disease Profile	0.00%	0.08%	-0.12%	-0.10%	-0.03%
Case Mix	0.17%	-0.28%	0.54%	0.17%	0.15%
PMB Diagnoses	-0.23%	-0.20%	0.24%	0.19%	0.00%
<u>Unexplained Factors</u>	<u>-0.75%</u>	<u>0.67%</u>	<u>-0.53%</u>	<u>1.22%</u>	<u>0.15%</u>

**TABLE 14: LEVEL OF CARE TRENDS, ALL SCHEMES (BROAD DISEASE BURDEN)**

All Schemes, LoC Trends	2011	2012	2013	2014	Average
Total Increase	-0.51%	0.61%	0.55%	1.77%	0.60%
<u>Explanatory Factors</u>	<u>0.28%</u>	<u>-0.15%</u>	<u>1.08%</u>	<u>0.53%</u>	<u>0.43%</u>
Age	0.35%	0.36%	0.41%	0.34%	0.36%
Gender	-0.05%	-0.02%	0.00%	-0.04%	-0.03%
Disease Profile	0.18%	-0.09%	-0.08%	-0.11%	-0.02%
Case Mix	0.04%	-0.21%	0.51%	0.15%	0.12%
PMB Diagnoses	-0.24%	-0.19%	0.24%	0.18%	0.00%
<u>Unexplained Factors</u>	<u>-0.79%</u>	<u>0.76%</u>	<u>-0.53%</u>	<u>1.24%</u>	<u>0.17%</u>

20. Table 13 shows that, of the unexplained increases outlined in the previous section, only 0.15% in the narrow disease burden approach and 0.17% in the broad approach can be attributed to unexplained increases in levels of care. This again cannot be a result of price increases above CPI, since the analysis is based on utilisation rather than cost. The increase of 1.77% from 2013 to 2014 is noted, but appears not to be a result of any of the explanatory factors which have been analysed.
21. The next four tables, starting with Table 15 below, show the level of care trends for surgical and medical admissions respectively. The tables show that levels of care have increased at a marginally faster rate for surgical than medical admissions, part of which is explained by the explanatory factors used and part of which is a result of other factors. The large increase from 2013 to 2014 is present in both groups, but is more evident in surgical than medical admissions.

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**TABLE 15: LEVEL OF CARE TRENDS, SURGICAL ADMISSIONS (NARROW DISEASE BURDEN)**

Surgical Admissions, LoC Trends	2011	2012	2013	2014	Average
Total Increase	-1.81%	1.74%	0.72%	2.49%	0.79%
<b>Explanatory Factors</b>					
Age	0.20%	0.67%	1.03%	0.32%	0.56%
Gender	-0.03%	-0.07%	0.00%	-0.03%	-0.03%
Disease Profile	-0.03%	0.08%	-0.14%	-0.11%	-0.05%
Case Mix	0.00%	-0.22%	0.50%	0.54%	0.20%
PMB Diagnoses	-0.28%	-0.08%	0.56%	0.50%	0.17%
<b>Unexplained Factors</b>					
	-1.66%	1.37%	-1.24%	1.28%	-0.06%

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**TABLE 16: LEVEL OF CARE TRENDS, SURGICAL ADMISSIONS (BROAD DISEASE BURDEN)**

Surgical Admissions, LoC Trends	2011	2012	2013	2014	Average
Total Increase	-1.81%	1.74%	0.72%	2.49%	0.79%
<u>Explanatory Factors</u>	<u>-0.13%</u>	<u>0.29%</u>	<u>1.96%</u>	<u>1.21%</u>	<u>0.83%</u>
Age	0.20%	0.67%	1.03%	0.32%	0.56%
Gender	-0.03%	-0.07%	0.00%	-0.03%	-0.03%
Disease Profile	0.13%	-0.04%	-0.02%	0.03%	0.03%
Case Mix	-0.14%	-0.19%	0.40%	0.40%	0.12%
PMB Diagnoses	-0.29%	-0.08%	0.55%	0.48%	0.17%
<u>Unexplained Factors</u>	<u>-1.68%</u>	<u>1.45%</u>	<u>-1.23%</u>	<u>1.29%</u>	<u>-0.04%</u>

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TABLE 17: LEVEL OF CARE TRENDS, MEDICAL ADMISSIONS (NARROW DISEASE BURDEN)

Medical Admissions, LoC Trends	2011	2012	2013	2014	Average
Total Increase	-0.08%	0.11%	0.58%	1.46%	0.52%
<u>Explanatory Factors</u>	<u>0.40%</u>	<u>-0.28%</u>	<u>0.67%</u>	<u>0.20%</u>	<u>0.25%</u>
Age	0.42%	0.18%	0.09%	0.25%	0.23%
Gender	-0.07%	0.00%	0.00%	-0.05%	-0.03%
Disease Profile	0.02%	0.07%	-0.11%	-0.10%	-0.03%
Case Mix	0.19%	-0.25%	0.63%	0.06%	0.16%
PMB Diagnoses	-0.16%	-0.28%	0.06%	0.04%	-0.08%
<u>Unexplained Factors</u>	<u>-0.49%</u>	<u>0.39%</u>	<u>-0.09%</u>	<u>1.26%</u>	<u>0.27%</u>



**TABLE 18: LEVEL OF CARE TRENDS, MEDICAL ADMISSIONS (BROAD DISEASE BURDEN)**

Medical Admissions, LoC Trends	2011	2012	2013	2014	Average
Total Increase	-0.08%	0.11%	0.58%	1.46%	0.52%
<u>Explanatory Factors</u>	<u>0.45%</u>	<u>-0.38%</u>	<u>0.68%</u>	<u>0.17%</u>	<u>0.23%</u>
Age	0.42%	0.18%	0.09%	0.25%	0.23%
Gender	-0.07%	0.00%	0.00%	-0.05%	-0.03%
Disease Profile	0.21%	-0.13%	-0.11%	-0.16%	-0.05%
Case Mix	0.06%	-0.16%	0.64%	0.10%	0.16%
PMB Diagnoses	-0.18%	-0.27%	0.07%	0.04%	-0.08%
<u>Unexplained Factors</u>	<u>-0.54%</u>	<u>0.49%</u>	<u>-0.10%</u>	<u>1.29%</u>	<u>0.29%</u>

### Summary of Overall Trends

22. Table 19 and Table 20 show the results of all of the attribution analyses summarised into a single table. The analysis shows that the majority of the increase in in-hospital costs above CPI is attributable to increases in admission rates, length of stay and level of care, with only a very small unexplained component remaining. We note however that one could expect increased length of stay and level of care to lead to reduced costs per average day since subsequent days are usually cheaper than the first day. This effect is evident in 2011 with increased length of stay and 2014 with increased levels of care.

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**TABLE 19: IN-HOSPITAL TOTAL COST PER LIFE ATTRIBUTION SUMMARY, ALL SCHEMES (NARROW DISEASE BURDEN)**

<b>Trends Summary, All Schemes</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>Average</b>
<u>Total Increase</u>	<u>10.24%</u>	<u>11.38%</u>	<u>10.95%</u>	<u>10.79%</u>	<u>10.84%</u>
- CPI	5.00%	5.60%	5.70%	6.10%	5.60%
- Explanatory Factors	2.61%	2.07%	1.58%	1.80%	2.01%
- Unexplained Factors	2.63%	3.71%	3.67%	2.89%	3.23%
<u>Admission Rate</u>	<u>1.89%</u>	<u>1.95%</u>	<u>2.48%</u>	<u>2.37%</u>	<u>2.17%</u>
- Explanatory Factors	2.52%	-0.08%	0.76%	0.75%	0.99%
- Unexplained Factors	-0.63%	2.04%	1.72%	1.62%	1.19%
<u>Length of Stay</u>	<u>5.10%</u>	<u>-0.31%</u>	<u>0.12%</u>	<u>1.00%</u>	<u>1.48%</u>
- Explanatory Factors	0.28%	0.35%	1.61%	1.13%	0.84%
- Unexplained Factors	4.82%	-0.66%	-1.49%	-0.12%	0.64%
<u>Level of Care</u>	<u>-0.51%</u>	<u>0.61%</u>	<u>0.55%</u>	<u>1.77%</u>	<u>0.60%</u>
- Explanatory Factors	0.24%	-0.06%	1.08%	0.55%	0.45%
- Unexplained Factors	-0.75%	0.67%	-0.53%	1.22%	0.15%
<u>Other</u>	<u>-1.45%</u>	<u>3.15%</u>	<u>1.74%</u>	<u>-0.76%</u>	<u>0.63%</u>

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23. Of the 3.23% unexplained increase in in-hospital claims cost, 1.19% (37% of the unexplained) is a result of unexplained increases in admission rates, 0.64% (20% of the unexplained increase) as a result of unexplained length of stay increase and 0.15% (5% of the unexplained) is a result of unexplained increases in levels of care. This leaves an unexplained increase of 1.25%, which is likely a result of price increases above CPI and/or increased numbers of line items per event (we note again that these will be dealt with in subsequent analyses).

**TABLE 20: IN-HOSPITAL TOTAL COST PER LIFE ATTRIBUTION SUMMARY, ALL SCHEMES (BROAD DISEASE BURDEN)**

Trends Summary, All Schemes	2011	2012	2013	2014	Average
<u>Total Increase</u>	<u>10.24%</u>	<u>11.38%</u>	<u>10.95%</u>	<u>10.79%</u>	<u>10.84%</u>
- CPI	5.00%	5.60%	5.70%	6.10%	5.60%
- Explanatory Factors	4.19%	3.09%	2.02%	2.54%	2.96%
- Unexplained Factors	1.06%	2.69%	3.23%	2.15%	2.28%
<u>Admission Rate</u>	<u>1.89%</u>	<u>1.95%</u>	<u>2.48%</u>	<u>2.37%</u>	<u>2.17%</u>
- Explanatory Factors	3.06%	1.13%	1.97%	1.98%	2.04%
- Unexplained Factors	-1.17%	0.82%	0.51%	0.38%	0.14%
<u>Length of Stay</u>	<u>5.10%</u>	<u>-0.31%</u>	<u>0.12%</u>	<u>1.00%</u>	<u>1.48%</u>
- Explanatory Factors	0.43%	0.26%	1.58%	1.07%	0.84%
- Unexplained Factors	4.67%	-0.57%	-1.46%	-0.07%	0.64%
<u>Level of Care</u>	<u>-0.51%</u>	<u>0.61%</u>	<u>0.55%</u>	<u>1.77%</u>	<u>0.60%</u>
- Explanatory Factors	0.28%	-0.15%	1.08%	0.53%	0.43%

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Trends Summary, All Schemes	2011	2012	2013	2014	Average
- Unexplained Factors	-0.79%	0.76%	-0.53%	1.24%	0.17%
<u>Other</u>	<u>-1.45%</u>	<u>3.15%</u>	<u>1.74%</u>	<u>-0.76%</u>	<u>0.63%</u>

24. Table 20 shows that the results for the broad disease burden models differ primarily in the admission rates section, where a much larger explained component is evident. The length of stay and level of care contributions remain very similar to the narrow disease burden model.
25. The contribution of practitioner behaviour to these trends will be investigated in the practitioner report, while the geographical analyses will also assist in understanding these trends further in terms of potential market concentration in certain areas of the country.

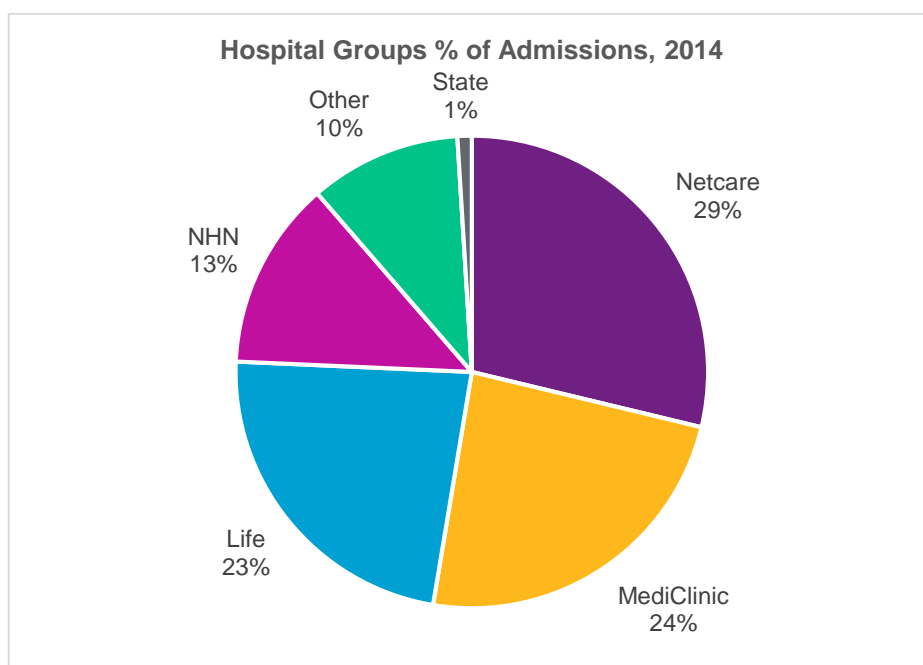
## FACILITY DETAIL ANALYSES

### Hospital Group Analysis

#### *Descriptive Statistics and Trends*

26. In order to assess whether trends differ by hospital group, the hospitals to which patients in the dataset have been admitted have been grouped according to their ownership structures and affiliations. This has led to six groups of hospitals. These are the three large corporate groups (Netcare, MediClinic and Life Healthcare), the National Hospital Network (NHN) which is a loose grouping of independent hospitals which has an exemption from the Competition Commission to negotiate tariffs collectively, the 'Other' independent hospitals and day clinics not affiliated to NHN, and State hospitals.
27. Figure 1 shows the proportion of admissions within each of the six groups in 2014, based on all admissions i.e. overnight stays as well as day cases. It shows that Netcare, with 29% of admissions, is the largest group, followed by MediClinic and Life Healthcare with 24% and 23% respectively. The NHN, Other and State hospitals show smaller shares.
28. The trends in admissions per 1 000 lives to each hospital group over the period covered by the data are shown in the next two tables. Facility Detail Analyses

**FIGURE 1: % OF TOTAL ADMISSIONS BY HOSPITAL GROUP, 2014**



29. The trends in admissions per 1 000 lives to each hospital group over the period covered by the data are shown in the next two tables.

**TABLE 21: ADMISSIONS PER 1 000 LIVES BY HOSPITAL GROUP, 2010-14**

Year	Netcare	MediClinic	Life	NHN	Other	State <sup>3</sup>	All
2010	73.49	62.96	57.44	26.91	23.44	3.23	247.46
2011	73.81	63.94	58.18	29.16	24.66	3.43	253.19
2012	74.84	64.04	59.76	30.98	25.79	3.31	258.71
2013	76.44	63.66	60.68	32.92	26.73	2.89	263.32
2014	77.09	63.97	61.86	34.67	27.80	2.61	268.00

**TABLE 22: ADMISSIONS PER 1 000 LIVES TRENDS BY HOSPITAL GROUP, 2010-14**

Year	Netcare	MediClinic	Life	NHN	Other	State	All
2010							
2011	0.44%	1.56%	1.30%	8.37%	5.19%	6.38%	2.31%
2012	1.39%	0.15%	2.72%	6.24%	4.58%	-3.66%	2.18%
2013	2.14%	-0.59%	1.54%	6.28%	3.66%	-12.65%	1.78%
2014	0.85%	0.48%	1.95%	5.31%	3.98%	-9.56%	1.78%

30. The tables show that, although admission rates to all of the hospital groups have increased over the period, the NHN and other independent hospitals have shown the highest growth rates, while MediClinic has shown only marginal growth. Netcare and Life Healthcare have growth rates in line with the overall increases in admission rates, while admission rates to State hospitals have declined off an already low base.
31. The next tables, starting with Table 23 below, show trends in cost per admission within each hospital group over time. The unadjusted cost per admission outlined here includes hospital costs as well as all the other associated costs and does not fully reflect

<sup>3</sup> A 'State' admission in this section is an admission by a medical scheme member to a provincial hospital which is claimed from the relevant medical scheme i.e. admissions to state hospitals by non-medical scheme members or those which are not claimed for will not be included. The admission rate is therefore the number of qualifying admissions per 1 000 medical scheme beneficiaries.

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a price comparison between hospitals. We note that these are descriptive comparisons comparing actual cost per admission as extracted from the data, and no adjustments for risk or case mix have been applied to these.

**TABLE 23: UNADJUSTED TOTAL COST PER ADMISSION (RANDS) BY HOSPITAL GROUP, 2010-14**

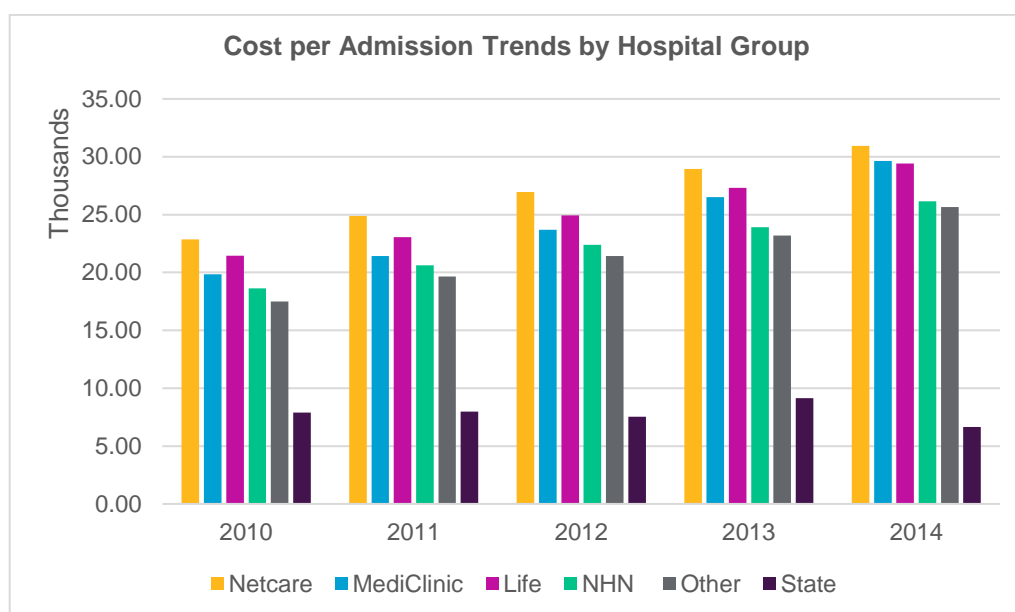
Year	Netcare	MediClinic	Life	NHN	Other	State	All
2010	22 867	19 862	21 476	18 672	17 497	7 820	20 619
2011	24 858	21 398	23 016	20 614	19 582	7 906	22 328
2012	26 971	23 695	24 959	22 407	21 423	7 465	24 346
2013	28 960	26 509	27 339	23 928	23 196	8 929	26 560
2014	30 935	29 628	29 432	26 151	25 681	6 625	28 875

**TABLE 24: UNADJUSTED TOTAL COST PER ADMISSION TRENDS BY HOSPITAL GROUP, 2010-14**

Year	Netcare	MediClinic	Life	NHN	Other	State	All
2010							
2011	8.70%	7.73%	7.17%	10.40%	11.91%	1.10%	8.29%
2012	8.50%	10.74%	8.44%	8.70%	9.40%	-5.58%	9.04%
2013	7.37%	11.88%	9.54%	6.79%	8.28%	19.62%	9.09%
2014	6.82%	11.77%	7.65%	9.29%	10.71%	-25.81%	8.72%
<b>Average</b>	<b>7.85%</b>	<b>10.51%</b>	<b>8.20%</b>	<b>8.79%</b>	<b>10.07%</b>	<b>-4.06%</b>	<b>8.78%</b>

32. The tables show that the three large groups have higher unadjusted costs per admission than NHN and the other independent hospitals, with admissions to Netcare hospitals marginally more costly than those to MediClinic and Life hospitals. This may be a result of case mix differences, as the NHN and Other groups contain a large proportion of day clinics and smaller hospitals, whereas the larger hospitals with the specialised units potentially dealing with more complex cases are usually found within the three large groups. The trends are presented graphically in Figure 2 below.

FIGURE 2: UNADJUSTED COST PER ADMISSION TRENDS BY HOSPITAL GROUP, 2010-14



33. Other than for State hospitals, the unadjusted cost per admission has increased by between 6.5% and 12.5% per year across all groups and all years. Netcare and Life Healthcare show lower increases, albeit off a higher base value, than the other groups. An attribution analysis of these increases will be outlined in the next section.

**Attribution Analyses by Hospital Group**

34. The first set of tables below presents the results of the same cost per admission attribution analysis which was outlined in **The Cost Attribution Report**, by hospital group. The overall tables from that report are repeated below, followed by the individual tables for each hospital group starting with Netcare.

TABLE 25: TOTAL COST PER ADMISSION TRENDS, ALL HOSPITALS (NARROW DISEASE BURDEN)

All Schemes, CPA Trends	2011	2012	2013	2014	Average
Total Increase	8.28%	9.04%	9.10%	8.72%	8.79%
CPI	<u>5.00%</u>	<u>5.60%</u>	<u>5.70%</u>	<u>6.10%</u>	<u>5.60%</u>
All Explanatory Factors	<u>-0.25%</u>	<u>0.95%</u>	<u>2.61%</u>	<u>1.48%</u>	<u>1.20%</u>



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All Schemes, CPA Trends	2011	2012	2013	2014	Average
Age	0.57%	1.57%	1.40%	1.04%	1.15%
Gender	-0.01%	-0.03%	-0.02%	-0.02%	-0.02%
Disease Profile	-0.18%	0.19%	-0.12%	-0.15%	-0.06%
Case Mix	-0.31%	-0.48%	0.73%	0.18%	0.03%
PMB Diagnoses	-0.31%	-0.31%	0.61%	0.44%	0.11%
<u>Unexplained Factors</u>	<u>3.54%</u>	<u>2.49%</u>	<u>0.79%</u>	<u>1.14%</u>	<u>1.99%</u>

TABLE 26: TOTAL COST PER ADMISSION TRENDS, ALL HOSPITALS (BROAD DISEASE BURDEN)

All Schemes, CPA Trends	2011	2012	2013	2014	Average
Total Increase	8.28%	9.04%	9.10%	8.72%	8.79%
CPI	<u>5.00%</u>	<u>5.60%</u>	<u>5.70%</u>	<u>6.10%</u>	<u>5.60%</u>
<u>All Explanatory Factors</u>	<u>-0.12%</u>	<u>0.84%</u>	<u>2.60%</u>	<u>1.49%</u>	<u>1.20%</u>
Age	0.57%	1.57%	1.40%	1.04%	1.15%
Gender	-0.01%	-0.03%	-0.02%	-0.02%	-0.02%
Disease Profile	0.26%	-0.08%	-0.16%	-0.11%	-0.02%
Case Mix	-0.59%	-0.34%	0.77%	0.15%	0.00%
PMB Diagnoses	-0.34%	-0.29%	0.61%	0.44%	0.10%
<u>Unexplained Factors</u>	<u>3.40%</u>	<u>2.60%</u>	<u>0.80%</u>	<u>1.13%</u>	<u>1.98%</u>

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**TABLE 27: TOTAL COST PER ADMISSION TRENDS, NETCARE HOSPITALS (NARROW DISEASE BURDEN)**

CPA Increases, Netcare	2011	2012	2013	2014	Average
Total Increase	8.70%	8.50%	7.37%	6.82%	7.85%
<u>CPI</u>	<u>5.00%</u>	<u>5.60%</u>	<u>5.70%</u>	<u>6.10%</u>	<u>5.60%</u>
<u>All Explanatory Factors</u>	<u>-0.20%</u>	<u>0.31%</u>	<u>1.53%</u>	<u>0.73%</u>	<u>0.59%</u>
Age	0.60%	0.92%	1.13%	1.11%	0.94%
Gender	0.00%	-0.05%	0.00%	-0.03%	-0.02%
Disease Profile	-0.18%	0.19%	-0.18%	-0.16%	-0.08%
Case Mix	-0.53%	-0.80%	-0.31%	-0.75%	-0.60%
PMB Diagnoses	-0.09%	0.05%	0.88%	0.56%	0.35%
<u>Unexplained Factors</u>	<u>3.90%</u>	<u>2.59%</u>	<u>0.15%</u>	<u>-0.01%</u>	<u>1.66%</u>

**TABLE 28: TOTAL COST PER ADMISSION TRENDS, NETCARE HOSPITALS (BROAD DISEASE BURDEN)**

CPA Increases, Netcare	2011	2012	2013	2014	Average
Total Increase	8.70%	8.50%	7.37%	6.82%	7.85%
<u>CPI</u>	<u>5.00%</u>	<u>5.60%</u>	<u>5.70%</u>	<u>6.10%</u>	<u>5.60%</u>
<u>All Explanatory Factors</u>	<u>-0.02%</u>	<u>0.21%</u>	<u>1.57%</u>	<u>0.70%</u>	<u>0.61%</u>
Age	0.60%	0.92%	1.13%	1.11%	0.94%
Gender	0.00%	-0.05%	0.00%	-0.03%	-0.02%
Disease Profile	0.27%	-0.06%	-0.08%	-0.16%	-0.01%
Case Mix	-0.76%	-0.66%	-0.35%	-0.76%	-0.63%
PMB Diagnoses	-0.13%	0.06%	0.88%	0.55%	0.34%
<u>Unexplained Factors</u>	<u>3.73%</u>	<u>2.69%</u>	<u>0.10%</u>	<u>0.02%</u>	<u>1.64%</u>

35. Table 27 and Table 28 above shows that, for admission to Netcare hospitals, the unadjusted cost per admission has increased by 7.85% on average, compared to 8.79% for all hospitals and an average CPI of 5.60%. The explanatory factors in the narrow disease burden model have contributed 0.59% to the increase, with changes in age profile (+0.94%) and case mix (-0.60%) the most significant trends. This leaves an unexplained increase of 1.66% which cannot be explained by the demographic and clinical factors outlined in the table. The trends are very similar for the broad disease burden model.
36. This unexplained factor is most likely a result of increased numbers of services used per admission or price increases above CPI.

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**TABLE 29: TOTAL COST PER ADMISSION TRENDS, MEDICLINIC HOSPITALS (NARROW DISEASE BURDEN)**

CPA Increases, MediClinic	2011	2012	2013	2014	Average
Total Increase	7.73%	10.74%	11.88%	11.77%	10.53%
<u>CPI</u>	<u>5.00%</u>	<u>5.60%</u>	<u>5.70%</u>	<u>6.10%</u>	<u>5.60%</u>
<u>All Explanatory Factors</u>	<u>-0.36%</u>	<u>4.36%</u>	<u>4.73%</u>	<u>3.67%</u>	<u>3.10%</u>
Age	0.55%	2.32%	1.36%	1.33%	1.39%
Gender	-0.01%	-0.02%	0.00%	0.01%	-0.01%
Disease Profile	-0.14%	0.25%	-0.15%	-0.22%	-0.06%
Case Mix	-0.53%	1.52%	2.83%	1.97%	1.45%
PMB Diagnoses	-0.22%	0.29%	0.69%	0.58%	0.34%
<u>Unexplained Factors</u>	<u>3.09%</u>	<u>0.77%</u>	<u>1.45%</u>	<u>2.00%</u>	<u>1.83%</u>

**TABLE 30: TOTAL COST PER ADMISSION TRENDS, MEDICLINIC HOSPITALS (BROAD DISEASE BURDEN)**

CPA Increases, MediClinic	2011	2012	2013	2014	Average
Total Increase	7.73%	10.74%	11.88%	11.77%	10.53%
<u>CPI</u>	<u>5.00%</u>	<u>5.60%</u>	<u>5.70%</u>	<u>6.10%</u>	<u>5.60%</u>
<u>All Explanatory Factors</u>	<u>-0.23%</u>	<u>4.29%</u>	<u>4.76%</u>	<u>3.80%</u>	<u>3.16%</u>
Age	0.55%	2.32%	1.36%	1.33%	1.39%
Gender	-0.01%	-0.02%	0.00%	0.01%	-0.01%
Disease Profile	0.28%	-0.03%	-0.13%	-0.04%	0.02%
Case Mix	-0.80%	1.72%	2.86%	1.93%	1.43%
PMB Diagnoses	-0.24%	0.30%	0.67%	0.57%	0.33%
<u>Unexplained Factors</u>	<u>2.96%</u>	<u>0.84%</u>	<u>1.41%</u>	<u>1.87%</u>	<u>1.77%</u>

37. Table 29 and Table 30 above for MediClinic show the unadjusted cost per admission increasing by 10.53% a year on average, well above the figure for all hospitals of 8.79%. This appears to be a result of MediClinic receiving more severe cases, since both age and case mix are materially impacting the annual increases for both disease burden scenarios.

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**TABLE 31: COST PER ADMISSION TRENDS, LIFE HEALTHCARE HOSPITALS (NARROW DISEASE BURDEN)**

CPA Increases, Life Healthcare	2011	2012	2013	2014	Average
Total Increase	7.17%	8.44%	9.54%	7.65%	8.20%
<u>CPI</u>	<u>5.00%</u>	<u>5.60%</u>	<u>5.70%</u>	<u>6.10%</u>	<u>5.60%</u>
<u>All Explanatory Factors</u>	<u>0.46%</u>	<u>0.16%</u>	<u>2.42%</u>	<u>1.08%</u>	<u>1.03%</u>
Age	0.58%	1.33%	1.61%	0.77%	1.07%
Gender	-0.02%	-0.03%	-0.04%	-0.05%	-0.04%
Disease Profile	-0.14%	0.05%	-0.06%	-0.01%	-0.04%
Case Mix	0.17%	-1.05%	0.32%	-0.33%	-0.22%
PMB Diagnoses	-0.12%	-0.13%	0.59%	0.70%	0.26%
<u>Unexplained Factors</u>	<u>1.71%</u>	<u>2.68%</u>	<u>1.41%</u>	<u>0.48%</u>	<u>1.57%</u>

**TABLE 32: COST PER ADMISSION TRENDS, LIFE HEALTHCARE HOSPITALS (BROAD DISEASE BURDEN)**

CPA Increases, Life Healthcare	2011	2012	2013	2014	Average
Total Increase	7.17%	8.44%	9.54%	7.65%	8.20%
<u>CPI</u>	<u>5.00%</u>	<u>5.60%</u>	<u>5.70%</u>	<u>6.10%</u>	<u>5.60%</u>
<u>All Explanatory Factors</u>	<u>0.57%</u>	<u>0.12%</u>	<u>2.40%</u>	<u>0.99%</u>	<u>1.02%</u>
Age	0.58%	1.33%	1.61%	0.77%	1.07%
Gender	-0.02%	-0.03%	-0.04%	-0.05%	-0.04%
Disease Profile	0.24%	-0.02%	-0.12%	-0.17%	-0.01%
Case Mix	-0.08%	-1.05%	0.36%	-0.26%	-0.26%
PMB Diagnoses	-0.15%	-0.12%	0.59%	0.70%	0.25%
<u>Unexplained Factors</u>	<u>1.60%</u>	<u>2.73%</u>	<u>1.44%</u>	<u>0.56%</u>	<u>1.58%</u>

38. Table 31 and Table 32 above for Life Healthcare shows the unadjusted cost per admission increasing by 8.20% a year on average, slightly below the figure for all hospitals of 8.79%. Again, age (+1.07%) is materially impacting the trends, while the unexplained increases are below the overall unexplained increases across all hospitals.

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**TABLE 33: COST PER ADMISSION TRENDS, NHN HOSPITALS (NARROW DISEASE BURDEN)**

<b>CPA Increases, NHN Hospitals</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>Average</b>
Total Increase	10.40%	8.70%	6.79%	9.29%	8.79%
<u>CPI</u>	<u>5.00%</u>	<u>5.60%</u>	<u>5.70%</u>	<u>6.10%</u>	<u>5.60%</u>
<u>All Explanatory Factors</u>	<u>-0.78%</u>	<u>-0.19%</u>	<u>1.83%</u>	<u>-0.11%</u>	<u>0.19%</u>
Age	0.30%	1.67%	1.61%	0.77%	1.09%
Gender	-0.02%	0.01%	-0.06%	-0.01%	-0.02%
Disease Profile	-0.19%	0.46%	0.03%	-0.24%	0.01%
Case Mix	0.47%	-0.43%	0.02%	-0.11%	-0.01%
PMB Diagnoses	-1.34%	-1.90%	0.24%	-0.52%	-0.88%
<u>Unexplained Factors</u>	<u>6.18%</u>	<u>3.29%</u>	<u>-0.74%</u>	<u>3.30%</u>	<u>3.01%</u>



**TABLE 34: COST PER ADMISSION TRENDS, NHN HOSPITALS (BROAD DISEASE BURDEN)**

CPA Increases, NHN Hospitals	2011	2012	2013	2014	Average
Total Increase	10.40%	8.70%	6.79%	9.29%	8.79%
<u>CPI</u>	<u>5.00%</u>	<u>5.60%</u>	<u>5.70%</u>	<u>6.10%</u>	<u>5.60%</u>
<u>All Explanatory Factors</u>	<u>-0.63%</u>	<u>-0.49%</u>	<u>1.79%</u>	<u>-0.06%</u>	<u>0.15%</u>
Age	0.30%	1.67%	1.61%	0.77%	1.09%
Gender	-0.02%	0.01%	-0.06%	-0.01%	-0.02%
Disease Profile	0.44%	-0.16%	-0.27%	0.01%	0.01%
Case Mix	0.02%	-0.14%	0.26%	-0.31%	-0.04%
PMB Diagnoses	-1.38%	-1.87%	0.25%	-0.51%	-0.88%
<u>Unexplained Factors</u>	<u>6.03%</u>	<u>3.59%</u>	<u>-0.70%</u>	<u>3.25%</u>	<u>3.04%</u>

39. Table 33 and Table 34 above for the NHN hospitals shows cost per admission increasing by 8.79% a year on average, identical to the figure for all hospitals. Again, age (+1.09%) is materially contributing to the increases, but in this case a reduction in the proportionate severity of PMB diagnoses (-0.88%) is offsetting this. The unexplained increase of over 3% is well above the overall unexplained increase across all hospitals.

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**TABLE 35: COST PER ADMISSION TRENDS, OTHER INDEPENDENT HOSPITALS (NARROW DISEASE BURDEN)**

CPA Increases, Other Hospitals	2011	2012	2013	2014	Average
Total Increase	11.91%	9.40%	8.28%	10.71%	10.08%
<u>CPI</u>	<u>5.00%</u>	<u>5.60%</u>	<u>5.70%</u>	<u>6.10%</u>	<u>5.60%</u>
<u>All Explanatory Factors</u>	<u>0.66%</u>	<u>-1.69%</u>	<u>1.13%</u>	<u>2.43%</u>	<u>0.63%</u>
Age	1.03%	2.33%	1.63%	1.43%	1.61%
Gender	-0.02%	-0.02%	-0.02%	-0.04%	-0.02%
Disease Profile	-0.17%	0.24%	-0.10%	-0.12%	-0.04%
Case Mix	0.55%	-2.56%	-0.56%	0.66%	-0.48%
PMB Diagnoses	-0.74%	-1.68%	0.17%	0.50%	-0.44%
<u>Unexplained Factors</u>	<u>6.26%</u>	<u>5.49%</u>	<u>1.45%</u>	<u>2.18%</u>	<u>3.84%</u>

**TABLE 36: COST PER ADMISSION TRENDS, OTHER INDEPENDENT HOSPITALS (BROAD DISEASE BURDEN)**

CPA Increases, Other Hospitals	2011	2012	2013	2014	Average
Total Increase	11.91%	9.40%	8.28%	10.71%	10.08%
<u>CPI</u>	<u>5.00%</u>	<u>5.60%</u>	<u>5.70%</u>	<u>6.10%</u>	<u>5.60%</u>
<u>All Explanatory Factors</u>	<u>0.67%</u>	<u>-1.95%</u>	<u>0.92%</u>	<u>2.42%</u>	<u>0.52%</u>
Age	1.03%	2.33%	1.63%	1.43%	1.61%
Gender	-0.02%	-0.02%	-0.02%	-0.04%	-0.02%
Disease Profile	0.10%	-0.27%	-0.36%	-0.13%	-0.17%
Case Mix	0.29%	-2.34%	-0.50%	0.65%	-0.47%
PMB Diagnoses	-0.74%	-1.65%	0.17%	0.51%	-0.43%
<u>Unexplained Factors</u>	<u>6.25%</u>	<u>5.75%</u>	<u>1.66%</u>	<u>2.19%</u>	<u>3.96%</u>

40. Table 35 and Table 36 above for the other independent hospitals shows the unadjusted cost per admission increasing by 10.08% a year on average, well above the figure of 8.79% for all hospitals. Again, age (+1.61%) is materially impacting the trends, but reductions in the average case mix and the proportionate severity of PMB diagnoses are offsetting this. The unexplained increase of close to 4% is again markedly above the overall unexplained increase across all hospitals.

41. The next tables compare the overall total expenditure on admissions to each hospital group (excluding the State) and breaks it down into admission rate, length of stay and level of care as outlined in the previous section. For the purposes of this analysis, we have assumed the all of the groups have a national geographical footprint, and thus all

service the same population at a group level.<sup>4</sup> Practically this means that the 'explained' component of admission rates for each group will be the same, and any differences in admission rates will be reflected as movements in the unexplained factor. The summaries are shown in Table 37 and Table 38 below.

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<sup>4</sup> This assumption was made for purposes of this analysis only and will have to be revised when the results of more detailed geographical analyses become available.

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**TABLE 37: AVERAGE COST PER ADMISSION INCREASE BREAKDOWN BY HOSPITAL GROUP, 2010-14 (NARROW DISEASE BURDEN)**

Cost Increases 2010-2014	Netcare	MediClinic	Life	NHN	Other
<u>Total Increase</u>	<u>9.15%</u>	<u>10.96%</u>	<u>10.23%</u>	<u>15.93%</u>	<u>14.87%</u>
- CPI	5.60%	5.60%	5.60%	5.60%	5.60%
- Explanatory Factors	1.58%	4.10%	2.03%	1.17%	1.63%
- Unexplained Factors	1.97%	1.26%	2.60%	9.15%	7.64%
<u>Admission Rate</u>	<u>1.21%</u>	<u>0.40%</u>	<u>1.87%</u>	<u>6.55%</u>	<u>4.35%</u>
- Explanatory Factors	0.99%	0.99%	0.99%	0.99%	0.99%
- Unexplained Factors	0.22%	-0.59%	0.89%	5.56%	3.37%
<u>Length of Stay</u>	<u>0.95%</u>	<u>2.71%</u>	<u>1.42%</u>	<u>1.85%</u>	<u>-0.15%</u>
- Explanatory Factors	0.38%	2.31%	1.02%	-0.20%	-0.49%
- Unexplained Factors	0.57%	0.40%	0.40%	2.06%	0.33%
<u>Level of Care</u>	<u>0.32%</u>	<u>1.15%</u>	<u>0.29%</u>	<u>0.79%</u>	<u>1.19%</u>
- Explanatory Factors	0.53%	1.30%	0.09%	-0.10%	0.56%
- Unexplained Factors	-0.21%	-0.15%	0.20%	0.89%	0.63%
<u>Other</u>	<u>0.85%</u>	<u>0.73%</u>	<u>0.73%</u>	<u>0.37%</u>	<u>3.17%</u>

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**TABLE 38: AVERAGE COST PER ADMISSION INCREASE BREAKDOWN BY HOSPITAL GROUP, 2010-14 (BROAD DISEASE BURDEN)**

Cost Increases 2010-2014	Netcare	MediClinic	Life	NHN	Other
<u>Total Increase</u>	<u>9.15%</u>	<u>10.96%</u>	<u>10.23%</u>	<u>15.93%</u>	<u>14.87%</u>
- CPI	5.60%	5.60%	5.60%	5.60%	5.60%
- Explanatory Factors	2.66%	5.25%	3.08%	2.19%	2.57%
- Unexplained Factors	0.88%	0.11%	1.55%	8.14%	6.71%
<u>Admission Rate</u>	<u>1.21%</u>	<u>0.40%</u>	<u>1.87%</u>	<u>6.55%</u>	<u>4.35%</u>
- Explanatory Factors	2.04%	2.04%	2.04%	2.04%	2.04%
- Unexplained Factors	-0.83%	-1.64%	-0.16%	4.51%	2.32%
<u>Length of Stay</u>	<u>0.95%</u>	<u>2.71%</u>	<u>1.42%</u>	<u>1.85%</u>	<u>-0.15%</u>
- Explanatory Factors	0.39%	2.33%	1.02%	-0.23%	-0.58%
- Unexplained Factors	0.56%	0.39%	0.40%	2.08%	0.43%
<u>Level of Care</u>	<u>0.32%</u>	<u>1.15%</u>	<u>0.29%</u>	<u>0.79%</u>	<u>1.19%</u>
- Explanatory Factors	0.50%	1.28%	0.09%	-0.11%	0.55%
- Unexplained Factors	-0.17%	-0.13%	0.20%	0.90%	0.65%
<u>Other</u>	<u>0.85%</u>	<u>0.73%</u>	<u>0.73%</u>	<u>0.37%</u>	<u>3.17%</u>

42. The tables show that:

42.1. Total expenditure on admissions to NHN and Other independent hospitals has increased by more than expenditure on admissions to the three large groups,

primarily driven by shifts in admission rates as outlined above. Whilst the CPA for NHN and Other remains lower than those of the large groups, there however has been an increase in admission rates overtime.

- 42.2. Length of stay and level of care have generally increased across all hospital groups, although Netcare shows lower increases than the other groups (again MediClinic shows high increases which appear to relate to more severe cases); and
- 42.3. All groups barring the other independent hospitals show very small 'Other' components, which is likely to reflect price increases above CPI as well as any increase in the volume of services (number of line items) used per acuity-adjusted day.

### ***Hospital Cost Only Analyses***

43. For the report so far, the HMI has been primarily interested in general expenditure trends within the South African healthcare industry, and hence analyses of in-hospital costs have so far included all costs related to a hospital event, and not only the hospitals' direct cost. However, in order to compare hospital groups to each other, an analysis including only hospital costs is required.
44. The analysis in this section focuses only on hospital costs i.e. any costs billed by specialists or most other attending service providers are excluded. In this section, a descriptive trend analysis of hospital cost per admission by hospital group is outlined, breaking the cost into its component parts as outlined in Section 2, and then a set of cost per admission attribution analyses are performed on hospital cost only.
45. Table 39 shows the average unadjusted hospital cost per admission across the various tariff types as defined in Section 2. It shows that ward fees are the largest component, followed by 'Other' claims, which would include charges for gases, equipment, some NAPPI code items where in-house codes are used and the NAPPI code does not appear on the claim as well as prosthesis claims. The 'ARM' group refers to so-called fixed fee arrangements which will be analysed later in the report.

**TABLE 39: HOSPITAL COST PER ADMISSION BY TARIFF TYPE (RANDS), 2010-14**

Year	Ward	Theatre <sup>5</sup>	NAPPI	ARM	Other	All
2010	5 962	2 243	2 710	340	2 706	13 961
2011	6 569	2 389	2 769	345	3 009	15 082
2012	6 939	2 545	2 873	395	3 550	16 303
2013	7 546	2 772	2 932	426	3 976	17 652
2014	8 224	2 981	2 996	541	4 394	19 136

46. Table 40 shows the annual unadjusted increases in each of the categories over the period analysed. It shows that overall unadjusted hospital cost per admission has increased by between 8.0% and 8.5% per year, slightly below the increases in overall cost per admission shown above.

**TABLE 40: HOSPITAL COST PER ADMISSION TRENDS BY TARIFF TYPE, 2010-14**

Year	Ward	Theatre	NAPPI	ARM	Other	All
2010						
2011	10.19%	6.53%	2.20%	1.49%	11.20%	8.03%
2012	5.63%	6.54%	3.76%	14.64%	17.96%	8.10%
2013	8.74%	8.90%	2.06%	7.78%	12.00%	8.27%
2014	9.00%	7.53%	2.16%	27.03%	10.52%	8.41%
<b>Average</b>	<b>8.37%</b>	<b>7.37%</b>	<b>2.54%</b>	<b>12.34%</b>	<b>12.88%</b>	<b>8.20%</b>

<sup>5</sup> In this case 'Theatre' costs refer both to actual theatre fees as well as equipment charges for theatre equipment. It is therefore possible that 'medical' admissions could have theatre costs if the equipment fees are billed without a theatre facility fee code.



47. The cost associated with NAPPI items has increased at a slower rate than the other categories, while the 'Other' group has consistently shown higher increases (ARM increases are off a very low base and would be expected to be unstable). This suggests either increased use of so-called in-house tariff codes for NAPPI items or slower inflation in medicine costs than overall costs.
48. Table 41 breaks down the overall hospital cost per admission by hospital group and compares the trends. We note that the figures presented here are not adjusted for case mix or patient profile and are intended to be illustrative. The appropriate adjustments are included in the attribution analyses presented later in the section.

**TABLE 41: HOSPITAL COST (RANDS) PER ADMISSION BY HOSPITAL GROUP, 2010-14**

Year	Netcare	MediClinic	Life	NHN	Other	State
2010	15 468	13 558	14 686	12 255	11 700	5 191
2011	16 768	14 555	15 688	13 585	13 104	5 327
2012	18 146	15 964	16 827	14 587	14 084	5 139
2013	19 324	17 860	18 346	15 300	14 929	6 158
2014	20 524	19 939	19 785	16 642	16 428	4 818

49. The table shows that on an unadjusted basis, admissions to Netcare hospitals are on average the most costly, with MediClinic and Life slightly below this and the NHN and Other hospitals significantly less costly. Table 42 shows the increases in the unadjusted cost per admission by group over the period analysed. The trends are mixed, but MediClinic hospitals show the highest increases over the period. This is likely a result of the trend towards more severe cases as was outlined in the previous section.

**TABLE 42: HOSPITAL COST PER ADMISSION TRENDS BY HOSPITAL GROUP, 2010-14**

Year	Netcare	MediClinic	Life	NHN	Other	State
2010						
2011	8.41%	7.35%	6.82%	10.85%	12.00%	2.62%
2012	8.22%	9.68%	7.27%	7.37%	7.48%	-3.53%
2013	6.49%	11.88%	9.03%	4.89%	6.00%	19.82%
2014	6.21%	11.64%	7.84%	8.77%	10.04%	-21.75%
<b>Average</b>	<b>7.33%</b>	<b>10.12%</b>	<b>7.73%</b>	<b>7.95%</b>	<b>8.85%</b>	<b>-1.84%</b>

50. As outlined above, all of the trends presented in the preceding tables are not adjusted for changes in patient profiles over time. The next set of tables outline the results of an attribution analysis performed on hospital cost per admission, as opposed to overall cost per admission. Other than the difference in the response variable, the methodologies are identical and the results are split in the same ways. The first table, Table 43 below, shows the overall results for all admissions using the narrow disease burden model.

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**TABLE 43: HOSPITAL COST PER ADMISSION TRENDS, ALL SCHEMES 2010-14 (NARROW DISEASE BURDEN)**

Claims Increases	2011	2012	2013	2014	Average
Total Increase	7.80%	8.29%	8.25%	8.40%	8.19%
<u>CPI</u>	<u>5.00%</u>	<u>5.60%</u>	<u>5.70%</u>	<u>6.10%</u>	<u>5.60%</u>
<u>All Explanatory Factors</u>	<u>-0.33%</u>	<u>0.95%</u>	<u>2.85%</u>	<u>1.66%</u>	<u>1.28%</u>
Age	0.60%	1.66%	1.44%	1.08%	1.19%
Gender	-0.02%	-0.03%	-0.02%	-0.03%	-0.02%
Disease Profile	-0.17%	0.20%	-0.14%	-0.18%	-0.07%
Case Mix	-0.33%	-0.50%	0.79%	0.23%	0.05%
PMB Diagnoses	-0.41%	-0.39%	0.78%	0.55%	0.13%
<u>Unexplained Factors</u>	<u>3.13%</u>	<u>1.75%</u>	<u>-0.30%</u>	<u>0.64%</u>	<u>1.31%</u>

**TABLE 44: HOSPITAL COST PER ADMISSION TRENDS, ALL SCHEMES 2010-14 (BROAD DISEASE BURDEN)**

Claims Increases	2011	2012	2013	2014	Average
Total Increase	7.80%	8.29%	8.25%	8.40%	8.19%
<u>CPI</u>	<u>5.00%</u>	<u>5.60%</u>	<u>5.70%</u>	<u>6.10%</u>	<u>5.60%</u>
<u>All Explanatory Factors</u>	<u>-0.21%</u>	<u>0.82%</u>	<u>2.84%</u>	<u>1.66%</u>	<u>1.28%</u>
Age	0.60%	1.66%	1.44%	1.08%	1.19%
Gender	-0.02%	-0.03%	-0.02%	-0.03%	-0.02%
Disease Profile	0.26%	-0.10%	-0.18%	-0.15%	-0.04%
Case Mix	-0.60%	-0.34%	0.83%	0.21%	0.03%
PMB Diagnoses	-0.46%	-0.38%	0.78%	0.55%	0.12%
<u>Unexplained Factors</u>	<u>3.01%</u>	<u>1.88%</u>	<u>-0.29%</u>	<u>0.64%</u>	<u>1.31%</u>

51. The unadjusted hospital cost per admission has increased by 8.19% a year on average over the period, compared to an overall cost per admission increase of 8.79% as outlined in Table 25. This again shows higher increases in the associated costs when compared to the hospital costs. Of this increase, 1.28% can be explained by the factors analysed in the model (primarily age) while 1.31% is unexplained. Although the explained components are very similar the unexplained component of 1.31% is lower than the figures outlined in Table 25 for all costs.
52. The next tables (Table 45 and Table 46) are for admissions to Netcare hospitals only, and the tables for the remaining hospital groups (excluding State hospitals) follow that.

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**TABLE 45: HOSPITAL COST PER ADMISSION TRENDS, NETCARE HOSPITALS 2010-14 (NARROW DISEASE BURDEN)**

Claims Increases	2011	2012	2013	2014	Average
Total Increase	8.25%	8.37%	6.45%	6.22%	7.32%
<u>CPI</u>	<u>5.00%</u>	<u>5.60%</u>	<u>5.70%</u>	<u>6.10%</u>	<u>5.60%</u>
<u>All Explanatory Factors</u>	<u>-0.07%</u>	<u>0.51%</u>	<u>1.90%</u>	<u>0.87%</u>	<u>0.80%</u>
Age	0.63%	0.95%	1.15%	1.09%	0.96%
Gender	0.00%	0.00%	0.00%	0.00%	0.00%
Disease Profile	-0.17%	0.20%	-0.19%	-0.18%	-0.08%
Case Mix	-0.41%	-0.68%	-0.17%	-0.73%	-0.50%
PMBs	-0.13%	0.04%	1.12%	0.68%	0.43%
<u>Unexplained Factors</u>	<u>3.32%</u>	<u>2.26%</u>	<u>-1.15%</u>	<u>-0.75%</u>	<u>0.92%</u>

**TABLE 46: HOSPITAL COST PER ADMISSION TRENDS, NETCARE HOSPITALS 2010-14 (BROAD DISEASE BURDEN)**

Claims Increases	2011	2012	2013	2014	Average
Total Increase	8.25%	8.37%	6.45%	6.22%	7.32%
<u>CPI</u>	<u>5.00%</u>	<u>5.60%</u>	<u>5.70%</u>	<u>6.10%</u>	<u>5.60%</u>
<u>All Explanatory Factors</u>	<u>0.10%</u>	<u>0.41%</u>	<u>1.95%</u>	<u>0.83%</u>	<u>0.82%</u>
Age	0.63%	1.00%	1.15%	1.13%	0.98%
Gender	0.00%	-0.05%	0.00%	-0.03%	-0.02%
Disease Profile	0.27%	-0.06%	-0.10%	-0.20%	-0.03%
Case Mix	-0.62%	-0.53%	-0.21%	-0.73%	-0.52%
PMBs	-0.18%	0.05%	1.11%	0.67%	0.41%
<u>Unexplained Factors</u>	<u>3.15%</u>	<u>2.36%</u>	<u>-1.20%</u>	<u>-0.71%</u>	<u>0.90%</u>

53. Table 45 and Table 46 show that the unadjusted hospital cost per admission for admissions to Netcare hospitals has increased by 7.32%, less than the 8.19% for all hospitals. In the narrow disease burden model, 0.80% of this increase can be explained by the factors analysed (primarily age) while 0.92% is unexplained, while the results for the broad disease burden model are similar. Both of these figures are lower than the overall figures for all hospitals, suggesting that cost escalation in respect of Netcare hospitals has been lower overall than for some other hospitals.

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**TABLE 47: HOSPITAL COST PER ADMISSION TRENDS, MEDICLINIC HOSPITALS 2010-14  
(NARROW DISEASE BURDEN)**

Claims Increases	2011	2012	2013	2014	Average
Total Increase	7.13%	9.94%	11.81%	11.61%	10.12%
<u>CPI</u>	<u>5.00%</u>	<u>5.60%</u>	<u>5.70%</u>	<u>6.10%</u>	<u>5.60%</u>
<u>All Explanatory Factors</u>	<u>-0.58%</u>	<u>4.68%</u>	<u>5.02%</u>	<u>4.03%</u>	<u>3.29%</u>
Age	0.58%	2.42%	1.39%	1.41%	1.45%
Gender	0.00%	0.00%	0.00%	0.00%	0.00%
Disease Profile	-0.13%	0.27%	-0.17%	-0.25%	-0.07%
Case Mix	-0.74%	1.61%	2.95%	2.14%	1.49%
PMBs	-0.29%	0.38%	0.85%	0.73%	0.42%
<u>Unexplained Factors</u>	<u>2.71%</u>	<u>-0.33%</u>	<u>1.09%</u>	<u>1.47%</u>	<u>1.24%</u>

**TABLE 48: HOSPITAL COST PER ADMISSION TRENDS, MEDICLINIC HOSPITALS 2010-14 (BROAD DISEASE BURDEN)**

Claims Increases	2011	2012	2013	2014	Average
Total Increase	7.13%	9.94%	11.81%	11.61%	10.12%
<u>CPI</u>	<u>5.00%</u>	<u>5.60%</u>	<u>5.70%</u>	<u>6.10%</u>	<u>5.60%</u>
<u>All Explanatory Factors</u>	<u>-0.45%</u>	<u>4.60%</u>	<u>5.06%</u>	<u>4.19%</u>	<u>3.35%</u>
Age	0.59%	2.43%	1.40%	1.40%	1.46%
Gender	-0.02%	-0.01%	0.00%	0.01%	-0.01%
Disease Profile	0.28%	-0.05%	-0.16%	-0.05%	0.01%
Case Mix	-1.00%	1.84%	2.99%	2.10%	1.48%
PMBs	-0.32%	0.39%	0.83%	0.72%	0.41%
<u>Unexplained Factors</u>	<u>2.59%</u>	<u>-0.26%</u>	<u>1.06%</u>	<u>1.31%</u>	<u>1.17%</u>

54. Table 47 and Table 48 show that the unadjusted hospital cost per admission in respect of admissions to MediClinic hospitals has increased by 10.12% a year, well above the overall figure of 8.19%. In both disease burden models, this increase has been driven primarily by changes in the explanatory factors in respect of these admissions, with age and admission type prominent. The unexplained component is marginally lower than the overall figure.



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**TABLE 49: HOSPITAL COST PER ADMISSION TRENDS, LIFE HEALTHCARE HOSPITALS 2010-14  
(NARROW DISEASE BURDEN)**

Claims Increases	2011	2012	2013	2014	Average
Total Increase	6.59%	7.46%	9.03%	7.81%	7.72%
<u>CPI</u>	<u>5.00%</u>	<u>5.60%</u>	<u>5.70%</u>	<u>6.10%</u>	<u>5.60%</u>
<u>All Explanatory Factors</u>	<u>0.53%</u>	<u>0.05%</u>	<u>2.65%</u>	<u>1.31%</u>	<u>1.14%</u>
Age	0.59%	1.37%	1.60%	0.76%	1.08%
Gender	0.00%	0.00%	0.00%	0.00%	0.00%
Disease Profile	-0.14%	0.05%	-0.08%	-0.04%	-0.05%
Case Mix	0.25%	-1.17%	0.38%	-0.29%	-0.21%
PMBs	-0.18%	-0.20%	0.76%	0.88%	0.31%
<u>Unexplained Factors</u>	<u>1.06%</u>	<u>1.80%</u>	<u>0.68%</u>	<u>0.40%</u>	<u>0.98%</u>

**TABLE 50: HOSPITAL COST PER ADMISSION TRENDS, LIFE HEALTHCARE HOSPITALS 2010-14 (BROAD DISEASE BURDEN)**

Claims Increases	2011	2012	2013	2014	Average
Total Increase	6.59%	7.46%	9.03%	7.81%	7.72%
<u>CPI</u>	<u>5.00%</u>	<u>5.60%</u>	<u>5.70%</u>	<u>6.10%</u>	<u>5.60%</u>
<u>All Explanatory Factors</u>	<u>0.63%</u>	<u>-0.01%</u>	<u>2.63%</u>	<u>1.21%</u>	<u>1.12%</u>
Age	0.61%	1.41%	1.64%	0.82%	1.12%
Gender	-0.02%	-0.03%	-0.04%	-0.06%	-0.04%
Disease Profile	0.24%	-0.05%	-0.14%	-0.21%	-0.04%
Case Mix	0.02%	-1.15%	0.43%	-0.21%	-0.23%
PMBs	-0.22%	-0.18%	0.75%	0.87%	0.30%
<u>Unexplained Factors</u>	<u>0.96%</u>	<u>1.86%</u>	<u>0.70%</u>	<u>0.50%</u>	<u>1.01%</u>

55. Table 49 and Table 50 show that the unadjusted hospital cost per admission in respect of admissions to Life Healthcare hospitals has increased by 7.72% a year, marginally below the overall figure of 8.19%. Both the explained and unexplained components of the increase are below the overall figures, suggesting a similar trend to the one recorded for Netcare hospitals.

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**TABLE 51: HOSPITAL COST PER ADMISSION TRENDS, NHN HOSPITALS 2010-14 (NARROW DISEASE BURDEN)**

Claims Increases	2011	2012	2013	2014	Average
Total Increase	10.59%	7.46%	4.94%	8.73%	7.93%
<u>CPI</u>	<u>5.00%</u>	<u>5.60%</u>	<u>5.70%</u>	<u>6.10%</u>	<u>5.60%</u>
<u>All Explanatory Factors</u>	<u>-0.94%</u>	<u>-0.85%</u>	<u>1.76%</u>	<u>-0.14%</u>	<u>-0.04%</u>
Age	0.31%	1.76%	1.58%	0.77%	1.11%
Gender	0.00%	0.00%	0.00%	0.00%	0.00%
Disease Profile	-0.19%	0.47%	0.02%	-0.28%	0.01%
Case Mix	0.67%	-0.63%	-0.20%	-0.01%	-0.04%
PMBs	-1.74%	-2.45%	0.36%	-0.62%	-1.11%
<u>Unexplained Factors</u>	<u>6.52%</u>	<u>2.71%</u>	<u>-2.52%</u>	<u>2.77%</u>	<u>2.37%</u>

**TABLE 52: HOSPITAL COST PER ADMISSION TRENDS, NHN HOSPITALS 2010-14 (BROAD DISEASE BURDEN)**

Claims Increases	2011	2012	2013	2014	Average
Total Increase	10.59%	7.46%	4.94%	8.73%	7.93%
<u>CPI</u>	<u>5.00%</u>	<u>5.60%</u>	<u>5.70%</u>	<u>6.10%</u>	<u>5.60%</u>
<u>All Explanatory Factors</u>	<u>-0.82%</u>	<u>-1.19%</u>	<u>1.71%</u>	<u>-0.10%</u>	<u>-0.10%</u>
Age	0.34%	1.74%	1.65%	0.78%	1.13%
Gender	-0.03%	0.02%	-0.07%	-0.01%	-0.02%
Disease Profile	0.46%	-0.22%	-0.32%	-0.01%	-0.02%
Case Mix	0.20%	-0.32%	0.08%	-0.23%	-0.07%
PMBs	-1.79%	-2.41%	0.37%	-0.62%	-1.11%
<u>Unexplained Factors</u>	<u>6.40%</u>	<u>3.05%</u>	<u>-2.47%</u>	<u>2.73%</u>	<u>2.43%</u>

56. Table 51 and Table 52 show that the unadjusted hospital cost per admission in respect of admissions to NHN hospitals has increased by 7.93% a year, again marginally below the overall figure of 8.19%. The explained component of the increase is marginally negative unlike the overall figure, while the unexplained portion is substantially higher. This suggests an unexplained factor may be present in the NHN experience which is not necessarily present to such an extent in the three large groups.

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**TABLE 53: HOSPITAL COST PER ADMISSION TRENDS, OTHER HOSPITALS 2010-14 (NARROW DISEASE BURDEN)**

Claims Increases	2011	2012	2013	2014	Average
Total Increase	11.54%	7.83%	6.06%	10.05%	8.87%
<u>CPI</u>	<u>5.00%</u>	<u>5.60%</u>	<u>5.70%</u>	<u>6.10%</u>	<u>5.60%</u>
<u>All Explanatory Factors</u>	<u>0.37%</u>	<u>-2.17%</u>	<u>1.37%</u>	<u>2.64%</u>	<u>0.55%</u>
Age	1.02%	2.44%	1.66%	1.45%	1.64%
Gender	0.00%	0.00%	0.00%	0.00%	0.00%
Disease Profile	-0.17%	0.26%	-0.12%	-0.13%	-0.04%
Case Mix	0.48%	-2.71%	-0.40%	0.64%	-0.50%
PMBs	-0.96%	-2.15%	0.24%	0.67%	-0.55%
<u>Unexplained Factors</u>	<u>6.18%</u>	<u>4.40%</u>	<u>-1.01%</u>	<u>1.31%</u>	<u>2.72%</u>

**TABLE 54: HOSPITAL COST PER ADMISSION TRENDS, OTHER HOSPITALS 2010-14 (BROAD DISEASE BURDEN)**

Claims Increases	2011	2012	2013	2014	Average
Total Increase	11.54%	7.83%	6.06%	10.05%	8.87%
<u>CPI</u>	<u>5.00%</u>	<u>5.60%</u>	<u>5.70%</u>	<u>6.10%</u>	<u>5.60%</u>
<u>All Explanatory Factors</u>	<u>0.35%</u>	<u>-2.49%</u>	<u>1.12%</u>	<u>2.61%</u>	<u>0.39%</u>
Age	1.04%	2.46%	1.68%	1.49%	1.67%
Gender	-0.02%	-0.02%	-0.02%	-0.04%	-0.02%
Disease Profile	0.09%	-0.34%	-0.38%	-0.19%	-0.21%
Case Mix	0.21%	-2.49%	-0.39%	0.66%	-0.50%
PMBs	-0.96%	-2.11%	0.23%	0.69%	-0.54%
<u>Unexplained Factors</u>	<u>6.20%</u>	<u>4.72%</u>	<u>-0.75%</u>	<u>1.34%</u>	<u>2.88%</u>

57. Table 53 and Table 54 show that the unadjusted hospital cost per admission in respect of admissions to other independent hospitals has increased by 8.87% a year, above the overall figure of 8.19%. The explained component of the increase is lower than the overall figure, while the unexplained portion is substantially higher. This suggests a similar trend to the NHN hospital trend is present in the other independent hospitals' experience, which is not seen in the three larger groups.

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58. Table 55 and Table 56, summarise the overall results by hospital group.

**TABLE 55: HOSPITAL COST PER ADMISSION INCREASES BY HOSPITAL GROUP, 2010-14  
(NARROW DISEASE BURDEN)**

Claims Increases	Netcare	MediClinic	Life	NHN	Other
Total Increase	7.32%	10.12%	7.72%	7.93%	8.87%
<u>CPI</u>	<u>5.60%</u>	<u>5.60%</u>	<u>5.60%</u>	<u>5.60%</u>	<u>5.60%</u>
<u>All Explanatory Factors</u>	<u>0.80%</u>	<u>3.29%</u>	<u>1.14%</u>	<u>-0.04%</u>	<u>0.55%</u>
Age	0.96%	1.45%	1.08%	1.11%	1.64%
Gender	0.00%	0.00%	0.00%	0.00%	0.00%
Disease Profile	-0.08%	-0.07%	-0.05%	0.01%	-0.04%
Case Mix	-0.50%	1.49%	-0.21%	-0.04%	-0.50%
PMBs	0.43%	0.42%	0.31%	-1.11%	-0.55%
<u>Unexplained Factors</u>	<u>0.92%</u>	<u>1.24%</u>	<u>0.98%</u>	<u>2.37%</u>	<u>2.72%</u>

**TABLE 56: HOSPITAL COST PER ADMISSION INCREASES BY HOSPITAL GROUP, 2010-14 (BROAD DISEASE BURDEN)**

Claims Increases	Netcare	MediClinic	Life	NHN	Other
Total Increase	7.32%	10.12%	7.72%	7.93%	8.87%
<u>CPI</u>	<u>5.60%</u>	<u>5.60%</u>	<u>5.60%</u>	<u>5.60%</u>	<u>5.60%</u>
<u>All Explanatory Factors</u>	<u>0.82%</u>	<u>3.35%</u>	<u>1.12%</u>	<u>-0.10%</u>	<u>0.39%</u>
Age	0.98%	1.46%	1.12%	1.13%	1.67%
Gender	-0.02%	-0.01%	-0.04%	-0.02%	-0.02%
Disease Profile	-0.03%	0.01%	-0.04%	-0.02%	-0.21%
Case Mix	-0.52%	1.48%	-0.23%	-0.07%	-0.50%
PMBs	0.41%	0.41%	0.30%	-1.11%	-0.54%
<u>Unexplained Factors</u>	<u>0.90%</u>	<u>1.17%</u>	<u>1.01%</u>	<u>2.43%</u>	<u>2.88%</u>

### **Direct Hospital Group Comparisons**

59. Although the trend analyses outlined above provide information in respect of movements between the analysis years, they do not provide a direct cost comparison between admissions to the various hospital groups on a case-mix adjusted basis. In order to facilitate some comparative analyses, the cost per admission model has been rerun including the hospital groups as predictor variables in addition to the variables listed above. Analysis of these parameters should allow for a case-mix adjusted comparison of the groups.
60. In order to add hospital groups as a predictor variable, one of the groups had to be set as the 'base' category so that all other groups could be compared to it. Because it had



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the most admissions and would provide the most reliable comparisons, Netcare was chosen as the base category. Thus all figures for the other groups are presented compared to Netcare. The applicable parameters were tested for statistical significance using the Chi-Squared test applicable to GL modelling, and converted into 'Implied Additional Cost' percentages using an exponential transformation corresponding to the log link function used in the CPA model.

61. Table 57 and Table 58 below show the implied additional cost for each hospital group relative to Netcare (the figures for Netcare are shown as zero since it is used as the base category. The table calculates figures for all costs, not only hospital costs. The hospital cost only figures are presented later in the section.

**TABLE 57: HOSPITAL GROUPS' COST PER ADMISSION COMPARISON, ALL COSTS 2010-2014 (NARROW DISEASE BURDEN)**

Implied Additional Cost per Admission (All Costs)					
Group	2010	2011	2012	2013	2014
Netcare	0.00%	0.00%	0.00%	0.00%	0.00%
Life Healthcare	-2.93%	-3.18%	-2.72%	-1.95%	-1.07%
MediClinic	-3.43%	-4.59%	-4.32%	-2.34%	-0.08%
NHN	4.17%	7.68%	7.32%	4.11%	4.52%
Other	-4.63%	-1.52%	1.23%	-0.71%	0.80%
State	-31.84%	-25.48%	-26.54%	-33.94%	-34.01%

**TABLE 58: HOSPITAL GROUPS COST PER ADMISSION COMPARISON, ALL COSTS 2010-2014 (BROAD DISEASE BURDEN)**

Group	Implied Additional Cost per Admission (All Costs)				
	2010	2011	2012	2013	2014
Netcare	0.00%	0.00%	0.00%	0.00%	0.00%
Life Healthcare	-3.41%	-3.51%	-3.07%	-2.33%	-1.37%
MediClinic	-3.61%	-4.77%	-4.44%	-2.49%	-0.22%
NHN	3.44%	6.87%	6.74%	3.67%	4.10%
Other	-5.61%	-2.27%	0.39%	-1.26%	0.30%
State	-32.27%	-25.72%	-27.14%	-34.22%	-34.11%

62. Table 57 and Table 58 show that, relative to Netcare, admissions to Life Healthcare, MediClinic and Other hospitals are between 1% and 5% less costly, with the exception of MediClinic hospitals in 2014 where the difference was not statistically significant and amounted to only 0.08%. Admissions to NHN hospitals have remained between 4% and 8% more costly than those to Netcare hospitals, whilst those to State hospitals are substantially cheaper, albeit in a small sample. We expect these figures to differ from those in Table 23, as adjustment was made for complexity of cases.
63. Table 59 and Table 60 show the same figures for hospital costs only. The table shows that, in 2014, admissions to all hospital groups barring the State were more costly than those to Netcare hospitals, adjusting for the explanatory factors outlined above and considering only hospital costs. This gap was much smaller, and in some cases negative, in the earlier years, demonstrating the effect of higher unexplained increases for the other groups relative to Netcare.

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**TABLE 59: HOSPITAL GROUPS COST PER ADMISSION COMPARISON, HOSPITAL COSTS 2010-2014 (NARROW DISEASE BURDEN)**

Implied Additional Cost per Admission (All Costs)					
Group	2010	2011	2012	2013	2014
Netcare	0.00%	0.00%	0.00%	0.00%	0.00%
Life Healthcare	1.88%	2.06%	1.93%	2.86%	4.50%
MediClinic	2.15%	0.63%	0.03%	2.96%	5.63%
NHN	13.71%	18.18%	14.90%	10.10%	9.54%
Other	2.22%	6.27%	7.59%	3.33%	4.74%
State	-22.99%	-10.23%	-9.88%	-21.22%	-16.00%

**TABLE 60: HOSPITAL GROUPS COST PER ADMISSION COMPARISON, HOSPITAL COSTS 2010-2014 (BROAD DISEASE BURDEN)**

Implied Additional Cost per Admission (All Costs)					
Group	2010	2011	2012	2013	2014
Netcare	0.00%	0.00%	0.00%	0.00%	0.00%
Life Healthcare	1.27%	-3.51%	1.51%	-2.33%	4.14%
MediClinic	1.93%	-4.77%	-0.09%	-2.49%	5.43%
NHN	12.73%	6.87%	14.28%	3.67%	9.13%
Other	0.91%	-2.27%	6.52%	-1.26%	4.14%
State	-23.61%	-25.72%	-10.72%	-34.22%	-16.22%

**Additional Analysis – MediClinic Case Mix**

64. As part of the analyses in 4.1.2 and 4.1.3, it was discovered that MediClinic has over time appeared to handle more complex cases compared to prior years, whereas the other hospital groups, notably Netcare and Life Healthcare, have not seen as much growth in the complexity of cases as measured by the various explanatory factors. This section attempts to understand the source of this increase within the MediClinic hospitals as compared to the other groups.
65. In 4.1.2 and 4.1.3, it was shown that MediClinic had significant increases in both age and ‘case mix’ over the period analysed. The age effect was also present in the other hospital groups, albeit to a lesser extent (with the exception of the ‘Other’ independent hospitals which had a larger age effect). However, the ‘case mix’ or admission type effect was only evident for MediClinic.
66. Table 61 shows the average patient age for patients admitted to each of the hospital groups over time.

**TABLE 61: TRENDS IN ADMITTED PATIENT AGE BY HOSPITAL GROUP, 2010-2014**

Average Patient Age	2010	2011	2012	2013	2014	Trend
Life Healthcare	37.48	37.73	38.37	39.26	39.58	2.10
MediClinic	35.79	35.97	37.16	37.83	38.45	2.66
Netcare	36.58	36.85	37.23	37.85	38.48	1.90
NHN	37.02	37.12	37.97	38.77	39.18	2.16
Other	34.52	35.10	36.12	36.91	37.57	3.05

67. Table 61 shows that the ‘Other’ independent hospitals showed the highest increases in age over the period, followed by the MediClinic hospitals. This is likely the reason for MediClinic’s high age age factor when compared to the other groups.
68. The ‘Admission Type’ grouping used to build the attribution analyses is based initially on the treating medical practitioner, and then on the diagnosis and/or procedure performed. To the extent the mix of either medical practitioners or diagnoses/procedures changes within any hospital group, this will be reflected in a ‘case mix’ effect in the attribution

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tables. Table 62 below show the trends in admissions by medical practitioner discipline for MediClinic hospitals.

**TABLE 62: TRENDS IN PROPORTION OF ADMISSIONS BY PRACTITIONER DISCIPLINE, MEDICLINIC HOSPITALS 2010-2014**

MediClinic Admissions by Discipline	% 2010	% 2014	Trend
General Practitioner	34.29%	27.96%	-6.33%
Otorhinolaryngologist	3.91%	3.57%	-0.34%
Other	0.40%	0.18%	-0.22%
Gynaecologist	11.39%	11.18%	-0.21%
Gastroenterologist	1.05%	0.85%	-0.20%
Psychiatrist	1.20%	1.02%	-0.18%
Cardiologist	0.98%	0.81%	-0.17%
Ophthalmologist	1.92%	1.86%	-0.06%
Oncologist	0.13%	0.09%	-0.04%
Pulmonologist	0.23%	0.22%	-0.02%
Rheumatologist	0.08%	0.07%	-0.01%
Dermatologist	0.05%	0.04%	-0.01%
Thoracic Surgeon	0.42%	0.45%	0.03%
Neurosurgeon	1.38%	1.46%	0.07%
Radiation Oncologist	0.66%	0.75%	0.09%
Plastic Surgeon	0.82%	0.93%	0.11%
Neurologist	0.75%	1.12%	0.37%
Urologist	3.73%	4.29%	0.56%

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MediClinic Admissions by Discipline	% 2010	% 2014	Trend
Paediatrician	7.20%	7.83%	0.63%
Orthopaedic Surgeon	8.52%	9.22%	0.71%
Surgeon	11.03%	12.46%	1.43%
Physician	9.85%	13.64%	3.79%

69. Table 62 shows that, for admissions to MediClinic hospitals, admissions by general practitioners have declined over the period analysed (by 6.33%), and that the proportion of admissions by specialist physicians and general surgeons have increased (by 3.79% and 1.43% respectively). The trends for the other two large corporate hospital groups are shown in Table 63 below, which shows markedly different trends with increased proportions of admissions made by general practitioners and no increases for general surgeons.

**TABLE 63: TRENDS IN PROPORTION OF ADMISSIONS BY MEDICAL PRACTITIONER DISCIPLINE, NETCARE AND LIFE HEALTHCARE HOSPITALS, 2010-2014**

Netcare + Life Admissions by Discipline	% 2010	% 2014	Trend
Gynaecologist	10.23%	9.23%	-1.00%
Otorhinolaryngologist	3.78%	3.30%	-0.49%
Surgeon	11.56%	11.11%	-0.44%
Paediatrician	6.40%	5.98%	-0.43%
Cardiologist	2.09%	1.72%	-0.37%
Gastroenterologist	0.95%	0.61%	-0.34%
Pulmonologist	0.39%	0.28%	-0.10%
Neurosurgeon	1.89%	1.80%	-0.09%

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Netcare + Life Admissions by Discipline	% 2010	% 2014	Trend
Ophthalmologist	2.06%	2.01%	-0.05%
Thoracic Surgeon	0.65%	0.61%	-0.04%
Orthopaedic Surgeon	8.47%	8.44%	-0.03%
Radiation Oncologist	0.89%	0.86%	-0.03%
Rheumatologist	0.13%	0.12%	-0.01%
Oncologist	0.14%	0.13%	-0.01%
Dermatologist	0.07%	0.07%	-0.01%
Psychiatrist	1.51%	1.55%	0.04%
Plastic Surgeon	0.92%	0.99%	0.07%
Other	0.08%	0.20%	0.13%
Neurologist	1.01%	1.23%	0.21%
Urologist	3.93%	4.26%	0.32%
General Practitioner	32.23%	33.34%	1.11%
Physician	10.62%	12.15%	1.53%

70. To assess the impacts of this shift in practitioner profiles, the average cost per admission for 2014 (predicted and actual) has been calculated and is shown in Table 64.

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**TABLE 64: AVERAGE COST PER ADMISSION (ACTUAL AND PREDICTED) BY MEDICAL PRACTITIONER DISCIPLINE, 2014**

Cost per Admission 2014 (Rands)	Predicted	Actual
General Practitioner	5 784	6 026
Otorhinolaryngologist	20 012	19 322
Other	92 723	84 390
Gynaecologist	28 392	27 514
Gastroenterologist	18 305	17 999
Psychiatrist	40 063	38 824
Cardiologist	61 643	60 096
Ophthalmologist	24 601	23 388
Oncologist	49 300	46 365
Pulmonologist	67 219	67 243
Rheumatologist	16 812	16 141
Dermatologist	16 792	16 304
Thoracic Surgeon	230 988	222 843
Neurosurgeon	84 615	82 560
Radiation Oncologist	50 793	48 822
Plastic Surgeon	43 968	40 786
Neurologist	39 301	38 743
Urologist	26 396	25 127
Paediatrician	31 375	31 141
Orthopaedic Surgeon	51 374	50 918



Cost per Admission 2014 (Rands)	Predicted	Actual
Surgeon	37 081	36 720
Physician	48 589	48 257

71. Table 64 shows that the average general practitioner admission costs around R6 000 (noting that general practitioner admissions here include emergency room events), whereas admissions by specialists are significantly more costly. Admissions by specialist physicians cost around R48 000 on average, while admissions by general surgeons cost around R37 000 on average.
72. This, combined with the trends in admitting practitioners shown previously, appears to suggest that the MediClinic ‘case mix’ effect recorded in the attribution analyses is as a result of changes in the profile of practitioners admitting patients to these hospitals, most notably a reduction in the proportion of admissions made by general practitioners. This will be recorded in the model as increasing ‘case mix’ since admissions by specialists are expected to be more costly.

### Alternative Reimbursement Models (Fixed Fees)

73. The majority of the claims processed by medical schemes are so called ‘fee for service’ claims i.e. each individual service a provider renders to a patient is reflected as a different line on the account, and paid separately. Some schemes have, however, begun to move away from the fee for service model in order to manage total cost, by so doing attempting to gain efficiencies in managing the total cost of a healthcare event.
74. These type of arrangements are collectively referred to as alternative reimbursement models (ARMs), and are usually in the form of ‘fixed fees’ where a healthcare service provider levies one single fee which covers a defined bundle of services for a given patient for a given period, e.g. *per diem* rates. In the current industry, the vast majority of these arrangements are with hospitals as opposed to specialists or other service providers. The objective of this section is to analyse the prevalence and cost trends with respect to these types of arrangements in the hospital sector.
75. As outlined in previous sections, some of the medical scheme administrators have provided the HMI with the tariff codes used in the most common ARM arrangements,

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and these were used to identify admissions where ARMs were applied. We note that only ARM arrangements which are identifiable from the data through a specific tariff codes are included here – and specifically, any capitation arrangements where a premium is exchanged for the payment of claims that meet a defined set of criteria, as well as any arrangements where claims are paid as fee for service claims and rebalanced to the agreed fixed fees at the end of a financial cycle, will by definition be excluded.

76. For the purposes of this analysis, any admission where one or more of the identified ARM codes were found was labelled as an ARM admission. Table 65 shows the number of ARM and non-ARM admissions and how this has changed over time.

**TABLE 65: ADMISSION TRENDS BY ARM STATUS, 2010-14**

Year	No. of Admissions			Trend (% Change)		
	ARM	Non-ARM	% ARM	ARM	Non-ARM	% ARM
2010	85 668	1 854 758	4.62%			
2011	87 478	1 982 988	4.41%	2.11%	6.91%	-0.21%
2012	90 899	2 207 736	4.12%	3.91%	11.33%	-0.29%
2013	97 382	2 337 979	4.17%	7.13%	5.90%	0.05%
2014	111 065	2 365 256	4.70%	14.05%	1.17%	0.53%

77. Table 65 shows that ARM admissions comprise between 4% and 5% of all admissions, and that this proportion has not materially increased over the period. This is a small proportion of total admissions from which to attempt to draw conclusions, and all of the subsequent analyses in this section should be interpreted in that light.
78. Table 66 shows the proportionate contribution of the cost of services billed for using ARMs relative to the total average cost per admission where ARMs were used.

**TABLE 66: COST PER ADMISSION TRENDS BY ARM STATUS, 2010-14**

Year	Cost per ARM Admission (Rands)			Trend (% Change)		
	ARM	Total	% ARM	ARM	Total	% ARM
2010	7 705	28 076	27.44%			
2011	8 183	30 310	27.00%	6.21%	7.96%	-0.45%
2012	9 994	34 782	28.73%	22.12%	14.75%	1.73%
2013	10 651	36 991	28.79%	6.58%	6.35%	0.06%
2014	12 066	39 801	30.32%	13.28%	7.60%	1.52%

79. Table 66 shows that the ARM codes constitute on average just under 30% of the total cost of the admission. This suggests that, as outlined above, the fixed fee only includes a portion of the total services provided, and the remainder are still subject to fee for service reimbursement. We would expect this given that most ARMs only apply in respect of hospital claims, and very few so called ‘global fee’ arrangements where hospital and specialist claims are bundled together exist. In addition, some services are intentionally ‘carved out’ of the fixed fee arrangements for various reasons agreed between schemes and service providers.
80. We note that as new procedures become subject to ARM arrangements we would expect step changes in the average cost per admission, and some are evident in the data.
81. A number of hospital groups discuss ARM arrangements in their submissions, and outline some of the experiences they have had with such arrangements. In order to assist the HMI
82. in assessing some of these submissions, the next two tables outline some statistics around ARMs by hospital group. Table 67 below shows the percentage of admissions to hospitals within each group which have been labelled as ARM admissions (as outlined above).

**TABLE 67: % OF ADMISSIONS LABELLED AS ARM BY HOSPITAL GROUP, 2010-14**

Year	Netcare	MediClinic	Life	NHN	Other	State
2010	4.37%	7.14%	5.90%	0.67%	0.22%	0.10%
2011	3.94%	6.02%	6.96%	0.59%	0.21%	0.12%
2012	3.56%	5.80%	6.67%	0.38%	0.22%	0.05%
2013	3.71%	5.96%	6.25%	0.88%	0.21%	0.05%
2014	3.60%	7.12%	6.23%	2.57%	0.23%	0.06%

83. Table 67 shows that ARM arrangements are most common in MediClinic and in Life Healthcare, and less commonly used in the other groups. The NHN and other independent hospitals show very low rates of ARM admissions, although there appears to have been an uptick in utilisation by NHN in 2014. Netcare falls somewhere in the middle, with some ARM admissions but not as high a rate as the other two large groups.
84. Table 68 shows, for ARM admissions in each group, the percentage of total in-hospital cost which is covered by the ARM i.e. what proportion of total claims were paid under the ARM codes. It shows that the ARMs used by Netcare and MediClinic, as well as the other independent hospitals, cover just under 50% of total claims for the admissions they form part of. Life Healthcare ARMs appear to cover a smaller proportion of claims, which implies a more limited range of services are included in the fixed fee, while the NHN trend is variable, suggesting new arrangements may have been introduced during the period.

**TABLE 68: ARM CLAIMS AS A PROPORTION OF TOTAL ARM ADMISSION COST, 2010-14**

Year	Netcare	MediClinic	Life	NHN	Other	State
2010	46.14%	44.08%	11.48%	15.29%	43.29%	6.53%
2011	45.74%	45.27%	13.33%	16.43%	47.35%	5.73%
2012	43.60%	44.87%	19.09%	13.69%	40.84%	9.46%
2013	43.97%	43.06%	17.72%	39.14%	40.73%	5.32%
2014	42.49%	45.69%	17.05%	45.28%	43.50%	3.44%

85. Table 69 shows the numbers of admissions for the admission types (as defined in **The Cost Attribution Report**) for which ARMs are most commonly applied.

**TABLE 69: MOST COMMON ARM ADMISSION TYPES, 2010-14**

Admission Type	ARM	Non-ARM	% ARM
Gastroenterologist - Non-Malignant Neoplasms	2 166	1 964	52.45%
Gastroenterologist - Other GI	4 642	8 169	36.23%
Gastroenterologist - Stomach and Intestinal	2 221	5 491	28.80%
Gastroenterologist - Upper GI	4 434	12 209	26.64%
Otorhinolaryngologist - Tonsillectomy	26 917	119 418	18.39%
Otorhinolaryngologist - Myringotomy	9 178	61 383	13.01%
Orthopaedic Surgeon - Knee Replacement	5 088	35 238	12.62%
Orthopaedic Surgeon - Spinal Fusion	2 472	17 613	12.31%
Neurosurgeon - Spinal Fusion	3 716	26 576	12.27%
Orthopaedic Surgeon - Hip Replacement	3 983	29 102	12.04%

86. The table shows that a variety of procedures appear to be commonly subject to ARMs, but aside from gastroenterology admissions (endoscopies and colonoscopies mainly) none are paid by ARM more than 20% of the time. The next set of tables compares ARM against non-ARM admissions by admission type for these admissions.

87. Table 70 shows the combined trends in the four gastroenterologist admission types in the table above, and compares ARM admissions to non-ARM admissions over time.

**TABLE 70: GASTROENTEROLOGISTS ARM ADMISSION TRENDS, 2010-14**

Year	% ARM Adm.	ARM		Non-ARM	
		CPA	Trend	CPA	Trend
2010	29.34%	10 391		10 885	
2011	31.65%	11 341	9.15%	11 212	3.01%
2012	32.43%	12 199	7.56%	12 082	7.76%
2013	35.34%	12 894	5.70%	13 043	7.95%
2014	34.37%	13 166	2.11%	14 750	13.09%

88. Table 70 shows that the proportion of gastroenterologist admissions which were subject to an ARM has increased by around 5% over the period. In addition, the unadjusted cost per admission for ARM admissions is lower than for non-ARM, and has mostly increased more slowly over time. Although this could represent evidence of cost efficiencies gained by the ARM arrangement, we note that complex cases are often carved out of ARM arrangements and this could be the reason for the higher cost per admission for non-ARM arrangements. It is also important to note that claims for ARM admissions typically contain less detail, which makes it almost impossible to apply conventional risk adjustment methodologies that would enable comparisons between ARM and non-ARM admissions on a like for like basis.

89. Table 71 shows the combined trends in tonsillectomy admissions, and compares ARM admissions to non-ARM admissions over time.

**TABLE 71: TONSILLECTOMY ARM ADMISSION TRENDS, 2010-14**

Year	% ARM Adm.	ARM		Non-ARM	
		CPA	Trend	CPA	Trend
2010	13.14%	10 300		10 107	
2011	18.67%	10 869	5.52%	10 850	7.35%
2012	17.63%	11 440	5.26%	11 552	6.47%
2013	19.42%	12 191	6.57%	12 110	4.83%
2014	22.38%	12 923	6.00%	13 038	7.66%

90. The table shows that the proportion of tonsillectomy admissions which were subject to an ARM has increased by around 9% over the period. In addition, although the unadjusted cost per admission for ARM admissions is around the same as for non-ARM, it has increased more slowly over time. The lower increases have led to the ARM being less costly in 2014.

**TABLE 72: MYRINGOTOMY ARM ADMISSION TRENDS, 2010-14**

Year	% ARM Adm.	ARM		Non-ARM	
		CPA	Trend	CPA	Trend
2010	12.31%	8 381		7 566	
2011	13.02%	9 360	11.69%	8 113	7.23%
2012	12.39%	9 800	4.70%	8 568	5.61%
2013	12.47%	10 443	6.55%	9 129	6.55%
2014	14.75%	11 020	5.53%	9 806	7.42%

91. Table 72 shows that the proportion of myringotomy admissions which were subject to an ARM has increased by around 2.5% over the period. In this case the unadjusted

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cost per admission for ARM procedures is higher than for non-ARM procedures, and is increasing more rapidly over time. This suggests that the ARM arrangements are potentially not generating the cost efficiencies they were intended to in general terms.

92. Table 73 shows the combined trends in knee replacement admissions, and compares ARM admissions to non-ARM admissions over time.

**TABLE 73: KNEE REPLACEMENTS ARM ADMISSION TRENDS, 2010-14**

Year	% ARM Adm.	ARM		Non-ARM	
		CPA (Rands)	Trend	CPA (Rands)	Trend
2010	11.84%	116 099		113 721	
2011	12.42%	119 782	3.17%	116 362	2.32%
2012	11.61%	136 905	14.30%	122 865	5.59%
2013	11.42%	137 209	0.22%	128 444	4.54%
2014	15.18%	140 790	2.61%	135 406	5.42%

93. Table 73 shows that the proportion of knee replacement admissions which were subject to an ARM has remained static over the period, barring 2014 which shows a step increase. For knee replacements, the unadjusted cost per admission for ARM procedures is marginally higher than that for non-ARM procedures, and is increasing at a similar rate over time.
94. Table 74 shows the combined trends in spinal fusion admissions, and compares ARM admissions to non-ARM admissions over time.



**TABLE 74: SPINAL FUSION ARM ADMISSION TRENDS, 2010-14**

Year	% ARM Adm.	ARM		Non-ARM	
		CPA (Rands)	Trend	CPA (Rands)	Trend
2010	12.45%	112 708		119 459	
2011	12.53%	122 493	8.68%	127 991	7.14%
2012	13.18%	133 505	8.99%	139 400	8.91%
2013	11.86%	140 609	5.32%	144 491	3.65%
2014	11.62%	151 005	7.39%	153 486	6.23%

95. Table 74 shows that the proportion of spinal fusion admissions which were subject to an ARM has declined slightly over the period. The unadjusted cost per admission for ARM procedures is marginally lower than that for non-ARM procedures, and is increasing at a similar rate over time.

96. Table 75 shows the combined trends in hip replacement admissions, and compares ARM admissions to non-ARM admissions over time.

**TABLE 75: HIP REPLACEMENT ARM ADMISSION TRENDS, 2010-14**

Year	% ARM Adm.	ARM		Non-ARM	
		CPA (Rands)	Trend	CPA (Rands)	Trend
2010	11.22%	125 260		120 187	
2011	10.67%	131 452	4.94%	126 531	5.28%
2012	11.15%	141 945	7.98%	136 591	7.95%
2013	11.13%	154 541	8.87%	142 474	4.31%
2014	15.34%	152 827	-1.11%	150 377	5.55%

97. Table 75 shows that the proportion of hip replacement admissions which were subject to an ARM has remained static over the period, barring 2014 which shows a step increase. For hip replacements, the unadjusted cost per admission for ARM procedures is marginally higher than that for non-ARM procedures, and is increasing at a similar rate over time.
98. In addition to the top 10 procedures shown previously, cataract procedures are also commonly subject to ARM arrangements. Table 76 shows the combined trends in lens and cataract procedure admissions, and compares ARM admissions to non-ARM admissions over time.

**TABLE 76: LENS AND CATARACT PROCEDURES ARM ADMISSION TRENDS, 2010-14**

Year	% ARM Adm.	ARM		Non-ARM	
		CPA (Rands)	Trend	CPA (Rands)	Trend
2010	8.01%	19 620		19 155	
2011	11.66%	20 270	3.31%	20 300	5.98%
2012	9.87%	21 555	6.34%	21 302	4.93%
2013	10.75%	22 923	6.34%	22 581	6.01%
2014	16.15%	24 549	7.09%	23 783	5.32%

99. Table 76 shows that the proportion of lens and cataract procedure admissions which were subject to an ARM has been inconsistent over the period, barring 2014 which shows a step increase. For lens and cataract procedures, the unadjusted cost per admission for ARM procedures is marginally higher than that for non-ARM procedures, and is increasing at a similar rate over time.
100. From the specific admission types extracted here, it appears that no evidence of any significant cost efficiencies resulting from the various ARM arrangements identified can be found from the data. The trends across the majority of admission types with material proportions of ARM admissions do not appear materially different for ARM procedures relative to non-ARM procedures.

## **Geographical Analyses**

101. A complete geocoded dataset was not included at the time of preparing this version of this facility report. An updated analysis including geographical factors will be published in future HMI reports.

## **CONCLUSION**

102. Willis Towers Watson (WTW) has been contracted to assist the Competition Commission Health Market Inquiry (HMI) with the storage, warehousing and analysis of the data collected from the various industry stakeholders in respect of the inquiry. This report is intended to outline some trends and details relating to facilities and in-hospital claims. The report shows that:

102.1. In-hospital claims are an increasing component of medical scheme expenditure over the period analysed;

102.2. The medical schemes industry has been subject to increases across all major components (utilisation, length of stay and level of care) of expenditure over time, beyond what can be explained by the demographic and clinical markers used in the analysis;

102.3. The unexplained increase has been attributed to utilisation, length of stay, level of care and other factors;

102.4. Analyses by hospital group suggest increasing expenditure in NHN and other independent hospitals, with slower growth in the three larger corporate groups; and

102.5. The use of ARMs is relatively low, albeit increasing over time, and no significant trends are evident in the group of ARM admissions.