

REPORT TO

**Victorian Department of Human
Services**

**2000-01 Cost weight
study**

Final report
Admitted, non admitted and
rehabilitation

June 2001

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List of abbreviations and acronyms

AS	Allegiance Systems
ALOS	Average length of stay
AR-DRG 4.1	Australian Related Diagnosis Related Groups version 4.1
CMIDS	Casemix Information Delivery Services. This is a patient level costing service offered by Allegiance Systems which is more commonly purchased by smaller hospitals.
CRAFT	Casemix Rehabilitation and Funding Tree
CCS	Clinical Costing Standards
CCSAA	Clinical Costing Standards Association of Australia
VIC-DRG	Diagnosis Related Groups classification
N Hospitals	Number of hospitals within sample
PBS	Pharmaceutical benefits schedule
Quals	Number of data reliability qualifiers
RSEM	Relative Standard Error of the Mean. The formula is: standard deviation divided by the square root of the number of cases, then divided by the average cost. It gives a measure of the robustness of the estimation of mean cost, given the variability around the mean and the number of cases in the sample. Previous reports have set 0.2 as the threshold for identifying DRGs and VACS with adequate samples but high variability and/or moderate variability with a small sample size.
SCG	Service Cost Group. Clinical Costing Standard 2 (Clinical Costing Standards Association of Australia) defines how service costs eg ward nursing, pathology services etc should be grouped into associated major service units or 'SCGs'.
StdDev	Standard Deviation. This provides a measure of the variability of the cost data, relative to the mean.
VACS	Victorian Ambulatory Classification Scheme

VAED Victorian Admitted Episodes Dataset

VACCDI Victorian Ambulatory Classification Casemix Data Investigation

VIC-DRG 4.1... Victorian Diagnosis Related Groups version 4.1 based on AR-DRG 4.1

1 Introduction

This report documents the eighth Victorian Cost Weights Study, commissioned by the Department of Human Services (the Department). The general aim of the study was to provide estimated costs for acute admitted episodes, designated rehabilitation admitted episodes and ambulatory encounters for patients attending Victorian public hospitals in 1999/00. The study findings are to be used by the Department in developing product cost weights for use in the hospital funding model for the year 2001/2002.

Twenty one public hospitals participated in this year's study, including four regional hospitals, two of which had not contributed data in prior years. The total number of records included in the final analysis amount to 526,680 acute admitted patient episodes, 936,086 ambulatory encounters and 2,146 rehabilitation episodes.

1.2 Study approach

The project commenced in January 2001 and was conducted in three phases:

1. Status of hospital systems: including hospital site visits, costing standards surveys and systems status survey to identify relevant changes that occurred since the previous study. Costing methods of hospitals were assessed via a survey with reference to Clinical Costing Standards recommended by the Clinical Costing Standards Association of Australia (CCSAA).
- 2 Preliminary analysis: including data extraction, data integrity testing in consultation with hospitals, preliminary analysis and clinical review. Some 20 clinicians across various specialities were invited to participate in the review of data for two key areas: Vic-DRGs 4.1 (the classification used for acute admitted patient episodes) where there has been a significant change in average cost or LOS since the prior year study, and the average cost of prostheses for selected Vic-DRGs 4.1. The findings of the clinical review are discussed in the body of the report.
- 3 The final phase involved some detailed analysis of the data and production of estimated costs. Estimated average costs of Vic-DRGs are reported in Appendix A, while average costs for ambulatory encounters (using the VACS classification) and for rehabilitation episodes (using the CRAFT classification) are provided in Chapters 4 and 5 of the report.

1.3 Costing and cost weights

This study is concerned only with cost data and the calculation of average costs to inform the development of cost weights. The average costs are used to form the base for the establishment of the annual funding model, although they will not necessarily correspond to the final prices because of the influence of other factors. In this regard, the Department takes into account funding policy (such as setting of new trim points and designating same-day DRGs), reliability of estimated costs for

individual DRGs (where it may chose to use more than one year data to ensure stability in the cost weight), and clinical review (upon which it may decide to set a cost weight to reflect new clinical practices).

Average costs by DRG are provided in Appendix A. The report also contains recommendations where cost weights should be based on other factors such as those examples given above particularly for DRGs where the cost of prosthetic implants represents a significant proportion of the total average cost for that DRG. Discussion of these issues is contained in sections 3.2, 3.3 and 3.4.

Estimated average costs contained in this report are unlikely to reflect 'prices' set for the 2001-02 funding model. While the average costs presented in this report reflect average total costs, some cost elements are excluded from case weight payments such as specified grants. Thus average costs are not directly comparable with 'prices'.

1.4 Participating hospitals

Twenty one hospitals participated in the study of which 19 hospitals contributed acute admitted patient data, 13 contributed ambulatory data and 5 contributed rehabilitation data (of which 2 hospitals contributed only rehabilitation data). Participating hospitals were:

- Alfred Hospital
- Austin and Repatriation Medical Centre
- Bendigo Health Care Group
- Dandenong Hospital
- Geelong Hospital
- Goulburn Valley Hospital
- Mercy Women's Hospital
- Moorabbin Hospital
- Monash Medical Centre
- Peter MacCallum Cancer Institute
- Royal Children's Hospital
- Royal Melbourne Hospital

- Royal Talbot Hospital
- Royal Victorian Eye and Ear Hospital
- Royal Women's Hospital
- St Vincent's Hospital
- Wangaratta Base Hospital
- Werribee Hospital
- Western Hospital – Footscray
- Western Hospital – Sunshine
- Wimmera Hospital (9 months data only)

Chapter 3 provides information on the scope of data provided by hospitals for this study including the number of validated episodes and cost value of those episodes.

Hospitals new to the cost weights study this year are Mercy Women's, Moorabbin, Wangaratta and Wimmera Hospital. Hospitals that participated last year that were not able to participate this year are The Angliss, Mildura and Peninsula Hospital. Box Hill hospital did not participate again this year.

1.5 Highlights and issues

This year's study has several key highlights including:

- More hospitals were able to participate in the study compared to prior years, reflecting further uptake of clinical costing activities for hospitals' own management information requirements. The work of the CCSAA has also been integral to this process. It provides the framework for clinical costing methods within hospitals and provides a mechanism for the ongoing improvement of costing standards.
- Many hospitals have upgraded their information systems to facilitate or improve clinical costing activities. Details of system upgrades are discussed in the Phase One report¹.
- A number of quality checks and data investigations have been undertaken this year. These include extensive review of prosthetic cost distribution data, review

¹ Phase One report refers to a report produced by KPMG on the status of hospital costing systems and costing methodologies that was provided to The Department in April 2001.

of Service Cost Groups (SCGs) average costs and the requirement for hospitals to provide full details in relation to any anomalies identified. In this process, hospitals have been eager to receive feedback about their data, investigating any potential data issues and providing feedback for the study. This has resulted in valuable insight into the overall quality of the data, the sorts of problems experienced by hospitals and issues in problem resolution including limitations.

- A new SCG 'Outreach community' has been incorporated into CCSAA 2. This has yet to be fully reflected in CCSAA 1 and 8.
- CCSAA 9 'Public/Private allocations for clinical costing' recommends that 'when costs are used to develop cost weight relativities for public hospitals, these costs are only applicable to public patients'. The standard states that 'Cost weight studies that include both public and private patients will cause average distortion in cost weights where the public and private mix is significantly different to the average. Eg: different methods for paying medical staff can cause distortions'. We note that the current cost weight study includes both public and private patients. Currently private patients comprise 8% of inlier inpatient total cost and volumes.

One hospital noted that its medical costs for public inpatients were estimated to be approximately 30% understated as the costs of VMO's were allocated across all patients as opposed to public patients only. As recommended last year, regardless of the methods of payment for medical staff, it would be preferable for all hospitals to adopt a similar approach when allocating these costs to patients, ie: they should be spread over public patients only. The exclusion of private patients from the cost weight study will require careful consideration by the Department as it will increase the opportunities for differences in costing allocations between public and private patients to have a significant impact on the derived cost weights.

Issues encountered during the study included:

- Some hospitals were not fully prepared for the costing study due to resourcing and system problems.
- Data anomalies identified during investigation of cost outliers identified problems with costing processes not identified from hospital survey of costing methodologies.
- Data problems identified during the analysis phase could have been identified earlier by hospitals through more extensive quality control mechanisms and processes.

There were delays in receiving data from those hospitals that were not able to finalise their internal processing until some time after the commencement of the study. We recognise that there are important and valid reasons why processing could not be undertaken earlier, for example resource issues at the hospital.

While the analysis of data was completed in accordance with the Department's schedule, the delays resulted in some loss of opportunity for those and other hospitals to receive feedback about their data and improve its overall quality and completeness for inclusion in the study. For example, if problems are encountered during processing there is little time to investigate and correct problems when processing is occurring later than planned. We were able to accommodate re-extraction and retesting of four sets of individual hospital data where errors in the extracts had been identified at an early stage. There were some other feeder system and allocation issues that could not however be corrected.

As recommended last year, the Department could consider offering an incentive to hospitals to provide full year data on time and in accordance with minimum standards. Ideally the data would already be subject to quality checks and review by the hospital so that the data is in a reasonable state prior to the study. We have included a summary in the following chapter of this report.

We relied significantly on information provided by hospitals for our assessment of their compliance with costing standards, of the status of their feeder systems and for our assessment of issues identified during examination of data anomalies. Further verification of these matters would require an independent audit of the costing processes and costing data.

2 Phase one summary of key issues

The project team visited participating hospitals in phase one of the study and undertook a survey of hospitals' compliance with clinical costing standards and identified the status of hospital costing and feeder systems.

2.1 Background

Initial contact was made with hospitals that were involved in the prior year cost weight study and other hospitals where there was potential for their participation for the first time.

Site visits were subsequently undertaken for all but two major participating hospitals (not visited largely due to timing and resource issues at the hospitals) and the four CMIDS sites. Contact was also made with the appropriate person at Allegiance Systems (AS) to review and monitor the progress of four sites where their costing systems are operated by AS on the hospitals' behalf. The hospitals themselves gave permission to AS for their costing data to be extracted and used in the study.

The purpose of the site visit was primarily to meet with hospital study coordinators, introduce the project team, to discuss their participation in the study, to identify what types of data they could supply (acute admitted patient, ambulatory encounters, rehabilitation episodes) and discuss any data issues and/or the costing methodology. Hospitals were asked to complete a 'System Status Report' about the status of their patient costing system and data processing, the findings of which are reported below.

Hospitals were required to complete two surveys the results of which were used to audit hospital compliance with the CCSAA's clinical costing standards (CCS). These 2 surveys covered:

- Assignment of direct and indirect costs (CCS 1);
- Allocation of service cost structure for comparative purposes (CCS 2);
- Exclusion of costs for clinical costing purposes (CCS 7)); and
- Intermediate products and feeder systems (CCS 8).

2.2 Issues

The key findings are outlined below including recommendations where relevant.

2.2.1 Extraction and reconciliation

This year a number of hospitals required re-extraction and auditing of data due to:

- Partial year data only extracted;
- Prior year data extracted;
- Identified problems with systems which required data re-costing; and
- Omission of particular inpatient records which should have been included.

The extraction files were passed to the hospitals by Allegiance for review and confirmation prior to the files being released to the project team. The errors identified slipped through the initial review process but were picked up during the hospitals' review of the audit data. The initial audits verified the number of excluded records, total records extracted and total dollars extracted along with a number of 'query' records. This is performed during the initial stages of the process. It appears that the tight timeframes do not often provide sufficient time for the hospitals to review the data to the depth that they would like to. We note that a couple of the hospitals had signed off the extraction data and audit checks as being correct without picking up the errors. This appears to primarily be due to resource constraints.

Recommendation 1: That consideration be given to the cost weight study being split into two phases to allow greater in-depth verification and checking of the initial extraction data by hospitals. The first phase should be in October and the second in January.

2.2.2 Audit of data quality and checks

The types of reconciliations and checks outlined below should be undertaken by hospitals on a routine basis. This simply confirms the flow of dollars from the ledger into the costing system and that the outputs agree with those reported to the VAED.

In the 'Systems Status' survey hospitals were asked to investigate and verify the following:

- Cases with \$0 total cost;
- Cases with negative \$ total cost;
- Cases with total cost > \$100,000;
- Cases with single day stay but costs < \$50;
- Cases with average per day costs >\$5,000;
- Cases with negative Services Cost Group costs;
- Cases not assigned to DRG; and
- Services Cost Group costs don't sum to the total cost per case.

The responses from each hospital were verified, and it was agreed that the affected cases would be excluded.

Recommendation 2: As per last year, it is recommended that the CCSAA incorporate a set of data quality checks in a standard which hospitals would review periodically instead of (for some) once per year during the cost weights study. This is particularly important if the errors arising are due to major systemic problems and involve a significant proportion of costs. We understand that the CCSAA is in the process of developing an auditing tool kit which should help to facilitate improvements in this area.

2.2.3 Sessional Medical Costs

The issue of sessional medical salary costs arises because of inconsistent treatment of such costs by hospitals. Non salaried medical staff treat public and private patients. However generally hospitals only incur the labour costs when such staff treat public patients.

Recommendation 3: It is recommended that sessional medical salary costs be allocated only to public admitted patients. The issue will require further consideration by DHS in consultation with the CCSAA especially in light of CCS9 which recommends that the cost weights be derived from the costs of public patients only.

2.2.4 S100 Drugs

Section 100 drugs are relevant primarily for VACS funded outpatients. Hospitals may receive funding from the Commonwealth for Section 100 drugs supplied to outpatients. S100 drugs may also be rebatable when prescribed to inpatients on their day of discharge. However, as we reported last year, not all S100 drugs prescribed are rebatable. The conditions for rebates are detailed in S100 of the National Health Act. One hospital has noted that it only receives a rebate for about 20% of S100 drugs provided, the balance being paid for by the hospital. In order to remain consistent with prior years' studies, S100 drugs where identifiable have been excluded from all VACS analysis and included in the admitted patient analysis.

Recommendation 4: It is recommended that the treatment and capture of S100 rebatable drugs be modified to exclude the rebatable portion from both inpatient and VACS encounters and that the non rebatable portion be separately identified and considered in terms of its impact on the costs derived.

2.2.5 Privatisation and co-location of facilities

Hospitals were asked to clarify their treatment of revenues received from privatised or co-located facilities in order to determine the extent to which public sector costs could be overstated.

Recommendation 5: For the purposes of clinical costing, recoveries from privatised or co-located facilities should be treated as a recovery against expenses.

2.2.6 Clinical Costing Standard 1 – Assignment of direct and indirect departmental costs

CCS1 specifies how the general ledger cost centres should be classified, ie as direct or indirect departments. As noted last year, hospitals should provide a complete response to the survey to enable an improved assessment of compliance with CCS 1. CCS1 should reflect a master list of departments which are interchangeable with the SCG's cited in CCS2

Recommendation 6: To increase consistency in costing methods, hospitals should as far as practicable, designate departments as direct and indirect in accordance with CCS1.

2.2.7 Clinical Costing Standard 2- Allocation to service cost groups (SCG)

CCS2 specifies how service costs (eg ward nursing, renal dialysis, ward catering, pathology service costs etc) should be grouped into associated major service units. There are 13 major service cost groups defined in CCS2² although 'Outreach Community' has not been fully implemented across the standards and so was not surveyed this year.

Recommendation 7: CCS 2 survey responses may be improved if the underlying service costs / departments listed in CCS 2 were more consistent with the (direct) departments in CCS 1 ie the term 'departments' (and at a detailed level, cost centres) and 'service costs' should be interchangeable. For example the service costs defined in CCS 2 for each of Theatre 'operating' and 'non operating' groups should be listed as potential departments or cost centres in CCS 1. (In practice, hospitals may not have separate cost centres for all these theatre services). Such consistency would improve survey simplicity and provide potential to combine surveys for CCS 1 and 2, resulting in less time required of hospitals to complete the surveys.

² SCGs are: Allied health, CCU, Emergency, ICU, Imaging, Medical – surgical, Medical – non surgical, Nursing, Pathology, Pharmacy, Theatre – operating procedures, Theatre – non operating procedures.

For the purposes of peer review and benchmarking, hospitals should as far as practicable, identify and roll up the direct departments to SCG's in accordance with CCS2.

2.2.8 CCS 7 – Exclusion of costs for the purposes of clinical costing

CCS7 provides guidelines for those services or units that are excluded from the clinical costing system, that is, are not allocated to acute patients. In addition there are a number of costs which are not incurred by the hospital but which may validly add to the cost of treatment. Consistent treatment of these costs is desirable in order to maintain the comparability of the cost base between hospitals.

Recommendation 8: Hospital insurances, blood and other such costs that are a valid cost of treatment, but paid for by the Department should be treated uniformly by all hospitals. This issue needs to be reviewed and a consistent approach clearly outlined for all hospitals to adhere to.

2.2.9 CCS8 – Hospital rating calculation

The section of the survey relating to CCS8³ utilised the CCS8 spreadsheet that hospitals complete to measure the materiality and quality of intermediate products. (Intermediate products represent 'discrete goods and services provided to a patient'⁴ and are used as a basis for allocating costs to the patient level, eg chest x-ray). This measurement is known as the CCSAA Rating and is calculated according to the feeder systems utilised, intermediate products identified (and rated according to relationship to actual patient level utilisation) and distribution of costs.

This rating is important in considering the overall accuracy of patient level costs attributed by the SCG. CCS 8 builds on the survey results for CCS 2 in that while CCS 2 is concerned with what departmental costs are grouped to particular SCGs, CCS 8 examines how accurately those SCG costs are allocated to the patient level.

Review of these calculations from the eleven hospitals that submitted them indicated that there is clearly scope for further improvement to hospital costing systems. This is particularly so for the areas of medical-surgical, medical-non surgical, nursing and ICU. However it is well known that these are also areas where intermediate product identification and data capture are problematic.

The data obtained during phase one of the project is primarily reliant on the self reporting of details by individual hospitals. We note that one hospital reported significant improvements in their systems and extracts this year. However their overall CCS8 rating decreased between 1998/99 and 1999/00. Further investigation with the hospital revealed that changes in personnel and their interpretation of the

³ Version 1.03. Dated 10/3/99, DRAFT ONLY of Clinical Costing Standards Committee.

⁴ Version 1.03. Dated 10/3/99, DRAFT ONLY of Clinical Costing Standards Committee, page 1.

systems were likely to have been the major causes for the differences in assessment between the two years. The hospital was confident that its products had improved between the two years and also that its assessment and rating for 1999/00 was more accurate than in 1998/99. We also note that another hospital submitted the exact same forms as for 1998/99 citing that they would still remain applicable for 1999/00. This self assessment by hospitals exposes the process to individual bias and interpretation variances. This year there are also indications that time pressures and resource constraints are resulting in the submission of historical data that indicates that hospitals are missing the opportunity to critically review and assess their own systems. The opportunity to 'take stock' and identify particular areas of need within hospital systems is a valued process however more concentrated effort into the overall process needs to occur if this is to happen.

2.2.10 Audit of hospital systems and processes

Our assessment of hospital costing systems, processes and methods are based on feedback from hospitals through the interview and survey processes. As raised last year, we have reservations regarding the veracity of the survey responses to CCS1, CCS2 and CCS8 without an audit of the costing systems. For example, during a spot review of data we found anomalies between SCGs within a particular DRG. Discussions with the hospital revealed that similar cost types had been mapped to different SCG's. The hospitals survey stated that all relevant costs had been mapped to the identified SCG's in accordance with the CCS's. While this does not impact upon the total cost, it does compromise the reliability of the SCG information. Independent verification of the information provided in the surveys, prior to the commencement of the cost weight study would provide opportunities for the hospitals to identify and correct problems prior to data extraction and thus improve the data quality. It would also assist in improving the useability of the SGC bucket data for benchmarking purposes as well as generally improve the credibility of the cost weight funding process overall.

Recommendation 9: It is recommended that a more detailed audit of hospital clinical costing systems be undertaken to provide assurance on the status of such systems, treatment of particular issues and compliance with costing standards.

3 Phase two and three – analysis

Key activities undertaken in phase two of the study relate to data validation: data integrity testing, preliminary analysis and the clinical review of selected product average costs, based on the preliminary analysis.

The findings from phase two have informed the final analysis (phase 3) to the extent that a better understanding of the underlying data has resulted. The Department can use this information in setting the cost weights for use in the 2000/2001 funding model.

These activities span the acute admitted patient, outpatient and rehabilitation service data and are discussed below in the context of each service category.

3.1 Acute Admitted patient data

The final validated admitted patient database comprises a total of 526,680 records. All hospitals provided acute admitted patient data except for the Royal Talbot Hospital and Sunshine campus of the Western Hospital that provided only rehabilitation service data. The relevant hospitals are listed in section 1.3.

Several steps were undertaken to arrive at the final database. These are outlined below.

3.1.1 Data matching between VAED and clinical costing systems

The total matched records forwarded from AS at commencement of the study, comprised a total of 597,853 admitted patient records including the two sites that provided rehabilitation data only.

AS grouped the hospitals' data to AR-DRG and Vic-DRG version 4.1. They subsequently matched the records for each hospital costing database, to those records in the Victorian Admitted Episode Data (VAED) system, using matching key(s) criteria specified by the hospitals. Only matched records were considered for study purposes.

The table below indicates the total number of records and expenditure matched to the VAED.

Table 3-1 Case and case expenditure matching, clinical costing systems and VAED

Hospital	Cost extract (#)	Cost extract (\$)	Cost mismatch (#)	Cost mismatch (\$)	Duplicate cost cases (#)	Duplicate cost cases (\$)	VIMD Mismatch (#)	Matched cases (#)	Matched cost (\$)
Mercy Womans	18,696	41,114,225					2	18,696	41,114,325
MMC	51,593	148,553,464	-	-	138	882,742	3	51,455	147,695,320
RCH	28,876	102,102,376	16	44,128	1	35,026	230	28,859	102,023,223
Royal Talbot	784	7,045,986	1	795	-	-	-	783	7,045,191
RWH	29,970	59,753,936	12	71,702	-	-	16	29,958	59,682,234
RVEEH	11,881	22,206,088	-	-	-	-	1	11,881	22,206,088
Mercy Werribee	18,033	21,859,212	5	-	-	-	-	18,028	21,859,212
The Alfred	47,080	186,549,719	7	-	3	49,520	2	47,070	186,500,199
ARMC	64,745	178,635,662	16	-	9	28,321	1,189	64,720	178,607,341
Dandenong	28,165	62,561,745	7	8,111	186	121,368	1,088	27,972	62,432,267
Western Footscray	33,637	84,861,954	32	114,749	-	-	33	33,605	84,747,205
Moorabbin	24,587	24,768,850	26	26,662	7	7,616	6	24,554	24,734,571
RMH	60,818	153,094,095	140	640,581	4	2,812	51	60,674	152,450,702
Western Sunshine	385	3,622,250	-	-	-	-	-	385	3,622,250
St Vincents	39,510	103,941,244	59	258,362	51	1,002,578	1,980	39,400	102,680,305
Bendigo	21,401	41,775,096	2	2,007	1	2,440	771	21,398	41,770,650
Geelong	42,571	115,773,802	4	6,922	-	-	1,187	42,567	115,766,880
Goulburn Valley	18,784	33,934,434	7	-	-	-	-	18,777	33,934,434
Wangaratta	11,401	24,733,072	16	-	-	-	-	11,385	24,733,072
Wimmera	8,143	12,288,692	447	956,922	-	-	-	7,696	11,331,771
PMCI	12,194	37,408,496	-	-	1	-	-	12,193	37,408,496
	593,254	1,466,608,998	791	2,130,941	401	2,132,423	6,559	572,056	1,462,345,737

Note: 24,599 cost records were initially reported as cost mismatches, but excluded from this table because they resulted by including Moorabbin twice (once individually and once as a part of Monash).

The number of unmatched records was verified with the hospitals to ensure a complete dataset had been received. The majority of VIMD mismatched records for RCH, ARMC, Dandenong, Geelong and Bendigo relate to care types not included in the cost weight study. These are primarily care type 5, though there are some care type 1 records that have also been excluded on request of the hospital.

St Vincent's mismatched records arose from a mix of care type 5 records, lithotripsy records and admissions for cases receiving a replacement pacemaker valve at no cost.

Only 9 months of data was available from Wimmera as the remaining 3 months had not been processed in time. The 447 cost mismatched records arise from Dimboola District Hospital which has a 'piggy-back' processing arrangement with AGS. This data has not been included in the study.

The cost mismatch records for MMC relate to the Moorabbin campus that was extracted both individually and as part of MMC. The study has considered Moorabbin records as a separate campus and the mismatched records reported under MMC have been excluded.

3.1.2 Data integrity testing

The first step in the process of deleting records not valid or not relevant to the admitted patient cost weights involved undertaking a series of data validity checks. Some cases were referred back to hospitals for their investigation and recommendation as to the case validity.

The second step involved the exclusion of care types not relevant to the acute admitted patient analysis. Care types excluded were rehabilitation - care types 2 and 6 and care types 1, 5 and 9. Rehabilitation data is considered separately in Chapter 5. Other cases that attract separate funding according to the Department's funding policy were also excluded at this point. For example, family choice services are contracted separately between one hospital and the Department.

Step 3 involved the removal of length of stay outliers. The basis for determining outliers was agreed between project team and the Department ⁵.

⁵ The data has been trimmed on the basis of length of stay, ie high and low boundary points for each DRG as established by The Department. Each unit record was compared against this DRG boundary and flagged as either an 'inlier' or 'outlier'. The boundary points applied were the same as those used in the 98-99 data.

The table below summarises the record exclusions and value of those records, reconciling the matched to the final validated database. A total of **526,680** validated admitted patient records formed the basis for study analysis.

Table 3-2 Record Exclusions, cases and dollars

	Cases			Dollars		
	Number	% of total matched	Cummulative case balance	Dollars	% of total matched	Cummulative cost balance
Total matched records	572,056	100.00%	572,056	1,462,345,737	100.00%	1,462,345,737
Total cost doesn't balance	5	0.00%	572,051	7,651	0.00%	1,462,338,086
Total cost < \$0	265	0.05%	571,786	(578,169)	-0.04%	1,462,916,255
Total cost = \$0	6,111	1.07%	565,675	-	0.00%	1,462,916,255
Total cost < \$50	4,027	0.70%	561,648	99,215	0.01%	1,462,817,040
Total multiday cost < \$300	417	0.07%	561,231	77,593	0.01%	1,462,739,447
Total cost > \$100,000	20	0.00%	561,211	2,866,580	0.20%	1,459,872,867
Total cost > \$200,000	6	0.00%	561,205	1,360,961	0.09%	1,458,511,906
Avg multiday cost < \$50	230	0.04%	560,975	281,416	0.02%	1,458,230,490
Sameday or overnight > \$5,000	185	0.03%	560,790	1,616,142	0.11%	1,456,614,347
Avg multiday cost > \$5,000	23	0.00%	560,767	495,806	0.03%	1,456,118,541
Other error exclusions	3	0.00%	560,764	11,603	0.00%	1,456,106,938
Step 1: Validated records	560,764	98.03%	-	1,456,106,938	99.57%	-
Step 2: Out of scope records						
Care type 1	400	0.07%	560,364	4,781,837	0.33%	1,451,325,101
Care type 2, 6 or 7	3,022	0.53%	557,342	19,211,464	1.31%	1,432,113,637
Care type 5	2,602	0.45%	554,740	26,635,347	1.82%	1,405,478,290
Care type 9	69	0.01%	554,671	462,857	0.03%	1,405,015,433
Other	40	0.01%	554,631	1,547,894	0.11%	1,403,467,539
Step 3: Acute Outliers	27,951	4.89%	526,680	279,124,181	19.09%	1,124,343,358
Final acute validated dataset	526,680	92.07%	526,680	1,124,343,358	76.89%	1,124,343,358

KPMG provided a total of 554,631 records (including outliers) to the Department for their own analysis in setting the cost weights. The records were first subject to the data exclusions outlined above (Step 2 above). Note that analysis in this report excludes outliers as defined by Department criteria (refer to section 3.1.3 on tests of data reliability).

A breakdown of final validated record numbers and associated cost is provided for each hospital in the table below. These records represent the final samples to estimate average costs.

Table 3-3 Final validated data-set

Hospital	Matched cases (#)	Final Validated cases	Matched cost (\$)	Final Validated cost	Avg Cost per separation	Prior year avg cost per sep	% change
Mercy Womans	18,696	17999	41,114,225	31,778,921	1,766	N/A	N/A
MMC	51,455	47122	147,695,320	107,641,264	2,284	3,145	-27%
RCH	28,859	26960	102,023,223	76,190,246	2,826	2,603	9%
Royal Talbot	783	776	7,045,191	7,027,014	9,055	9,771	-7%
RWH	28,804	28751	55,713,608	49,365,565	1,717	1,569	9%
RVEEH	11,881	11638	22,206,088	21,244,326	1,825	1,649	11%
Mercy Werribee	18,028	16719	21,859,212	19,368,209	1,158	1,085	7%
The Alfred	47,070	41435	186,500,199	124,558,800	3,006	2,801	7%
ARMC	64,720	61007	178,607,341	125,026,883	2,049	1,973	4%
Dandenong	27,972	26539	62,432,267	53,206,465	2,005	1,962	2%
Western	33,605	29219	84,747,205	64,540,962	2,209	1,960	13%
Moorabbin	24,554	23529	24,734,571	23,356,403	993	N/A	N/A
RMH	60,674	54637	152,450,702	120,916,666	2,213	2,250	-2%
Western Sunshine	385	385	3,622,250	3,622,250	9,408	7,312	29%
St Vincents	39,400	35927	102,680,305	81,982,815	2,282	2,329	-2%
Bendigo	21,398	20554	41,770,650	36,027,985	1,753	1,700	3%
Geelong	42,567	40719	115,766,880	97,694,518	2,399	2,330	3%
Goulburn Valley	18,777	17126	33,934,434	28,974,805	1,692	1,749	-3%
Wangaratta	11,385	10222	24,733,072	21,827,147	2,135	N/A	N/A
Wimmera	7,696	5421	11,331,771	10,542,210	1,945	N/A	N/A
PMCI	12,193	11156	37,408,496	30,099,167	2,698	2,612	3%
	570,902	526,680	1,458,377,011	1,124,343,357	2,135	2,088	2%

Note: Royal Talbot and Western Sunshine included in CRAFT analysis only

3.1.2.1 Hospital de-identification

To protect confidentiality of hospital data in relation to comments in this report and hospital level cost information provided to the Department during the course of the study, hospitals have been de-identified by the consulting team using a simple numbering system. The numbering for admitted patient data uses the numbers one to twenty-one, randomly assigned to hospitals. Where it is necessary in this report to comment on data issues of particular hospitals, the hospital number assigned is referred to rather than hospital names.

3.1.3 Tests of data reliability

Four data qualifiers were used to summarise data quality. Each criteria was assigned a value of one for each of the following:

- percentage trimmed records > 50 percent of all cases per DRG;
- Less than 10 records per DRG;
- Less than 3 hospitals contributing data to the DRG; and
- RSEM > 0.2 for the DRG.

The results of the last 3 tests are provided below. The first test is dependant on the Department's funding approach and as such is not considered in this report in isolation as a test of data reliability (see one of the following tables on DRGs with more than one data qualification).

The following tables for admitted patient data are based on the *inlier component of episodes*.

One of the tests of data reliability identifies DRGs with fewer than 10 cases across all hospitals. For these DRGs the relatively small sample results reduces the reliability of the cost estimates. The DRGs and count of cases are shown in the tables below.

Table 3-4 DRGs with fewer than 10 cases

Vic41	Description	Cases
961Z	Unacceptable Principal Diagnosis	1
962Z	Unacceptable Obstetric Diag Combination	2
963Z	Neonatal Diagnosis Inconsistent W/Weight	1
A40Z	ECMO W/O Cardiac Surgery	5
F02Z	AICD Component Implantation/Replacement	1
I21Z	Loc Excis & Remov Int Fix Dev Hip+Femur	2
P04Z	Neonate, AdmWt 1500-1999G W Sign OR Proc	8
S61Z	HIV-Related CNS Disease	3
U62A	Paranoia & Ac Psych Dis W C/S CC or MHLS	5
Z60A	Rehabilitation W Catastrophic/Severe CC	7
Z60B	Rehabilitation no Catastrophic/Severe CC	6
Z60C	Rehabilitation, Sameday	3
Z65Z	Mult Oth & Unspec Congenital Anomalies	6

The second test for reliability identifies DRGs represented at fewer than 3 hospitals. These are shown in the table below.

Table 3-5 DRGs represented at fewer than 3 hospitals

Vic41	Description	N Hospitals	Total cases
961Z	Unacceptable Principal Diagnosis	1	1
962Z	Unacceptable Obstetric Diag Combination	1	2
963Z	Neonatal Diagnosis Inconsistent W/Weight	1	1
A01Z	Liver Transplant	2	25
A02Z	Multiple Organs Transplant	2	10
A03Z	Lung Transplant	2	37
A05Z	Heart Transplant	1	16
A40Z	ECMO W/O Cardiac Surgery	2	5
F02Z	AICD Component Implantation/Replacement	1	1
I21Z	Loc Excis & Remov Int Fix Dev Hip+Femur	2	2
P02Z	Cardiothoracic/Vascular Procs - Neonates	1	39
S61Z	HIV -Related CNS Disease	1	3
S62Z	HIV -Related Malignancy	2	14
Y01Z	Severe Full Thickness Burns	2	18
Z60C	Rehabilitation, Sameday	2	3

Another test relates to DRGs with a relative standard error of the mean (RSEM) of more than 0.2. The list of abbreviations and acronyms in the front section of this report defines RSEM.

RSEM gives a measure of the robustness of the estimation of average cost, given the variability around the average and the number of cases in the sample. Previous studies have set 0.2 as the threshold for identifying cases with adequate samples but high variability and/or moderate variability with a small sample size.

The following table provides a list of DRGs with an RSEM of more than 0.2.

Table 3-6 RSEM > 0.2

Vic41	Description	T cases	RSEM
U62A	Paranoia & Ac Psych Dis W C/S CC or MHLS	5	0.43
Z65Z	Mult Oth & Unspec Congenital Anomalies	6	0.39
Y60Z	Burns, Tran Oth Ac Care Facility < 5 Days	54	0.35
A40Z	ECMO W/O Cardiac Surgery	5	0.30
962Z	Unacceptable Obstetric Diag Combination	2	0.26
A02Z	Multiple Organs Transplant	10	0.26
I21Z	Loc Excis & Remov Int Fix Dev Hip+Femur	2	0.26
E72Z	Respiratory Problem from Neonatal Period	17	0.24
G43Z	Complex Therapeutic Colonoscopy	18	0.24
S62Z	HIV -Related Malignancy	14	0.23
Z60C	Rehabilitation, Sameday	3	0.21
F64Z	Skin Ulcers for Circulatory Disorders	20	0.21
X64A	Oth Injury, Poison, Toxic Eff Dx > 59 or +CC	89	0.21
Y61Z	Severe Burns	46	0.21

In summary, there are 17 DRGs with more than one data qualification. The DRGs are listed below with indications where a data qualification applies ('Y' = yes).

Table 3-7 DRGs with more than one data qualification

Vic41	Description	Total cases	% trimmed > 50%	< 10 cases	< 3 hospitals	RSEM > 0.2	Quals
A40Z	ECMO W/O Cardiac Surgery	20	Y	Y	Y	Y	4
961Z	Unacceptable Principal Diagnosis	5	Y	Y	Y	0	3
962Z	Unacceptable Obstetric Diag Combination	2	0	Y	Y	Y	3
F02Z	AICD Component Implantation/Replacement	3	Y	Y	Y	0	3
I21Z	Loc Excis & Remov Int Fix Dev Hip+Femur	2	0	Y	Y	Y	3
Z60C	Rehabilitation, Sameday	3	0	Y	Y	Y	3
963Z	Neonatal Diagnosis Inconsistent W/Weight	2	0	Y	Y	0	2
A02Z	Multiple Organs Transplant	10	0	0	Y	Y	2
E72Z	Respiratory Problem from Neonatal Period	82	Y	0	0	Y	2
P04Z	Neonate, AdmWt 1500-1999G W Sign OR Proc	28	Y	Y	0	0	2
S61Z	HIV-Related CNS Disease	6	0	Y	Y	0	2
S62Z	HIV-Related Malignancy	18	0	0	Y	Y	2
U62A	Paranoia & Ac Psych Dis W C/S CC or MHLS	5	0	Y	0	Y	2
Y01Z	Severe Full Thickness Burns	40	Y	0	Y	0	2
Z60A	Rehabilitation W Catastrophic/Severe CC	35	Y	Y	0	0	2
Z60B	Rehabilitation no Catastrophic/Severe CC	16	Y	Y	0	0	2
Z65Z	Mult Oth & Unspec Congenital Anomalies	8	0	Y	0	Y	2

Recommendation 10: We recommend that for DRGs where data is not reliable as tested above, the Department apply three year averaging for the purposes of deriving cost weights.

3.2 Admitted patient data issues

The data integrity testing and review by hospitals of records where the costs appear to be unreasonable, revealed a number of ad-hoc data issues due to problems experienced by some hospitals with clinical costing and feeder systems. For the purposes of cost analysis, in some instances the resulting data issues could be resolved by making a simple adjustment to the data at the DRG level and without significantly impacting the final average costs derived.

For information and to provide an insight into the sorts of problems that some hospitals experienced in relation to their clinical costing systems, a summary of the key issues and action taken are provided below. **Individual hospitals are not identified, rather, codes used by the project team replace the hospital name.**

Other issues

In some cases a small number of patients were correctly costed but excluded from the data set eg.

- Partly costed episodes where patients stays spanned financial years
- Patients who were treated in a VACS clinic and subsequently admitted, but had not been allocated a DRG by the time of processing (consequently regarded as a stand alone VACS episode by transition)

As costs are correctly allocated to these patients their exclusion does not impact on the accuracy of the remaining data.

3.2.1 Analysis and clinical review

This section outlines analysis undertaken of the admitted patient data leading to the final analysis of average cost per DRG. The analyses include data reliability tests and analysis of cost changes per DRG and of prosthetic costs. Comments made in this report that are of a clinical nature have been provided by clinicians involved in the clinical review of the initial results of the study and as discussed with clinicians on the project team.

This year, clinicians from varying specialities participated in the clinical review workshop. While specific comments in relation to each of the speciality DRG's was sought from a number of specialists in the field, the workshop provided an opportunity to raise specific issues in relation to the cost weight study and highlight any particular changes in technology, clinical and/or administrative practices that may have had an impact on costs.

3.2.1.1 Long stay outliers

Clinicians commented that the reimbursement for the long stay outliers disadvantages many of the tertiary referral hospitals. They consider that these patients are often high complexity patients whose length of stay and high cost is due to complexity that is not currently reflected in the current outlier payment formula. There is the potential for hospitals with a disproportionate number of long stay outliers to be financially disadvantaged.

Clinicians commented on the need for a review of the current outlier payment formula in conjunction with the DHS to determine a more appropriate formula for reimbursement. Clinician involvement was seen as critical and access to a number of years of 'outlier' cost data should provide a reasonable basis on which to determine a fair and workable solution.

3.2.1.2 Transfers in

Clinicians believe that transfers in to tertiary referral hospitals reflect a particularly complex and expensive group of patients. There is published Australian and international literature to support this. They remain unconvinced that the current training and development grants adequately compensate tertiary level hospitals for this level of complexity.

3.2.1.3 Pharmaceuticals

The extent to which some patients are being externally funded for some pharmaceutical costs is uncertain. However, if this occurs weights for some DRGs might inappropriately reflect the actual costs of pharmaceuticals to the hospital.

Other clinical changes noted that are likely to have an impact on future average costs were:

- The use of higher cost day surgery anaesthetic agents which are more expensive than those used when a patient is admitted for an overnight stay; and
- The use of a new drug, Propofol, in ICU for sedation and muscle relaxation that is more expensive than the drugs used previously.

Recommendation 11: Further analysis of funding of pharmaceuticals is required to ensure the accuracy and appropriateness of weights for specific DRGs.

3.2.1.4 Victorian Clinical Casemix Committee

Clinicians wanted more interaction between the Victorian Clinical Casemix Committee and the Department. It was generally noted that this should be an appropriate environment in which to have changes in clinical practice identified and discussed.

3.2.1.5 The low Australian dollar

Clinicians noted that the low Australian dollar is expected to have a material effect on the 2000-01 costs though the impacts may not be as evident in 1999-00. Many felt that hospitals had built up considerable reserves of supplies and equipment that may have helped to cushion the effects of the change in the exchange rate. However most of these reserves will have been eroded by 2000-01.

Recommendation 12: The extent of hospitals exposure to movements in the exchange rate and the degree to which they are protected by fixed prices offered by bulk purchasing bodies such as Hospital Supplies Australia needs to be considered.

3.2.1.6 Inadequate feeder systems

A number of new procedures have been introduced into cardiac investigation laboratories and x-ray theatres that were unsupported by adequate feeder systems in 1999/2000. This has resulted in a number of DRG's that have inadequate prosthetic costs. Prosthetic costs are the subject of a separate discussion in section 3.4 below.

3.2.1.7 DRG average length of stay and cost changes

A comparison of the average cost and length of stay to last year's study was undertaken for DRGs with more than 150 cases in the sample.

The table overleaf compares the 1999-2000 data with the 1998-99 data. The reference file for 1998-99 data generally used the same exclusion criteria as the current study.

For the selected DRGs, clinical input was sought to assist in the identification of causes for the cost change, eg a change in clinical practice. This process assisted in identifying DRGs from which a new same-day DRG could be created and DRGs where a wide variation in cost was apparent. The review examined the 1999-2000 average costs across hospitals and by hospital, in addition to average cost data for 1998-99 across hospitals and by hospital, for selected DRGs. In some instances the average service cost group (SCG) costs were referred to, by hospital, to further inform the investigation.

Further comments for some of the DRGs are provided after the table. Refer to the list of abbreviations and acronyms at the front of this report for definitions of some column titles.

Table 3-8 DRG length of stay and cost change, more than 150 cases

Vic41	Description	Cases		ALOS					Total Cost					N Data Quals 99-00
		Tcases 98-99	TCases 99-00	ALOS 98-99	ALOS 99-00	StDev ALOS	RSEM ALOS	% change ALOS	Avg TCost 98- 99	Avg Tcost 99-00	StDev Tcost 99-00	RSEM 99-00	% Change Tcost	
S60Z	HIV, Sameday	165	380	1.00	1.00	-	-	0%	1,070.45	495.94	552.13	0.06	-54%	-
U64Z	Other Affective and Somatoform Disorders	64	174	7.13	2.65	2.05	0.06	-63%	3,356.98	1,631.53	1,640.77	0.08	-51%	-
U67Z	Personality Disorders & Acute Reactions	44	163	4.20	1.92	1.44	0.06	-54%	2,164.61	1,318.61	1,360.70	0.08	-39%	-
U65Z	Anxiety Disorders	214	227	2.61	1.71	1.41	0.05	-35%	1,658.31	1,120.85	1,124.61	0.07	-32%	-
J63Z	Non-Malignant Breast Disorders	197	295	1.37	1.28	0.79	0.04	-6%	1,126.61	791.56	810.83	0.06	-30%	-
Q62B	Coagulation Disorders Age<70	967	1,131	1.59	1.48	1.32	0.03	-7%	1,544.64	1,091.46	1,399.69	0.04	-29%	-
I65A	Conn Tiss Malig W Pathological Frac >64	691	966	3.05	2.50	2.87	0.04	-18%	2,194.41	1,571.56	1,839.31	0.04	-28%	-
O61Z	Postpartum & Post Abortion W/O O.R. Proc	1319	2,527	2.46	1.90	1.61	0.02	-23%	1,130.46	817.32	1,173.82	0.03	-28%	-
N11B	Oth Fem Repro Sys ORP <65 No Malig No CC	254	281	1.33	1.32	0.92	0.04	-1%	1,515.08	1,905.23	1,442.49	0.05	26%	-
E60A	Cystic Fibrosis W Catastrophic/Severe CC	344	369	13.06	14.46	6.19	0.02	11%	9,455.66	11,923.90	6,623.93	0.03	26%	-
H62A	Dis Pancreas Exc for Malig W Cat/Sev CC	190	196	7.31	7.98	4.53	0.04	9%	4,536.63	5,729.93	4,488.71	0.06	26%	-
I18Z	Knee Procedures	3080	2,406	1.37	1.34	0.92	0.01	-2%	1,770.57	2,238.90	1,516.35	0.01	26%	-
M63Z	Sterilisation, Male	424	386	1.00	1.00	-	-	0%	889.22	1,127.98	655.77	0.03	27%	-
D08Z	Mouth Procedures	492	532	1.26	1.29	0.69	0.02	2%	1,481.64	1,888.97	1,347.91	0.03	27%	-
X06A	Oth Procs for Oth Injuries W Cat/Sev CC	181	178	8.40	9.74	6.34	0.05	16%	7,158.10	9,129.31	7,225.22	0.06	28%	-
I08A	Oth Hip & Femur Procs W Catast/Severe CC	915	854	12.03	13.99	8.38	0.02	16%	9,059.43	11,578.05	6,252.22	0.02	28%	-
Z63B	Oth Aftercare W/O Catastrophic/Severe CC	342	335	1.89	2.01	1.88	0.05	7%	988.34	1,270.77	1,479.64	0.06	29%	-
B81A	Oth Disord – Nervous Sys W Cat/Sev CC	194	208	7.13	7.84	5.01	0.04	10%	3,856.45	4,973.54	3,400.58	0.05	29%	-
Z01B	ORPs W Diags Oth Contacts W/O Cat/Sev CC	433	409	1.09	1.09	0.33	0.01	-1%	1,110.36	1,434.47	1,752.94	0.06	29%	-
F20Z	Vein Ligation and Stripping	1219	795	1.17	1.19	0.49	0.01	1%	1,891.43	2,446.24	1,235.17	0.02	29%	-
F42B	Circ Dis No AMI W Card Inv No Comp Dx/Pr	3076	2,770	1.29	1.34	0.85	0.01	3%	2,196.46	2,901.96	2,210.15	0.01	32%	-
L62B	Kidney+Urinary Tr Neoplasm No Cat/Sev CC	189	232	1.43	1.49	1.05	0.05	4%	1,145.75	1,539.83	2,032.00	0.09	34%	-
O64Z	False Labour	1820	2,006	1.23	1.28	0.69	0.01	4%	582.18	785.29	923.89	0.03	35%	-

Vic41	Description	Cases		ALOS					Total Cost					N Data Quals
		Tcases 98-99	TCases 99-00	ALOS 98-99	ALOS 99-00	StDev ALOS	RSEM ALOS	% change ALOS	Avg TCost 98- 99	Avg Tcost 99-00	StDev Tcost 99-00	RSEM 99-00	% Change Tcost	
N05B	Oophs,Cx Fall Tube Prs-Non-Mal No C/S CC	346	356	3.15	2.78	1.86	0.04	-12%	3,461.57	4,715.12	3,144.15	0.04	36%	-
I22Z	Major Wrist, Hand and Thumb Procedures	172	174	1.45	1.56	0.96	0.05	7%	1,964.23	2,727.55	1,750.64	0.05	39%	-
L07A	Transur Procs Exc Prostatectomy+C/Sev CC	175	192	3.19	3.53	2.98	0.06	11%	2,514.72	3,501.50	2,268.69	0.05	39%	-
R03B	Lymphoma+Leukaemia+Oth ORP No Cat/Sev CC	340	218	1.82	2.22	2.46	0.07	22%	2,133.43	3,040.91	2,493.16	0.06	43%	-
F67B	Hypertension W/O CC	271	242	1.45	1.59	1.15	0.05	10%	971.40	1,471.06	1,600.78	0.07	51%	-
J06B	Maj Procs for Non-Malignant Breast Cond	390	236	1.43	1.80	1.09	0.04	26%	1,904.72	2,919.81	1,736.17	0.04	53%	-
X64B	Oth Injury,Poison,Tox Eff Diag <60 No CC	192	183	1.08	1.18	0.57	0.04	9%	1,275.41	3,617.88	6,129.94	0.13	184%	-
U40Z	Mental Health Treatment, Sameday, W ECT	759	607	1.00	1.00	-	-	0%	244.15	903.37	782.16	0.04	270%	-

Further comments from the clinical review are provided below in relation to same-day DRG issues and in relation to clinical practice.

Recommendation 13: That a same-day DRG be created

We recommend that the following DRGs be considered for same-day DRG classification for the purposes of the funding model (ie the DRG should be split to form one DRG for the same-day cases and one DRG for the overnight stay cases).

- **O61Z** (Postpartum and post abortion w/o OR proc). The significant reduction in costs is primarily due to the participation of a new hospital that contributes 50% of the volumes of this DRG. The majority of the admissions are same day admissions to a Lactation unit for breastfeeding problems. These could be better differentiated from the remaining population with the creation of a same day classification.
- **J63Z** (Non malignant breast disease). The reduction in this DRG has similarly been caused by the participation of a new hospital. The hospital provides just over one third of the total volumes for the DRG which are primarily for the treatment of postmastectomy lymphodema within a dedicated unit. These cases are all treated as same day admissions and could be better differentiated from the remaining population with the creation of a same day classification.
- **I65A** (Conn. Tissue malig w path fracture >64). The costs of this DRG vary quite considerably from year to year and hospital to hospital. However, two major providers had substantial falls, after being very high cost providers in 1999. There was also a new major provider who had relatively low costs. The decrease in average cost has also been accompanied with a decrease in the ALOS. Clinicians have noted the increased use of intravenous bisphosphonate treatment that is commonly administered as a day admission for the prevention of complications of bone metastases. The same treatment applies to those patients falling into DRG I65B as well. The average cost for those cases with a same day classification is \$597 compared to \$3,399 for those with an overnight admission. Similar splits exist for DRG I65B, \$620 and \$3,608 respectively. These DRG's should be considered for a same day classification.

DRGs where the average cost change may reflect clinical practice

Specialist clinicians in each of the specialities were consulted with respect to potential clinical, technological or administrative changes that may have resulted in a change in average cost between 1998/99 and 1999/00. The following DRG's were identified as having a change in cost that may be reflective of clinical practice. It would be preferable to verify the observations of the specialists through a formal industry committee or professional group (eg. RACS, RACP specialist sub groups) prior to accepting the 1999/00 data as representative of future clinical trends.

- **U65Z** (Anxiety disorders)

- **U67Z** (Personality disorders and acute reactions)
- **U64Z** (Other affective and somatoform disorders) These DRG's all show a decrease in average cost that has been accompanied by a falling length of stay between 98-99 and 99-00. The decreases appear to be consistent across the majority of hospitals. Clinician advice pointed to increased bed pressures and the treatment of high complexity patients in dedicated units rather than within general wards that has driven higher rates of turnover and lower average costs.
- **I08A** (Other hip and femur procs w cat/sev CC). The major diagnoses in this DRG were open and closed reduction of a fractured femur with internal fixation. Most hospitals showed an increase in costs and these were primarily incurred in allied health and nursing and theatre costs. Average prosthetic costs increased significantly across all hospitals. Clinical comment indicated that this may have been driven by the increased cost and use of titanium nails in comparison to stainless steel ones. The use of titanium nails has been advocated by manufacturers, who claim they will result in decreased ALOS. However to date there has been no empirical evidence to support this. Anecdotal comments also cited increases in complexity and co-morbidity and delays in transfers to rehabilitation units as potential reasons for the increase in ALOS.
- **D08Z** (Mouth procedures). The major diagnoses in this DRG were incision-drainage of abscess/cyst in the oral cavity, excision of cyst in oral cavity and excision of other lesion in oral cavity. Most hospitals reported increased costs in 1999/2000. Clinician advice noted the greater use of flaps in the management of carcinoma of the lip and variation in patient complexity as a driver of the change in costs.
- **E60A** (Cystic fibrosis with cat/sev cc). Both major providers reported substantial increases in cost in allied health, medicine, nursing and pharmacy. ALOS increased by 11%. Clinical comment noted three key outcomes following a DHS review of cystic fibrosis management that may have contributed to the change in costs. Increased allied health professionals are available during inpatient episodes, increased numbers of patients are being treated with a high cost mucolytic, Pulmozyme, and the use of increased strength high cost antibiotics to treat highly resistant bacteria.

Recommendation 14: Three year averaging should be applied to these DRG's until such time as the change in clinical practice is confirmed by industry.

DRG's where the data has been identified as erroneous

Investigation of average costs across hospitals identified that changes in average cost since 1998/99 can be attributed to erroneous data in one or more hospitals. We recommend that the data for these hospitals be eliminated when calculating average costs for the following DRGs:

- **X64B** (Other injury, poison, toxic one hospital diagnosis, < 60, no CC). The increase in cost for this DRG is being driven by hospital 18 which is the sole

provider of a specific therapy in the State. A review of the data by the hospital indicated that inadequate feeder systems were available in 1999/2000 and therefore the data should be excluded from the study.

- **S60Z** (HIV Same day). A decrease in the overall average cost was attributable to one provider hospital 18. A review of their data by the hospital identified a number of issues with the allocations in 1999/00 that had resulted in understated costs for that year. These issues have been addressed for the 2000-2001 year. Data from a specific hospital should be excluded from the derivation of 1999/2000 average costs for this DRG.
- **F42B** (Circ disorders No AMI W Card Inv No Comp Dx/Pr). The increase in average cost was driven primarily by hospitals 18 and 19. A review of the data by hospital 18 indicated that due to a lack of feeder systems in 1999/2000 cardiac prosthetics had been averaged across all patients based on bed days. This has resulted in an overstatement of costs for those patients without prosthetics and understatement of costs for those with prosthetics. Data related to hospital 18 should be excluded for the purposes of deriving the average cost for this DRG with separate consideration being given to the derivation of a true cost for cardiac prosthetics.
- **F67B** (Hypertension). The higher cost in this DRG was driven primarily by hospital 19. Discussion with the hospital revealed that there appeared to be some utilisation errors in certain cases that occurred during periods 11 and 12. The hospital advised that not all cases were corrupted and to exclude cases with a total cost greater than \$2,000 for this DRG.
- **U40Z** (Mental health treatment, same day with ECT). The increase in average cost was driven primarily by hospital 6 which reported higher than average costs in several of the SCG's. Discussion with the hospital identified that costing allocations of some departments over all DRG's had resulted in this group of patients picking up a number of costs inappropriately. Data relating to hospital 6 should be excluded for the purposes of deriving the average cost for this DRG.
- **N05B** (Ovarian, cervix and fallopian tube procedures – no malign – c/s cc). The increase in this DRG is being driven by hospital 15 who reported an increase in average cost from \$3,380 to \$6,723. The ICD10-AM Diagnosis codes and the procedure codes have remained consistent between the two years indicating no change in casemix. The hospital reported that a costing error had occurred in some of the patients within this DRG and that these records should be excluded for the purposes of deriving the average cost.
- **N11B** (Other female repro. Syst ORP < 65, no malign no cc). The change in this DRG has been driven by the loss of 2 low cost providers and the introduction of a significant volume high cost provider in 1999-2000. Several of the providers in the 98-99 study reported increased costs and increased LOS, this was however compensated for by a relatively low LOS in the new hospital. The change in this

DRG is driven by a mix of increasing costs among hospitals that participated in 98-99 and the introduction of a new hospital in 99-00. Hospital 15 also noted an error in its costing system for some of its patients within this DRG. These records should be excluded for the purposes of deriving the average cost.

Recommendation 15: Exclude data for specified hospitals as detailed for individual DRG's.

DRGs where the cost change was due to other issues

- **J06B** (major procedure for non-malignant breast). In 1999, procedure 3034200 *local excision of lesion of breast* appears to have been grouped to **DRG J06B** rather than to **J07B**. This procedure would be substantially less expensive than the procedures in **J06B**. In 2000, procedure 3034200 was grouped to **J07B** which has resulted in a subsequent higher average cost for the remaining cases in **J06B**. We have been unable to identify a reason for the change in grouping of the procedure code to the different DRG's, however based on the type of procedures in J06B the change in cost appears reasonable.

Recommendation 16: Further investigation of the grouping of procedure code 3034200 needs to be conducted in order to validate the movement in costs between J06B and J07B.

DRGs where the cost change seems reasonable

- **L07A** (Transureth Pro exc prostatectomy +c/sev cc). The largest provider of this procedure in 2000 reported significant cost increases. Other hospitals' costs remained about the same suggesting no change in clinical practice. The largest provider's costs in 1999 were very low in comparison to other hospitals, and now they are consistent with the costs reported by other hospitals. The change in DRG costs appear to be driven by change in this hospital but the outcome seems reasonable given the parity across all hospitals.
- **L62B** (Kidney and Urinary Tract neoplasm No cat/sev CC). In one of the top three providers of this service, costs increased markedly with only a minor increase in length of stay. In 1999 this hospital's costs were high in comparison to others. Costs in the other hospitals were comparable across the two years. A review of the data in this DRG indicated that the primary cause was the inclusion of Wilms tumor and rhabdomyosarcoma, which are the paediatric neoplasms and are very different in their management from cancer in adults. A solution is to exclude the paediatric patients and give them a separate DRG, otherwise hospitals treating paediatric cancers will lose significant funding on each patient managed.
- **Q62B** (Coagulation disorders<70). The decrease in cost for this DRG was driven primarily by hospital 18. A review of the data by the hospital indicates that its 1998-99 SCG 7 costs appear over-inflated and that the costs for 1999/2000 appear correct.

DRGs with cost changes which may benefit from cost averaging over three years

There were a number of DRG's where investigation by the hospitals into the cost changes between years provided inconclusive advice as to the validity of the costs. This may be due to, for example, changes in clinical complexity, variances in treatment protocols, and/or differences in costing allocations and/or feeder systems. Where the data was unable to be reliably validated for inclusion or exclusion we recommend that three year averaging be applied in order to smooth the costing variances between years.

- **B81A** (Other Disord – Nervous System w Cat/Sev CC). The most common diagnosis was *Falls* which suggest most patients in this DRG are elderly. Three hospitals (all significant providers) had substantial increases in costs between the two years. All of these cost increases were explained to a large degree by an increase in length of stay in the three hospitals. Clinical advice suggested that it is possible that there was an increase in dependency of patients in these hospitals and this suggestion is supported by the findings as the increase in costs in the DRG were primarily in allied health and nursing. Costs and LOS in other hospitals were much the same. This is the type of DRG that will inevitably have somewhat unstable costs because of the variable casemix. To address this issue, it could be argued that the costs should be averaged over three years.
- **Z01B** (ORPS w diag other contacts w/o cat/severe CC). This is a not very satisfactory DRG with the dominant diagnosis *other specified surgical follow up* so the mix of patients is likely to vary from year to year. Two major providers, had significant increases. Other hospitals showed variation in costs between hospitals and from year to year. Again this is likely to be an unstable DRG and three-year averaging would be appropriate.
- **R03B** (Lymphoma & leukaemia + ORP no cat/se CC). Two of the five major providers had costs very similar to 1999. However the second largest provider in 2000 had a marked cost increase. Smaller increases were also seen in two other major providers. The lack of consistent change across most hospitals indicates that there was no widespread change in management. This DRG was also highlighted during the clinical review as being inadequate for the heterogeneous range of patients that may be captured within it. In addition, changes in hospital policy such as the charging high cost pharmaceuticals to the PBS may have a marked impact on the costs of this DRG. This issue is discussed earlier in section 3.3.1.3. This DRG is also discussed in section 3.3.1.8 below.
- **F42B** (Circ disorders No AMI W Card Inv No Comp Dx/Pr). The increase in average cost was driven primarily by hospitals 18 and 19. Hospital 19 reported that significant improvements had been made to their theatre extraction programmes in 1999/2000. Both data extracts and data entry compliance in theatre has improved which has resulted in more accurate costs. The average costs reported within this DRG are variable by hospital and three year averaging should be considered.

- **F20Z** (Vein ligation and stripping). Two hospitals reported marked increases between 1999 and 2000. These are two of the three major providers. Other hospitals' costs remained much the same suggesting no widespread change in clinical practice. Of these two hospitals, one was low in 1999 and the other high in both years. Both hospitals concerned reported that their 1999/2000 costs were correct. Given the variance in costs between hospitals and between years three year averaging should be considered for this DRG.
- **I22Z** (Major, wrist, hand and thumb procedures). Two hospitals reported increases in average costs between 1998-99 and 1999/2000. However their resultant costs for 1999/2000 were not dissimilar to the other hospitals in the data set. A review of the data by the hospitals concerned identified that improvements in theatre, imaging and pathology feeder systems may account for the cost change. Both hospitals concerned remained confident that the 1999/2000 were an accurate representation of the costs of these cases. Due to the variability between hospitals and years for this DRG, three year averaging should be considered.
- **O64Z** (False labour). The increased cost in this DRG was driven by the second largest provider of cases to this DRG. This hospital was also a new participant in the cost weight study. A review of the data by the hospital indicated that significant costs were incurred in delivery suite for these patients, and that these costs were the key driver for the high cost. There is significant variance between hospitals within this DRG with two other hospitals reporting high average costs. This is likely to be due to differences in the cost allocations and feeder systems that exist within each hospitals delivery suite unit. Three year averaging would appear to be the most appropriate treatment for this DRG.
- **M63Z (Male sterilisation)**. The major increase in this DRG was driven by hospital 19 whose average costs increased from \$1203 to \$2013 between 1998-99 and 1999-00. The hospital commented that the costs were accurate and arose from better theatre extracts. The Department needs to consider whether or not it wishes to continue to fund this DRG as an inpatient procedure when it is commonly available as an outpatient procedure at much lower cost that may represent better value for money.
- **I18Z** (Knee procedures). The common diagnoses in this DRG cover arthroscopy with meniscectomy and / or debridement. Hospital 6 had a marked increase in costs. In addition two relatively low cost substantial providers in 1999 did not participate in this year's study and a new substantial high cost provider was introduced in 2000. The absence of a consistent increase in costs over many hospitals suggests there is no widespread change in management. Three year averaging would probably provide the best reflection of the change in casemix and contributing hospitals.
- **H62A** (Dis pancreas exc for malig w cat/sev cc). The dominant diagnosis in this DRG is acute pancreatitis. This is a relatively uncommon disease that can vary considerably in severity. The increase in cost has been accompanied by a slight increase in the ALOS. Higher costs were reported in ICU and CCU this year

which were either minimal or absent in last years data which anecdotally supports a change in case severity. Due to the fluctuating nature of this DRG, three year averaging may again be appropriate.

- **X06A** (Other procs for other injuries w cat/sev cc). 9 of the hospitals within this DRG reported increases in their average costs and two low cost providers in 98-99 did not participate in this years study. The ALOS has also increased by 16% that reflects the influence of the higher acuity hospitals. There has also been a slight change in the procedure codes undertaken within the DRG that may indicate a change in the composition of cases. Given the generic nature of this DRG, three year averaging is considered to be appropriate.
- **Z63B** (Other aftercare w/o cat/sev cc). Inconsistent movements were recorded within this DRG which is a catch all for a variety of admissions. The significant difference can be attributed in part to an increase in ALOS and also the relatively low cost of the DRG. Given the generic nature of this DRG, three year averaging is again considered to be appropriate.

Recommendation 17: The nature of the casemix within each of these DRG's suggests that three year averaging should be considered for these DRG's

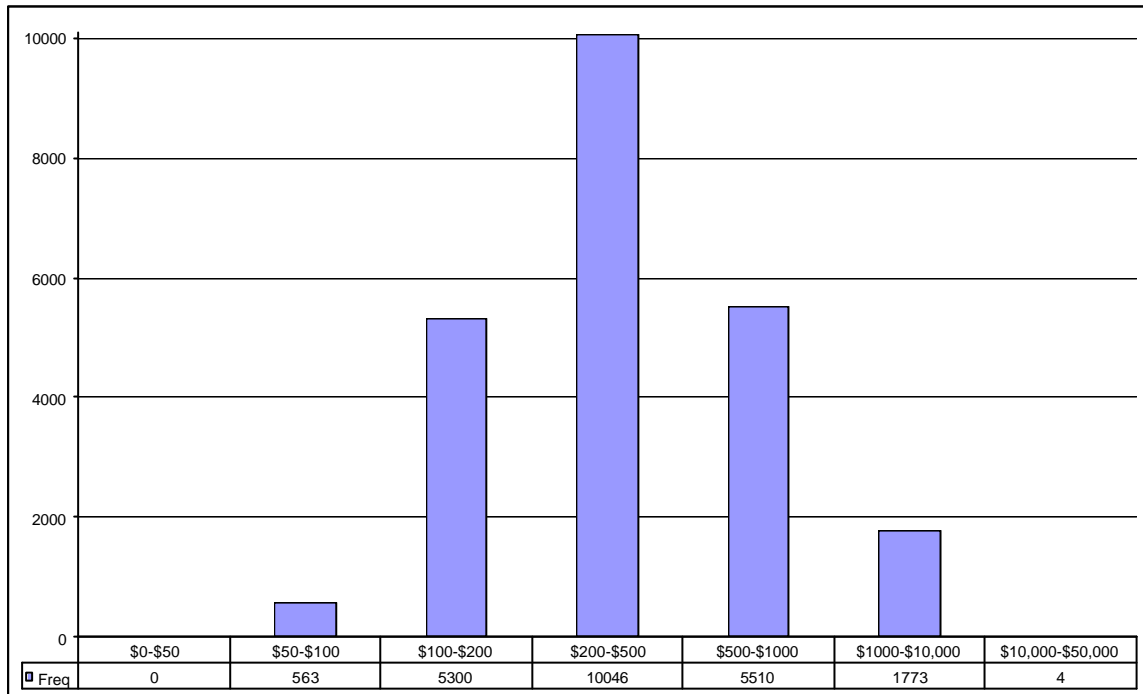
3.2.1.8 Other DRG issues

Both VACCDI and the clinicians invited to the clinical review workshop were invited to raise other DRG's where they felt that the costs reported in 99-00 failed to represent an accurate true cost of clinical practice.

Comments were received from clinicians on two particular categories of DRG's.

DRG R63Z Chemotherapy

Concerns were raised regarding the large number of patients within this DRG and the highly heterogeneous nature of their case complexity and drug costs. It was also commented that some hospitals were increasingly shifting pharmaceutical costs onto the PBS that may be contributing to lowering the average costs. As this practice differs between hospitals it is likely that the resultant average costs may be skewed. The following chart summarises the frequency of R63Z inlier costs within several bands. Note that the bands are **not uniform in interval**.

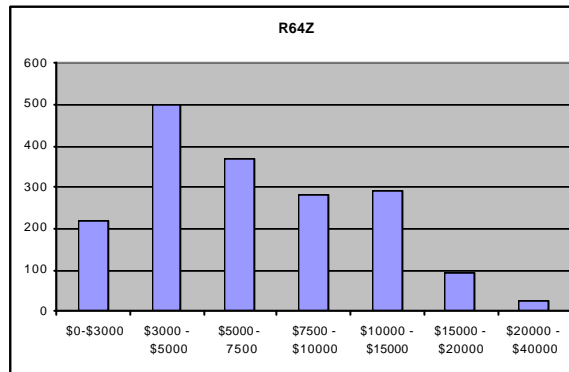
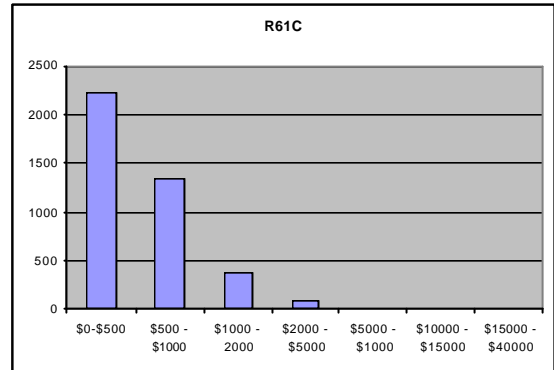
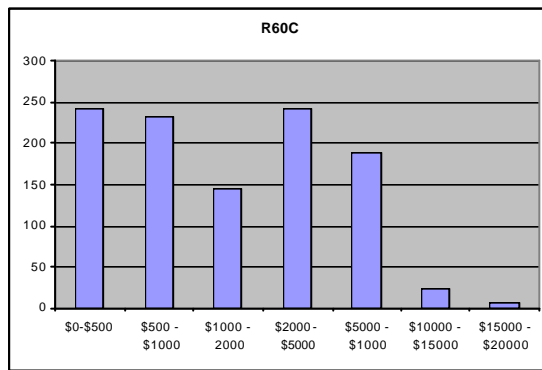
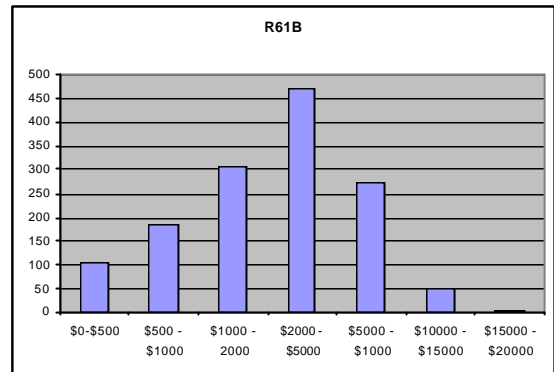
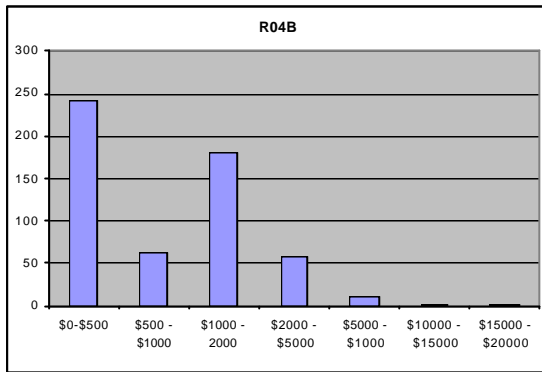


Of the 23,196 inlier records, 23,189 had a LOS equal to one day, the remaining 7 had a LOS of 2 or 3 days. A review of the high outlier cases (4 with costs greater than \$10,000) indicated that the high costs were driven by pharmacy costs. The high cost of chemotherapy drugs indicates that in this case, LOS is a poor proxy for cost. Last years study split R63Z into R63A Chemotherapy with HIV/AIDS and R63B Chemotherapy without HIV/AIDS based on Vic3.1 DRG's 778 and 779. This years coding shows that Vic 3.1 DRG 778 has been mapped to Vic 4.1 DRG S60Z HIV Same day, with 779 accounting for all of R63Z. A review of the primary and secondary diagnosis codes and procedure codes within R63Z did not reveal any significant drivers in cost indicating the further need for more detailed analysis. 22,368 records had a primary diagnosis code of Z511 with the remaining 828 recording a primary diagnosis code of Z512. The most commonly quoted secondary diagnosis for both Z511 and Z512 is C509. Other frequently quoted secondary diagnosis codes are C20, C189, and Z451.

DRG's R01A to R61C – Lymphomas and leukaemia's

Clinicians were similarly concerned about the lymphoma and leukaemia DRG's because of their heterogeneous nature and drug costs. In addition it was asserted that tertiary centres that provide induction chemotherapy for acute leukaemia cases incur greater costs and higher average LOS's than other cases within the same DRG's. We have analysed those lymphoma and leukaemia DRG's with greater than

500 inlier cases reported. The cost frequency graphs for each of the DRG's is summarised below.



Specialist clinical advice questioned the usefulness of the existing diagnosis and procedure codes as a reasonable differentiator of complexity or case differentiation. It was commented that cases could undergo both simple and complex treatment during the course of an illness. It was suggested that a better method of differentiation would be to treat the drug costs separately and code the nursing complexity based on Medicare item numbers, such as infusion duration < 1hr, >1hr but <3hrs, etc.

Recommendation 18: Further analysis of DRG R01A to R61C and R63Z is required to explore mechanisms to better differentiate between high and low cost treatments.

3.3 Review of prosthetic costs

The cost of prostheses were a subject of specific interest in the cost analysis due to the significant unit cost for some items where the reliability of cost weight for that DRG could be affected by the reliability of the estimate cost for the prosthetic item. The reliability of the estimated costs for the prosthetic item depends on the availability of appropriate feeder systems within hospitals. Traditionally, the Department has used data from these hospitals to compensate for problems that would otherwise occur if all hospital data were used to set cost weights for DRGs where prosthetic costs comprised a significant part of total cost.

Note that the feeder systems of some hospitals may relate to specific areas only, eg orthopaedic or cardiac, so the data captured is not consistent across hospitals. Thus, data have been used from those hospitals and for those DRGs where there is reliable prosthetic cost data.

The issue of the allocation of prosthetic costs to patients has been compounded in recent times by the expansion of technology in relation to prosthetic implants. This is particularly so, given the growing use of items such as stents which are high cost and can impact dramatically on the overall cost (and subsequently the price) of a limited number of DRGs.

Prosthetic costs are generally more readily identifiable for private (in a public hospital) patients due to the need to be able to claim health insurance fund rebates. However for public patients, allocation methods vary from allocating the total prostheses used by the hospital to all surgical patients, regardless of whether they received prosthesis or not, to using a tracking system to identify the recipients of prostheses and associated costs.

Average prosthetic costs for selected DRGs⁶ are provided overleaf. The left hand side of the table indicates the total records for the DRG across all 19 hospitals providing admitted patient data. The next set of columns shows the average prosthetic cost across 10 hospitals whose prosthetic cost data was provided from feeder systems. The prosthetic cost data from such hospitals was initially reviewed

⁶ DRGs for review of the average prostheses cost were selected on the basis of more than 20 cases in the DRG, records where the prostheses cost > \$0 and the average prostheses cost for the DRG > \$500.

for 'reasonableness' prior to including in the prosthetic cost calculations ⁷. The average cost was calculated in 3 ways:

- 1 Based on all cases;
- 2 Based only on cases where the prosthetic cost is greater than \$0; and
- 3 Based on cases where the prosthetic cost is greater than \$100.

These DRGs were the basis for the clinical review of prosthetic costs. The review involved clinicians and some hospitals contributing source data.

⁷ The 10 hospitals' prosthetic data included in the final prosthetic database are hospitals 1, 2, 4, 5, 12, 13, 16, 18, 19 and 3. Hospital 6 data was not included in the clinical review due to clarification required in relation to cost apportionment methods for some DRGs, eg allocation across all cases.

Clinicians considered that the estimated average prosthetic cost presented from the study sample was appropriate in most cases. In some instances the average prosthetic cost was a relatively small percentage of total costs and so was not a significant issue. For other DRGs the average costs and actual distribution of prosthetic costs appeared to be appropriate although there were some anomalous values. In those instances we recommended that the Department consider trimming the data where the cost is more than 1.5 times the inter-quartile range above the third quartile and below the second quartile for hospitals that have feeder systems and based on cases where the prosthetic cost is greater than \$0.

Of particular concern to the clinicians is the cost of cardiac and gastro stents that have not been reflected in the 99-00 data due to a lack of feeder systems in cath labs where they are commonly inserted.

Identified outlier cases

A review of the average prosthetic costs for DRG's highlighted two unique cases from hospital 12 which were noted as having outlier prosthetic components. DRG I73A Acare connect tissue dis > 59 w c/sev cc recorded one case that was a transfer from another hospital for care which subsequently had a hip replacement and died. Similarly K03Z Adrenal procedures had an abnormally complex case that required 5 femoral stems over 240 minutes of theatre time and a high ICU cost.

Recommendation 19: With respect to prosthetic costs, we recommend the exclusion of these outlier cases prior to determining the average cost weight for the respective DRG's. The fact that these cases did not exceed the outlier boundary points for their respective DRG's does however indicate that significant losses will be incurred by hospitals undertaking these unusual cases.

Table 3-9 Prosthetic costs for selected DRGs

Vic41	Description	All hospitals			Select 10 hospitals			Prosthetic > \$0			Prosthetic > \$100		
		Tcases	Avg Tcost	Avg Pros	Tcases	Avg Tcost	Avg Pros	Tcases	Avg Tcost	Avg Pros	Tcases	Avg Tcost	Avg Pros
A06Z	Tracheostomy Any Age, Any Condition	573	45,976	320	398	47,208	455	112	54,926	1,619	98	56,594	1,844
B01Z	Ventricular Shunt Revis No Other OR Proc	91	5,526	506	68	5,345	473	49	5,941	656	49	5,941	656
B02A	Craniotomy W Catastrophic CC	380	18,898	224	275	19,094	250	124	20,179	556	113	20,495	605
B02B	Craniotomy W Severe or Moderate CC	539	11,175	167	366	10,808	195	134	12,713	533	114	12,473	620
B02C	Craniotomy W/O CC	722	8,946	215	527	8,907	233	233	9,996	526	206	10,159	589
B04A	Extracranial Vascular Procs W Cat/Sev CC	191	7,324	98	111	7,563	140	46	7,938	338	29	8,394	516
B04B	Extracranial Vascular Proc no Cat/Sev CC	285	5,492	86	194	5,578	93	51	6,022	355	33	6,677	527
C02Z	Enucleations and Orbital Procedures	114	3,361	184	107	3,314	195	37	3,978	564	31	4,025	658
C08Z	Major Lens Procedures	6551	1,502	96	6120	1,467	102	4709	1,593	133	4198	1,586	139
D01Z	Cochlear Implant	86	18,635	12,193	86	18,635	12,193	69	22,177	15,197	69	22,177	15,197
D04B	Maxillo Surgery W/O CC	483	3,344	113	301	3,310	180	147	4,296	369	119	4,474	444
E01A	Major Chest Procedures W Catastrophic CC	304	14,756	370	237	15,024	468	102	17,091	1,087	96	16,959	1,152
E01B	Major Chest Procs W/O Catastrophic CC	481	8,114	345	361	8,143	433	148	8,804	1,056	142	8,890	1,100
F01Z	Implant or Replace of AICD, Total System	85	13,963	7,697	78	14,775	6,112	30	20,929	15,892	30	20,929	15,892
F03Z	Cardiac Valve Proc+Pump+Inv Card Inv Pr	76	30,377	1,522	68	31,133	1,526	41	33,025	2,531	40	33,529	2,594
F04A	Card Valve Pr+Pump No Inv Inv Pr+C/S CC	521	20,983	1,354	483	20,846	1,354	264	22,281	2,478	255	22,498	2,564
F04B	Card Val Pr+Pump No Inv Inv Pr No C/S CC	67	15,885	1,002	60	15,821	965	41	15,712	1,413	33	16,272	1,741
F05A	Coronary Bypass+Inv Card Inv Proc+Cat CC	261	23,415	361	213	23,783	442	74	24,248	1,272	74	24,248	1,272
F06A	Coron Bypass No Inv Card Inv Pr W C/S CC	1445	16,581	261	1313	16,231	287	497	16,775	759	497	16,775	759
F06B	Cor Bypass No Inv Card Inv Pr W/O C/S CC	325	14,193	284	300	13,920	308	141	14,430	655	141	14,430	655
F07Z	Oth Cardiothoracic/Vascular Procs W Pump	255	20,891	771	252	20,927	780	185	22,820	1,063	157	23,033	1,243
F08A	Maj Recon Vasc Procs W/O Pump W Cat CC	481	17,101	423	416	17,301	474	148	19,251	1,333	128	20,164	1,540
F08B	Maj Recon Vasc Procs W/O Pump W/O Cat CC	463	9,971	368	405	10,057	416	129	10,807	1,305	109	11,504	1,542
F10Z	Percutaneous Coronary Angioplasty W AMI	574	7,041	270	542	7,196	177	74	6,451	1,298	74	6,451	1,298
F12Z	Cardiac Pacemaker Implantation	832	8,239	2,188	740	8,635	2,120	277	8,637	5,663	277	8,637	5,663
F14C	Vasc Prs Exc Maj Rec W/O Pump W/O C/S CC	511	2,792	64	427	2,827	77	29	5,142	1,131	26	5,217	1,262

F15Z	Percut Coron Angioplasty W/O AMI W Stent	1921	4,678	281	1827	4,715	188	275	3,226	1,246	275	3,226	1,246
F17Z	Cardiac Pacemaker Replacement	194	5,359	1,413	160	5,523	1,642	58	6,442	4,531	58	6,442	4,531
F19Z	Oth Trans-Vasc Percut Cardiac Intervent	143	4,351	417	142	4,263	420	32	5,258	1,865	32	5,258	1,865
G02A	Maj Small & Large Bowel Proc W Catast CC	602	14,006	94	340	14,167	142	117	16,455	414	106	16,558	451
G02B	Maj Small+Large Bowel Proc no Catast CC	646	7,870	105	448	7,848	140	123	9,305	510	111	9,386	560
G03A	Stomach,Oesophal,Duodenal Procs W Malig	125	15,431	315	92	17,056	427	53	19,359	742	47	19,841	830
I03A	Hip Revision W Catastrophic or Severe CC	98	18,241	3,405	56	17,742	3,085	40	19,445	4,319	38	19,288	4,542
I03B	Hip Replac W C/S CC or Hip Rev No C/S CC	752	11,909	2,348	412	12,062	1,776	284	13,135	2,576	235	13,251	3,098
I03C	Hip Replacement W/O Catastroph/Severe CC	666	9,618	2,657	389	9,411	1,984	275	10,324	2,806	249	10,526	3,092
I04A	Knee Replacement & Reattach W Catast CC	139	14,009	2,918	71	13,988	2,812	52	14,535	3,840	51	14,676	3,915
I04B	Knee Replace & Reattach W/O Catast CC	706	10,558	2,728	434	10,401	2,757	304	11,432	3,936	304	11,432	3,936
I05Z	Oth Maj Joint Repl & Limb Reattach Procs	103	8,216	1,593	65	8,118	1,399	34	9,698	2,674	33	9,868	2,753
I08A	Oth Hip & Femur Procs W Catast/Severe CC	854	11,578	685	515	11,580	954	382	12,225	1,286	365	12,376	1,344
I08B	Oth Hip & Femur Procs >54 W/O Cat/Sev CC	382	7,604	738	236	7,629	1,013	175	8,246	1,366	166	8,215	1,439
I08C	Oth Hip & Femur Procs <55 W/O Cat/Sev CC	334	6,344	341	270	6,349	373	148	7,457	681	127	7,632	783
I09A	Spinal Fusion W Catastrophic/Severe CC	103	14,806	1,745	60	17,264	2,788	38	20,545	4,402	38	20,545	4,402
I09B	Spinal Fusion W/O Catastrophic/Severe CC	129	10,198	1,843	89	10,723	2,410	62	12,588	3,460	61	12,658	3,517
I13A	Humerus,Tibia, etc Procs W Cat/Sev CC	236	9,050	230	154	9,292	310	103	9,808	464	84	10,520	557
I13B	Humerus,Tibia etc Procs >59 No C/Sev CC	180	6,137	233	103	6,230	339	72	6,604	485	62	6,918	556
I13C	Humerus,Tibia etc Procs <60 No C/Sev CC	1326	4,236	181	794	4,167	250	549	4,449	362	336	5,206	566
I16Z	Other Shoulder Procedures	491	3,229	183	297	3,137	219	59	4,455	1,104	41	5,104	1,571
I18Z	Knee Procedures	2406	2,239	98	1459	2,098	140	147	5,221	1,385	122	5,571	1,663
I19Z	Other Elbow or Forearm Procedures	847	3,277	204	494	3,229	333	278	3,738	592	156	4,826	1,028
I26Z	Other Wrist and Hand Procedures	2419	1,967	40	1440	1,935	65	358	2,196	261	113	3,376	774
J06A	Major Procs- Malignant Breast Conditions	767	4,821	94	361	4,836	191	118	4,735	585	101	4,719	680
P02Z	Cardiothoracic/Vascular Procs - Neonates	39	36,666	665	39	36,666	665	37	36,773	701	34	37,639	762
W01Z	Ventil/Craniotomy Procs-Mult Sign Trauma	119	51,527	779	89	54,666	1,016	59	59,188	1,533	54	59,609	1,670
W02Z	Hip,Femur,Limb Prs Mult Sign Trauma+Imp	94	19,719	846	70	22,442	1,120	56	23,381	1,400	55	23,641	1,424

3.4 Average costs by DRG

The average cost by DRG across the hospitals, and distribution statistics for VIC-DRG 4.1 are provided in Appendix A. These cost estimates are 'raw' average costs in that we have not made any of the adjustments for which we have made specific recommendations to the Department as discussed in the previous sections of this report.

The average costs by service cost group for Vic-DRG 4.1 are shown in Appendix B.

4 Outpatient Data

The following presents analysis of outpatient data based on VACS (Victorian Ambulatory Classification Scheme).

The unit of measurement used in the study for deriving average treatment cost for a VACS clinic is the patient encounter. The encounter is defined as *“the clinic visit, plus all ancillary services (pathology, radiology and pharmacy) provided within the 30 days either side of the clinic visit. The thirty day window has been chosen to encompass the majority of services associated with a particular visit and to enable a reasonable and practical time period for reporting and funding”*⁸.

The thirteen hospitals that contributed VACS data this year are as follows:

- Austin and Repatriation Medical Centre;
- Bendigo Health Care Group;
- Dandenong Hospital;
- Monash Medical Centre (SHS);
- Moorabbin Hospital (SHS);
- Peter MacCallum Cancer Institute;
- Royal Children’s Hospital;
- Royal Melbourne Hospital;
- Victorian Eye and Ear Hospital;
- Royal Women’s Hospital;
- St Vincent’s Hospital; and
- Western Hospital – Footscray.

(Outpatient data was also collected for Allied Health from a non-VACS funded hospital, but was not used for deriving weights)

⁸ Victorian Department of Human Services, Acute Health Division “Victorian Ambulatory Classification Scheme – VACS”.

4.2 Data integrity testing

A number of data integrity tests were undertaken and hospitals were asked to review records where the allocated costs appeared to be unreasonable (refer to section 2.4 of the Phase One report) and to indicate those records that should be excluded or modified because of data problems. This identified, as would be expected, a variety of ad-hoc problems hospitals experienced with their costing systems and costing processes. These specific issues are discussed overleaf.

The table below indicates the total number and value of records received from Allegiance Systems (AS), ie after AS extracted the data and undertook their own data integrity checks. Generally all cases were automatically excluded with the exception of cases where total encounter costs exceed \$1,500 in which case hospitals were asked to review these records and to recommend as to their validity. Some hospitals identified a number of issues with the data by reviewing these cases.

Table 4-1 VACS data integrity checks

	Number	% of total matched	total Cumulative case balance	Dollars	% of total matched	total Cumulative cost balance
Total matched records	1,104,593	100.00%	1,104,593	\$151,253,094	100.00%	151,253,094
Exclusions						
Total cost doesn't balance	-	0.00%	1,104,593	-	0.00%	151,253,094
Total cost < \$0	-	0.00%	1,104,593	-	0.00%	151,253,094
Total cost = \$0	10,631	0.96%	1,093,962	-	0.00%	151,253,094
Total cost < \$5	16,902	1.53%	1,077,060	\$42,108	0.03%	151,210,986
Total cost > \$1,500 excl S100	1,748	0.16%	1,075,312	\$5,604,719	3.71%	145,606,267
Null VACS codes	138,911	12.58%	936,401	\$28,812,751	19.05%	116,793,516
Other exclusions	315	0.03%	936,086	\$223,648	0.15%	116,569,868
Total exclusions	168,507	15.26%	936,086	\$34,683,226	22.93%	116,569,868
S100 adjustments		0.00%	936,086	\$3,460,669	2.29%	113,109,199
Final acute validated dataset	936,086	84.74%	936,086	\$113,109,199	74.78%	\$113,109,199

(Note: includes data collected for Allied Health from a non-VACS funded hospital not used for defining weights)

Hospitals are responsible for assigning the VACS codes. Some hospitals requested that AS extract those episodes with valid VACS codes and others requested AS extract all records. This includes for example privatised clinics and clinics funded separately to VACS payments (and therefore not assigned a VACS code). AS assigned a 'null' VACS code for such cases. Consequently some hospitals recorded a large number of 'null' VACS codes as having been excluded from the study.

In relation to records > \$1,500, comments were provided from the hospitals as follows:

- Hospital 2, 7 and 13

The majority of the high cost records are a result of a system error that failed to separate the inpatient encounter from the outpatient visit. The reported cost of the encounter includes both the VACS cost and the inpatient cost. The hospital advised to exclude all of these encounters due to the error. Clinics significantly affected were nephrology, infectious diseases and pre-admission.

Nephrology costs have been further complicated through the inclusion of external patient costs (patients who are seen by other hospitals such as Traralgon). Fluid and other supply costs for these patients are incurred by the hospitals and should have been excluded prior for the purposes of costing renal patients. The hospital estimates that the costs of these patients have been over-estimated by approximately 10% due to this error.

The exclusion of these records resulted in the exclusion of 13%, 2% and 4% of total costs respectively.

Action: Exclude 611 records totalling \$2,377,565

■ Hospital 8

All records were reviewed by the hospital with the majority being validated as correct. 4 records were noted for exclusion.

Action: Exclude 4 records totalling \$133,830

■ Hospital 12

All records were reviewed by the hospital with the majority being validated as correct largely due to high cost radiology and pharmacy costs. 3 records were noted for exclusion due to high operating theatre costs.

Action: Exclude 3 records totalling \$13,207

■ Hospital 10

No advice regarding these records was received from the hospital. All records greater than \$1,500 excl S100 drugs have been excluded.

Action: Exclude 31 records totalling \$67,590

■ Hospital 11

Hospital advised to exclude all records without citing reason.

Action: Exclude 96 records totalling \$360,611

- Hospital 1

All records reviewed by the hospital with advice that all were to be excluded due to utilisation errors.

Action: Exclude 73 records totalling \$160,066

- Hospital 3

560 of the high cost cases were due to the inclusion of patients funded through the Dialysis Program grant. These patients were subsequently excluded. The hospital advised to exclude all remaining records due to utilisation errors.

Action: Exclude 887 records totalling \$2,330,959

- Hospital 4

Reasons for exclusion not forwarded by the hospital, however a significant majority of cases > \$1,500 were identified as valid due to high cost pharmaceuticals. Hospital advised to exclude all records where total cost excl s100 drugs was greater than \$1,500.

Action: Exclude 76 records totalling \$169,802

- Hospital 5

5 records reviewed by the hospital with 4 excluded due to unreliable feeder systems and changes in standard costs. Remaining record advised to be correct by hospital.

Action: Exclude 4 records totalling \$36,825

- Hospital 6

All records reviewed by the hospital with the majority validated as correct due to high imaging and pharmacy costs. 2 records were noted for exclusion.

Action: Exclude 2 records totalling \$7,905

We note that the tight timeframes involved appeared not to provide some hospitals with sufficient time to review their data with a number of hospitals advising us to exclude all cases or include all cases on the basis of spot testing/reviewing.

Our review of the remaining cases indicates that there are still 31,704 of cases with unusually low costs ie < \$10 that still remains in the data. While these records are not material given the total records in the dataset, they nevertheless indicate potential costing anomalies in the systems. In order to be consistent with prior years these cases remain in the dataset. However we believe that the overall quality of the data could be improved by longer lead times and more frequent auditing of the data by hospitals.

Recommendation 20: It is recommended that hospitals undertake data validity testing on a regular basis, eg monthly. This may be an issue for the CCSAA, who could incorporate a set of data quality checks in a costing standard. We understand that efforts are currently being made by the CCSAA to establish a quality tool kit. Periodic checks act as a quality control process and will facilitate detection of significant errors or systematic problems as they arise.

4.3 Unallocated Costs

As reported last year, feeder systems for Diabetes costs do not exist at hospitals 7 and 13 resulting in a continued understatement of approximately \$0.5m in admitted and VACS costs. The issues with the feeder systems for Allied Health costs have been rectified and the hospital did not note any other unallocated costs. The unallocated costs constitute < 1% of total matched costs and are therefore unlikely to have a material affect on average costs.

4.4 Section 100 drug costs

Section 100 costs were separately identified by some hospitals to enable subsequent deletion from the study. Other hospitals confirmed that Section 100 costs had already been excluded from their costing database. A summary by hospital is provided below.

Table 4-2 S100 costs and adjusted total cost

Hospital	Final Validated records	Total cost	S100 costs	Final validated cost
A	80,506	15,311,910	1,609,918	13,701,992
B	152,900	15,927,992	43,598	15,884,394
C	6,341	401,055	-	401,055
D	71,750	7,856,756	-	7,856,756
E	129,537	12,879,405	21,368	12,858,037
F	168,218	19,662,873	851,901	18,810,972
G	11,158	1,833,364	955	1,832,409
H	54,681	7,470,190	-	7,470,190
I	12,954	1,208,869	4,323	1,204,546
J	101,880	15,373,272	-	15,373,272
K	86,180	10,727,856	758,271	9,969,585
L	28,180	2,502,311	-	2,502,311
M	31,801	5,414,017	170,335	5,243,682
	936,086	116,569,868	3,460,669	113,109,199

(Note: includes records and total costs for allied health data)

S100 costs are an issue as not all the costs of S100 drugs attract a rebate from the Commonwealth. Conditions under which a rebate is applicable are set out in section 100 of the National Health Act. One hospital commented that only around 20% of their S100 drugs prescribed attract a rebate. However it is unlikely that hospitals can readily identify those cases where a rebate would apply. Therefore for the study, all S100 costs have been excluded.

Recommendation 21: *It is recommended that the rebateable component of Section 100 costs should be excluded from costing of VACS encounters, or at least the non rebateable cost should be separately identified and considered in terms of it's impact on the cost estimates for VACS encounters and the implications for cost feeder systems.*

4.5 Less than 3 hospitals' data per VACS clinic

The VACS encounter data was initially reviewed to determine where there are less than 3 hospitals contributing data. In this year's study there are 4 VACS clinics all of which contain only two hospital's data. The number of cases for these VACS categories are shown in the table below.

Table 4-3 VACS clinics with less than 3 hospitals contributing

VACS Clinic	Description	N Hospitals	Total Cases
115	Developmental Neurological Disability	2	977
311	Orthopaedic Applications	2	14580
501	Paediatrics surgical	2	1215
601	Audiology	2	7414

4.6 Encounter costs by VACS clinic

The average encounter cost and distribution statistics are shown in the following table for each VACS category. Refer to the list of abbreviations and acronyms at the front of this report for the full title and definition for some column headings.

The table overleaf also provides a comparison to 1998-99 average cost by VACS category. Note that only three VACS categories have changed by more than 30% since 1998-99. These categories are respiratory, psychiatry & behavioural disorders and reproductive medicine. These categories are relatively low volume so some variability is expected.

Table 4-4 Average outpatient cost by VACS

VACS Clinic	Description	1999/2000 Data				1998-99 Data		% change
		T Cases	SD Tcost	Avg Cost	RSEM	T Cases	Avg Cost	
101	General Medicine	30,436	169.57	146.31	0.01	46,505	129.95	11%
102	Allergy	2,256	164.45	237.69	0.01	5,659	201.72	15%
103	Cardiology	10,959	212.59	238.14	0.01	15,629	221.89	7%
104	Diabetes	11,584	93.15	121.17	0.01	13,099	99.32	18%
105	Endocrinology	10,589	148.71	153.95	0.01	14,030	135.55	12%
106	Gastroenterology	20,889	179.46	166.88	0.01	22,455	131.24	21%
107	Haematology	12,350	205.45	135.55	0.01	20,224	111.58	18%
108	Nephrology	17,720	188.28	201.13	0.01	19,601	178.21	11%
109	Neurology	10,846	172.34	198.92	0.01	13,871	159.30	20%
110	Oncology	21,099	272.28	215.80	0.01	25,766	157.91	27%
111	Respiratory	7,472	254.77	272.75	0.01	10,988	159.06	42%
112	Rheumatology	12,196	136.59	149.03	0.01	12,713	131.27	12%
113	Dermatology	18,934	161.90	137.85	0.01	19,805	130.14	6%
114	Infectious diseases	12,414	199.81	254.41	0.01	12,788	253.51	0%
115	Developmental Neurological Disability	977	168.91	223.73	0.02	3,794	270.96	-21%
201	General surgery	36,421	170.42	132.34	0.01	44,968	137.77	-4%
202	Cardiothoracic	3,443	278.01	238.75	0.02	3,179	213.56	11%
203	Neurosurgery	10,691	172.98	121.68	0.01	9,021	111.82	8%
204	Ophthalmology	73,794	76.24	95.94	0.00	83,625	84.28	12%
205	Ear, nose and throat	35,510	111.52	116.36	0.01	44,436	98.32	15%

VACS Clinic	Description	1999/2000 Data				1998-99 Data		% change
		T Cases	SD Tcost	Avg Cost	RSEM	T Cases	Avg Cost	
206	Plastic surgery	46,039	91.51	94.38	0.00	48,221	94.51	0%
207	Urology	17,121	128.54	105.80	0.01	21,436	112.15	-6%
208	Vascular	9,639	168.05	138.78	0.01	10,609	128.67	7%
209	Pre-admission	21,001	174.42	215.55	0.01	21,073	202.52	6%
301	Dental	15,102	133.43	110.86	0.01	15,340	121.11	-9%
310	Orthopaedics	67,363	106.98	122.80	0.00	73,605	117.94	4%
311	Orthopaedic Applications	14,580	57.46	54.51	0.01	13,811	55.94	-3%
350	Psychiatry & Behavioural Disorders	2,391	198.53	320.40	0.01	1,079	188.76	41%
401	Family Planning	4,194	77.47	112.84	0.01	4,214	129.34	-15%
402	Obstetrics	66,610	75.51	100.31	0.00	81,392	94.51	6%
403	Gynaecology	14,830	94.24	108.24	0.01	19,039	132.63	-23%
404	Reproductive Medicine	7,290	127.80	97.40	0.02	1,419	53.65	45%
405	Dysplasia and Colposcopy	7,510	73.43	120.13	0.01	7,616	96.00	20%
501	Paediatrics surgical	1,215	121.27	179.87	0.02	1,450	180.45	0%
502	Paediatrics medical	4,252	150.00	156.94	0.01	3,721	175.97	-12%
550	Emergency Medicine	89,331	106.57	132.77	0.00	70,446	123.02	7%
601	Audiology	7,414	31.85	38.41	0.01	8,683	31.28	19%
602	Nutrition	19,767	55.89	50.74	0.01	12,422	45.04	11%
604	Occupational Therapy	21,751	70.32	60.19	0.01	17,329	55.35	8%
605	Physiotherapy	39,784	52.84	49.33	0.01	36,566	52.19	-6%
606	Podiatry	5,643	133.38	80.73	0.02	4,790	89.79	-11%
607	Speech Pathology	8,874	78.57	93.59	0.01	7,963	89.48	4%
608	Social Work	27,148	109.18	66.26	0.01	26,423	56.61	15%
609	Other Allied Health Services	56,657	114.59	83.90	0.01	50,183	90.96	-8%
	Total average	936,086	138.73	120.83		1,000,986	114.44	5%
	Total average excl allied health emergency medicine	659,717	149.52	134.68		766,181	123.98	8%

Note there are no VACS code 603 "optometry" records in the data-set. This is consistent with previous studies.

The table below provides the average encounter costs by VACS component.

Table 4-5 Average encounter costs by VACS component

VACS Clinic	Description	T Cases	Avg Tcost	Avg Allied	Avg Emerg	Avg Imag	Avg MedSurg	Avg Med Non Surg	Avg Nurse	Avg Pathology	Avg Pharm	Avg Theatre OR	Avg Theatre Non OR	Avg Other
101	General Medicine	30,436	146.31	5.77	0.60	19.67	21.24	60.86	17.23	14.08	5.38	0.01	0.37	0.37
102	Allergy	2,256	237.69	0.60	-	3.96	35.15	145.27	10.93	13.16	28.00	-	0.06	-
103	Cardiology	10,959	238.14	3.70	-	23.73	15.97	170.23	13.37	5.75	1.78	-	2.58	0.16
104	Diabetes	11,584	121.17	11.97	-	5.49	22.13	43.31	20.39	13.93	2.99	-	0.27	-
105	Endocrinology	10,589	153.95	7.33	-	19.04	20.14	45.24	18.23	24.23	17.78	-	0.02	1.22
106	Gastroenterology	20,889	166.88	2.19	-	21.12	31.02	51.31	20.67	19.40	19.64	-	0.60	0.10
107	Haematology	12,350	135.55	1.92	-	25.51	8.57	29.33	22.69	35.14	7.13	-	0.06	4.42
108	Nephrology	17,720	201.13	7.11	-	14.68	16.80	52.89	44.61	38.84	24.99	0.00	0.18	-
109	Neurology	10,846	198.92	6.38	-	27.91	38.91	82.09	19.01	5.33	18.33	-	0.20	-
110	Oncology	21,099	215.80	3.57	-	66.95	31.97	46.10	23.57	23.67	15.91	-	0.03	2.98
111	Respiratory	7,472	272.75	72.01	0.05	54.33	18.78	88.51	18.63	8.56	9.70	0.05	0.19	1.14
112	Rheumatology	12,196	149.03	4.33	-	19.17	22.69	56.27	16.61	13.24	15.79	-	0.11	-
113	Dermatology	18,934	137.85	1.64	0.19	3.68	26.17	34.45	18.23	26.38	25.97	-	0.04	0.39
114	Infectious diseases	12,414	254.41	2.77	-	14.61	14.41	112.37	10.21	44.08	54.86	-	0.05	-
115	Developmental Neurological Disability	977	223.73	47.37	0.45	12.40	106.92	29.31	16.27	5.09	4.60	0.56	-	-
201	General surgery	36,421	132.34	1.69	0.16	26.87	47.14	14.97	16.06	8.39	3.30	12.36	0.04	0.55
202	Cardiothoracic	3,443	238.75	19.41	-	62.43	91.98	27.74	12.48	16.24	7.28	-	0.12	-
203	Neurosurgery	10,691	121.68	6.67	0.32	54.69	25.66	13.61	13.00	2.60	1.64	2.11	0.07	0.57
204	Ophthalmology	73,794	95.94	17.07	0.00	1.53	43.18	3.25	24.58	1.70	3.51	-	-	0.03
205	Ear, nose and throat	35,510	116.36	26.58	0.36	8.50	48.94	4.54	20.27	3.77	2.31	0.02	0.01	-
206	Plastic surgery	46,039	94.38	7.91	0.10	7.69	40.94	4.00	21.90	5.63	1.41	0.02	0.01	3.95
207	Urology	17,121	105.80	1.54	-	30.37	36.35	1.48	23.51	8.58	2.95	-	0.06	0.14
208	Vascular	9,639	138.78	2.83	-	35.04	43.24	28.44	21.51	4.45	2.66	-	0.12	-

VACS Clinic	Description	T Cases	Avg Tcost	Avg Allied	Avg Emerg	Avg Imag	Avg MedSurg	Avg Med Non Surg	Avg Nurse	Avg Pathology	Avg Pharm	Avg Theatre OR	Avg Theatre Non OR	Avg Other
209	Pre-admission	21,001	215.55	4.31	-	22.96	43.09	5.53	36.40	28.10	1.42	67.08	-	5.86
301	Dental	15,102	110.86	15.05	0.49	9.00	40.40	11.71	16.48	5.04	7.88	0.01	-	3.48
310	Orthopaedics	67,363	122.80	7.94	0.31	34.01	47.94	4.73	24.15	1.83	0.79	0.10	0.02	0.08
311	Orthopaedic Applications	14,580	54.51	53.35	0.50	0.15	0.00	-	0.08	-	0.07	0.13	-	-
350	Psychiatry & Behavioural Disorders	2,391	320.40	240.11	-	19.20	-	28.24	22.70	3.52	4.03	-	-	2.22
401	Family Planning	4,194	112.84	4.31	-	2.54	5.81	36.85	25.34	30.48	6.68	-	-	-
402	Obstetrics	66,610	100.31	3.40	-	5.47	26.69	17.01	33.36	12.85	0.82	-	-	-
403	Gynaecology	14,830	108.24	2.88	-	9.21	13.00	24.46	33.04	20.75	3.78	-	-	0.48
404	Reproductive Medicine	7,290	97.40	2.83	-	4.70	5.82	19.38	3.24	55.53	5.21	-	-	-
405	Dysplasia and Colposcopy	7,510	120.13	0.95	-	0.71	12.37	26.15	37.64	41.14	0.41	-	-	-
501	Paediatrics surgical	1,215	179.87	4.68	-	23.03	128.20	0.38	18.27	2.03	2.66	-	-	-
502	Paediatrics medical	4,252	156.94	13.10	-	8.19	75.84	6.57	36.46	11.66	4.54	-	-	-
550	Emergency Medicine	89,331	132.77	0.61	85.36	10.96	13.36	2.81	7.58	7.01	4.07	0.03	-	-
601	Audiology	7,414	38.41	35.54	2.35	0.02	0.17	-	0.39	-	0.01	-	-	-
602	Nutrition	19,767	50.74	48.87	0.34	0.28	0.02	0.13	0.29	0.31	0.20	-	-	-
604	Occupational Therapy	21,751	60.19	59.25	0.14	0.16	0.02	0.02	0.05	0.08	0.02	-	0.02	-
605	Physiotherapy	39,784	49.33	46.90	0.25	0.80	0.04	0.13	0.24	0.24	0.19	-	0.05	-
606	Podiatry	5,643	80.73	43.80	-	5.18	1.08	9.24	9.43	3.29	8.29	-	0.12	-
607	Speech Pathology	8,874	93.59	90.01	0.37	0.23	0.00	-	1.48	-	0.00	-	0.01	1.26
608	Social Work	27,148	66.26	65.14	0.16	0.25	0.01	-	0.04	0.34	0.01	-	0.01	-
609	Other Allied Health Services	56,657	83.90	55.96	0.47	3.03	2.37	10.74	7.63	2.78	0.51	0.02	-	-

A summary of the key changes in service cost groups for the 3 clinics experiencing an average cost increase of 30% or more is detailed below:

Changes in the average cost of respiratory cases appear to be driven by increases in:

- Allied Health;
- Imaging;
- Medical Non Surgical costs; and
- Minor decreases were noted in the average pharmaceutical costs.

Increases in the average cost of psychiatry and behavioural disorders appear to be driven by changes in:

- Allied health;
- Imaging;
- Nursing; and
- These have been offset to some degree by a significant decrease in Medical Non Surgical costs.

The most significant cost changes in reproductive medicine have occurred in:

- Med Non Surgical;
- Pathology;
- Pharmaceuticals; and
- This has been offset by a significant decrease in nursing costs.

The table below shows the total number of records and the average cost, by major VACS categories for this year with comparatives for last year.

Table 4-6 Average costs by VACS categories

VACS Category	1999/2000 Data				1998/99 Data				% change
	T Cases	Avg Tcost	Std Dev Tcost	RSEM	T Cases	Av Tcost	Std Dev Tcost	RSEM	
Allied Health	187038	66.28	91.29	0.00	164359	66.33	98.48	0.00	0%
Dental	15102	110.86	133.43	0.01	15340	121.11	115.29	0.01	-9%
Emergency Medicine	89331	132.77	106.57	0.00	70446	123.02	90.92	0.00	7%
Medical Categories	200721	178.91	194.32	0.00	256927	152.16	197.91	0.00	15%
Obstetrics & Gynaecology	100434	103.28	83.48	0.00	113680	101.78	148.13	0.00	1%
Orthopaedics Categories	81943	110.65	103.34	0.00	87416	108.15	105.44	0.00	2%
Paediatrics	5467	162.04	144.41	0.01	5171	177.23	188.76	0.01	-9%
Psychiatric Related Services	2391	320.40	198.53	0.01	1079	188.75	166.46	0.03	41%
Surgical Categories	253659	118.96	132.00	0.00	286568	111.30	114.37	0.00	6%

VACS Category	1999/2000 Data				1998/99 Data				% change
	T Cases	Avg Tcost	Std Dev Tcost	RSEM	T Cases	Av Tcost	Std Dev Tcost	RSEM	
Total	936086				1000986				

As discussed earlier, the most significant changes have occurred in VACS categories subject to relatively low volumes. Increases in the average cost of Reproductive Medicine and Respiratory have contributed to the 15% increase in medical clinic costs, while the psychiatric related services clinic are reflective of the changes in psychiatry and behavioural disorders.

We further reviewed the Nephrology (VACS 108) data due to the advised overstatement of renal costs from hospitals 7. Hospital 7 contributes 27% of the data and therefore has a significant impact on the derived average cost. The high number of records contributed by the hospital has also contributed to the low RSEM value. The weighted average cost for all cases is \$201.13, the weighted average cost of all cases excluding hospital 7 is only \$161.84, a difference of 20% with the average cost of hospital 7 cases only calculated at \$309, 35% greater than the weighted total average. 3 SCG's were affected by the inclusion of external patient costs, peritoneal dialysis (outpatients only, estimated overstatement \$31,051), haemodialysis (inpatients only, estimated overstatement \$197,271) and renal (inpatients and outpatients, estimated overstatement \$753,342). Patient volumes were used as a proxy to allocate the \$753,342 overstatement between inpatients and outpatients. Total costs of \$31,051 and \$376,056, or 14% of total uncleaned costs should be removed from the total outpatient costs for clinic 108. This has the impact of reducing the average cost of nephrology outpatients to \$226.86 for hospital 7 and decreasing the total average cost for all hospitals from \$201.13 to \$181.47.

The following table details those VACS clinics and hospitals where the total cases contributing to the derivation of the average cost is greater than 25% and the average total cost for the hospital is greater than 125% of the average total cost for all hospitals.

VACS Clinic	Hospital contributing > 25% of total cases and whose total average cost is greater than 125% of the total average cost for all hospitals
102 – Allergy	Hospital 3
108 – Nephrology	Hospital 7
502– Paediatric medicine	Hospital 7
550 – Emergency medicine	Hospital 8
607 – Speech pathology	Hospital 8

Commentary

102 – Allergy: A review of the average costs within each SCG showed that the higher average cost for hospital 3 was driven primarily by an average MedNonSurg cost of 4 times the other hospitals. We have reviewed these cases and it appears that the higher average MedNonSurg cost occurs across the board and is not due to any one particular case or group of cases. The majority of cases appear to attract one of two standard costs, \$146.86 and \$354.49. The hospital advised that in November 1999 a review of their Clinical immunology/allergy unit resulted in the reallocation of the split of costs between inpatient and outpatient services which has driven the change in cost from \$146.86 to \$354.49. This has been the primary cause for the increase in costs.

108 – Nephrology: As discussed above this is primarily due to the inclusion of external patient costs. These cases have been revised and a revised average cost based on the decreased cost of cases has been calculated at \$181.47.

502 – Paediatric medicine: Only three hospitals report cases under the paediatric medical category, hospital 7 (2609 cases), hospital 10 (1642 cases) and hospital 5 (1 case). Given the low volumes reported by hospital 5, this clinic should also be noted as having a small representative hospital sample.

550 - Emergency medicine: As discussed earlier only four hospitals contributed data under this VACS category. As emergency departments are currently funded under a mix of block and WIES funding not all hospitals submitted data under this category. We understand that a review of the funding for emergency departments is currently being undertaken. As such the data received in this years study should be supplemented with further data and analysis in order to determine a more robust cost for non-admitted emergency cases.

5 Rehabilitation

The following presents analysis of hospital admitted patient data from designated rehabilitation units only. The data is based on the CRAFT (Casemix Rehabilitation and Funding Tree) classification. Further detail and additional analysis of the CRAFT data is provided in the separate CRAFT report.

There are two types of rehabilitation patients of relevance in the study:

- 1 Level 1: spinal, amputation and head injury (where the rehabilitation episode follows the acute care episode in which the injury is the principal diagnosis). Level 1 patients are categorised as Care type 2 patients in the VAED.
- 2 Level 2: stroke, orthopaedic, neurological, and other rehabilitation services. Level 2 patients are categorised as Care type 6 patients in the VAED.

Information on the costs associated with the treatment of Level 1 and 2 patients, grouped to the CRAFT classification, was forwarded by five Victorian hospitals for inclusion in the study. The contributing hospitals are St Vincent's Hospital Melbourne; Royal Talbot; Sunshine Hospital; Goulburn Valley and Austin and Repatriation General Hospital.

5.2 Average cost and cost weights

The costing study provides estimated average costs for rehabilitation classes that are relevant for establishing relative values for use in the pricing of casemix products but do not reflect pricing values (refer to Section 1.3 for further discussion of this issue).

The average cost estimates reported here do not reflect the final cost relativities for application in the casemix model. The estimates include the cost of activities that are funded outside of the casemix component of hospital funding policy, such as equipment and case related activities such as aged care assessment. Similarly patient types that have a separate revenue source are included in these cost estimates such as DVA patients and private patients. The Department will adjust for these factors in deriving the cost weights for CRAFT categories.

5.3 Data matching

Data matching of VAED to the hospitals' clinical costing system data was undertaken by AS. A summary of the matched records and final validated dataset appears in the table below.

Table 5-1 Rehabilitation final validated dataset excluding same day cases

Hospital	Matched cases (#)	Final Validated records	% of total	Matched cost (\$)	Final Validated cost	% of total
1	781	776	99.36%	7,028,110	7,027,014	99.98%
2	445	442	99.33%	5,134,430	5,080,060	98.94%
5	385	385	100.00%	3,622,250	3,622,250	100.00%
3	1355	487	35.94%	3,200,963	2,840,869	88.75%
4	56	56	100.00%	225,710	225,710	100.00%
	3,022	2,146	71.01%	19,211,464	18,795,904	97.84%

The final validated records represent exclusions where the average cost per day was greater than \$3,000 (1 case), records where no CRAFT code was recorded (6 cases) and same day cases (869 records). Same-day rehabilitation cases are treated separately for the purposes of funding compared to non same-day cases. The same-day rehabilitation cases also relate largely to only one hospital. Given these issues, the following tables exclude same day records from the analysis.

Short stay cases (overnight stay of less than four days) also attract separate funding. To reflect this, the average costs for short stay cases are provided separately.

5.4 Data integrity testing

The project team undertook a range of data integrity checks and asked hospitals to review and confirm the validation of high or low cost cases for rehabilitation patients. These checks included:

- total costs equal \$0;
- negative total costs;
- total cost < \$50;
- average multi-stay cost <\$300;
- cases where the average cost per day exceeds \$3,000;
- missing CRAFT code; and
- missing CRAFT split code.

A total of seven cases were deleted through the editing process. We note that this is a significant improvement on the 67 exclusions that occurred last year. The table below depicts the total number of records deleted.

Table 5-2 CRAFT exclusions, records and total dollars

	Cases			Dollars		
	Number	% of total matched	Cummulative case balance	Dollars	% of total matched	Cummulative cost balance
Total matched records	3,022	100.00%	3,022	19,211,464	100.00%	19,211,464
Exclusions						
Total cost doesn't balance	-	0.00%	3,022	-	0.00%	19,211,464
Total cost <= \$0	-	0.00%	3,022	-	0.00%	19,211,464
Total cost < \$50	-	0.00%	3,022	-	0.00%	19,211,464
Total multistay cost < \$300	-	0.00%	3,022	-	0.00%	19,211,464
Average multiday cost > \$3,000	1	0.03%	3,021	3,316	0.02%	19,208,148
Missing CRAFT code	6	0.20%	3,015	68,868	0.36%	19,139,280
Total exclusions	7	0.23%	3,015	72,183	0.38%	19,139,280
CRAFT validated dataset	3,015	99.77%	3,015	19,139,280	99.62%	19,139,280
Same day cases	869	28.76%	2,146	343,376	1.79%	18,795,904
Final CRAFT validated dataset	2,146	71.01%	2,146	18,795,904	97.84%	18,795,904

NB: CRAFT records defined as those with care type 2, 6 or 7

The number of records by care type (rehabilitation level) are shown below. Total validated records are 2,146 including short stay cases (ie less than four days stay) but excluding same-day cases.

Table 5-3 Case numbers and total costs by modified CRAFT category

Modified CRAFT	Total Cases	%	Total Cost	%
Level 1	285	13%	3,120,285	17%
Level 2	1861	87%	15,675,619	83%
Total	2146	100%	18,795,904	100%

The number of rehabilitation cases forwarded for the cost weights study is 2,146 compared to last year's total records of 2,040 (excludes same-day cases). A comparison, by hospital, is provided below.

Table 5-4 Comparison of 98-99 to 99-00 data by hospital

Hospital	Final Validated records 98-99	Final Validated records 99-00	Final Validated cost 98-99	Final Validated cost 99-00
1	750	776	7,362,256	7,027,014
2	454	442	5,637,666	5,080,060
5	354	385	2,588,569	3,622,250
3	462	487	2,947,398	2,840,869
4	0	56		225,710
	2,020	2,146	18,535,888	18,795,904
6	20	0	546,180	0
Total	2,040	2,146	19,082,068	18,795,904

The following tables profile the number of cases within each CRAFT category and clinical sub-program, average costs and analysis of level 1 and 2 data. Some tables are repeated using the CRAFT modified split categories. Note that unless specified all tables (including above) exclude same-day cases.

5.5 Analysis of Level 2 rehabilitation episodes

For information, the table below provides the number of Level 2 records, by hospital, for each CRAFT category. Same-day cases are excluded. No data was provided for CRAFT category 14, Burns.

Table 5-5 CRAFT records by hospital, Level 2, LOS 4 days or more

CRAFT	CRAFT Classification	Total Cases	Hospital 1	Hospital 2	Hospital 5	Hospital 3	Hospital 4
0	Short Stay	134	86	10	6	30	2
1	Stroke / Neurological LB	307	56	63	98	80	10
2	Stroke / Neurological HB	305	49	73	122	48	13
3	Fractures LB	162	52	41	36	28	5
4	Fractures HB	82	24	12	29	12	5
5	Replace Hip / Knee LB	105	35	4	7	57	2
6	Replace Hip / Knee MB	131	72	1	18	40	
7	Replace Hip / Knee LB	55	29	1	19	5	1
8	Other Orthopaedic LB	106	41	21	9	34	1
9	Other Orthopaedic HB	81	35	12	18	12	4
10	Cardio / Pulmonary	45	4	36	1	3	1
11	Amputation	7		2	3	2	
12	Head Trauma / Major Trauma	42	5	29	4	3	1
13	Spinal	5		1	2	2	
15	Other Rehabilitation LB	137	15	69	5	43	5
16	Other Rehabilitation HB	157	19	67	8	57	6
	Total	1861	522	442	385	456	56

The table below indicates the number of cases by hospital and proportion of all level 2 cases where the length of stay is four days or more. All hospitals are consistent in the proportion of level 2 cases that are equal or more than four days LOS, except Hospital 4 which contributes around 3% of total cases.

Table 5-6 Cases by hospital, Level 2 only

HospCode	Total Cases	No. of cases	
		% of Total Cases	with LOS >= 4 days % of Total Cases
1	522	28%	436 23%
2	442	24%	432 23%
5	385	21%	379 20%
3	456	25%	426 23%
4	56	3%	54 3%
Total	1861	100%	1727 93%

The following indicates the number of cases by length of stay (days) for level 2 cases only. This shows that 28% of cases fall between 11 and 20 days LOS. The 50% cumulative also occurs around cases 11 - 20 days.

Table 5-7 Cases by LOS including short stay excl same day, Level 2

LOS	No of Cases	% of total	Cumulative %
1	25	1%	1%
2	64	3%	5%
3	45	2%	7%
4	31	2%	9%
5	22	1%	10%
6	53	3%	13%
7	85	5%	17%
8	90	5%	22%
9	76	4%	26%
10	79	4%	31%
11 - 20	514	28%	58%
21 - 30	276	15%	73%
31 - 40	164	9%	82%
41 - 50	133	7%	89%
51 - 60	74	4%	93%
61 - 70	44	2%	95%
71 - 80	25	1%	97%
81 - 90	21	1%	98%
91 - 100	14	1%	99%
> 100	26	1%	100%

5.6 Rehabilitation data issues

Two issues concerning the rehabilitation data are discussed below.

Data variability

All CRAFT groups had in excess of 50 cases for Level 2 rehabilitation, with the exception of Amputation (n=7), Head Injury (n=42), cardio/pulmonary (n= 45) and Spinal (n=5). Amputation was the only group for which RSEM exceeded 0.20.

These results suggest that with the exception of the four relatively low volume classes, estimates of the average costs are within the threshold indicator for reliability. Variances of reported cost within any CRAFT group could be reduced by applying data trimming to the episodes. The issue of trimming is essentially a funding policy issue and is not the subject of the cost weights study. However, the Department may consider trimming the rehabilitation data on the basis of for example:

- Length of stay cost outliers; or
- Using parametric or non-parametric methods.

Non parametric methods are arguably preferable given the nature of the underlying distribution (ie non-normal) although this could be overcome by applying parametric methods to logarithmic data. Determination of the appropriate method would require analysis of the distribution of data and modelling of alternative methods. The form of the funding formula also needs to be considered.

5.7 Clinical costing for rehabilitation cases

This year hospitals with designated rehabilitation units were requested to complete two submissions of the CCSAA survey forms if their costing practices differed between the acute site and the rehabilitation site. No separate surveys were received with hospitals indicating that costing is generally the same for all patient costing, including acute admitted and rehabilitation patient episodes. For example, if a hospital has allied health feeder systems in place then this would improve the quality of (allied health) patient costing data for all patient groups. Similarly if the hospital uses products such as bed days to allocate ward nursing costs (and lack of feeder systems prevents other intermediate products being used), then this would be the case for all patients within the ward(s) regardless of the patient type.

While this may be the case generally, it is possible that there are differences for separate rehabilitation facilities. Most hospitals for example noted that the majority of their efforts were focused on the acute site with a greater likelihood of data errors in rehabilitation specific areas.

Recommendation 22: Greater emphasis could be placed on identifying costing differences between acute and rehabilitation sites if the study afforded greater time to complete, submit and review the surveys. See recommendation 1 above.

5.8 Level 1 &2 average costs by CRAFT category

The final results of analysis of costing data are presented in the following tables. The first two tables present average costs for CRAFT categories with cost based distribution statistics. The second two tables present component cost data.

Table 5-8 Average costs by CRAFT category and distribution statistics, Level 1

CRAFT	Description	Total Cases	Avg Cost	Min Cost	Max Coxt	Std Dev	RSEM	Std error	IQR
0	Short Stay	120	705	224	2,426	317	0.04	28.97	527.31 to 786.06
11	Amputation	76	10,816	1,304	33,794	8,408	0.09	964.52	5,118.13 to 13,876.54
12	Head Inj / Trauma	71	26,135	2,413	142,243	28,200	0.13	3,346.77	8,824.60 to 31,950.07
13	Spinal	17	20,734	3,260	79,475	19,972	0.23	4,843.93	8,011.58 to 22,632.12
16	Other Rehab HB	1	5,614	5,614	5,614				5614 to 5614
	Total	285	10,948						

A review of the prior year tables for Level 1 compared to this years shows a significant increase in total volumes across all categories with the exception of other rehab HB. Average costs have fallen in the first three categories however spinal has increased from \$10,950 to \$20,734. This is likely to have been driven in part by the low volumes last year (3) compared to this year (17). To compare averages, the table is repeated for Level 2 only (overleaf).

Table 5-9 Average costs by CRAFT category and distribution statistics, Level 2

CRAFT	Description	Total Cases	Avg Cost	Min Cost	Max Coxt	Std Dev	RSEM	Std error	IQR
0	Short Stay	134	966	72	2,658	421	0.04	36.36	689.90 to 1,182.90
1	Stroke / Neuro LB	307	14,439	946	56,792	12,409	0.05	708.23	5,249.68 to 19,249.49
2	Stroke / Neuro HB	305	6,547	557	70,283	5,919	0.05	338.94	3,360.55 to 7,833.92
3	Fractures LB	162	11,176	1,969	30,955	6,990	0.05	549.22	5,685.42 to 16,299.42
4	Fractures HB	82	8,578	1,271	33,140	6,881	0.09	759.87	3,873.53 to 10,133.18
5	Replace Hip / Knee LB	105	5,793	1,834	34,541	4,179	0.07	407.80	3,268.80 to 6,655.74
6	Replace Hip / Knee MB	131	4,877	1,133	35,120	3,640	0.07	318.04	2,998.04 to 5,510.09
7	Replace Hip / Knee HB	55	4,487	1,819	12,941	2,241	0.07	302.21	3,017.70 to 5,327.50
8	Other Ortho LB	106	9,765	1,649	45,089	7,782	0.08	755.86	4,229.11 to 13,140.96
9	Other Ortho HB	81	6,617	544	21,295	4,400	0.07	488.89	3,467.04 to 8,929.76
10	Cardio / Pulmonary	45	10,841	1,711	41,091	8,683	0.12	1,294.38	4,739.45 to 12,734.92
11	Amputation	7	7,121	1,265	24,142	7,647	0.41	2,890.28	4,226.25 to 5,548.30
12	Head Inj / Trauma	42	14,030	946	67,986	15,078	0.17	2,326.59	5,592.06 to 14,821.51

CRAFT	Description	Total Cases	Avg Cost	Min Cost	Max Coxt	Std Dev	RSEM	Std error	IQR
13	Spinal	5	3,005	2,141	5,001	1,181	0.18	527.99	2,281.38 to 3,149.26
15	Other Rehab LB	137	10,036	1,426	31,462	6,973	0.06	595.71	4,761.47 to 13,779.67
16	Other Rehab HB	157	6,503	1,012	35,864	5,248	0.06	418.85	3,232.81 to 7,286.66
	Total	1861	8,423						

Overall volumes and costs remained fairly consistent between the two years. There were only minor movements in the RSEM between both years, with the larger numbers being reported in those categories with small volumes and high standard deviations.

Table 5-10 Level 1 Average costs by major component

CRAFT	Total Cases	Description	Avg Cost	Avg Allied	Avg Imaging	Avg MedSurg	Avg MedNonSurg	Avg Nursing	Avg Pathology	Avg Pharmacy	Avg Theatre	Avg Other
0	120	Short Stay	705	80	8	20	50	455	22	70	-	0
11	76	Amputation	10,816	1,848	112	1,599	315	6,273	179	464	12	14
12	71	Head Inj / Trauma	26,135	3,840	35	175	19,753	1,592	130	593	11	4
13	17	Spinal	20,734	2,275	82	829	4,004	12,728	134	682	-	0
16	1	Other Rehab HB	5,614	1,323	-	-	192	3,738	77	285	-	0
	285	Average all cases	10,948	1,624	47	528	5,265	3,033	98	343	6	5

We note that there is a significant degree of variability in the average component costs for Level 1 cases this year compared to last year. Overall average costs for amputation and head injury/trauma have fallen between the two years from \$12,234 to \$10,816 and \$30,350 to \$26,135 respectively. The average cost for spinal cases has increased however from \$10,850 to \$20,734. As stated earlier, this will be influenced significantly by the relatively small volumes.

Level 2 average costs are shown overleaf.

Table 5-11 Level 2 Average costs by major component

CRAFT	Total Cases	Description	Avg Cost	Avg Allied	Avg Imaging	Avg MedSurg	Avg MedNonSurg	Avg Nursing	Avg Pathology	Avg Pharmacy	Avg Theatre	Avg Other
0	134	Short Stay	966	169	22	147	108	396	21	98	3	3
1	307	Stroke / Neuro LB	14,439	2,551	108	1,746	1,268	8,050	171	510	20	14
2	305	Stroke / Neuro HB	6,547	1,095	35	407	755	4,007	61	179	0	8
3	162	Fractures LB	11,176	2,181	150	637	753	6,907	166	357	17	8
4	82	Fractures HB	8,578	1,363	69	336	537	5,772	135	324	40	3
5	105	Replace Hip / Knee LB	5,793	1,180	44	1,396	152	2,675	94	252	0	1
6	131	Replace Hip / Knee MB	4,877	887	27	605	137	2,951	60	199	-	11
7	55	Replace Hip / Knee HB	4,487	683	14	157	149	3,211	49	220	0	3
8	106	Other Ortho LB	9,765	2,168	101	967	583	5,304	122	395	122	4
9	81	Other Ortho HB	6,617	1,346	77	332	384	4,118	102	244	11	2
10	45	Cardio / Pulmonary	10,841	1,913	196	127	1,306	6,660	228	412	0	1
11	7	Amputation	7,121	1,646	21	901	613	3,672	111	157	-	0
12	42	Head Inj / Trauma	14,030	1,719	219	221	3,924	7,329	203	389	26	1
13	5	Spinal	3,005	278	0	651	123	1,634	56	264	-	0
15	137	Other Rehab LB	10,036	1,726	117	1,096	936	5,348	232	539	33	7
16	157	Other Rehab HB	6,503	1,102	141	806	575	3,380	134	331	29	4
	1861	Average all cases	8,423	1,506	85	793	743	4,827	121	321	20	7

Overall the average cost across all cases has remained fairly consistent between 98-99 and 99-00 with a small decrease in the overall average from \$8,764 to \$8,423. A significant decrease in average cost occurred in the spinal category which moved from \$16,943 to \$3,005. We note however that the number of cases has fallen similarly from 11 to 5, which is likely to have had an impact on the derivation of the average costs between the two years.

6 Synthesis of recommendations

Significant issues and findings of the study are discussed in the relevant sections of this report. They are summarised in the table below.

#	Recommendation
1	That consideration be given to the cost weight study being split into two phases to allow greater in-depth verification and checking of the initial extraction data by hospitals. The first phase should be in October and the second in January.
2	It is recommended that the CCSAA incorporate a set of data quality checks in a standard which hospitals would review periodically instead of (for some) once per year during the cost weights study. This is particularly important if the errors arising are due to major systemic problems and involve a significant proportion of costs. We understand that the CCSAA is in the process of developing an auditing tool kit which should help to facilitate improvements in this area.
3	It is recommended that sessional medical salary costs be allocated only to public admitted patients. The issue will require further consideration by DHS in consultation with the CCSAA especially in light of CCS9 which recommends that the cost weights be derived from the costs of public patients only.
4	It is recommended that the treatment and capture of S100 rebatable drugs be modified to exclude the rebatable portion from both inpatient and VACS encounters and that the non rebatable portion be separately identified and considered in terms of its impact on the costs derived.
5	For the purposes of clinical costing, recoveries from privatised or co-located facilities should be treated as a recovery against expenses.
6	To increase consistency in costing methods, hospitals should as far as practicable, designate departments as direct and indirect in accordance with CCS1.

7	CCS 2 survey responses may be improved if the underlying service costs / departments listed in CCS 2 were more consistent with the (direct) departments in CCS 1
8	Hospital insurances, blood and other such costs that are a valid cost of treatment, but paid for by the Department should be treated uniformly by all hospitals. This issue needs to be reviewed and a consistent approach clearly outlined for all hospitals to adhere to.
9	It is recommended that a more detailed audit of hospital clinical costing systems be undertaken to provide assurance on the status of such systems, treatment of particular issues and compliance with costing standards.
10	We recommend that for DRGs where data is not reliable as tested above, the Department apply three year averaging for the purposes of deriving cost weights.
11	Further analysis of funding of pharmaceuticals is required to ensure the accuracy and appropriateness of weights for specific DRGs.
12	The extent of hospitals exposure to movements in the exchange rate and the degree to which they are protected by fixed prices offered by bulk purchasing bodies such as Hospital Supplies Australia needs to be considered.
13	That a same-day DRG be created
14	Three year averaging should be applied to these DRG's until such time as the change in clinical practice is confirmed by industry.
15	Exclude data for specified hospitals as detailed for individual DRG's.
16	Further investigation of the grouping of procedure code 3034200 needs to be conducted in order to validate the movement in costs between J06B and J07B.

17	The nature of the casemix within each of these DRG's suggests that three year averaging should be considered for these DRG's
18	Further analysis of DRG R01A to R61C and R63Z is required to explore mechanisms to better differentiate between high and low cost treatments.
19	With respect to prosthetic costs, we recommend the exclusion of these outlier cases prior to determining the average cost weight for the respective DRG's. The fact that these cases did not exceed the outlier boundary points for their respective DRG's does however indicate that significant losses will be incurred by hospitals undertaking these unusual cases.
20	It is recommended that hospitals undertake data validity testing on a regular basis, eg monthly. This may be an issue for the CCSAA, who could incorporate a set of data quality checks in a costing standard. We understand that efforts are currently being made by the CCSAA to establish a quality tool kit. Periodic checks act as a quality control process and will facilitate detection of significant errors or systematic problems as they arise.
21	It is recommended that the rebateable component of Section 100 costs should be excluded from costing of VACS encounters, or at least the non rebateable cost should be separately identified and considered in terms of it's impact on the cost estimates for VACS encounters and the implications for cost feeder systems.
22	Greater emphasis could be placed on identifying costing differences between acute and rehabilitation sites if the study afforded greater time to complete, submit and review the surveys. See recommendation 1 above.

On further analysis, the 27 recommendations listed above can be summarised in to five key areas that need detailed attention.

1. **Standards and surveys improvement;**
2. **Quality control and audit;**
3. **Prosthetic systems;**
4. **Outlier payment formula; and**
5. **Specific DRG reviews.**

In order to progress each of these key issues forward in a constructive manner we recommend that VACCDI and the Victorian Clinical Advisory Committee develop a workplan that formally assesses the priorities and provides a timeline in which to review the recommendations and oversee their implementation. To assist in the advancement of this process the project team has outlined some of the key elements which it believes needs to be addressed within each of the key areas of the workplan.

6.1 Standards and survey improvement

In relation to the costing standards, the study has identified several issues for consideration in future cost weight studies and for the CCSAA. These issues include suggested improvements to the study survey tool and underlying costing standards, such as improved consistency between CCS 1 and 2 and more detailed survey questions to identify differences in costing methods for rehabilitation cases. The latter may be of particular relevance for separate rehabilitation facilities that may have different feeder systems to other campuses within a hospital network.

In addition a number of issues were raised about the subjective nature of relying on hospital self reporting for consistency of assessment with respect to CCS 1, 2 and 8.

6.2 Quality control and the need for a data quality toolkit

During the course of the study, it was clear that those hospitals which regularly utilised the patient costing system (PCS) data for management information purposes were not only more advanced in their processing, but also more vigilant in their review and quality checking of the data.

In almost all hospitals however, apparent anomalies were still detected after the data was extracted (nil balances, negative balances in some DRG's, etc). These were referred back to the hospitals for review and recommendations as to how they should be addressed.

The decreasing number of exclusions due to edit errors indicates that hospitals are paying more attention to data quality and audit checks however there were still a number of significant issues which remained undetected until the verification process was underway.

We have therefore made various recommendations in this report regarding the conduct of future studies. In particular, we have recommended that **prior to the next cost weight study** and certainly before hospitals finish processing for the current year, that a data quality tool kit be developed to guide hospitals in validating their data. We understand that a data quality tool kit is currently being developed by the CCSAA. Sufficient priority should be allocated within the workplan to ensure that the toolkit is developed, tested and implemented prior to the commencement of the next cost weight study.

The mere existence of such a tool kit would give hospitals a handy quality check list and should encourage them to undertake these data quality checks as part of their routine tasks. This is important with new and inexperienced casemix staff who may not have previously been involved with data quality checks but who could follow a tool kit check list if it was available to them.

The benefit to the Department would be to improve and to correct errors before the annual study and more importantly before the data is actually extracted from the hospitals. The annual study should test hospital compliance with the quality checks recommended in the tool kit.

The application of a quality tool kit should reduce the number of cases, which have to be eliminated from the database each year due to errors. Further it would also enable reprocessing to occur before the annual study data extraction, thus ensuring that where errors are detected due to an over or under application of costs that the corrections are made and costs appropriately adjusted over the whole hospital case mix.

The implementation of greater quality checks of PCS output data has obvious advantages for hospitals not the least being enhanced credibility with clinicians as users of the data.

Both the standards survey and quality control and audit are integral elements to maintaining and improving the credibility and veracity of the cost weight data and subsequent study. In order to maximise the integrity of the process VACCDI and the Clinical Costing Advisory Committee should consider the benefits and costs associated with splitting the current study into two phases to enable more indepth examination of the data by both the project team and the hospitals themselves.

6.3 Prosthetic systems

Prosthetics continue to be a high cost item and an area of high exposure to hospitals especially given the recent movements in the exchange rate. A review of prosthetic costs this year again highlighted problems with the data even within those hospitals reporting reliable feeder systems. Examples of some of the issues include missing prosthetic costs from a significant number of cases expected to attract a prosthetic and unreasonably low prosthetic costs.

We recommend that a separate review of prosthetic systems and costs be undertaken to assess the status of such systems in the State, the prosthetic data collected and the quality of the information currently gathered. The project should also establish a reasonable basis on which future prosthetic costs could be based.

6.4 Specific DRG reviews

The clinical review also raised a number of DRG's that appear to capture a wide ranging cost of treatment. Examples of this include the chemotherapy and lymphoma and leukaemia DRG's. In order to improve the robustness of the DRG's as a funding base further investigation of the specific clinical and treatment drivers within these DRG's needs to occur to establish whether new diagnosis and/or procedure codes are required, whether improved DRG classifications are needed and or whether more appropriate methods of funding or establishing trim points can be derived.

Appendix A

Average cost and statistics by VIC DRG 4.1

Appendix B

Average component costs by VIC DRG 4.1

Appendix C

Victorian Modifications to AR-DRG Version 4.1

Changes have been made to AR-DRG Version 4.1 to reflect Victorian DRG modifications for DRG A04Z. The original AR-DRG 4.1 codes were provided from Allegiance Systems. The numbers below refer to the number of final validated inlier records (as defined by Vic AR-DRG 4.1)

Bone Marrow Transplant

A04Z (Bone Marrow Transplant) has been split into A04A (Allogenic Bone Marrow Transplant, equivalent to VicDRG11) and A04B (Non-Allogenic Bone Marrow Transplant, equivalent to VicDRG12). This is a complete split as VicDRG's 11 and 12 are not assigned to any other DRG. As a result of this modification, no cases remain in AR-DRG A04Z

Outcome: A04Z (152 cases) were split into new Vic AR-DRG 4.1 codes A04A (55 cases) and A04B (97 cases).