SUMMARY OF THE IMPLANT DATA RECORD PROVIDED BY THE VICTORIAN ORTHOPAEDIC TRAUMA OUTCOMES REGISTRY PARTICIPATING HOSPITALS

Summary report: October 2010

This report was prepared on behalf of the VOTOR Steering Committee by Cameron Gosling, with contributions from Belinda Gabbe, Andrew Hannaford, Melissa Hart and Peter Cameron.

A joint initiative of

Introduction

The Victorian Orthopaedic Trauma Outcomes Registry (VOTOR) began in 2003 as a pilot collaborative project between The Alfred Hospital, the Royal Melbourne Hospital (RMH), and the Department of Epidemiology and Preventive Medicine (DEPM) at Monash University. Between 2003 and 2006 VOTOR registered 4445 cases (Phase 1 and 2), with the key aim of using a standardised data collection protocol to determine injury nature and outcomes and to allow for comparisons of patients who present with orthopaedic injuries to the MTS (major trauma service) hospitals in Victoria. Since 2007, VOTOR has expanded to include The Geelong (regional trauma) and Northern (metropolitan trauma) hospitals. This has enabled capture of information from key regional and metropolitan trauma services. Since the expansion, a further 14243 cases have been registered. The registry is a comprehensive database of orthopaedic injuries, treatment, complications and outcomes based on admissions to the participating hospitals. Information is collected about the patient, their injury event, injuries sustained, injury management and their functional and health-related quality of life outcomes at 6 and 12 months post-injury.

VOTOR data provides the capacity for profiling orthopaedic injuries across hospitals and regions, including descriptions of the causes of injury and tracking of pain and quality of life outcomes over the course of injury recovery. The registry provides the potential to link injury with surgical intervention, implant type and patient outcomes. The collection of implant data would allow for the regular monitoring and tracking of specific implants, similar to the National Joint Replacement Registry. Effectively linked implant and injury data within VOTOR would enable routine data analyses to identify internal or external surgical fixation procedures or implant types contributing to positive patient outcomes. Improved patient outcomes leads to decreased burden on the health system, improved quality of life and earlier return to work and social function. The collection of implant data commenced in March 2007 from The Alfred and RMH hospitals and June 2007 for The Geelong hospital. Northern Hospital has yet to provide implant data for the registry as the theatre management system used at the Northern relies on manual recording methods and is yet to be linked to the electronic data systems of the hospital. The aim of this report is to provide a summary of the current implant data collected by VOTOR and determine the utility of the data for potential research uses.

Methodology:

The methodology for VOTOR data collection is well established. There are four participating sites – The Alfred, RMH, Geelong Hospital, and Northern Hospital. All patients aged fifteen and over admitted to the participating hospitals with an emergency admission (>24 hours) for an orthopaedic injury are eligible for inclusion on the registry. Patients with a pathological fracture related to metastatic disease are excluded. Eligible patients are identified by the discharge diagnosis through ICD-10 reports from the hospitals. The registry uses an opt-off consent process where all eligible patients (or their next of kin in the case of deaths) are sent a letter and a brochure to explain the purpose of the registry, why they have been included, the registry processes, and how to opt-off if they choose to do so. The registry has ethics approval from all participating hospitals and Monash University. The VOTOR dataset is fully linked with the Victorian State Trauma Registry (VSTR) to eliminate duplication of effort and to streamline follow-up procedures. Data relating to the hospital admissions are obtained electronically from the participating hospitals and include: (i) Patient details; (ii) Injury event details; (iii) Injury diagnoses; (iv) Injury management; (v) Key in-hospital indicators; (vi) Complications and pre-morbid conditions; and (vii) Implant information where available. A standardised telephone interview is completed at 6 and 12-months post injury by trained registry staff. This process is fully integrated with the VSTR to prevent multiple calls to the same patient. The data collected by telephone interview includes: (i) Pre-morbid status; (ii) Pain; (iii) Functional level using the Glasgow Outcome Scale – Extended; (iv) Work disability; (v) Health-related quality of life using the SF-12 and EQ-5D; and (vi) Living status and need for additional care. Linkage with the Victorian deaths registry is also undertaken to establish post-discharge mortality.

Data Transfer Process:

Implant data are submitted concurrently with all other acute episode data and only loaded for those patients that meet VOTOR inclusion criteria. Implant data has been received on a quarterly basis, with two of the three hospitals submitting implant data since the start of VOTOR Phase 3 (March 2007). The implementation of a new patient management system at the RMH has meant that implant data were only received up until November 2009. This new patient management system does not yet link theatre implant records with the Performance

Management Unit (PMU). The Alfred hospital provided retrospective implant data on July 2010 for all VOTOR confirmed case admissions from March 2007.

Implant file formats:

The implant files received are in different formats for each hospital. Table 1 shows the fields provided by each hospital. Sample extracts are also provided (Appendices 1-3) by site to highlight these differences.

A different approach for each site was required to load the data into a standardised format and extract rebate codes. Rebate codes are the billing codes designated by the schedule for the prostheses and human tissue benefits system as part of the Commonwealth of Australia, *National Health Act*. Rebate code extraction was most straightforward for the Alfred data due to the separation of codes and the level of detail in the provision of data. The two other sites embedded rebate codes within a text description that also incorporated detailed product codes, resulting in a manual and time consuming approach to data loading. The Geelong data did not include operation date or implant quantity.

Table 1: Implant file formats by hospital

Field provided	Field Description	Geelong	RMH	Alfred
Implant Description	Description of the implant	Text description of the implant incorporating rebate codes, product codes	Text description of the implant incorporating rebate codes and specific widths/lengths	Rebate Code Description
Vendor	Company name supplying implant	Derived from 1st two characters of Rebate code	Description	Derived from 1st two characters of Rebate code
Operation Date	Date implant was used	✗	☑	☑
Quantity	Number of each implant used	✗	☑	☑
Rebate Codes	A reference code allocated to a listed	Embedded within text description with	Embedded within text description with	Separate field

	prosthesis that facilitates hospital invoicing procedures and the payment of benefits by insurers.	{} delimiters	different delimiters depending on vendor eg. {,(,:	

Methodology for the Review of Implants:

All cases (n=12,704) from March 2007 for the Alfred and RMH hospitals and from June 2007 for the Geelong hospital were included in the sample. The ICD-10 diagnosis codes were utilised to determine injury distribution in the population, while ICD-10 procedure codes were used to identify if an orthopaedic procedure had occurred. Orthopaedic procedure codes were identified by a trained orthopaedic research nurse in consultation with orthopaedic surgeons. Implant procedures were defined as any orthopaedic ICD-10 procedure code defined by internal fixation, arthroplasty, external fixation or other implant device (e.g. Halo). The hospital implant record was defined as any case with at least one prosthesis device listed on the implant data transferred by the hospital. The implant type was generated by utilising a combination of the implant description, rebate code and company information, allowing allocation to a pre-specified category. An implant was excluded if it was a piece of equipment used in the procedure (e.g. drill bits or guide wires), bone plugs or fillers, antibiotic beads, osteogenic protein injections, bone cement or expanders, or implants not related to orthopaedic procedures (e.g. ureteric stents or venous filters) and listed on the implant records list. Quantity data for each implant was collected directly from the hospital data transfer or, in the case of the Geelong hospital, was assumed to be one if not otherwise specified due to multiple implants identified with the same implant description (e.g. screws) for a single case. Data are presented as frequency distributions.

Results:

Most cases were male (56%), and the mean (SD) age was 54 (24) years. According to the fund source for the admission, 33% were compensable. The most common cause of injury was a fall (51%), while motor vehicle and motorcycle crashes accounted for 26% of the admissions (Table 2). The median (IQR) length of stay was 5.1 (2.7-10.1) days with most patients discharged to home (57%). A total of 17,681 orthopaedic injuries were identified from the sample. Isolated orthopaedic injuries occurred 71% of the time, two orthopaedic injuries

19% and three or more orthopaedic injuries 10% of the time. Non orthopaedic injuries were identified in 27% of the sample. The ten most frequent orthopaedic injury categories are presented in Table 3.

Table 2: Cause of injury

Cause of Injury	% of Cases+
Fall	50.6
Motor Vehicle	15.9
Motorcycle	10.3
Pedestrian	5.0
Pedal Cyclist	4.6
Struck by/collision with object/person	3.9
Other	9.8

+ Greater than 100% due to rounding.

Table 3: Distribution of orthopaedic injuries

Site of Fracture/Orthopaedic Injury	**% of Cases**
Neck of femur	17.9
Forearm	17.8
Tibia including ankle	16.4
Pelvis	11.1
Thoracic spine	10.7
Cervical spine	9.9
Lumbar spine	9.9
Humerus	7.9
Foot	7.0
Clavicle	6.5

At least one orthopaedic ICD-10 procedure code, regardless of whether an implant was used, was recorded for 67% of the sample, and was as high as 76% at the Geelong hospital. Over half (56%) of the cases had an implant procedure code recorded, indicating a high proportion of fractures treated with surgical fixation. The numbers of cases with an identified orthopaedic procedure (Table 4) or implant procedure (Table 5) are presented for each hospital below.

Table 4: ICD-10 identified orthopaedic procedures by hospital

	Alfred	Geelong	RMH	Total
No	2,063 (35%)	687 (24%)	1,354 (35%)	4,104 (33%)
Yes	3,773 (65%)	2,201 (76%)	2,542 (65%)	8,516 (67%)
Total	5,836	2,888	3,896	12,620*

* ICD-10 procedure codes missing for 84 cases.

Table 5: ICD-10 identified implant procedures by hospital

	Alfred	Geelong	RMH	Total
No	2,801 (48%)	1,043 (36%)	1,731 (44%)	4,855 (39%)
Yes	3,035 (52%)	1,845 (64%)	2,165 (56%)	7,045 (61%)
Total	5,836	2,888	3,896	12,620*

* ICD-10 procedure codes missing for 84 cases.

A comparison between implant device data provided by the hospitals and the ICD-10 procedure codes indicating an implant procedure is presented in Table 6. It is important to note that the Geelong hospital was the only hospital to specify when no implant was used as part of their implant record. For the sub-group of 853 Geelong cases where it was specified that no implant was used, no ICD-10 implant procedure was recorded for 714 (84%) of cases. The remaining 139 cases had an identifiable ICD-10 implant code but were designated as having received no implant on the implant record. There were 2,570 cases (20%) across all hospitals where the implant record and the ICD-10 procedure did not agree (Kappa = 0.56, *P* <0.001).

Table 6: Implant procedures determined by ICD-10 procedure codes versus the hospital implant record.

		Implant Procedures (ICD-10 codes)		
		No Implant Procedure	Implant Procedure	Total
Implant Record	No Implant	4,425 (78%)	1,336 (19%)	5,622
	Implant	1,234 (22%)	5,709 (81%)	7,082
		5,659	7,045	12,704

Table 7 reports the total number of implants used in patients across all hospital sites. This table reports the information provided by implant data transfer and is reflective of each piece of hardware identified by the hospitals description codes. Items are often represented many times as part of a single procedure, especially for the screws as a fixation/implant type. For example, where plating has been used as the primary fixation method a 10 hole plate may use up to 10 screws for fixation.

Table 7: Total number of implants recorded across all hospital sites for cases where a hospital implant record has been identified:

	Hospital			
Implant Type (n=number of cases)	**Alfred (n=2,982)**	**Geelong (n=1,865)**	**RMH (n=1,313)**	**Total (n=7,082)**
Dynamic Hip Screw	196	352	127	675
Arthroplasty	657	492	339	1,488
Screws	15,524	6,082	12,264	33,870
Intramedullary Nail	514	120	271	905
Gamma Nail	169	22	58	249
Plate	2,047	805	1,039	3,891
K-Wire	2,114	232	1,031	3,377
External Fixation	633	39	936	1,608
Spine	1,101	0	488	1,589
Washers	472	147	170	789
Others	1,056	65	225	1,346
Total	24,483	8,356	16,948	49,787

Discussion:

This report presents an overview of the implant data collected from the VOTOR affiliated hospitals. Association of implant data with accurate injury, treatment and outcome data is essential to determine the effectiveness of procedures in improving outcomes and reducing disability. To date the collection and comparison of implant data across hospitals has not been investigated. The access VOTOR has to injury, procedure and implant data represents

a unique opportunity to identify implant types and compare them with surgical procedures. The hospitals are not mandated to collect this information for health outcome or monitoring purposes however most do so for stock ordering systems or internal audit reasons. This is the first opportunity to evaluate methods for capturing this information across hospitals, the usefulness of the data for monitoring and research purposes, and the identification of specific issues that limit the current usefulness. The implant data also provides the opportunity to compare with the ICD-10 procedure information for cross-validation purposes.

Approximately 80% of cases have an implant recorded in the implant record and a concurrent ICD-10 procedure code that involves an implant. The data indicate that screw fixations are the most commonly utilised implant type, however the total number of this implant are likely to be overestimated as often multiple screws are utilised in implant procedures, regardless of the number of orthopaedic injuries. The profile of implant types is also indicative of the case-mix at each VOTOR site. An example of this is the higher proportion of dynamic hip screws and arthroplasty implants recorded against the Geelong site, where neck of femur (hip) fractures were the most commonly reported diagnosis. The further 20% of cases, where there is a lack of agreement between the implant record and ICD-10 procedure codes, requires further investigation. The level of disagreement highlights a potential limitation of using ICD-10 and implant record data for research purposes without further checking. Currently, the VOTOR investigations of specific fracture types or sites utilise medical record and operation reports data to confirm surgical approaches and implant types. A future project could involve the auditing of medical records against the hospital implant data and ICD-10 procedure coding to identify the source of the error. Ideally, validated implant record and ICD-10 procedure data would minimise the need for extraction of medical and surgical records for detailed investigation of specific injury, reducing the resource intensiveness of these projects and providing a robust, electronic monitoring system for orthopaedic procedures involving implants.

Over two thirds of VOTOR cases involved an isolated fracture, simplifying the linkage of implant type with injury. In this case the main implant type is able to be identified and surgical approaches using different implants may be meaningfully compared in future projects. Multiple injuries present a challenge in the identification of primary implant type linked to specific diagnosis or injury. A list of implants does not readily identify where each one has been used or for what type of fixation. Currently, x-ray and medical record reviews are

required to link specific implants with specific injury sites. Missing operation (ICD-10 procedure codes) or implant details (hospital implant records) contribute to this problem. While specific implants (e.g. dynamic hip screws) are generally used only for specific injuries (femur fractures), there are instances where implants may be used for multiple injury types. For example, a small plate predominately used in lower extremity internal fixations, may be used for an upper extremity fixation based on implant availability or sizing. If data were to be used for detailed monitoring then the information contained in this report needs to be fedback to the participating hospitals to enable improved linkage between their implant recording systems and injury diagnoses.

The hospital implant record indentifies all implants for a single admission, but does not link this implant information with specific injury diagnoses. As a result a number of limitations have been identified as part of this initial review. Firstly where multiple orthopaedic injuries or bilateral injuries have occurred it is difficult to identify the implant utilised for final fixation. For example, a patient may present with a humeral fracture and a tibial fracture. In this case a plate and intramedullary nail may be the main implant types, however from the registry level data it is often difficult to determine which implant was used at each injury site, especially if limited item descriptions are used. A potential solution is to ensure all implants are linked by a rebate code which has a more comprehensive description of the implant uses and can be linked across hospitals. Secondly, it is unclear whether the implants recorded represent hardware that is actually implanted in the patient or if the implant was recorded for auditing/re-ordering purposes. If recorded implants were identified for item re-ordering purposes then an over-estimation of implant numbers may occur, especially if the hospital employs an open and discard policy for implants opened but not used. Further information about implant use and recording methods are required from the hospitals before this potential problem is addressed. Thirdly, data has not yet been received from the Northern Hospital. This limits the generalisation of information provided in this report across all sites.

The number of implants is also identified as a potential error source with either under or over estimations. A current sub-project on shaft of femur fractures has afforded us with the opportunity to investigate a number of isolated femur fractures. In all instances the main implant for each patient was clearly evident (intramedullary nail, gamma nail or plate) and the quantity of each appropriately recorded from the small sample of 15 reviewed. The error occurred with the description of the number of screws used. In all cases the quantity of

screws used was listed as one when in fact multiple numbers of these screws were utilised in the fracture fixation. Therefore it is likely that the main implant will be correct but variability around the additional elements of fixation exists. The implications of this for research and for monitoring purposes warrants further consideration.

The method by which data is supplied by each hospital site adds a further challenge to the ability to compare surgical approaches, implant types and patients outcomes. The Geelong data did not include operation date or number, which meant that it was difficult to determine whether data duplication issues were a problem or if implants were used more than once. The three hospitals tended to use different item descriptors, often based on the main company supplying the individual hospital. One solution would be to link implants by their rebate code, however not all implant descriptors identified a code nor was this code listed in a separate field. The establishment of the rebate code firstly as a separate field, and secondly as the key implant identifier across hospitals, would allow for easier collation of data and improve the utility of information.

The information collected by VOTOR on implants is a valuable addition to the registry and provides a means of tracking and monitoring specific implant types. This first report on the combined data suggests that there are a number of issues that require further evaluation and consideration. Specific recommendations that would improve the quality, validity and usefulness of the data received and utilised by VOTOR are:

1. Complete a sample audit of implant records and ICD-10 procedure codes across hospitals against the medical record to determine potential sources of error.
2. Further investigate the utility of using the rebate code to link implant information across hospital sites to generate implant types.
3. Investigate methods to determine the main implant type across the multi-injured patient.
4. Prioritise the collection of implant data from the Northern hospital.

Conclusion:

The implant data collected routinely as part of VOTOR provides a unique and useful means of identifying the type and frequency of implants used across participating VOTOR sites. There is the potential to improve the utility and validity of the data to allow meaningful comparisons of implant types across hospital sites, procedure types, injury sites and the multi- and isolated

injured patient. The recommendations outlined will be addressed by the VOTOR team in the short to medium term. This work will enable long term outcomes from orthopaedic implants to be compared and tracked over time.

Appendix 1: Sample Geelong extract of implant data for one patient.

Geelong URNumber	Implant_Description
NNNNNNN-NNN	2030-6516-1 Osteonics Cancellous Bone Screw, 6.5x16mm {ST545}
NNNNNNN-NNN	2030-6525-1 Osteonics Cancellous Bone Screw, 6.5x25mm {ST545} $NNN.NN
NNNNNNN-NNN	2030-6540-1 Osteonics Cancellous Bone Screw, 6.5x40mm {ST545} $NNN.NN
NNNNNNN-NNN	2232-04-18 Cable Ready Grip System, 1.8mm dia. 635mm lth {ZI173}
NNNNNNN-NNN	3315-040 CMW TYPE 1 CEMENT WITH GENTAMICIAN {DP108} $NNN.NN
NNNNNNN-NNN	542-11-52E TRIDENT Acetabular Shell 52mm size E {ST548}
NNNNNNN-NNN	6260-4-122 V40 FEMORAL HEAD 22mm dia, Standard {HW032}
NNNNNNN-NNN	6478-6-640 Total Knee System Fluted Stem Extender 18mm x 80mm {ST606}
NNNNNNN-NNN	6481-2-100 Modular Rotating Hinge Knee, Tibial rotating component ES/EL {HW231}
NNNNNNN-NNN	6481-2-110 Modular Rotating Hinge Femoral Bushing {HW145}
NNNNNNN-NNN	6481-2-120 Modular Rotating Hinge Knee Axle {HW228}
NNNNNNN-NNN	6481-2-130 Modular Rotating Hinge Bumper Insert, Neutral {HW230}
NNNNNNN-NNN	6481-2-140 Global MRS Tibial Sleeve {HW233}
NNNNNNN-NNN	6481-3-110 Modular Rotating Hinge Knee Tibial Baseplate-Keel Design, Small {HW141}
NNNNNNN-NNN	6481-3-210 Modular Rotating Hinge Insert 10mm, Small {HW248}
NNNNNNN-NNN	6495-1-001 Howmedica GMRS Proximal Femoral Component Standard {SK158}
NNNNNNN-NNN	6495-2-040 GMRS Distal Femoral Component, Standard Right, 65mm {SK157}
NNNNNNN-NNN	6495-6-019 Global MRS Connection Piece Right 90mm {SK162}
NNNNNNN-NNN	6495-6-200 GMRS Extension Piece 200mm {SK161}

Appendix 2: Sample RMH extract of implant data for one patient

RMH UR Number	Implant Description	Operation Date	Vendor	Quantity
NNNNNNN-NNN	11.0MM DIA. CARBON FIBRE ROD LENGTH 100MM [REBATE CODE-SY196]	12/07/2008	SYNTHES AUSTRALIA PTY LTD	2
NNNNNNN-NNN	11.0MM DIA. CARBON FIBRE ROD LENGTH 300MM [REBATE CODE-SY196]	12/07/2008	SYNTHES AUSTRALIA PTY LTD	2
NNNNNNN-NNN	11.0MM DIA. CARBON FIBRE ROD LENGTH 350MM [REBATE CODE-SY196]	12/07/2008	SYNTHES AUSTRALIA PTY LTD	1
NNNNNNN-NNN	11.0MM DIA. CARBON FIBRE ROD LENGTH 400MM [REBATE CODE-SY196]	12/07/2008	SYNTHES AUSTRALIA PTY LTD	2
NNNNNNN-NNN	2.4MM LOCKING HEAD SCREW 16MM SELF-TAPPING [REBATE CODE-SY278]	21/07/2008	SYNTHES AUSTRALIA PTY LTD	3
NNNNNNN-NNN	2.4MM LOCKING HEAD SCREW 20MM SELF-TAPPING [REBATE CODE-SY278]	21/07/2008	SYNTHES AUSTRALIA PTY LTD	3
NNNNNNN-NNN	2.7MM CORTEX SCREW 18MM STARDRIVE SELF-TAPPING LDRP [REBATE CODE-SY056]	21/07/2008	SYNTHES AUSTRALIA PTY LTD	2
NNNNNNN-NNN	2.7MM CORTEX SCREW 20MM STARDRIVE SELF-TAPPING LDRP [REBATE CODE-SY056]	21/07/2008	SYNTHES AUSTRALIA PTY LTD	1
NNNNNNN-NNN	2.7MM CORTEX SCREW 22MM STARDRIVE SELF-TAPPING LDRP [REBATE CODE-SY056]	21/07/2008	SYNTHES AUSTRALIA PTY LTD	1
NNNNNNN-NNN	2.7MM CORTEX SCREW 30MM STARDRIVE SELF-TAPPING LDRP [REBATE CODE-SY056]	21/07/2008	SYNTHES AUSTRALIA PTY LTD	1
NNNNNNN-NNN	4.9MM LOCKING BOLT 54MM [REBATE CODE-SY132]	16/07/2008	SYNTHES AUSTRALIA PTY LTD	1
NNNNNNN-NNN	4.9MM LOCKING BOLT 54MM [REBATE CODE-SY132]	16/07/2008	SYNTHES AUSTRALIA PTY LTD	2
NNNNNNN-NNN	5.0MM SELDRILL SCHANZ LENGTH 200MM [REBATE CODE-SY051]	12/07/2008	SYNTHES AUSTRALIA PTY LTD	6
NNNNNNN-NNN	6.0MM SELDRILL SCHANZ LENGTH 175MM [REBATE CODE-SY051]	12/07/2008	SYNTHES AUSTRALIA PTY LTD	3
NNNNNNN-NNN	6.0MM SOFT ROD L 50MM [REBATE CODE-SY143]	16/07/2008	SYNTHES AUSTRALIA PTY LTD	2
NNNNNNN-NNN	ANTEGRADE FEMORAL NAIL 11MM S LENGTH 400MM RIGHT [REBATE CODE-SY270]	16/07/2008	SYNTHES AUSTRALIA PTY LTD	1
NNNNNNN-NNN	APEX PIN SELF-DRILL 3X110 T10 REBATE NUMBER: ST884	12/07/2008	STRYKER AUSTRALIA PTY LTD	8
NNNNNNN-NNN	CLIP APPLICATOR LIGACLIP MCA MULTICLIP APPLIER-20 X 3MM	21/07/2008	JOHNSON & JOHNSON MEDICAL PTY LTD	7
NNNNNNN-NNN	CLIP APPLICATOR LIGACLIP MCA MULTICLIP APPLIER-20 X 5MM	21/07/2008	JOHNSON & JOHNSON MEDICAL PTY LTD	5
NNNNNNN-	CLIP ON CLAMP REBATE CODE- SY201	12/07/2008	SYNTHES	2

NNN			AUSTRALIA PTY LTD	
NNNNNNN-NNN	COMBINATION CLAMP CLIP ON SELF HOLDING [REBATE CODE-SY201]	12/07/2008	SYNTHES AUSTRALIA PTY LTD	6
NNNNNNN-NNN	HII MRI C 30Â° ANGLED POST Ã˜5 REBATE NUMBER: SK374	12/07/2008	STRYKER AUSTRALIA PTY LTD	12
NNNNNNN-NNN	HII MRI C 4 HOLE PIN CLAMP REBATE NUMBER: SK375	12/07/2008	STRYKER AUSTRALIA PTY LTD	5
NNNNNNN-NNN	HII MRI C PIN-ROD COUPLING REBATE NUMBER: SK375	12/07/2008	STRYKER AUSTRALIA PTY LTD	8
NNNNNNN-NNN	HII MRI C ROD-ROD COUPLING REBATE NUMBER: SK375	12/07/2008	STRYKER AUSTRALIA PTY LTD	12
NNNNNNN-NNN	KIRSCHNER WIRE 1.0MM DIA. DOUBLE ENDED LENGTH 150MM [REBATE CODE-SY087]	21/07/2008	SYNTHES AUSTRALIA PTY LTD	2
NNNNNNN-NNN	LCP VOLAR BUTTRESS PLATE 2.4 12 HOLES [REBATE CODE-SY259]	21/07/2008	SYNTHES AUSTRALIA PTY LTD	1
NNNNNNN-NNN	LOW PROFILE TRANSCONNECTOR FOR 6.0MM ROD 25.5-30.5MM [REBATE CODE-SY250]	16/07/2008	SYNTHES AUSTRALIA PTY LTD	1
NNNNNNN-NNN	MRI SAFE CONNECTING ROD 5X100 REBATE NUMBER: SK393	12/07/2008	STRYKER AUSTRALIA PTY LTD	2
NNNNNNN-NNN	MRI SAFE CONNECTING ROD 5X250 REBATE NUMBER: SK393	12/07/2008	STRYKER AUSTRALIA PTY LTD	2
NNNNNNN-NNN	MRI SAFE CONNECTING ROD 5X300 REBATE NUMBER: SK393	12/07/2008	STRYKER AUSTRALIA PTY LTD	4
NNNNNNN-NNN	MULTI-PIN CLAMP LARGE 6 HOLE TRANSVERSE [REBATE CODE-SY200]	12/07/2008	SYNTHES AUSTRALIA PTY LTD	2
NNNNNNN-NNN	NUT USS II NUT TAN GREEN [REBATE CODE-SY174]	16/07/2008	SYNTHES AUSTRALIA PTY LTD	4
NNNNNNN-NNN	PEDICLE SCREW 6.2MMLENGTH 40M USS II DUAL CORE DUAL OPENIN [REBATE CODE-SY175]	16/07/2008	SYNTHES AUSTRALIA PTY LTD	4
NNNNNNN-NNN	SLEEVE USS II TAN GREEN [REBATE CODE-SY151]	16/07/2008	SYNTHES AUSTRALIA PTY LTD	4

Appendix 3: Sample Alfred extract of implant data for one patient

Alfred UR Number	Rebate Code	Implant Description	Operation Date	Quantity
NNNNNNN-NNN	AB003	Bioglue 5ml	10/04/2007 12:30	1
NNNNNNN-NNN	AB008	Bioglue Applicator Tip, Model BGAT	10/04/2007 12:30	1
NNNNNNN-NNN	G106	Pins: Hoffman - Tibial	1/04/2007 18:00	6
NNNNNNN-NNN	J437	Graft: Straight Polyester: Gelweave	10/04/2007 12:30	1
NNNNNNN-NNN	NG007	Horizon 24 clip cartridge small haemoclips	10/04/2007 12:30	1
NNNNNNN-NNN	NG008	Horizon 6 clip cartridge medium haemo clips	10/04/2007 12:30	1
NNNNNNN-NNN	NG009	Horizon 24 clip cartridge medium haemoclips	10/04/2007 12:30	1
NNNNNNN-NNN	Q503	Weck Clip	1/04/2007 18:00	1
NNNNNNN-NNN	R409	AO/ASIF Screws Steel 4.5mm cortex screws	2/04/2007 20:00	4
NNNNNNN-NNN	R416	AO/ASIF Screws Steel 6.5mm cancellous screws	2/04/2007 20:00	1
NNNNNNN-NNN	R494	AO/ASIF Plates - Steel 4.5mm Reconstruction	2/04/2007 20:00	1
NNNNNNN-NNN	SK245	Stryker 5mm locking screw	2/04/2007 8:30	3
NNNNNNN-NNN	SK245	Stryker 5mm locking screw	12/04/2007 17:00	1
NNNNNNN-NNN	ST045	End cap Titanium	2/04/2007 8:30	1
NNNNNNN-NNN	ST059	Femoral Nail Titanium	2/04/2007 8:30	1
NNNNNNN-NNN	ST059	Femoral Nail Titanium	12/04/2007 17:00	1
NNNNNNN-NNN	TU038	Gelweave Single Branch Thor Graft	10/04/2007 12:30	1
NNNNNNN-NNN	G106	Pins: Hoffman - Tibial	10/04/2007 10:25	4

NNNNNNN-NNN	G177	AO/ASIF Plates - Steel 3.5mm Cloverleaf	17/04/2007 9:40	1
NNNNNNN-NNN	NG016	Weck Clips - medium (company N. Stennings)	19/04/2007 13:30	20
NNNNNNN-NNN	NG017	Weck Clips - small (company N. Stennings)	19/04/2007 13:30	1
NNNNNNN-NNN	R405	AO/ASIF Screws Steel 4.0mm cancellous self tapping	17/04/2007 9:40	2
NNNNNNN-NNN	R405	AO/ASIF Screws Steel 4.0mm cancellous self tapping	19/04/2007 13:30	3
NNNNNNN-NNN	R469	AO/ASIF - Steel Steinmann Pins/Schanz Screws	10/04/2007 10:25	1
NNNNNNN-NNN	SK191	5cc Vitoss Scaffold Synthetic Cancellous Bone Void Filler	17/04/2007 9:40	1
NNNNNNN-NNN	ZI150	Zimmer S/S 4.0 Screws Cancellous	17/04/2007 9:40	2
NNNNNNN-NNN	ZI152	Zimmer S/S 3.5 Screws Cortical	17/04/2007 9:40	9
NNNNNNN-NNN	ZI243	Zimmer S/S Peri-articular Plate	17/04/2007 9:40	1

Documents accompanying this report	
Title	**Report number**
Summary of the implant data record provided by the VOTOR participating hospitals (Research brief)	1010-007-R1B