From: s 47F
To: Quaine, Julianne; Platona, Adriana; Keaney, Megan
Cc: s 47F ; s 22 ; s 47F
Subject: Re: Terms of Reference / Hereco Paper (post IWG) [SEC=OFFICIAL]
Date: Thursday, 7 November 2019 11:28:22 PM
Attachments: image001.jpg
image002.jpg
image003.jpg
image004.jpg
Outcomes of Hip and Knee Replacement Surgery in private and Public hospitals in Australia.pdf

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Julianne,
I managed to secure today. You will find it aligned to the slides from s 47F and the s 47F variation report of 2017. But is a little more detailed in specific points. See I can do an email in one line!
Best Regards
s 47F

From: "Quaine, Julianne"
Date: Thursday, 7 November 2019 at 11:22 pm
To: s 47F , "Platona, Adriana" , "Keaney, Megan"
Cc: "s 47F " , "s 22 " , s 47F

Subject: RE: Terms of Reference / Hereco Paper (post IWG) [SEC=OFFICIAL]
Thanks s – we will study with interest, note your comments on the Tors of the general misc review and provide feedback to Hereco as appropriate. I'd be interested in the ANZ Journal of Surgery paper if you get a copy otherwise we can probably get one through our department library services. Thanks Julianne
Julianne Quaine | Assistant Secretary | Office of Health Technology Assessment | Technology Assessment and Access Division | Department of Health | 02 6289 8372 | s 22 **| julianne.quaine@health.gov.au**

From: s 47F
Sent: Wednesday, 6 November 2019 5:08 PM
To: Platona, Adriana ; Quaine, Julianne ; Keaney, Megan
Cc: s 47F ; s 22 ; s 47F

Subject: Terms of Reference / Hereco Paper (post IWG) [SEC=No Protective Marking]
Importance: High
Dear Department of Health Team,
Please refer detailed response to the terms of reference (general & miscellaneous items) and principles of the Hereco paper which PHA support *with caveats*. Included is a prototypal case study, Billing Code DE649, reflecting all that we believe to be wrong with the current PL listing process and not likely to be addressed by the Hereco paper without adoption of the recommendations proposed (none are onerous on suppliers or department but will create appropriate transparency for stakeholders).
I became aware that the formal PHI request for comments on the terms of reference being issued following completing the attached. It remains important to address the points contained as they are interrelated to the reforms under consideration and the Hereco paper. The attached is not appropriate to be included for wider audiences (assuming the terms of reference responses will be accessible to stakeholders under FOI) as it lists sales volumes that are not known to competing suppliers and would be considered *commercial in confidence*. s 47F will issue an official response to the Terms of Reference. I may also provide a short public response as will some of the Health Funds.

The attachment is the Private vs Public variation report presented at the AOA NJRR, October 2017. I am also in the process of obtaining the following paper: Outcomes of hip and knee replacement surgery in private and public hospital in Australia. This paper was produced by the NJRR Directors and published earlier this year in the ANZ Journal of Surgery. This paper, the hospital variation report and the slides presented by Professor Graves at the IWG in February are all consistent in analysis around devices selected to be the cause of higher revision rates in private vs public patients (those devices routinely costing PHI $3,000+ more than best in class ones used with public patients).

Please feel free to share the attached with s 47F and the team at Hereco Research, I am also happy to discuss our recommendations with her directly or on a call with the department staff.

s 47F

ORIGINAL ARTICLE

ANZJSurg.com

Outcomes of hip and knee replacement surgery in private and public hospitals in Australia

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Key words
hip, hospital, knee, prosthesis, revision outcome, surgeon.

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Abstract

Background: This study determined the contributing factors of hospital sector (private ver sus public) variation in revision rates after elective total hip replacement (THR) for hip frac ture, and elective total knee replacement (TKR).

Methods: Using data from a large national arthroplasty registry, funnel plots for hospitals were generated, displaying the proportion of revised primary procedures. The proportion of outliers for each distribution was defined as the proportion outside the upper 99.7% confi dence limit. Survival analyses determined differences between hospital sector revision rates separately for implants with the lowest revision rate, and for all other implants. Multivariate Cox regression determined the role of hospital sector in revision, adjusting for possible confounders.

Results: For THR performed for osteoarthritis, 17.4% of private and 4.4% of public hospi tals were outliers. For TKR performed for osteoarthritis, 19.6% of private and 10.0% of public hospitals were outliers. For THR for fractured neck of femur, 8.1% of private and 0.0% of public hospitals were outliers. Adjusted and unadjusted Kaplan Meier analyses showed higher THR revision rates in private hospitals for osteoarthritis and fractured neck of femur, but no difference when restricted to the 10 prostheses with the lowest revision rate. The Kaplan Meier analysis of TKR showed higher revision rates for private hospitals, with the association reversing when restricted to prostheses with the lowest revision rate.

Conclusions: Considerable variation was seen in the revision rate after THR and TKR between hospital sectors in Australia. The variation was largely due to differences in pros thesis selection.

Introduction

Over 100 000 hip and knee replacement procedures are performed annually in Australia. Health insurance is a two tiered system in Australia, with universal coverage for all residents under Medicare, and with just over half of the population also having private health insurance.[1] Approximately two thirds of hip and knee replacement procedures are performed in private hospitals by specialist ortho paedic surgeons. Joint replacement surgery in public hospitals is often performed by orthopaedic trainees under the supervision of specialist surgeons.

The Australian Orthopaedic Association National Joint Replace ment Registry (AOANJRR) records nearly 100% of joint replacement procedures performed in Australia and reports on rates and reasons for revision (repeat) joint replacement surgery and on mortality.

Some reports have compared rates of readmission or patient satis faction between private and public hospitals but there are no reports available on the relative performance of private versus public hospi tals using revision surgery as the outcome.[2 6] This study aims to compare the rate of revision following primary hip and knee replace ment surgery between private and public hospitals in Australia.

Methods

Data from the AOANJRR was used to calculate rates of revision after primary total hip replacement (THR) and primary total

knee replacement (TKR) for osteoarthritis (OA), and primary THR for fractured neck of femur (FNF), and each procedure group was analysed separately. Data from 1 January 2003 to 31 December 2016 were used. Funnel plots were used to explore inter hospital variation in the overall proportion of pri mary procedures revised and the proportion of public and private hospitals lying outside the upper 99.7% confidence limit, based on the variation in the underlying data. To reduce any bias from differences in length of follow up between hospitals, and to explore variation in early revision, the funnel plot analy sis was repeated, restricted to revision within 2 years of primary surgery.

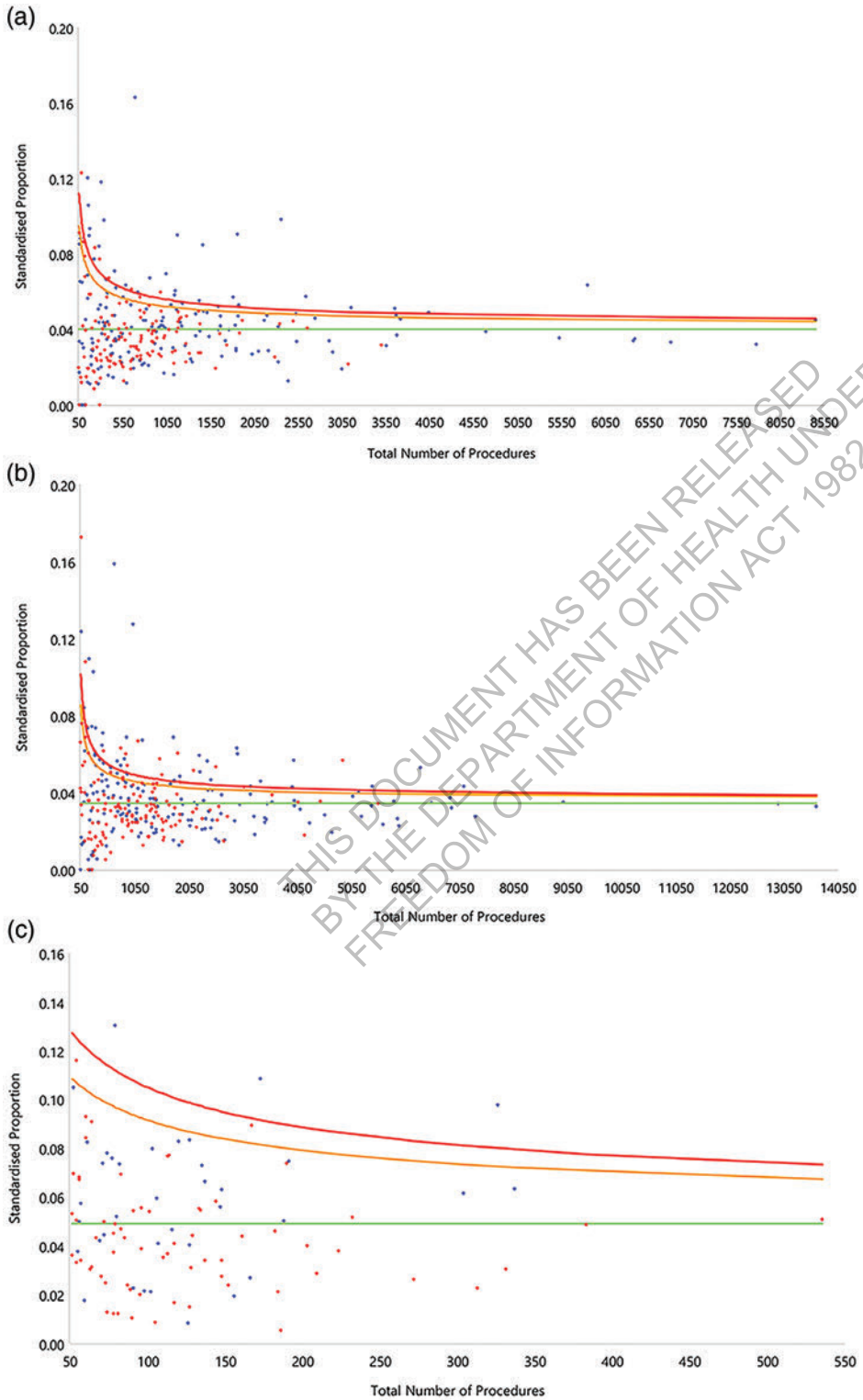


Fig. 1. (a) Funnel plot of revision of primary total hip replacement performed for osteoar thritis by hospital. (b) Funnel plot for revision of primary total knee replacement performed for osteoarthritis by hospital. (c) Funnel plot of revision of primary total hip replacement performed for fractured neck of femur by hospital. (——) Overall proportion; (——) 95% confidence limit; (——) 99.7% confi dence limit; (·····) private hospitals; (·····) public hospitals.

Kaplan Meier survival analysis was used to calculate the cumulative percent revision (CPR) and Cox proportional hazards regression was performed to compare outcomes between private and public hospitals. All hospitals performing THR or TKR with at least 50 procedures reported were included.

All regression analyses were adjusted for age and sex. Other variables known to be associated with revision for a TKR (use of a prosthesis with higher than anticipated rate of revision [HTARR] as defined by the AOANJRR,[7] use of patella replacement, type of stability, type of fixation, type of polyethylene and American Society of Anesthesiologists grade) and THR (head size, type of fixation, bearing surface and use of a prosthesis with HTARR) were included with age and sex in a multivariate regression model to explore possible confounding.

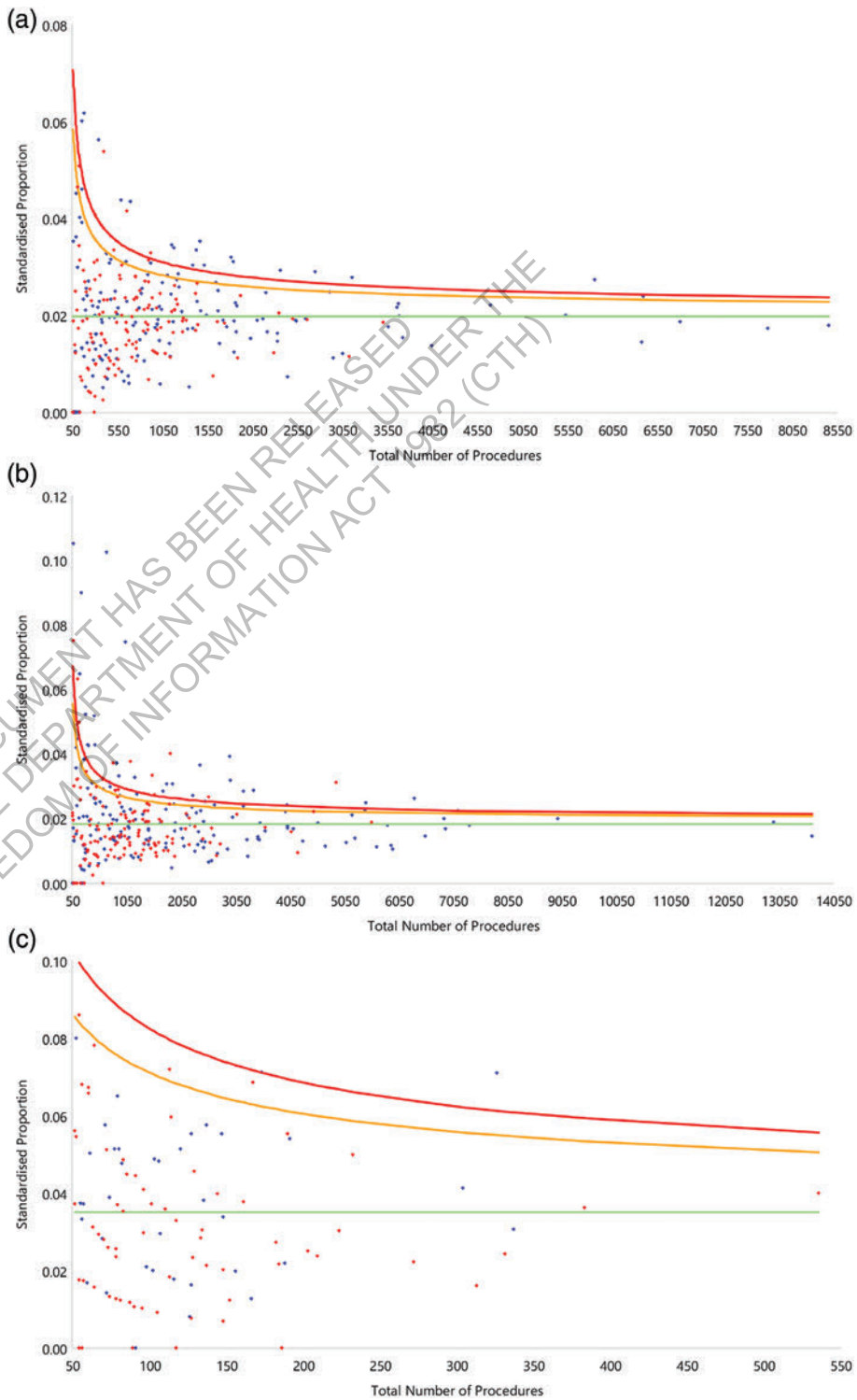
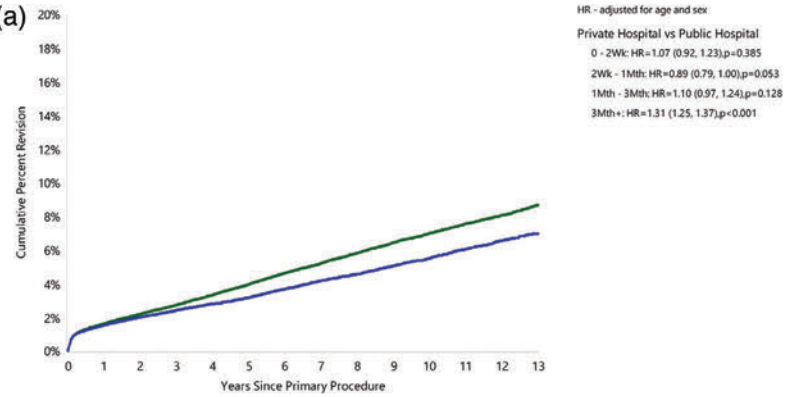


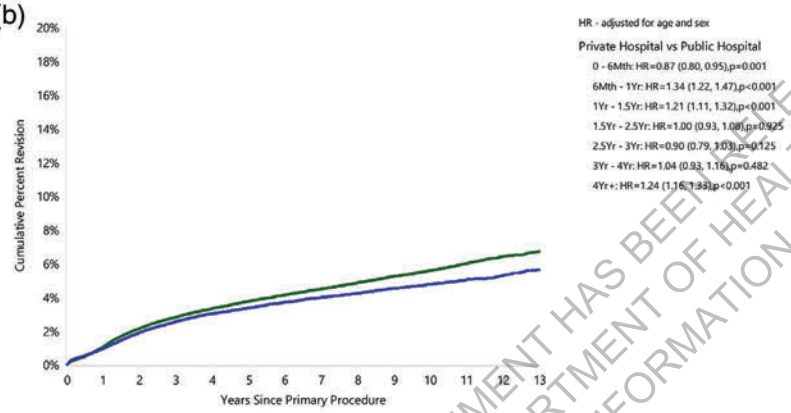
Fig. 2. (a) Funnel plot of revision within 2 years of primary total hip replacement performed for osteoarthritis by hospital. (b) Funnel plot of revision within 2 years of primary total knee replacement performed for osteoarthritis by hospital. (c) Funnel plot of revision within 2 years of primary total hip replacement performed for fractured neck of femur. (——) Overall proportion; (——) 95% confidence limit; (——) 99.7% confidence limit; (·····) private hospitals; (·····) public hospitals.

(a)



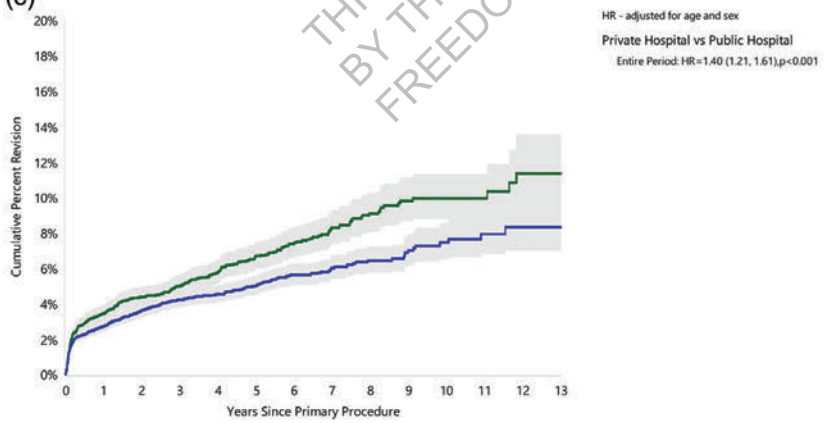
Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	13 Yrs
Private Hospital	210828	184220	138555	99366	66029	29927	5808
Public Hospital	100931	88836	68381	50871	34854	16112	3098

(b)



Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	13 Yrs
Private Hospital	338259	297471	222071	158463	104436	45000	8199
Public Hospital	160642	142391	108647	79446	53476	23973	4106

(c)



Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	13 Yrs
Private Hospital	6118	4752	3188	2040	1183	431	63
Public Hospital	9484	7467	4846	2975	1634	497	71

Fig. 3. (a) Cumulative percent revision for primary total hip replacement performed for osteoarthritis by hospital type. (b) Cumula tive percent revision for primary total knee replacement performed for osteoarthritis by hospital type. (c) Cumulative percent revi sion for primary total hip replacement per formed for fractured neck of femur by hospital type. (——) Private hospitals; (——) public hospitals.

Subgroup analyses were performed using only the 10 prosthesis combinations with the lowest CPR at 5 years, and separately using all other prosthesis combinations to explore the role of prosthesis choice in any differences seen. The number of prosthesis combina tions (10) allowed a balance between including a broad variety of prostheses and providing large enough numbers for analysis, and isolating a group based on performance.

Ethics

The AOANJRR is a declared Commonwealth of Australia Quality Assurance Activity under section 124X of the Health Insurance Act, 1973. All AOANJRR studies are conducted in accordance with ethical principles of research (the Helsinki Declaration II).

Results

Data from 164 private and 142 public hospitals were used in the analysis (296 hospitals for the elective THR analysis, 303 hospitals for the TKR analysis and 104 hospitals for the hip fracture analy sis). For elective THR performed for OA, 28 private hospitals (17.4%) and six public hospitals (4.4%) lay outside the upper 99.7% confidence limit for the overall proportion of primary cases revised. For TKR performed for OA, the corresponding numbers are 32 (19.6%) for private hospitals and 14 (10.0%) for public hospitals. For THR for FNF, the corresponding numbers are three (8.1%) for private hospitals and 0 (0.0%) for public hospitals (Fig. 1a c).

Restricting the analysis of overall revision rate to revision sur gery within 2 years of the primary procedure, for THR, 17 (10.6%) private hospitals and three (2.2%) public hospitals were outside the upper 99.7% confidence limit (Fig. 2a). For TKR, the correspond ing numbers are 26 (16.0%) for private hospitals and 10 (7.1%) for public hospitals. For THR for FNF, the corresponding numbers are two (5.4%) for private hospitals and 0 (0.0%) for public hospitals (Fig. 2a c).

For Cox regression analysis of THR performed for OA, the haz ard ratio for revision after 3 months in private hospitals compared to public hospitals (adjusted for age and sex) was 1.31 (95% confi dence interval 1.25 1.37; Fig. 3a). For TKR, the revision rate was lower in private hospitals for the first 6 months, but higher at sev eral time periods after 6 months (Fig. 3b). For THR performed for FNF, the revision rate was higher in private hospitals at all time points (hazard ratio 1.40, 95% confidence interval 1.21 1.61) (Fig. 3c).

Secondary multivariate Cox regression analyses including possi ble confounders (see Methods section) showed similar results (Appendix S1): public hospitals had a significantly lower rate of revision than private hospitals after 3 months for TKR, and at all times for elective THR and for THR for FNF. Multivariate analyses were restricted to data from the last 5 years as American Society of Anesthesiologists grade was available only for that time. Notably, in the multivariate analyses, the use of a prosthesis identified as HTARR was strongly associated with revision rate, adjusting for all other variables. However, despite higher use of HTARR prostheses in private hospitals, the association between private sector and increased revision was independent of the use of HTARR prosthe ses (Table 1).

The survival analysis was repeated using only the 10 prosthesis combinations (e.g. femoral and tibial combination for a knee replacement) with the lowest CPR at 5 years. For this analysis, the rate of revision after THR for OA is lower in private hospitals in the first month but not significantly different from public hospitals at all other times (Fig. 4a). For TKR, the rate of revision is lower in private hospitals in the first 3 months and after 1.5 years (Fig. 4b). For THR performed for FNF there is no difference in the rate of revision between private and public hospitals when the 10 prostheses with the lowest rate of revision at 5 years are used (Fig. 4c).

Discussion

Our study showed higher rates of revision surgery after primary THR and TKR in private hospitals compared to public hospitals. However, when restricted to prosthesis combinations with low rates of revision, the rate of revision was not higher in private hospitals at any time. Other variables known to affect revision rates did not explain the difference in revision rates between public and private hospitals.

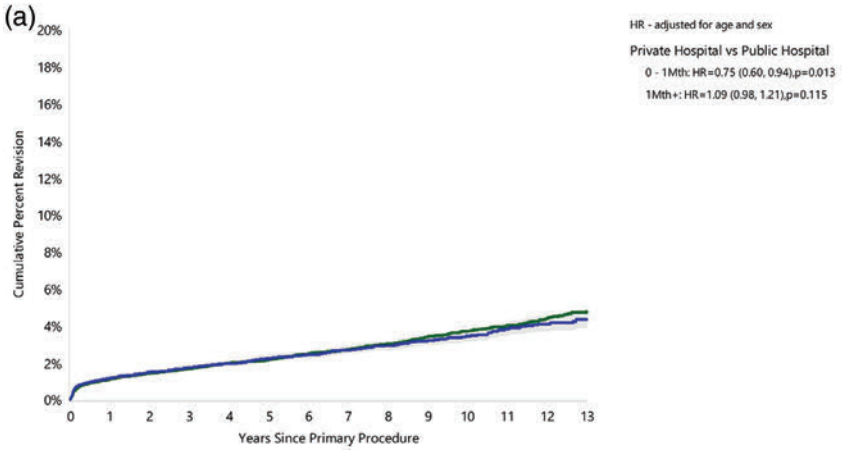
There are several reasons why rates of revision may vary between public and private hospitals. Implant selection is likely to differ between private and public hospitals. In private hospitals, implant choice is largely dictated by individual surgeons, whereas in public hospitals, mechanisms may exist to restrict access to more expensive prostheses and to newer prostheses, and the range of prostheses available may also be restricted. Our findings show that prosthesis choice is likely to be the main cause for the higher rate of revision surgery seen in private hospitals, due to surgeons in

Table 1 Use of higher than anticipated rate of revision (HTARR) prostheses in private and public hospitals

	Private	Public	% Difference	*P* value
THR for osteoarthritis				
HTARR prostheses	25 738 (12.2%)	11 735 (11.6%)	0.58% (0.34%, 0.82%)	<0.0001
Other prostheses	185 090 (87.8%)	89 196 (88.4%)		
THR for fracture				
HTARR prostheses	882 (14.4%)	754 (8.0%)	6.47% (5.43%, 7.50%)	<0.0001
Other prostheses	5236 (85.6%)	8730 (92.1%)		
TKR				
HTARR prostheses	29 854 (8.8%)	5031 (3.1%)	5.69% (5.57%, 5.82%)	<0.0001
Other prostheses	308 405 (91.2%)	155 611 (96.9%)		

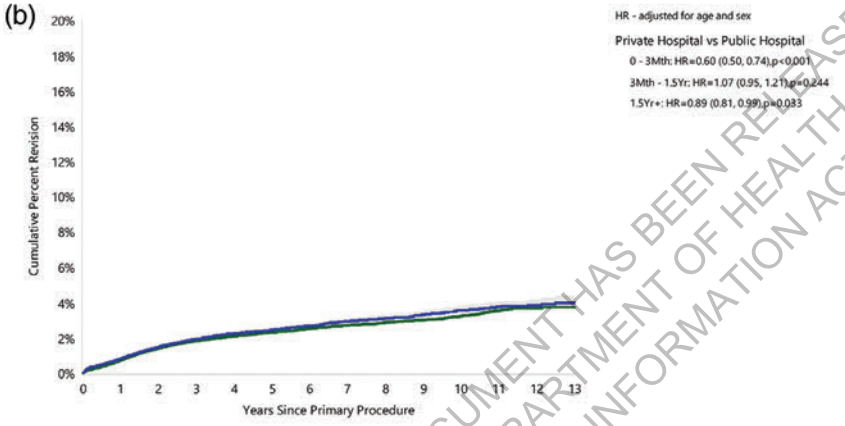
THR, total hip replacement; TKR, total knee replacement.

(a)



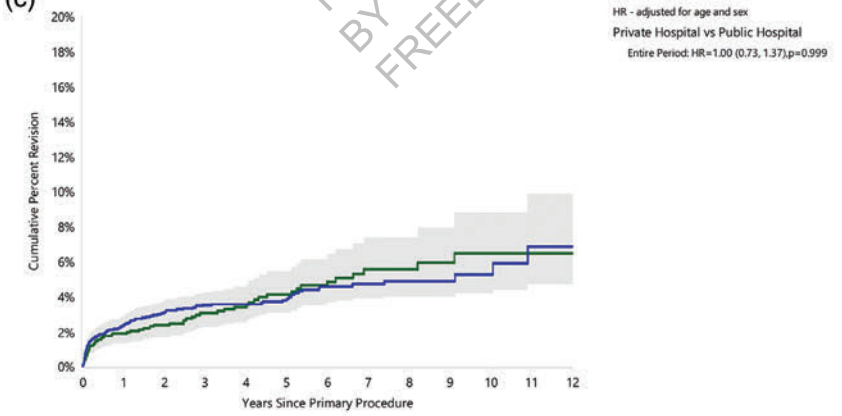
Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	13 Yrs
Private Hospital	44909	40668	32326	24506	17536	9048	1671
Public Hospital	27522	24372	18710	14103	9953	4738	730

(b)



Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	13 Yrs
Private Hospital	99701	87030	62335	39921	22725	7667	1068
Public Hospital	53865	45733	32051	20045	11197	4344	722

(c)



Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	13 Yrs
Private Hospital	1634	1322	917	570	357	128	18
Public Hospital	3688	2927	1918	1191	631	158	19

Fig. 4. (a) Cumulative percent revision for primary total hip replacement performed for osteoarthritis using 10 prostheses with lowest revision rate at 5 years, by hospital type. (b) Cumulative percent revision for total knee replacement for osteoarthritis using 10 prostheses with lowest revision rate at 5 years, by hospital type. (c) Cumulative percent revision for total hip replacement for fractured neck of femur using 10 prostheses with lowest revision rate at 5 years, by hospital type. (——) Private hospitals; (——) public hospitals.

private hospitals choosing prostheses with higher rates of revision, beyond those identified as HTARR. The process of identifying HTARR prostheses is rigorous, and there are many prosthesis com binations with higher than average rates of revision that do not meet the benchmark for HTARR status.

Second, surgery in public hospitals is often performed by trainee surgeons who may be expected to have a higher rate of revision and this may explain the lower rates of TKR revision in private hospitals when matched for prostheses. Previous research, however, has not shown a higher rate of arthroplasty revision among trainee surgeons.[8,9]

Third, expectations and demands of private patients may differ from public patients. Combined with greater access to care (not just access to consultants and private hospitals, but greater ability to take time off work and arrange for carers), this may increase the rate of revision in the private sector.

Other factors (described above) may also have a role in explain ing the differences seen; however the large size of the data set, the consistency of the findings on multivariate analysis and the loss (or reversal) of the association when adjusting for prosthesis choice, suggest that prosthesis choice (whether by hospital or by surgeon) is an important determinant of the difference in revision rates between public and private hospitals. This finding highlights the need to consider implant performance in the decision making pro cess, and the possible role of benchmarking in implant selection.

Conclusions

We conclude that differences in the rate of revision between private and public hospitals after primary hip and knee replacement surgery are largely explained by prosthesis choice, rather than hospital type. We suggest that implant choice remains a strong factor in reducing the need for revision joint replacement surgery.

Acknowledgements

We thank the AOANJRR staff, orthopaedic surgeons, hospitals and patients whose data made this work possible.

Conflicts of interest

None declared.

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Supporting information

Additional Supporting Information may be found in the online ver sion of this article at the publisher's web site:

Appendix S1. Secondary multivariate Cox regression analyses.