Risk factors associated with revision for prosthetic joint infection after knee replacement

As Erik Lenguerrand and colleagues[1] reported, 3659 of 679 010 primary total knee replacements (TKRs) were subsequently revised for an indication of prosthetic joint infection. The authors have identified several risk factors for revision for prosthetic joint infection and concluded that some of these factors are modifiable, and the use of targeted interventions or strategies could lead to a reduced risk of revision for prosthetic joint infection.

However, we noted that there were two factors that require further study. First, operation under general anaesthesia (rate ratio [RR] 1·1, 95% CI 1·0–1·2) was associated with a higher risk of revision for prosthetic joint infection. This study[1] is the first to propose that general anaesthesia will increase the incidence of infection after total knee arthroplasty. However, the authors did not study prophylactic use of antibiotics during general anaesthesia, which might influence the effect of general anaesthesia to TKR.

Second, use of posterior-stabilised fixed-bearing prostheses (RR for posterior-stabilised fixed-bearing prostheses *vs* unconstrained fixed-bearing prostheses 1·4, 1·3–1·5) was associated with a higher risk of revision for prosthetic joint infection. However, the authors did not assess the use of antibiotic cement for prosthetic fixation in their research. A previous study has shown that non-antibiotic cement could lead to an increase in the rate of infection after TKR (adjusted hazard ratio 1·35, 95% CI 1·01–1·81).[2] The different cement might influence the survival for different kinds of prostheses.

In summary, the conclusion that general anaesthesia and posterior-stabilised fixed-bearing prostheses increase the risk of infection requires further investigation.

We declare no competing interests.

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Authors' reply

We thank Ze-Yu Luo and colleagues for their interest in our study.[1] Further work is indeed required to clarify the increased risk of revision for prosthetic joint infection associated with primary knee replacement done under general anaesthesia or with posterior-stabilised fixed-bearing prosthesis. We hypothesise that the need to operate under general anaesthesia in England and Wales is a proxy for longer and more complex surgery.

A better understanding of the effect of antibiotic prophylaxis during the perioperative period, and specific effect associated with frequency and duration of prophylactic antibiotic delivery, is also necessary. Unfortunately, this information is not recorded in the National Joint Registry for England, Wales, Northern Ireland and the Isle of Man, but we have no reason to believe that the proportion of patients receiving antibiotic-loaded cement would differ according to whether a patient received a cruciate-retaining or posterior-stabilised implant.

Two meta-analyses[2,3] have explored the association between implant fixation methods and risk of prosthetic joint infection. For hip replacement,[3] plain cemented fixations were associated with an increased risk of prosthetic joint infection (relative risk 1·52, 95% CI 1·36–1·70) compared with antibiotic-loaded cemented fixations. For knee replacement,[2] the risk of prosthetic joint infection was similar for antibiotic-loaded and plain cemented fixations (0·95, 95% CI 0·69–1·31). However, antibiotic-loaded fixations were associated with decreased risk in Asian populations, with no difference in risk in other populations. In studies that followed up participants for a maximum of 6 months, antibiotic-loaded cemented fixations were associated with an increased risk of prosthetic joint infection compared with plain-cemented fixations (1·65, 1·12–2·43).[2] In analyses restricted to prosthetic joint infection diagnosed at 24 months of follow-up or later, no difference in risk was observed between antibiotic-loaded and plain cemented fixations (0·73, 0·33–1·63).[2] However, most studies underpinning these two meta-analyses were observational and have methodological limitations.

Trela-Larsen and colleagues[4] explored the effect of cement type and risk of revision for any indication. Similar rates of revision were observed for plain and antibiotic-loaded bone cements. Most bone cements performed similarly well, except for DePuy SMARTSET high viscosity and DePuy CMW3 high viscosity with gentamicin, both of which had higher revision rates than the other cements.

More research is needed to refine our understanding of the mechanisms underlying the patient-related, surgical-related, and health system-related factors associated with an increased risk of prosthetic joint infection. We encourage colleagues with access to large, unselected populations that are representative of national clinical practices and have data on prosthetic joint infection, antibiotic prophylaxis regimen, and

implant fixation methods to address the knowledge gaps highlighted here.

See Online for appendix

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Chlorhexidine for prevention of catheter-associated urinary tract infections: the totality of evidence

We read the Article by Oyebola Fasugba and colleagues,[1] and the supporting Comment by Bart J Laan and Suzanne E Geerlings,[2] with great interest. In a cross-sectional, stepped-wedge, open-label, randomised controlled trial (RCT), Fasugba and colleagues assessed the efficacy of 0·1% chlorhexidine solution compared with saline solution for meatal cleaning before urinary catheter insertion in reducing the incidence of catheter-associated asymptomatic bacteriuria and urinary tract infection (UTI). Meatal cleaning with 0·1% chlorhexidine before urinary catheterisation reduced the incidence of catheter-associated UTI by 94% compared with use of normal saline (incident rate ratio 0·06; 95% CI 0·01–0·32; p=0·00080).

Figure 3 of the study[1] showed that at one of the three participating centres (hospital A), a marked decrease in the incidence of catheter-associated UTI was observed in the intervention period compared with the control period, but the age and sex of the patients during the saline phase and the 0·1% chlorhexidine phase differed significantly. Although much lower than that of hospital A, the incidences of catheter-associated UTI in patients during the saline phase were similar at the other two hospitals. Therefore, the large decrease in the incidence of catheter-associated UTI in hospital A might have been due to bias.

The reduction in the incidence of catheter-associated UTI reported in this study might tempt health-care professionals to use a 0·1% chlorhexidine solution for urethral meatus cleaning instead of standard-of-care saline solution before urinary catheterisation. However, when all the evidence is considered, the efficacy of chlorhexidine is less robust. Based on the 2017 systematic review by Fasugba and colleagues,[3] two RCTs evaluating the efficacy of chlorhexidine have been published.[4,5] Both studies showed no significant benefit of chlorhexidine in meatal cleaning before urinary catheter insertion in reducing the incidence of UTI compared with a non-antiseptic agent (tap water). We did a meta-analysis summarising the data of these two studies and Fasugba and colleagues' RCT using a random-effects model with a generic inverse variance method. The pooled result did not show a significantly different incidence of catheter-associated UTI between the two treatment groups (pooled risk ratio 0·49; 95% CI 0·13–1·89; I^2=78%; appendix).

This meta-analysis might serve as a reminder that the evidence on the efficacy of chlorhexidine solution for meatal cleaning in reducing the incidence of catheter-associated UTI is still evolving and more data from high-quality RCTs are needed before the use of chlorhexidine solution can be recommended and implemented.

We declare no competing interests.

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Authors' reply

We thank Patompong Ungprasert and Visanu Thamlikitkul for their interest in our Article.[1] We agree that the totality of evidence should be considered in clinical decision making; systematic reviews are helpful in this regard. We also agree that the evidence for the routine use of chlorhexidine to prevent urinary tract infection (UTI) would be stronger if our study was replicated in different hospitals or countries.

However, we have reservations about simply pooling results from the three studies identified because