HK6: Does the use of antibiotic-impregnated polymethyl methacrylate cement reduce the incidence of infection in patients undergoing primary joint arthroplasty?

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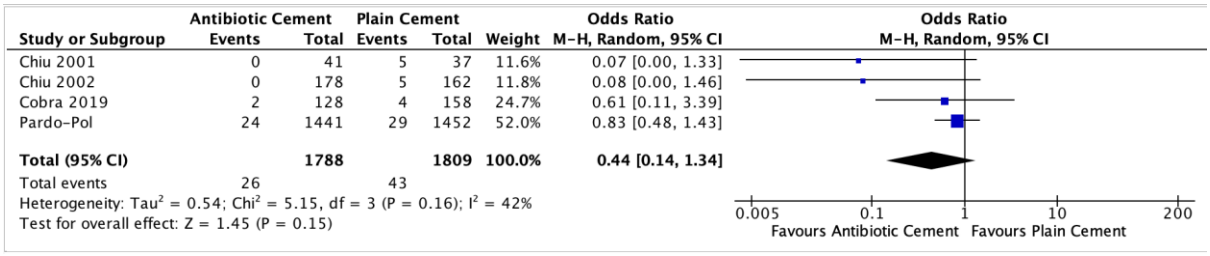
Response/Recommendation: The evidence among lower-level comparative studies is mixed, with some studies suggesting antibiotic-impregnated cement reduces the risk of infection in patients undergoing primary joint arthroplasty. However, pooling of the available Level 1 evidence, as well as pooled registry data, does not support a reduction in infection risk in primary total joint arthroplasty.

Level of Evidence: Moderate

Delegate Vote:

Rationale:
A total of 32 comparative studies were identified and published between 1990 and 2024 across 21 different countries (1–31). Nearly five million patients were included in total (4,943,801 joints in 4,943,768 patients). Of the studies reporting sex distribution, 37.3% were women. There were a total of six randomized controlled trials (RCTs), one prospective cohort study, 22 retrospective cohort studies, one case-control study, and one economic Markov model analysis. One study was a longer-term follow-up of an earlier published RCT (8).

The majority of studies included only total knee arthroplasty cases, while six studies included hip arthroplasty cases. Data from four RCTs comparing antibiotic-laden bone cement (ALBC) versus plain cement in primary total knee arthroplasty were pooled for a meta-analysis. The results of the meta-analysis revealed no significant difference in infection rates between the ALBC group and the plain cement group **(Figure 1)**.



The evidence among lower-level comparative studies was mixed. There were twelve studies that demonstrated no significant difference between ALBC and plain cement in primary hip and knee arthroplasty (3,12,15,18–21,23–25,28,29), while seven studies demonstrated a significant reduction in infection rates with the use of ALBC (10,11,14,16,17,22,31). Only one study found an increased risk of infection with the use of ALBC (27).

It is worth highlighting the findings from various registry and large database studies as well. A report utilizing data from the United Kingdom's National Joint Registry (17), as well as one from a large national insurance registry in the United States (10), found significant benefits in terms of infection prevention with the use of ALBC. However, three other registry-based studies did not find a difference between ALBC and plain cement (12,19,23). Importantly, one of these studies combined data from 14 different high-quality national or

regional arthroplasty registries, with a total sample size of over two million total knee arthroplasty patients (23).

The evidence regarding the economics of antibiotic-impregnated cement is also mixed. Of the two studies evaluating the economics of routine ALBC use, one found that routine antibiotic cement use was not cost-effective (26), while the other found that it was only potentially cost-effective if the antibiotics were added by the surgeon rather than commercially available pre-mixes (27).

Overall, there is a lack of evidence to support the routine use of ALBC in primary total joint arthroplasty. Data for total hip arthroplasty is relatively limited, while there are more studies available on total knee arthroplasty, including some high-quality RCT and registry data. The overall conclusion, whether based on pooling of data or an overall qualitative synthesis of the available literature, does not provide convincing evidence of the efficacy of ALBC in preventing infection in primary total hip and knee arthroplasty. The caveat that must be kept in mind is that with the overall rarity of prosthetic joint infection and the very large sample sizes required to answer this question directly (i.e., via RCT), many studies are likely underpowered to definitively answer the question. Is it out of the scope of answering this question to say something like: Need to re-write this--? Additionally, there are limited, but present concerns regarding rates of aseptic loosening and antibiotic resistance when utilizing ALBC routinely for primary total hip and knee arthroplasty procedures.

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