

Risk of revision after knee and hip replacement: even better than reported after accounting for the competing risk of death

We read with interest the papers by Evans et al.^{1,2} on implant survival after knee and hip replacement. Based on an exhaustive literature review and meta-analysis, they found long-term implant survival to be better than generally thought.

The studies included by the authors typically used Kaplan-Meier estimates for survival, where losses to follow-up are treated as noninformative. The implication of this is not trivial. With sufficient follow-up, the event of interest (i.e. revision surgery) would eventually occur for all subjects.³ However, after a primary knee or hip replacement, individuals have a competing risk of mortality which means that they may never undergo a revision surgery. The survival estimates provided therefore answer a patient's question: "what is my risk of having had a revision if I am still alive in 25 years?". Answering the question "what is my risk of having a revision?", however, requires taking the competing risk of mortality into account.⁴ We combined the estimates for risk of revision from the work by Evans et al.^{1,2} (assuming that risk was distributed evenly across time) with estimates for the risk of mortality from UK lifetables⁵ using a Markov model, with results summarised in Figure 1. It can be seen that the probability of revision at 25 years is 5 to 10 percentage points lower than would be estimated based on Kaplan-Meier estimates alone. Answers to both questions are likely of interest, and we hope these estimates help to contextualise those from Evans et al.^{1,2}

References

- 1 Evans JT, Walker RW, Evans JP, Blom AW, Sayers A, Whitehouse MR. How long does a knee replacement last ? A systematic review and meta-analysis of case series and national registry reports with more than 15 years of follow-up. *Lancet* 2019; **393**: 655–63.
- 2 Evans JT, Evans JP, Walker RW, Blom AW, Whitehouse MR, Sayers A. How long does a hip replacement last ? A systematic review and meta-analysis of case series and national registry reports with more than 15 years of follow-up. *Lancet* 2019; **393**: 647–54.
- 3 Austin PC, Lee DS, Fine JP. Introduction to the Analysis of Survival Data in the Presence of Competing Risks. *Circulation* 2016; **133**: 601–9.
- 4 Putter H, Fiocco M, Geskus RB. Tutorial in biostatistics : Competing risks and multi-state models. 2007; : 2389–430.
- 5 Office for National Statistics. National life tables: UK (2013-2015). <https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/lifeexpectancies/datasets/nationallifetablesunitedkingdomreferencetables> (accessed Aug 9, 2018).

