

LETTERS

MORTALITY AFTER HIP REPLACEMENT

Response to two recent *BMJ* papers on mortality after hip replacement: comparative modelling study

Ngianga-Bakwin Kandala *principal research fellow*¹, Martin Connock *senior research fellow*¹, Ruth Pulikottil-Jacob *research fellow*¹, Hema Mistry *assistant professor*¹, Paul Sutcliffe *associate professor*¹, Matthew Costa *professor of trauma and orthopaedics*², Aileen Clarke *professor of public health and health services research, director Warwick Evidence*¹

¹Warwick Evidence, Warwick Medical School, University of Warwick, Coventry CV4 7AL, UK; ²Warwick Orthopaedics, University Hospitals Coventry and Warwickshire, Coventry, UK

Two *BMJ* observational studies report increased survival of patients after metal-on-metal resurfacing versus cemented or uncemented total hip replacement.^{1 2} We considered the potential usefulness of these new estimates for lifetime cost effectiveness models, which necessitate extrapolation beyond observed data.³ Cost effectiveness models have assumed similar mortality irrespective of implanted device.⁴⁻⁶

McMinn and colleagues examined men under 55 years who received Birmingham hip resurfacing or cemented or uncemented hip replacements (mean age ~48 years).¹ Kendal and colleagues compared resurfacing with cemented and uncemented procedures in propensity matched groups followed for 10 years (mean age 57-59 years; 55-59% men).² McMinn and colleagues' estimated six year survival after resurfacing was 0.995; survival in those who underwent cemented and uncemented procedures were 0.018 and 0.013 worse, respectively.

The figure shows Office of National Statistics mortality data and well fitting Gompertz distribution for 48 year old men. Keeping the shape parameter we calculated the scale parameters that generated McMinn and colleagues' six year estimates. Plotted over a lifetime, these generated the curves in the top part of the figure, which predicted slightly better survival compared with the general population after uncemented total hip replacement, slightly worse after cemented a procedure, whereas after Birmingham hip resurfacing about one third of patients are predicted to become centenarians. The bottom part of the figure shows the curves generated when applying the same procedure with Kendal and colleagues' 10 year data. Again, survival after resurfacing is remarkably good, with a fifth of patients predicted to be centenarians.

Long term extrapolations are crude but reflect the predicted impact of short term observational estimates. The post-resurfacing curves are probably overoptimistic. This may stem from overoptimistic estimates at six and 10 years.^{1 2} Both sets of authors acknowledge the presence of strong selection biases in prosthesis allocation and the inability to adjust for hidden confounders. It is possible that selecting patients for resurfacing co-selects people with prolonged survival, but this seems unlikely. Similarly, it is difficult to see how a particular type of implant might deliver such substantial life extension. These mortality estimates do not seem to be of use for economic models; however, if they were adopted they would dominate current economic model outputs.

Competing interests: None declared.

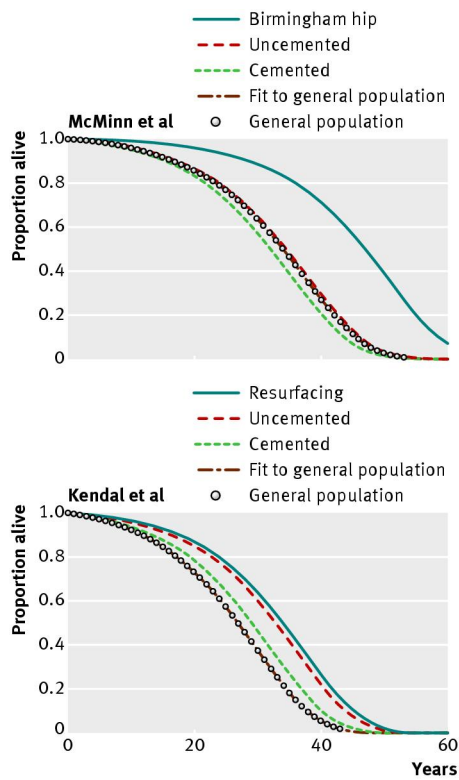
Full response at: www.bmj.com/content/347/bmj.f6549/rr/684641.

- McMinn DJW, Snell KIE, Daniel J, Treacy RBC, Pynsent PB, Riley RD. Mortality and implant revision rates of hip arthroplasty in patients with osteoarthritis: registry based cohort study. *BMJ* 2012;344:e3319.
- Kendal AR, Prieto-Alhambra D, Arden NK, Carr A, Judge A. Mortality rates at 10 years after metal-on-metal hip resurfacing compared with total hip replacement in England: retrospective cohort analysis of hospital episode statistics. *BMJ* 2013;347:f6549. (27 November.)
- Davies A, Briggs A, Schneider J, Levy A, Ebeid O, Wagner S, et al. The ends justify the mean: outcome measures for estimating the value of new cancer therapies. *Health Outcomes Res Med* 2012;3:e25-6.
- Pennington M, Grieve R, Sekhon JS, Gregg P, Black N, van der Meulen JH. Cemented, cementless, and hybrid prostheses for total hip replacement: cost-effectiveness analysis. *BMJ* 2013;346:f1026.
- Higashi H, Barendregt JJ. Cost-effectiveness of total hip and knee replacements for the Australian population with osteoarthritis: discrete-event simulation model. *PLoS One* 2011;6:e25403.
- Heintzbergen S, Kulin NA, IJzerman MJ, Steuten LMG, Werle J, Khong H, et al. Cost-utility of metal-on-metal hip resurfacing compared to conventional total hip replacement in young active patients with osteoarthritis. *Value Health* 2013;16:942-52.

Cite this as: *BMJ* 2014;348:g1506

© BMJ Publishing Group Ltd 2014

Figure



Survival curves generated from data from McMinn and colleagues (top) and Kendal McMinn and colleagues (bottom)^{1,2}