

# Revision hip networks

Matt Wilson, Anil Gambhir, Tim Board and Michael Whitehouse



**Matt Wilson** is a Consultant Orthopaedic Hip Surgeon based in the Exeter Hip Unit at the Princess Elizabeth Orthopaedic Hospital, Devon. Matt is the current President of the British Hip Society.



**Anil Gambhir** is a Consultant hip and knee surgeon at Wrightington Hospital and is the Immediate Past President of the British Hip Society. Anil is also the clinical lead for the North-West Revision Knee MRC based at Wrightington Hospital.

**T**he concept of centralising complex orthopaedic surgery is not a new one and the precedent is established. The advent of Major Trauma Centres (MTCs), in 2012, in response to the National Confidential Enquiry into Patient Outcome and Death (NCEPOD) report from 2007 has been a success with improvement in outcomes from major trauma<sup>1</sup>.

The shift towards developing similar networks for elective arthroplasty surgeons has been more contentious. There are differences between the requirements for major trauma surgery and major revision orthopaedic surgery; the most obvious is time. Both need specialist skills, staff and equipment and some cases need the skills of other surgical specialities; however, compared to major trauma surgery, elective orthopaedic cases offer time to plan and discuss at multi-disciplinary team (MDT) meetings.

The principle of Getting It Right First Time (GIRFT) is critical to the long-term success of any surgery. Data from the National Joint Registry (NJR) has shown that 21% of first-time revision hip replacements were revised within 15 years, 22% of second revisions were re-revised again within seven years and 22% of third revisions were revised a fourth time within three years<sup>2</sup>. Similar data for knee arthroplasty surgery and the GIRFT report from 2015<sup>3</sup>, which recommended dealing with the variation in practice and outcomes of orthopaedic surgery, was the stimulus for the introduction, in April 2022, of a pilot for knee revision networks.

The Revision Knee Working Group (RKWG), which developed the knee network, drafted a 'Guide for Good Practice in Revision Knee Surgery,' published in 2021<sup>4</sup>. Within this they outlined the concept of Regional Networks consisting of several Revision Units (RUs) working with a Major Revision Centre, who would 'specialise in the most complex work, including peri-prosthetic infection'.

The knee networks and MRCs were funded centrally to develop MDT services with additional funding available from top-slicing of the tariffs for revision knee surgery performed in RUs. While the outcomes of the pilot study are awaited, the process of developing the MRCs for knee surgery has had a knock-on effect on the way hip revisions are managed in many areas of the country. There are however, differences between revision hip and knee surgery in terms of burden and indications, notably the growing challenge of revision and fixation of peri-prosthetic hip fractures.

Although the timelines for development of revision in networks for hip surgery remain unclear, the British Hip Society (BHS) has been working in an inclusive manner to develop revision hip networks, engaging all stakeholders in a way that the rapid development of knee networks did not allow (Figure 1).

The process of understanding current practice involved commissioning of revision flow graphs from the NJR. These showed the network pathways that already existed for revision hip surgery under the coverage of NJR, with patients being transferred from smaller volume to higher volume centres for revision surgery. The main issue with this data was that it related to surgery undertaken between 2014 and 2019, the pre-COVID-19 era, and we know that the landscape of primary and revision centres has continued to evolve since those times. Therefore, it was difficult to draw conclusions or make recommendations based on data that might not reflect the current practice. >>

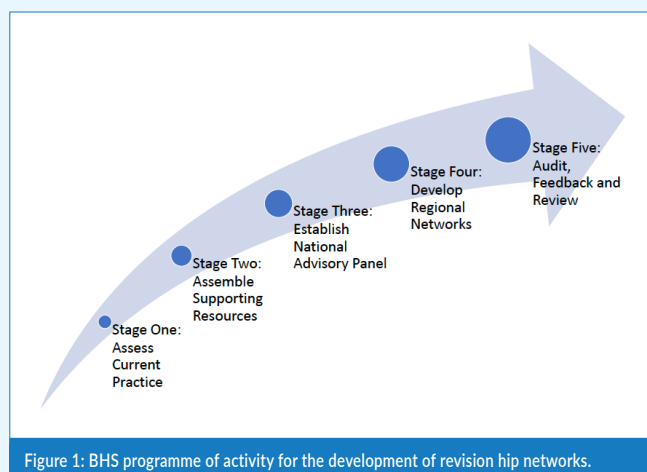


Figure 1: BHS programme of activity for the development of revision hip networks.



**Tim Board** is a Consultant hip surgeon at Wrightington Hospital and is President Elect of the British Hip Society. He specialises in complex and revision hip arthroplasty and young adult hip surgery. His research interest include outcomes of revision hip arthroplasty and hip arthroplasty in paediatric patients.



**Michael (Mike) Whitehouse** is the Professor of Trauma and Orthopaedics at the University of Bristol and an Honorary Consultant at North Bristol NHS Trust (Southmead). He is the British Hip Society Research Committee Chair and contract holder for Statistical Analysis, Advice and Support for the National Joint Registry.

The next stage of developing supporting resources was modelled on the work done by the RKWG on the Revision Knee Complexity Classification (RKCC) and a formal, modified Delphi process was undertaken by the Research Committee of the BHS to develop an equivalent for hip revision surgery, the RHCC<sup>5</sup>. In addition, the BHS partnered with Orthopaedic Research UK (ORUK) to fund a two-year research project exploring issues related to revision hip surgery with particular emphasis on surgeon volume and outcomes. The outputs of this research are informing the discussion around hip revision networks and are discussed in more detail below.

The BHS also developed a National Revision Hip Advisory Network with representation from all centres performing hip arthroplasty surgery from all seven regions in England, as well as Northern Ireland, Scotland, and Wales. We undertook two national meetings of this network to try and understand the current and evolving practice of networks. What became apparent was the influence of the established revision knee networks. Many of the knee MRCs were also using their funding and resources to develop regional hip networks, however some were not creating an inequality of service provision in some centres. In addition, there are a considerable number of high-volume revision hip centres that were not co-located in knee MRCs, but which were undertaking major revision work and doing so without the funding and support afforded to the established knee MRCs. It was also apparent from qualitative feedback that hip surgeons appreciated a collaborative process of trying to facilitate regional networks and build on established relationships and pathways rather than trying to enforce a process that might not work for local surgeons, staff and, most importantly, their patients.

The British Hip Society also took the opportunity to put together a series of BHS Surgical Standards documents, based on the successful BOA BOAST guidance format. These were developed with the support of many members of the advisory network and, hopefully, represent a consensus opinion of hip surgeons from around the country. The aim of these was to provide guidance, support, and auditable standards for revision units as we move into collaborative networks. These topics cover: management of peri-prosthetic infection, instability, fracture and aseptic loosening; mentorship and dual consultant operating; revision hip MDT and IT support as well as peri-operative care. These are available on the BHS website, under the resource section, and are available to non-members.

## Surgical volumes and outcomes

As with many areas of life, practice improves outcome from hip arthroplasty surgery. Studies on surgeon volume and failure of primary hip replacement have shown association between surgeon volume and outcome with surgeons

performing more than 200 primary hip replacements per year having the lowest revision risk although, of course, it is possible to be a high-volume surgeon with poor outcomes<sup>6</sup>.

It is reasonable to assume that the situation would be the same when it comes to outcomes for revision hip replacement. This not only relates to the experience of the surgeon and their technical skills but the support around them; from colleagues for dual consultant operating, access to MDT meetings, availability of, and familiarity with, revision implants that are routinely available and the skills of the allied health professionals we work alongside; from theatres staff, anaesthetic and recovery teams to nurses and therapists on the wards.

Data from NJR studies suggest that almost two-thirds of revision hip replacements recorded are performed by surgeons undertaking at least 15 procedures per year with the top 20% by annual volume performing 74.2% of all revision hip replacements. One notable finding is that for those surgeons undertaking smaller numbers of revisions, the indications for revisions are slightly different with a higher proportion performed for the indication of infection. It could be argued that revision for infection is one of the most challenging surgeries for both surgeon and patient. Therefore, if we are going to centralise any revision surgery, this may be the first group we need to consider and it is important to understand the reasons low volume revision surgeons feel compelled to take on these complex cases<sup>7</sup>.

Holleyman *et al.* explored the surgeon volume and outcome data in more detail looking at 12,961 linkable, first-time, single-stage revisions for aseptic loosening across 950 surgeons and 137 centres. The median annual consultant volume of revision surgeons was 20 (IQR 11-31) and the median centre volume was 87 (IQR 51-131). Mortality was 0.73% in the first 90 days and 4% of cases underwent re-revision with two years of first revision. Consultants performing less than one revision per year had a 30% higher risk of re-revision and this risk was significantly elevated until a rate of five revisions per year was reached, fewer than might be expected. Beyond this rate, there was no significant change. In terms of cumulative revision, risks of re-revision are elevated for the first 26 revisions. There was no significance related to centre volume for revision hip replacement.

Mortality rates mirrored those of surgeon rates, with higher rates of mortality for surgeons performing less than five revisions per year. When looking at experienced Consultants with experience of more than 50 revision surgeries, there is no association between surgeon volume and outcome suggesting that once experience is gained this offers a protective effect for declining volumes in the short term<sup>8</sup>.

So, what does this mean for revision networks? It would suggest that the surgeon and unit volumes needed to maintain good outcomes are less than might have been expected. A minimum of five revision hip cases per year for an individual surgeon, with mentoring and access to dual consultant operative support for the first 25 revision hip replacements is evidence-based. Given the lack of evidence around unit volume, it is not possible to advise on the number of surgeons per unit but a minimum of two surgeons per unit undertaking revision hip replacement seems sensible to allow cross cover, joint case discussion and cover for emergency cases. If we translate this to the data on surgeon numbers, this will mean an estimated 1,000 surgeons doing less than five revision hip replacements per year would be asked to stop and roughly 6,000 patients would be moved to the care of a higher volume surgeon, either in the same unit or transferred to a local revision centre.

### Key performance indicators

Ongoing monitoring of outcome data is essential to the success and development of revision networks. The RKGW have developed a series of key performance indicators (KPIs) that are auditable and collected by the MRCs. Similar KPIs can be suggested for hip networks and include; surgeon and centre volumes, case grading according to the RHCC, attendance at MDTs and discussion of all revision cases, use of loan and custom implants and submission of data to registries – NJR and Bone and Joint Injection Registry (BAJIR) should be mandated. Performance KPIs should also be recorded including; feedback for the coordinating centres, surgical site infection surveillance, return to theatre within 30 days and 90-day mortality rates. In addition, referral to treatment times for those cases transferred to other centres is an important metric. This becomes very pertinent when dealing with peri-prosthetic fractures

(PPF) of the hip. Fixation and revision of these cases is an increasing burden and prompt care of these patients is critical to their outcome and reduced morbidity and mortality. Best practice tariffs for neck of femur fractures have worked well to improve outcome and a similar approach may be needed for PPF cases where the challenges of providing surgeon, equipment and implants is more difficult.

### Model for networks and the future

The pilot for knee revision network in England has been developed with 24 major revision centres across 25 NHS Trusts. These MRCs are funded to coordinate revision networks in their region and support a variety of revision units (RUs), with the aim that the most complex cases according to the RKCC are transferred from RUs to MRCs. How this has worked over the pilot and its effect on outcomes may not be known for some time, but the process of evolving networks is clear from our work with the Hip Revision Network Group. The networks for hip revision surgery may not benefit from the same structure and the data above would suggest a larger number of revision orthopaedic centres (ROCs) is possible. Within regions, we would expect that one of these centres would be a 'Coordinating ROC,' with added funding to allow data collection, support of local ROCs and submission of annual audit data based on the KPIs already discussed (Figure 2). The greater number of revision centres is particularly important in view of the rise in PPFs to reduce the requirement to transfer patients long distances, away from their own support networks and subjecting them to delay in treatment. Current research being conducted by members of the BHS suggests that the volume effect for the treatment of peri-prosthetic fractures which includes fixation and revision may be different to revision for all indications.

primary surgical hubs and revision networks has developed and continues to evolve.

Moving forward, our role as hip surgeons is to engage with colleagues locally and within regions, considering the published data, to work collaboratively on developing established networks, attending MDTs, collecting data, and improving outcomes for best interests of our patients. ■

### References

1. Moran CG, Lecky F, Bouamra O, Lawrence T, Edwards A, Woodford M, *et al.* Changing the System - Major Trauma Patients and Their Outcomes in the NHS (England) 2008-17. *EClinicalMedicine*. 2018;2-3:13-21.
2. Deere K, Whitehouse MR, Kunutsor SK, Sayers A, Mason J, Blom AW. How long do revised and multiply revised hip replacements last? A retrospective observational study of the National Joint Registry. *Lancet Rheumatol*. 2022;4(7):e468-e479.
3. A national review of adult elective orthopaedic services in England. Available at: <https://gettingitrightfirsttime.co.uk/wp-content/uploads/2018/07/GIRFT-National-Report-Mar15-Web.pdf>. [Accessed March 2025].
4. A Guide to Good Practice for Revision Knee Replacement. Available at: <https://baskonline.com/professional/wp-content/uploads/sites/5/2021/05/Revision-Knee-Guide-to-Good-Practice-Final-AT-.pdf>. [Accessed March 2025].
5. Leong JWY, Singhal R, Whitehouse MR, Howell JR, Hamer A, Khanduja V, *et al.* Development of the Revision Hip Complexity Classification using a modified Delphi technique. *Bone Jt Open*. 2022;3(5):423-31.
6. Sayers A, Steele F, Whitehouse MR, Price A, Ben-Shlomo Y, Blom AW. Association between surgical volume and failure of primary total hip replacement in England and Wales: findings from a prospective national joint replacement register. *BMJ Open*. 2020;10(9):e033045.
7. Holleyman RJ, Jameson SS, Reed M, Meek RMD, Khanduja V, Hamer A, *et al.* Consultant revision hip arthroplasty volumes and new consultant volume trajectories in England, Wales, Northern Ireland, and the Isle of Man. *Bone Joint J*. 2023;105-B(10):1060-9.
8. Holleyman RJ, Jameson SS, Meek RMD, Khanduja V, Reed MR, Judge A, *et al.* Association between surgeon and hospital volume and outcome of first-time revision hip arthroplasty for aseptic loosening. *Bone Joint J*. 2024;106-B(10):1050-8.

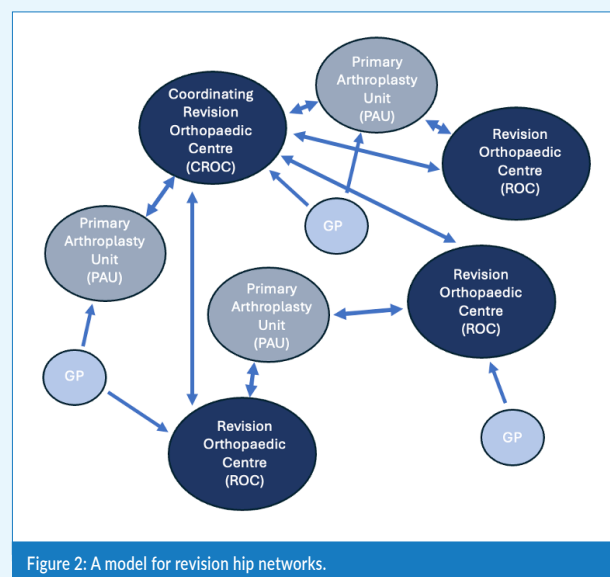


Figure 2: A model for revision hip networks.

The major issue at present is the commissioning of these services, not only for hip revision surgery but across all subspecialties. The 2013 Service Specification document was being updated with Specialist Commissioners from NHS England to reflect revision networks, however that has been stalled by the recent announcement that NHS England is being disbanded with their work coming back under the remit of the Department of Health and Social Care (DHSC). At the time of writing, and likely publication, there is little clarity on how the process will work moving forwards. What is clear is that the development of