University of BRISTOL

Elizabeth Blackwell Institute for Health Research

Research for Health Scheme

Stage 1 - Call for Challenges Application Form

- **This call is open to doctors, nurses and allied health professionals employed by the NHS.**
- **Please use this form to describe a specific issue or challenge which you are currently facing in your area of healthcare delivery.**
- **The deadline for submission is 25 Feb 2014. Please email this application form to Lisa.Wheatley@Bristol.ac.uk**
- **If your challenge is selected, University of Bristol researchers have the opportunity to bid for funds to help them develop a solution. They will work in partnership with you to make sure the new technology, device or innovation will really work for you, your colleagues and your patients.**

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Challenge Title (max 20 Words)
Measurement of Malrotation in Total Knee Arthroplasty

Please describe the specific problem which needs addressing
Total knee arthroplasty (TKA) is a cost effective and successful operation but approximately 20% of patients have persistent pain following TKA. Malrotation of the femoral and tibial component at primary (first time) and revision (repeat) TKA is a potential cause of pain, stiffness, instability, patella maltracking and component failure. The gold standard for measuring rotation of components in TKA is currently computerised tomography (CT) scan. CT scan is expensive and exposes the patient to ionising radiation, which exposes the patient to potential risk. It has been estimated that the use of CT scans in the United States of America is associated

with 29,000 excess future cancers. Assessment of the rotation of the femoral and tibial components in TKA has been shown to have variable interobserver and intraobserver correlation as well as reliability, calling into question the risk/benefit analysis for the determination of rotation by this investigation.
We seek a low cost, reliable, repeatable means of determining the rotation of femoral and tibial components in TKA in relation to the bone landmarks of the patient (epicondylar axis of the femur and the tibial tuberosity on the tibial side) that does not involve ionising radiation and is cost effective.

How does this issue impact on you, your colleagues and your patients?

Persistent pain following TKA is a substantial problem and a cause of poor function and dissatisfaction following TKA. 20% of our patients undergoing TKA are affected by this. When a patient does have persistent pain following TKA, it is important to understand the cause of the pain so this can be addressed at revision surgery. It is also important that the investigation of pain following TKA does not expose the patient to further unnecessary risk. Malrotation of components is an increasing reason for revision surgery in patients with a TKA yet the cause and effect of this indication is poorly understood. Most studies of revision for malrotation do not include postoperative assessment of rotation, calling into question the validity of the results. An alternative means of assessment of rotation as described above would allow us to assess rotation accurately before and after revision to establish this cause and effect as well as allowing us to determine the extent of malrotation in asymptomatic patients.

Can you estimate how many patients or staff are affected by this problem?
Can you describe any associated financial implications for the NHS or patients?
(Don't worry if you are not able to answer this question at this stage – it is not compulsory)

90,842 TKA procedures were performed in England, Wales and Northern Ireland in 2012. 84,833 were primary procedures and 6,009 were revision procedures. The number of primary TKAs is increasing by approximately 7% per year for primary procedures and 17% for revision procedures. Up to 53% of the revisions performed are for indications that may relate to component alignment such as pain, wear, instability, malalignment, stiffness and dislocation.