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**An exploratory study of the long-term impact of difficulty kneeling after total knee replacement**

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## **ABSTRACT**

### **Purpose**

To explore the long-term impact of difficulty with kneeling and how healthcare services could be improved to help patients kneel after total knee replacement.

### **Methods**

Telephone interviews were conducted with 56 patients who had extreme difficulty kneeling at 7-10 years after knee replacement. Patients were asked about reasons for difficulty kneeling, how it impacted upon their lives, and experiences of healthcare services. Responses were recorded on a standardised proforma and a descriptive content analysis performed.

### **Results**

Most people had difficulty kneeling because of pain or discomfort in the replaced knee. Many patients described this limitation affected their daily lives, including housework, gardening, religious practices, leisure activities and getting up after a fall. Patients often adapted to these limitations by finding alternatives to kneeling, assistance from others or home adaptations. Many patients had accepted that they could not kneel, however some still expressed frustrated. Few patients had consulted with healthcare professionals about kneeling difficulties, and unmet needs included the provision of information about kneeling and post-operative physiotherapy.

### **Interpretation**

This study provides an initial insight into how difficulty kneeling after knee replacement impacts upon patients and the need for better healthcare provision.

**Key words:** Total knee replacement, kneeling, service provision

## INTRODUCTION

Total knee replacement is a successful operation for many patients, providing pain relief and improving functional ability. However, patients with knee replacement still have considerable difficulty with some tasks. Kneeling is considered as one of the most important, but also most difficult, activities for patients with knee replacement [1]. Around 85% of patients listed for a knee replacement have difficulty kneeling [2 3] and the vast majority of these patients expect that they will be able to kneel after surgery [4]. However, these expectations are frequently not met [5], with 60-80% of patients reporting that they have difficulty kneeling or do not kneel after knee replacement [1-3 6 7]. These problems with kneeling continue for many years after surgery, with 67% of patients reporting difficulty kneeling at 5 years post-surgery [8]. Research has shown that kneeling ability is consistently the poorest patient-rated outcome after knee replacement [9 10].

There is no evidence that there is any clinical reason why patients should not kneel after knee replacement [11 12]. Arthritis Research UK recommend that patients can kneel on a soft surface at 3 months post-surgery [13]. The amount of knee flexion required to kneel is approximately 110°; this can be achieved by most patients by 3 months post-surgery [14]. Research suggests that there no relationship between kneeling ability and knee flexion [2 11 15], type of implant [2 3], scar position [15], and age [16]. Numbness has been found to correlate with kneeling ability in some studies [17] but not others [15]. Discrepancies between patient's perceived ability to kneel and their observed ability suggest that patients can kneel but elect not to [11 16 18].

Despite the prevalence of kneeling problems after knee replacement, little research has been undertaken to understand the impact that this has on patients and identify any unmet healthcare needs. Therefore, this study aimed to explore the long-term impact of difficulty

kneeling after knee replacement and to identify areas for improvement in the provision of healthcare.

## **PATIENTS AND METHODS**

### **Patient sampling and recruitment**

Patients were recruited from an ongoing single-centre cohort study evaluating the outcomes of the Triathlon prosthesis [8 19 20]. Patients completed their 7 year follow-up questionnaires between October 2013 and October 2016. In this questionnaire, patients were asked if they could kneel with response options of ‘no, not at all’, ‘with much difficulty’, ‘with a little difficulty’, ‘yes,easily’ and ‘I have not tried’. A purposive homogenous sample of all patients who self-reported extreme difficulty or inability to kneel in their 7 year follow-up questionnaire were sent information about the study and a reply form in November 2016. Patients who were interested in participating were asked to return a reply slip and provide written consent for the research team to contact them to arrange a telephone interview. Ethics approval was received from Southmead Local Research Ethics Committee (Reference: 06/Q2002/80).

### **Structured telephone interviews**

Brief structured telephone interviews [21 22] lasting between 15-20 minutes were conducted. All telephone interviews were performed by the same researcher (DF). Questions consisted of a mixture of 10 standardised or open-ended questions, some including prompts to encourage greater detail (Supplementary material). Questions about difficulty kneeling included when it started and the reasons why patients found it difficult to kneel, pre-operative expectations, how it affected their life including emotional impact, whether they had discussed their

kneeling problems with healthcare professionals, if they had received any support or advice, and whether they had any thoughts about any care or advice they would have liked to have received.

## **Analysis**

Participants' responses to the interview questions were written down as accurately and completely as possible on a standardised paper proforma at the time of the interview (Supplementary material). All telephone interviews were then directly transcribed from the paper proforma onto a Microsoft Excel spreadsheet. Data were analysed using descriptive content analysis, an analytic approach useful when conducting exploratory work to identify salient content in an under researched area. The aim of this approach is to provide a condensed and broad description of the phenomenon of interest, [23 24] which in this study is the difficulty kneeling experienced by people with knee replacement, and the impact this has on their lives. Firstly, participants' responses were read and re-read to achieve immersion and familiarisation with the data. This approach was deductive in the sense that some categories were drawn from the standardised questions on the pro-forma (e.g. 'Expectations') but the unconstrained categorization matrix which was based around the interview questions also allowed for the identification of inductive categories (e.g. 'Adaptations') [23]. Coding was performed by one author (DF) and codes discussed with two other authors (VW and AJM). Codes were agreed and then applied to the data set. Codes were organised into categories and these categories were then condensed into the main categories.

## **RESULTS**

### **Participants**

Of the 160 patients who completed a question about kneeling at 7 years post-surgery, 104 (65%) reported extreme difficulty or an inability to kneel. These patients were sent a study pack and 59 patients returned a reply form. Two patients who replied could not be contacted by telephone and one patient became too ill to participate. Therefore, interviews were conducted with 56 patients. Participant demographics are displayed in Table 1.

Categorisation matrices are presented in Table 2. A descriptive summary of the seven main categories are presented here to describe the long-term impact of difficulty kneeling on patients after knee replacement, use of health services and unmet healthcare needs.

### **Reasons for difficulty kneeling**

For the majority of patients, difficulty kneeling started immediately after surgery and had remained similar over the 7-10 years. The most common reason for difficulty kneeling was pain, discomfort or numbness when kneeling. Other reasons included a fear of damaging the prosthesis, other painful joints, being advised not to kneel, fear of being unable to get up from the floor, lack of confidence in the replaced knee and perceiving that there was not enough bend in the knee.

**Pre-operative expectations of kneeling ability after knee replacement** Pre-operative expectations regarding kneeling ability were varied. Some patients recalled that they had expected to be able to kneel after surgery. Specifically, some expected their knee replacement to be like a 'normal' knee and hence they thought they would be able to kneel like on a 'normal' knee. Others had expected some difficulty with kneeling, but not as severe as they experienced. In contrast, a number of patients did not expect to be able to kneel after surgery because they were advised by healthcare professionals, family members or friends that they would be unable to kneel after surgery. Also some patients reported that they experienced difficulty kneeling prior to surgery and therefore did not expect to be able to kneel after knee

replacement. There were also patients who had no expectations, primarily because they did not kneel before surgery, kneeling had not been discussed in their consultations with healthcare professionals or because their expectations were focussed on pain relief and mobility.

### **Impact on household activities, leisure activities and self-care**

Many patients described how difficulty with kneeling impacted on their daily lives.

Household activities were often problematic, particularly at a low level e.g. cleaning skirting boards and floors, reaching things in low cupboards, decorating and DIY. Gardening, an important leisure activity for many patients, was another activity that patients experienced difficulty with or were unable to do. Other leisure and social activities affected included exercise and sports, praying in church, playing with grandchildren and volunteer activities. Patients also described how picking things up from the floor and getting out the bath were difficult. Patients spoke of being nervous and fearful of not being able to get up after a fall particularly when engaged in activities outside such as gardening, fishing or walking the dog, and when there was no one else around to help. There were also patients who reported that their difficulty kneeling had little impact on their daily lives and did not present any barriers to activities; for some patients this was because they had adapted to their limitations.

### **Adaptation to limitations**

Patients had often employed strategies to minimise the impact of these limitations on their daily life. Many patients found alternatives to kneeling, these included bending at the waist or using a stool to sit on for low-level activities. Some patients used assistive devices such as 'grabbers' to retrieve items that were hard to reach on the floor. Others had adapted their homes, such as changing their bath to a shower or having raised flowerbeds. When patients were unable to find ways to continue to perform activities, they described how they relied on



their family members, primarily spouses and children, to assist in certain tasks or how they employed people to carry out these tasks for them e.g. cleaners and gardeners.

### **Emotional impact**

By 7-10 years post-surgery, many patients had accepted and adapted to the fact they could not kneel, and some reported that it no longer caused them distress or worry despite their initial feelings of frustration. A number of patients weighed their inability to kneel against the positive aspects of their knee replacement in terms of pain relief and improved mobility, and one patient no longer had to use a wheelchair. However, some patients continued to experience frustration, anger or disappointment at their inability to kneel.

### **Healthcare use**

The majority of patients had not spoken to healthcare professionals about their difficulty kneeling. Some patients decided not to speak to healthcare professionals as they did not think that their kneeling difficulty affected them enough to seek healthcare. Other reasons for not consulting with healthcare professionals included that it was thought to be normal to be unable to kneel, that nothing could be done, that the problem would improve over time, and that they were happy with other aspects of outcome. The few patients who had spoken to their surgeon or General Practitioner about kneeling reported that they perceived there was a degree of disinterest in the subject of kneeling, and that the primary concern was with range of motion rather than kneeling ability. Very few patients had received advice about their difficulty kneeling, but for those that had it included being shown how to kneel on the other knee, told to kneel on a cushion, advised to bend the knee in stages and not to kneel if it feels uncomfortable.

### **Unmet needs**

Many patients did not have any suggestions about care or advice they would like to have received regarding kneeling, often because they thought that nothing could be done about this outcome. However, several patients said they would have liked to have received more post-operative physiotherapy, and longer-term follow-up to assess progress. Also more pre-operative information provided to them regarding post-operative difficulty with kneeling was suggested by some patients. Other suggestions included more information on what one can and cannot do after a knee replacement, a more holistic approach, use of kneeling demonstrations and advice to encourage people not to be worried about damaging the prosthesis.

## **DISCUSSION**

This study found that difficulty kneeling after knee replacement has a long-term impact on some patients. Patients utilise a number of means to adapt to living with these limitations, including aids, home modifications and assistance from others. Although many patients had accepted and adapted to their limitations, some patients were still distressed and expressed frustration, disappointment and a loss of independence. Few patients had consulted with healthcare professionals or received advice about kneeling difficulties, and unmet needs regarding the provision of information about kneeling and post-operative physiotherapy were identified.

There are some limitations to this study which should be acknowledged when interpreting the results. This was a cross-sectional study which involved interviewing participants at 7-10 years post-surgery to explore the long-term impact of difficulty kneeling. This may have given rise to a degree of recall bias, particularly regarding pre-operative expectations [25], and future research would benefit from a longitudinal design. Participants were recruited

from a single orthopaedic centre in the South West of England, and while there may be differences in the information that patients receive about kneeling in other orthopaedic centres, we believe that there is representational generalisability of these findings to the wider population of people who have difficulty kneeling after knee replacement [26]. Moreover, the prevalence of difficulty kneeling after knee replacement in our cohort from which patients were sampled was 65%, which is similar to other studies [26-7]. However, there were few patients of working age in this study. Many occupations require kneeling, such as floor laying, roofing, nursery teaching, plumbing and cleaning. One third of working adults do not return to work after knee replacement and kneeling is the work-related activity that is least improved by knee replacement [27]. Further research specifically with patients of working age is needed to understand the impact of difficulty kneeling and how healthcare can best support people to enable them to return to work.

In terms of methodology, brief, structured telephone interviews were used as they presented an efficient means of providing a preliminary exploration of this understudied topic. Open questions and prompts allowed participants to expand on their experiences and views about kneeling, to provide a general broad description of issues, but the structured format did not allow for greater depth or contextualisation [21]. Also responses to interview questions were written down as accurately as possible rather than being audio-recorded and transcribed; this reduced the resources needed but and subtleties in the participants' responses may have led to greater insights if exact quotations were available for analysis. Further research using in-depth qualitative interviews with a diverse population of patients before and after knee replacement would build upon this study to gain a deeper understanding of the experience and impact of difficulty kneeling.

Similar to previous research, this study found that the reasons that people have difficulty kneeling are multifactorial and include pain or discomfort/numbness in the replaced knee; a

fear of damaging the prosthesis; advice from healthcare professionals, family or friends not to kneel; and other co-morbidities [11 16-18 28]. Pre-operative expectations about kneeling ability were varied, likely reflecting the diverse sources that inform patients' expectations [29]. Notably, some patients had not expected to be able to kneel after surgery, based on advice from healthcare professionals. There is no evidence to support that kneeling after knee replacement is unsafe [11 12], highlighting the need to explore healthcare professionals' perceptions about kneeling after knee replacement.

Kneeling was found to be an important activity for many aspects of life, including activities of daily living, leisure and social activities, interaction with family and self-care. The experience of difficulty kneeling can disrupt the taken-for-granted features of everyday life, leading to biographical disruption for patients and their family [30]. Kneeling is also important in enabling people to get up after a fall, which is a common problem in adults aged 60 years [31]. Participants expressed fear and nervousness about falling, particularly when doing activities outside such as fishing or gardening where there is a risk that there is no-one to help. Falling and fear of falling can substantially reduce health-related quality of life, and lead to needless restriction in participation in physical and social activities, physical deconditioning, social isolation, and psychological distress [32].

People had lived with this limitation for many years, and therefore had often found adaptations, for example finding alternatives to kneeling, using assistive devices or making modifications to their homes. Some people had to pay cleaners or gardeners to do the tasks that they could no longer do, which may present a financial burden to the individual. Others described how they now relied on other people, predominantly family members, and how this led to a loss of independence. These findings reflect previous literature on managing chronic musculoskeletal conditions which shows that functional losses are either accepted or

compensated for as people choose other ways to remain active or change how they enact activity [33 34].

Healthcare use for difficulty kneeling after knee replacement was found to be minimal, and reasons for not using healthcare services were varied. For example, some patients thought it was normal not to kneel and that nothing could be done to improve this outcome. Also in the context of being satisfied with other aspects of their outcome, some patients were willing to accept not being able to kneel. This highlights the need to increase awareness that difficulty kneeling is a problem after knee replacement and actively engage patients in an intervention to improve kneeling. A randomised controlled trial found that a 30-minute physiotherapy intervention delivered at 6 weeks post-surgery improved patient-reported kneeling ability at 12 months after unicompartmental knee replacement [15]. A cohort study suggests that pre-operative kneeling advice may improve post-operative kneeling ability [28].

Future research is needed to develop and evaluate an intervention to improve kneeling after knee replacement. Given the multifactorial reasons that patients find kneeling difficult after knee replacement, a complex intervention with multiple interacting components is needed [35]. This may involve education to reassure people that it is safe to kneel and that discomfort is not an indication that the knee prosthesis is being damaged, demonstrations and an opportunity to practice how to kneel safely, trying different kneeling techniques to account for co-morbidities and minimise stress on other joints, desensitisation exercises to reduce the pain or discomfort on kneeling and a supportive environment to build confidence. A degree of tailoring may be needed to provide individualised support. Pain and function after knee replacement improve dramatically in the first 3 months post-surgery with minor further improvement in the first post-operative year, but not thereafter [36], so any intervention to improve kneeling is more likely to be efficacious if delivered in the early post-operative period.

In conclusion, this study has provided an initial insight into how difficulty kneeling impacts upon patients' lives. Development and evaluation of an intervention to improve kneeling ability after knee replacement has the potential to improve patients' health-related quality of life and satisfaction with their outcome.

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## **Conflicts of interest**

The authors report no conflicts of interest.

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**Table 1: Participant demographics**

Median age in years (interquartile range)	75 (71-80)
Number of females	39
Difficulty kneeling (n)	
Extreme difficulty	19
Unable to kneel	37
Years since surgery (n)	
7	14
8	15
9	13
10	14

**Table 2: Categorisation matrices**

Codes	Details
Reasons for difficulty kneeling	Pain Discomfort, including numbness Other comorbidities e.g. osteoarthritis in other knee, painful hips Advised not to kneel Fear of not being able to get up again Fear of damaging the prosthesis Lack of confidence in knee Not enough bend in knee
Expectations	Expected to be able to kneel – expected replaced knee to be like a normal knee, told they would be able to kneel, knew people who could kneel, expected an improvement in kneeling ability  Did not expect to be able to kneel – told by surgeon, friends or family that they would be unable to kneel, knew people who could not kneel, unable to kneel before surgery  Did not know – had not thought about it, did not kneel before surgery, had not discussed it with anyone, just wanted to be mobile and out of pain  Unable to remember
Impact on household activities	Cleaning e.g. floors, skirting boards, oven, changing beds Decorating and DIY Getting things out of low cupboards and freezer
Impact on leisure activities	Gardening Exercise and sports e.g. badminton, pilates, skittles Praying in church Playing with grandchildren Camping Volunteer work e.g. guides
Impact on self-care/ability	Getting up after a fall – being unable to get up unaided particularly when outside alone e.g. gardening, walking the dog, fishing, Picking things up from the floor Getting out of the bath
Adaptions	Home modifications e.g. changed bath to shower, raised flower beds Assistive devices e.g. grabber to pick things up from the floor, long handles tools for gardening Assistance from others e.g. family (mainly spouses and children), pay cleaners or gardeners Change approach to activities e.g. bend at waist, use stool for gardening and low-level cleaning, lie down to paint skirting boards
Emotional impact	Frustration, anger, annoyance, disappointment and loss of independence –

	<p>initially or ongoing</p> <p>Accepted and adapted to limitations – got used to it, cope with it, use assistive devices</p> <p>Not distressed by limitations - seem minor compared to other benefits of knee replacement e.g. pain relief, no longer use wheelchair</p>
Healthcare use	<p>Not used healthcare – not distressed enough to seek healthcare, thought difficulty kneeling was normal, happy with overall outcome, just have to get on with it, reluctant to both healthcare professionals, did not want to mention it to General Practitioner as perceived as ‘not their problem’</p> <p>Discussed with General Practitioners – perceived disinterest in subject of kneeling e.g. it is just one of those things, let me know if it gets worse</p> <p>Discussed with orthopaedic surgeon/physiotherapist – perceived disinterest in subject of kneeling e.g. only interested in bend in knee, difficulty kneeling is normal</p> <p>Advice/support received from healthcare professionals - shown how to kneel on the other knee, told to kneel on a cushion, advised to bend the knee in stages and not to kneel if it feels uncomfortable.</p>
Unmet needs	<p>No suggestions – thought nothing could be done about the outcome</p> <p>More physiotherapy, longer-term follow-up, pre-operative information that kneeling would be difficult, kneeling demonstrations, more holistic approach, information on what can and cannot be done after a knee replacement, reassurance that kneeling will not damage the prosthesis, information on how many people find kneeling difficult after surgery</p>