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Long title Pathways through care for long-term pain after knee replacement: a qualitative study with healthcare professionals

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Abstract

Background

Chronic pain after total knee replacement is experienced by around 20% of patients in the UK. Ensuring that services are designed to best meet the needs of patients requires a foundation of empirical work. This study sought to describe healthcare professionals' experiences and views on the assessment and care of patients with chronic pain after total knee replacement.

Methods

We undertook a qualitative focus group study with healthcare professionals at a large acute NHS hospital trust, all of whom come into contact with patients who are experiencing chronic pain after total knee replacement. Snowball sampling was used to recruit participants to four focus groups. Transcripts of the audio recorded groups were analysed thematically.

Findings

Eighteen healthcare professionals from a range of disciplines took part. Participants found it difficult to conceptualise chronic pain; its character varied between patients, and its origins and progress were often ambiguous. In the first of two superordinate themes, participants recognised chronic pain as a possible outcome of total knee replacement, but felt that patients may be unprepared for this. In the second superordinate theme, apparent complexities in assessing and managing patients with chronic pain after total knee replacement and a lack of explicit access points meant that healthcare professionals often saw no clear way to help patients. Participants agreed that a multidisciplinary approach that adapts to individual patient context was an ideal approach.

Conclusion

This study has illustrated potential obstacles to 'best practice' in the management of chronic pain after total knee replacement, identified through research with healthcare professionals. There is a need to

improve access to services and develop well-defined and flexible care pathways that can accommodate complexities inherent to chronic pain, such as an unpredictable course.

Keywords Total knee replacement; Chronic pain; qualitative; care pathway

Introduction

Total knee replacement is an increasingly common procedure, with over 75,000 operations taking place annually in England and Wales (National Joint Registry for England and Wales, 2011) and numbers are expected to continue to rise (P. Jüni et al., 2003). Knee replacement aims to reduce pain and improve function, and the majority of operations take place due to persistent, troublesome pain related to osteoarthritis (G. Hawker et al., 1998; O'Neill et al., 2007). Although surgery provides good outcome for many patients (Peter Jüni et al., 2006), recent studies have found that around 20% of patients experience long-term ('chronic') pain after total knee replacement (Beswick et al., 2012; Jones et al., 2000). This equates to over 15,000 new cases of chronic post-surgical pain each year in the UK alone.

Although chronic pain after total knee replacement affects many, there are issues relating to provision of appropriate services to care for patients. Those experiencing chronic pain after total knee replacement have reported feeling 'abandoned' by healthcare (Jeffery et al., 2011). A recent survey of high-volume orthopaedic centres (V Wylde et al., 2014) found that pain was assessed at routine follow up appointments, providing an opportunity to identify patients experiencing ongoing pain. The wider literature on chronic pain of all causes indicates that service provision is inconsistent (Breivik et al., 2006; Dr Foster and The British Pain Society, 2003). Both the National Pain Audit (Dr Foster, 2012) and a review of chronic post-surgical pain (Macrae, 2008) suggest that numbers of patients with post-surgical pain (related to any surgery) attending specialist pain services are limited. For patients who present with chronic pain after total knee replacement there are no clear referral and treatment pathways and standardised protocols for the management and treatment of pain in those patients identified as having chronic pain at follow up has been reported by only three of twenty high volume UK orthopaedic centres (V Wylde et al., 2014).

The prevalence of chronic post-surgical pain combined with a lack of consistent and targeted service provision demonstrates a need to develop services based on both empirical evidence and theoretical understanding of best practice in service design. Current models of care for long-term conditions draw on systems theory to focus on integrated or 'shared' care, using several elements (e.g., primary health

care, patient self-care, allied health professions), a proactive approach, and full integration of patients' perspectives to work towards better patient care (Goodwin, 2012; Kodner & Spreeuwenberg, 2002; Wagner & Groves, 2002). There has been increasing recognition that personalised, multidisciplinary approaches to treating chronic pain after total knee replacement are appropriate (Grosu et al., 2014; Toms et al., 2009). However in a scoping review of the existing literature we found no multidisciplinary interventions or individualised treatments for chronic pain after total knee replacement.

As treatments already exist for long-term pain, then the issue for patients with chronic pain might be an absence of access to care rather than a need for novel interventions per se. In the design of care for conditions where multidisciplinary involvement might be of value, care coordination is seen as a means of delivering high quality healthcare (Schultz & McDonald, 2014). Coordinated care pathways are one means by which healthcare professionals and organisations try to deliver better care in keeping with the requirements of clinical governance (Allen, 2009; Degeling et al., 2004). It has been suggested that there is need to ensure consideration of patients' preferences at the point of care delivery along such pathways, although this is not always achieved (Faber et al., 2014). Pathway design often takes place in local clinical teams (Hunter & Segrott, 2008). This approach is consistent with guidance about the development and evaluation of complex interventions from the Medical Research Council (Craig et al., 2008), including in relation to a 'preclinical' phase of development (Campbell et al., 2007). This guidance provides a foundation for conduct of empirical and theoretical work to inform service improvements and their evaluation.

To develop appropriate services for people experiencing chronic pain after total knee replacement, there is a need to identify current care practices as well as describe both patients' and healthcare professionals' experiences and views on care, assessment, and service organisation. We conducted a qualitative study exploring healthcare professionals' views about the assessment and management of chronic pain after total knee replacement as one element of a multi-faceted programme of work.

Methods

Design

A qualitative focus group study investigated healthcare professionals' views about management of chronic pain after total knee replacement. The study aimed to elicit their experiences of the delivery of patient care, including opinions about service organisation. In addition, healthcare professionals were asked to identify pain domains that they thought were important in assessment of chronic post-surgical pain for incorporation into a Delphi study, reported elsewhere (V Wylde et al., In press). The study is most closely aligned with a 'subtle realist' approach (e.g., Hammersley, 1992), which holds that there is an objective reality but that accessing it is mediated by subjective perceptions, so there can be multiple ways of understanding reality (Maxwell, 2012). The aim of research should be to construct knowledge that is judged reasonable. Descriptions of rigour in the research process (e.g., clear, explicit methods) enable judgements about the credibility of knowledge claims. The study is also grounded in pragmatism, as with much Health Services Research, with a transdisciplinary research team and use of methods of data collection and analysis that best serve the research questions and wider aims of the programme. Focus group method has pragmatic uses (in this case enabling a reasonable number of time-pressured healthcare professionals to participate), but also encourages participants to describe and clarify views through interaction with others and to generate questions themselves (Kitzinger, 1995). Focus groups are not associated with a specific method of analysis (Wilkinson, 2004). Thematic analysis (Braun & Clarke, 2006) provided an appropriate way to organise data and interpret it in a way that emphasises patterns within the data.

Method

Setting

The study was set in one acute NHS hospital Trust covering two hospitals. Both hospitals have specialist services relevant to patients experiencing chronic pain after total knee replacement, including a centre for orthopaedic surgery, a pain clinic and a pain management programme. Ethical approval for the study

was provided by the University of Bristol Faculty of Medicine and Dentistry Committee for Ethics (ref: 121322), and Research and Innovation approval from North Bristol NHS Trust (ref: 122765). Data were collected between May and September 2013.

Participants and recruitment

Healthcare professionals working in the NHS Trust who came into contact with patients who were experiencing chronic pain after total knee replacement were eligible to participate. Initially, the research team drew up a list of key contacts from all relevant services (e.g., pain clinic, orthopaedic surgery, disablement services). Using a snowball sampling approach (Noy, 2008), key contacts were approached, invited to participate and asked to provide names and contact email addresses of other potential participants. Following the focus groups, participants were also asked to suggest other potential participants. Email invitations, consisting of an introductory letter and participant information sheet, were sent to all potential participants. Possible times and dates of focus groups were discussed with those expressing an interest in attending in order to find the most acceptable times for groups. Using these methods, around 91 professionals were approached and 18 took part (table 1). The sample included representatives of all professions within the Trust who see patients with chronic pain after total knee replacement. The sample size, given diversity of participant backgrounds, was felt to be sufficient at an acceptable level of 'saturation', i.e., enough data to enable transferable findings (Guest et al., 2006). Further data collection could have been undertaken if analysis had shown a need.

Focus group format

Focus groups took place in meeting rooms at the two hospital sites within the acute NHS Trust. Four focus groups were held in total, with between three and seven participants in each. Focus groups were brief to enable busy staff to attend, lasting between 22 and 44 minutes and all except one was held during lunch time, with lunch provided. No payment was provided to participants. Written, informed consent, including consent for audio-recording and publication of anonymised quotations was provided by participants at the start of each focus group. Groups were facilitated by an experienced qualitative researcher (FM), with an additional member of the research team acting as a scribe to facilitate

subsequent transcription. Groups were audio-recorded with participants' consent. The facilitator used a topic list to guide discussions and topics included professionals' experiences and views on current and ideal referral pathways for patients with post-surgical pain, which aspects of pain should be assessed, and provision of services for patients with chronic pain after total knee replacement. Full details of topics are shown in appendix 1. This topic guide was developed by the research team with the aim of encouraging participants to discuss their experiences of all elements of the pathway through services in depth, with one section focussing on assessment of chronic pain for the purpose of generating items for inclusion in the Delphi survey (V Wylde et al., In press). The topic guide was reviewed by the study steering group comprising 17 individuals representing clinical, patient, academic and third sector spheres.

Analysis

We used thematic analysis (Braun & Clarke, 2006) to identify and explore patterns in the data. Audio files were professionally transcribed and transcripts checked and anonymised. FM familiarised herself with the transcripts through repeated reading, and then noting initial reflections about the corpus of data. An initial code list was generated from all four focus group transcripts. The software QSR NVivo 10 (QSR International Pty Ltd, 2012) was used to facilitate coding, with all data included in the analysis. Another member of the research team (RGH) independently double coded all of the transcripts and the team then reviewed, revised and agreed the list in collaboration. Next, codes were grouped thematically and given provisional theme labels. Data (i.e., extracted focus group text) within each provisional theme were scrutinised to judge the coherence of each theme, and then the entire dataset was reviewed to assess whether the provisional themes were appropriate representations of the dataset overall. Where necessary, themes were revised.

Findings

The 18 healthcare professionals who took part comprised seven physiotherapists, three Surgical Registrars, two consultant orthopaedic surgeons, two nurses, one occupational therapist, one orthotist, one consultant pain specialist and one clinical psychologist (Table 1). Three of the four groups involved a mix of professions, which was intended to stimulate discussion by allowing participants to compare and contrast their experiences, and emphasise issues related to service provision. One focus group was uni-professional for practical purposes—to enable participants from different sites to attend it took place over lunch on a training day. Participants were 8 men and 10 women, aged 25-55 years. In presenting the data we include no quotations that might lead to identification of participants.

The analysis resulted in two superordinate themes. These were: 1) 'Chronic pain as an outcome of total knee replacement' which integrated subthemes relating to pain as a 'normal' outcome and the role of patients' expectations, and: 2) 'Complex care', which integrated subthemes relating to access to services, assessment of patients and management of patient with chronic post-surgical pain (Table 2). Across both superordinate themes, participants expressed the view that chronic post-surgical pain was a complicated condition that required multifaceted assessment and management.

Chronic post-surgical pain as an outcome of total knee replacement

Focus group participants described their thoughts about recovery after surgery. This is important as it impacts on decisions about what post-surgical pain to treat, and when, and highlights a perceived disjoint between patients' expectations and the experience of post-surgical pain that may be problematic for patients.

Although participants thought that the presence of some pain in the short to medium term after surgery would be a relatively 'normal' part of recovery, this would be in the context of gradual improvement:

I would say most patients have pain at three months [sounds of agreement from other group members] (P005, Extended Scope Physiotherapist)

We always say you'll have continuation of improvement over a long time, you know, possibly up to two years (P009; Specialist Physiotherapist).

Participants thought that patients should expect some pain and functional limitations after total knee replacement. For instance, one registrar described how unusual it would be for patients not to be aware of the replacement in the longer term:

It's rare that I've seen someone who has completely the – what I would call 'the forgotten knee replacement', i.e. where they have so few – they have no symptoms whatsoever from a knee replacement, like that's a very rare thing, if I've ever seen it at all (P002, Surgical Registrar)

Although professionals would expect patients to have some pain in the months after surgery, they distinguished between this type of experience and pain that is chronic in character. Participants saw chronic pain as complex, with the character of pain difficult to conceptualise, both for patients and health professionals:

*P002 (Surgical Registrar): find a lot of patients find it difficult to explain the character of their knee pain. And I've never I've not really had much success trying to unpick exactly what,
P003(Surgical Registrar) There are some, you know, a really sudden onset sharp pain, you know, says something has moved, something needs putting back. Whereas the kind of chronic pain has a – they tend to say, 'Oh it throbs,' or 'it aches' or, 'it's discomfort'*

I think the pain that people get perplexes them. Because I see, even subconsciously, people are trying to attribute pain to a mechanical cause. And when the mechanics have been fixed by the surgeon, a lot of times when people are describing their pain they're just completely puzzled by it. You know, 'I don't even – you know, the original knee isn't there anymore, why –why do I have the pain?' (P012, Specialist Physiotherapist)

Asking participants about what would constitute acceptable levels of pain after total knee replacement elicited discussion around the expectations of patients. Participants focused particularly on how patients' expectations before surgery may influence their experience of pain afterwards:

I think expectations are hugely relevant in how people experience any kind of discomfort or sensation afterwards. Because if they're expecting the knee will be as good as new afterwards, and it's not, or it feels different, then that can just be interpreted as a pain, or something's wrong, or anxiety (P006, Clinical Psychologist)

Although in every focus group participants described some pain as 'normal' in the short to medium term, and ongoing pain as a possible outcome for some patients, participants felt that patients largely expected to be pain-free after surgery. They identified a number of factors that might influence such

expectations, with pre-operative clinical encounters and lack of time during care before surgery as particularly central:

They're expecting no pain at all, and you try and explain to them this is a pain reducing, but not necessarily pain eliminating surgery (P003, Surgical Registrar)

I think they expect to be pain-free afterwards. I don't know what the surgeons quote them – but, you know, 20% of people are going to have pain afterwards (P014, Consultant in Pain Medicine)

Once they're listed there's very little time to actually talk to the patients and say, "This is what will be expected of you." And so, you know, they think, "Oh I'm going to have a new knee: I'll be able to kneel, I'll be able to do this, I'll be able to do that," and I don't know that that's discussed that much because there's not – there's time pressures. So you're having your new knee but there's not much that goes with it (P009, Specialist Physiotherapist)

Establishing expectations before surgery was thought to be difficult because of the individual nature of expectations, as well as the unpredictability of outcomes:

P009 (Specialist Physiotherapist): I mean they do the knee class: maybe that would be a way of educating them as to what to expect really.

P004 (Physiotherapy Assistant): I was at one the other day and they do – they like show them how to do the stairs on crutches and then show them the post-op exercises.

P008 (Specialist Physiotherapist): There's probably not much talked about the longer term

P004 (Physiotherapy Assistant): No.

P008 (Specialist Physiotherapist): Consultants certainly don't do that: they don't have the time.

P010 (Extended Scope Physiotherapist): I think it's hard though, because what do you tell someone? Because some people do amazingly well and do get back to all sorts. [sounds of agreement]

P008 (Specialist Physiotherapist): And some people don't.

P009 (Specialist Physiotherapist): Some people never are. I mean I know when one patient asked, "Will I be able to kneel?" and the answer was, "A third will, a third won't and a third are somewhere in-between."

P005 (Extended Scope Physiotherapist): How can you be in-between kneeling?

These interactions around chronic pain as an outcome of surgery were central to focus group discussions, partly because they informed decisions about patient care, but also because patients' post-surgical experience was felt to be shaped by expectations.

Complex care

Discussion of the ways in which patients might access care for chronic post-surgical pain and the availability and form of services to support patients highlighted inherent complexities and variation. There were no clear entry points to services for patients with chronic pain after total knee replacement. Participants listed a range of possible 'ways in', including GP referrals, Accident and Emergency, private hydrotherapy, and routine follow-ups. They thought that access to services was largely dependent on patients' proactivity, although routine follow-up at a single time point after surgery provided one opportunity for patients to discuss any ongoing pain.

Participants thought that assessment of patients who did present with chronic post-surgical pain should recognise the subjective nature of pain. Rather than using standardised measures, participants emphasised their use of patient narratives:

I normally go by the words that the patient says. Because, in my mind, it's such a subjective thing that I can't – what's 7 out of 10 for one patient is not 7 out of 10 for another one (P001, Surgical Registrar).

Alongside this, participants felt that it was important to explore the impact of pain in the context of patients' individual lives. Topics that participants felt would be appropriate to assess were diverse and included sleep, emotional well-being, characteristics of pain, use of pain medications, and functioning. The need to consider the impact of pain on personally valued activities was described as key:

*P006 (Clinical Psychologist): I guess we look at the things that are important to them (sounds of agreement) Stairs might not be terribly relevant in their mind or, you know, they might never have really liked socialising, but being able to do their shopping might be useful
P010 (Extended Scope Physiotherapist): Yeah or housework*

Correspondingly, participants thought that care and support offered to patients with chronic pain should be tailored to the individual:

I think what would be really important is to find out what are the issues with each individual patient and offer them a personalised pathway, it's finding out what their problem is and working out what services are needed to support them. And I suppose it's so broad—it could be anything. One person could be sleep deprived, another it could be going back to work, or not playing golf (P015, Consultant Orthopaedic Surgeon)

Although a holistic and highly personalised assessment of patients was seen as the most appropriate approach, all focus groups described first needing to exclude an orthopaedic cause (and surgical solution) to chronic pain after total knee replacement. Assessment of the characteristics of pain, such as changes in pain sensation, was needed to inform choice of treatment or referral:

P002 (Surgical Registrar): But to me, when I see a patient who is in pain, I try and work out what's causing the pain. Because if – because some of the causes of the pain they need a surgical solution and it's important not to miss those. And then when I've worked out that it's none of those problems, by taking a history, examination and doing x-rays, then I will decide that they will need treatment with painkillers.

P001 (Surgical Registrar): Yeah what worries, well yeah, the thing that worries me is that I may miss an important cause of pain that's treatable.

Once issues relating to the prosthesis had been ruled out, uncertainty about cause can remain problematic for patients, and lead to further investigation:

P012 (Specialist Physiotherapist): I think the first thing that goes through people's minds is that they attribute their ongoing pain to some kind of mechanical fault with the surgery. And it usually leads them to have repeated appointments back probably with the original surgeon. So, you know, "Is my knee replacement OK? Is there, you know, is there anything wrong with it?" And there will usually be the usual complement of scans and x-rays to determine whether the replacement is in a good place or good position

P014 (Consultant in Pain Medicine): They find that quite disappointing, don't they? Whereas I try and explain to them that that's reassuring that there's nothing wrong with the replacement. But actually they want a reason as to why they've still got pain.

If causes related to the prosthesis were excluded, there was no well-defined referral pathways or treatment options, and various approaches to supporting patients were described (Box 1). Some participants struggled to know how best to refer patients, and had concerns about the capacity of specialist services:

P017 (Nurse): And we don't know what to do with them, that's the thing. It would help if we knew what was available [sounds of agreement]. I don't know what's available

P015 (Consultant Orthopaedic Surgeon): Yes or how to go about making it available

P017: It's hard to know what is available for people who do come back. We make these referrals to the pain team but I don't know what they do, and they seem to be massively oversubscribed.

P018 (Nurse): What is out there? It would be nice to advise patients but there's not much we can say

Treatment options were dependent on the individual patient context, for example the character of pain and entry point into the system. Specialist services—specifically multidisciplinary pain clinics and pain management programmes—were seen to have a vital and specific role in helping patients with chronic post-surgical pain. However, these were often described as a ‘last resort’: *“People are meant to be at the end of all treatments by the time they come to pain management”* (P006, Clinical Psychologist), with only a fraction of patients receiving care from these services. The aim of treatment in specialist multidisciplinary services tended to be about managing, rather than resolving, pain:

Well I think the answer to your question about whether we’d refer people on to things. On the whole we wouldn’t. Because actually trying to get people to accept the situation they’re in and learning to manage that, and not actually go on shopping around for further support or something that might make a significant difference, it’s more about the skills that they then build. And we are very cautious – well not cautious – but we are clear from the outset that we’re not looking at a reduction in pain, we’re looking at an improvement in life, and that’s what our outcome would be. (P011, Occupational Therapist)

Options may be limited for patients experiencing chronic pain after total knee replacement, and one participant reported how patients may pay for private services when they reach ‘the end of the road’ (P010, Extended Scope Physiotherapist). The boundaries of responsibility between primary and secondary care were also discussed in the context of intractable pain:

P003 (Surgical Registrar): And follow-ups, you know, make sure they’re receiving their long-term arthroplasty follow-up service, so they don’t feel, “Oh I’m being shoved to one side here.” And, you know, again I think that’s quite a good strategy, it’s, you know, “Well we’ll manage this the best we can and we’ll keep an eye on you,”
P002 (Surgical Registrar): I’ve seen that used, but I’ve seen the opposite where people have some discomfort and get permanently discharged back to the GP for painkillers and ongoing care, as if problem solved.
P003: That probably works just as well, but I can’t bring myself to do it.

Supporting patients who have chronic pain after total knee replacement presented numerous challenges to healthcare professionals in this study. This appeared partly because pain is inherently subjective and its cause is often elusive, which means that determining a good approach to care may take time, but also reflects abstruse systems that healthcare professionals find difficult to negotiate.

Discussion

This qualitative study of healthcare professionals' views and experiences provides new insight into the assessment and management of chronic pain after total knee replacement. Participants emphasised that pain in the short to medium term recovery period after surgery was 'normal' despite thinking that patients often expected to be free of pain. When reflecting on their experiences and current services, participants described the complexities of helping patients to manage their own expectations when the development and course of chronic pain was unpredictable. Healthcare professionals thought that approaches should reflect the complex and individual nature of chronic post-surgical pain, but that current referral and management processes were neither clear nor consistent. This reflects findings from a recent evaluation of current practice that identified inconsistency in service provision and a lack of established protocols to guide the identification, management and assessment of patients with chronic pain after total knee replacement (V Wylde et al., 2014).

Healthcare professionals also thought that patients' expectations before surgery were important, as these could inform patients' experience and management of chronic post-surgical pain. This was described as partly related to features of service organisation, such as short appointments before surgery. However, this was also seen as related to the variability of pain and disability-related outcomes, absence of definitive predictors of poor outcome and the subjective nature of pain (G. A. Hawker, 2006). Although participants in the focus groups expressed their commitment and desire to help patients with chronic pain after surgery, they often did not feel confident that all patients could be helped in a meaningful way. They thought that accessing services was largely dependent on the proactivity of patients themselves. Non-consulting for chronic pain from all causes is common (Bedson et al., 2007; Thorstensson et al., 2009) and previous qualitative research has highlighted that patients with chronic pain after knee replacement may think that little can be done about their pain (Jeffery et al., 2011; Woolhead et al., 2005). Furthermore, the average age of a person undergoing total knee replacement is 70 years (National Joint Registry, 2013) and research indicates that older adults are more likely to believe that little can be done to alleviate chronic pain (Abdulla et al., 2013; Sanders et al., 2002). Alongside evidence that patients with chronic pain find it difficult to gain access specialist pain services (Dr Foster, 2012), there is may be considerable unmet need for support.

For those patients who do access services, participants saw assessment based on patient narrative and exclusion of surgical cause as good practice, reflecting findings from a national survey of current practice (V Wylde et al., 2014). However, this approach draws on professionals' knowledge acquired through practice, rather than local or national guidance, and is likely to result in variation in care. Additionally, the lack of obvious care pathways resulted in an uncoordinated approach to managing patients. This reflects empirical evidence of the lack of standardised protocols for the management of chronic pain after total knee replacement (V Wylde et al., 2014). Protocols for care pathways have recently been developed for a number of other chronic pain conditions (British Pain Society, 2014), in efforts to encourage evidence based best practice for the management of chronic pain. However, it was clear that healthcare professionals in our study felt a keen lack of such pathways to guide their provision of care for people with pain after knee replacement. In light of these findings, there may be scope to develop and evaluate a coordinated care pathway specifically for people with chronic pain after knee replacement. Embedding both patient and healthcare professionals' views in pathway design is important (Faber et al., 2014; Hunter & Segrott, 2008), and would be in keeping with MRC guidance about the development and evaluation of complex interventions (Campbell et al., 2007; Craig et al., 2008) .

The experiences and views of patients who have chronic pain after total knee replacement are necessarily at the core of research to improve services, and there is also value in understanding the standpoint of healthcare professionals. This study is the first of its kind to investigate healthcare professionals' experience and understanding of chronic pain after total knee replacement. It did not involve focus groups with patients, but complements past and planned research with both users and non-users of services. We used a variety of sampling strategies – contacting known individuals and snowball sampling – and of the 91 approached, 18 professionals took part. Despite this small sample, participants represented all professions involved in the care of people with chronic pain after total knee replacement and the largely mixed-profession groups enabled discussion and clarification of key issues such as the lack of clear care pathways. In addition, findings were repeated across focus groups, achieving reasonable saturation for an exploratory study (Charmaz, 2006; Guest et al., 2006). However,

a larger sample incorporating greater numbers of some professions (e.g., more clinical psychologists), would have added to the transferability of findings. Similarly, while snowball sampling is an accepted form of purposive sampling in qualitative research and had the benefit of efficiently targeting an appropriate sample in the context of a busy NHS Trust, the approach combined with turnover of staff may have meant that some potential participants may not have been approached about the study. The focus groups were relatively brief (22-44 minutes) to maximise participation. Although short, there was considerable discussion between participants as participants themselves generate data (Kitzinger, 1994), which is a key benefit of focus groups compared with one-to-one interviews or surveys. Finally, in analysis we took care to identify codes and themes of relevance to participants, and double coding ensured rigour (Pope et al., 2000).

Conclusions

This study has demonstrated the need for a clear and comprehensive care pathway to address the complex but important problem of chronic post-surgical pain after total knee replacement. Good practice would include multiple, explicit access points for patients and clear referral pathways for professionals, patient and professional agreed means of assessing chronic pain, and a multidisciplinary, 'shared care' approach to managing chronic pain. The study identifies aspects of care based on experience of healthcare professionals working in secondary care; further research could explore patients' experiences of care and services as well as those of professionals who design and deliver services in primary care.

Finally, successful development of new approaches to assessment and care of patients experiencing chronic pain after total knee replacement must be cognisant of, and accommodate, both patient and system complexity. Although functioning as a stand-alone study in its own right, this study will be used alongside a systematic review that is underway, a survey of current practice (V Wylde et al., 2014), expert groups and a Delphi study involving both patients and healthcare professionals (V Wylde et al., In press) to develop an intervention in keeping with guidance about the development of complex interventions (Campbell et al., 2007; Craig et al., 2008). Given the prevalence of chronic pain after total

knee replacement and the lack of consistent services, development and evaluation of an intervention should be the next step for research.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

FM, VW and RGH contributed to the design of the study. FM conducted the focus groups. FM conducted the analysis, with input from VW and RGH, including double coding (RGH) and developing the analysis as a research team (FM, RGH, VW). FM prepared the first draft of the manuscript, and VW and RGH revised and approved the manuscript.

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Table 1: Participants

Focus group	ID	Gender	Age (range)	Role	Experience (range in years)
1	P001	Male	30-34	Surgical Registrar	<5
	P002	Male	30-34	Surgical Registrar	<5
	P003	Female	25-29	Surgical Registrar	<5
2	P004	Female	25-29	Physiotherapy Assistant	<5
	P005	Male	30-34	Extended Scope Physiotherapist	10-20
	P006	Female	55-60	Clinical Psychologist	20+
	P007	Female	25-29	Orthotist	5 – 10
	P008	Female	45-49	Specialist Physiotherapist	20+
	P009	Female	30-34	Specialist Physiotherapist	10-20
	P010	Female	35-39	Extended Scope Physiotherapist	10-20
	P011	Female	45-49	Occupational Therapist	20+
	P012	Male	40-44	Specialist Physiotherapist	10-20
	P013	Male	45-49	Specialist Physiotherapist	10-20
4	P014	Female	45-49	Consultant in Pain Medicine	5-10
	P015	Male	40-44	Consultant Orthopaedic Surgeon	10-20
	P016	Male	35-39	Consultant Orthopaedic Surgeon	10-20
	P017	Male	50-44	Nurse	10-20
	P018	Female	35-39	Nurse	5-10

Appendix 1: Topic List

Part 1: Professionals' view of long-term pain after total knee replacement

- When you see a patient with long-term pain after total knee replacement, how have they come to you (probe: referral? ongoing patient?)
- What kind of pain do they describe?
- As a professional, what kind of pain or sensations do you think it's reasonable for patients to have after knee replacement? (and at what stage of recovery after the operation? How long should recovery take?)

Part 2: Assessment and patient perspectives

- What aspects of pain do you think it's important to assess when with patients who have long-term pain after knee replacement? (if not forthcoming, probe: intensity, temporality, pain on activity/movement, interference, pain types/sensations, distress/emotional impact, patients own management and use of medications)
- We talked about the kinds of pain that patients report to you and the things that you think it's important to assess. How do you elicit information about these in your practice?
- When talking about pain management with patients, what things do they say are most important to them?

Part 3: Services

- What kinds of treatment or management are patients with long-term pain after knee replacement usually offered?
- In an ideal world, what services would patients with long-term pain after total knee replacement receive?

Table 2: Final thematic hierarchy

Superordinate theme	Theme	Code
Chronic post-surgical pain as an outcome of total knee replacement	Pain as an outcome of surgery	<p>A pain reducing surgery</p> <p>Accepting pain as an outcome</p> <p>Judging patient recovery</p> <p>'Normal' trajectories of pain after TKR</p> <p>'Not their own knee'</p> <p>Patients 'at risk' of poor outcome</p> <p>Patients who do well</p> <p>Surgery hasn't changed pain</p> <p>Surgery not always a success</p>
	Expectations of surgery	<p>Doing more for patients pre surgery</p> <p>No time to prepare patients for post-surgery</p> <p>Patients have a need to understand pain</p> <p>The timing of surgery matters</p> <p>Patient expectations as important</p> <p>Healthcare professionals shape patient expectations</p>
Complex care	Getting in the system	<p>Impact on functioning as a reason for help seeking</p> <p>Pain as a reason for referral</p> <p>Different referral pathways</p>
	How and what to assess	<p>Chronic pain is difficult to describe</p> <p>New pain</p> <p>Emotional impact of pain</p> <p>Impact on function</p> <p>Impact on sleep</p> <p>Pain is subjective</p> <p>Pain impacting on valued activities</p> <p>Assessing the patient with chronic post-surgical pain</p> <p>Excluding surgical or orthopaedic cause</p> <p>Limitations of assessment tools</p> <p>Pain severity as important</p> <p>The importance of pain meds</p> <p>What pain patients report</p>
	What to do for patients	<p>Difficulty personalising information for patients</p> <p>Different perspectives on keeping people 'in the system'</p> <p>A need to consider medical treatment options</p> <p>Treatment options for patients with pain</p> <p>Doing 'something or anything' for patients</p> <p>Nothing we can do</p> <p>Pain management as a 'last resort'</p> <p>Exhausting treatment options</p>

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