


Supporting Rehabilitation of Rural Patients Receiving Total Knee Arthroplasty Through Physical Activity: Perceptions of Stakeholder Groups

Heather M. Hanson,¹ Joshua Friesen,² Lauren Beaupre,² Lisa Jasper,² Jackie Millington,³ and C. Allyson Jones² 

Objective. To identify how patients with osteoarthritis waiting for and recovering from total knee arthroplasty (TKA) conceptualized and participated in physical activity behaviors in their rural setting and to gather perceptions of health care professionals and rehabilitation decision-makers on the feasibility of a remotely led physical activity coaching intervention.

Methods. Using a qualitative descriptive study, we collected data from three stakeholder groups: patients waiting for or recovering from TKA (interviews), health professionals delivering a physical activity intervention to patients in the recovering cohort (focus group), and rehabilitation leaders involved in decision-making at the local or provincial level (interviews).

Results. A total of 38 individuals provided their perspectives (25 patients, five health professionals, eight decision-makers). Patients waiting for and recovering from surgery described the attributes of their rural environment that supported and restricted their ability to participate in physical activities. Patients recovering from TKA appreciated support for goal-setting and problem-solving during their rehabilitation. Health care professionals and decision-makers commented on the benefits of the program's innovative use of relatively simple technology to support remotely delivered, personalized rehabilitation in rural settings.

Conclusion. This study adds to the limited voice of and about patients living with osteoarthritis who reside in rural settings and identifies facilitators and barriers to TKA rehabilitation in this population. Our findings highlight that it is important to consider the local context and the resources available to patients as they navigate living well with osteoarthritis.

INTRODUCTION

Osteoarthritis (OA) is a highly prevalent chronic condition and the leading cause of mobility-related disability in older adults worldwide (1,2). Weight-bearing joints, particularly the knee, are commonly characterized by pain, stiffness, swelling, and limited range of movement (3,4). When conservative management fails to provide pain relief and functional improvement, total knee replacement surgery is an elective surgical option for advanced OA. Despite substantial improvements in physical function and pain relief after total knee arthroplasty (TKA) (5), relatively small improvements are reported with physical activity (6,7), and no change is reported with sedentary time (8). Physical activity has positive impacts on the health of people with OA (9,10) and is

recommended as an effective intervention to reduce pain and improve quality of life (11). Discordance between large improvements in pain, function, and health-related quality of life and negligible change with physical activity after TKA suggests that activity behavior does not change with TKA. Prior research highlighted the need for patients' rehabilitation to be supported following TKA (12) because barriers to physical activity include the severity of symptoms, perceived ability, and opportunities (13).

Barriers to physical activity behaviors have been documented in both rural and urban settings (14,15). In the urban context, perceptions of personal safety or crime can influence outdoor physical activity (14). For people in rural communities, defined here as individuals living in rural areas and small towns outside metropolitan or urban or metropolitan or urban-influenced

This research was funded by an Innovation grant by the Covenant Health Network for Excellence in Seniors' Health & Wellness.

¹Heather M. Hanson, PhD: Alberta Health Services, Edmonton, Alberta, Canada, and University of Calgary, Calgary, Alberta, Canada; ²Joshua Friesen, PhD, Lauren Beaupre, PhD, Lisa Jasper, PhD, C. Allyson Jones, PhD: University of Alberta, Edmonton, Alberta, Canada; ³Jackie Millington, BScPT: Alberta Health Services, Camrose, Alberta, Canada.

Address correspondence to C. Allyson Jones, PhD, University of Alberta, Department of Physical Therapy, Room 2-50 Corbett Hall, 8205 114 Street NW, Edmonton, Alberta T6G 2G4, Canada. Email: cajones@ualberta.ca.

Submitted for publication February 24, 2022; accepted in revised form June 16, 2022.

SIGNIFICANCE & INNOVATIONS

- This study adds to the qualitative literature on rehabilitation in rural settings for individuals with knee osteoarthritis.
- Although participants across the stakeholder groups (patients, physiotherapists, local decision-makers) recognized the importance of physical activity for older adults with osteoarthritis, unique challenges to maintain or increase physical activity while waiting for or recovering from total knee arthroplasty were identified.
- Our data suggest that advising patients residing in rural settings with osteoarthritis to take up an active living lifestyle might not resonate the way health professionals intend.
- An understanding of the patients' living environments and available local resources is necessary to tailor patient education and advice to their local resources.

communities (16,17), access to resources for physical activity is different from that for their urban-dwelling counterparts. Low population density influences the infrastructure for physical activity, resulting in a scarcity of built environment characteristics commonly found in urban settings, such as sidewalks, parks, and street connectivity (18). Proximity to infrastructure such as recreation centers often is reduced, requiring considerable driving distances to access such facilities. The time spent in different types of physical activities also differs across the rural-urban continuum, such as active transportation and occupational activity (19). As such, people living with OA in rural settings may have fewer resources to support physical activity and rehabilitation.

The literature regarding rehabilitation in rural locales is sparse (20), despite approximately 19% of the Canadian general population and 23% of Canadians aged 65 years and older residing in rural settings (21,22). Access to rehabilitation in rural areas is less than that in urban areas in terms of transportation services, treatment options, and rehabilitation personnel (23,24). Active living, evolving from the physical activity and health movement, focuses on a broader range of activities and positions those activities as a way of living, incorporating physical activity into daily routines (25). Patients may be given the advice to stay active or to incorporate active living into their lifestyles, but what that means to patients and how they enact it is less clear. Although some health care professionals live in the rural community where they practice and have local knowledge or experience, this is not always the case. Health care professionals need to be cognizant of factors of rural living to be effective in supporting rural residents. Given that rural rehabilitation looks different from that delivered in urban centers, new approaches to delivering services and support need to be identified and tested for feasibility and effectiveness. In keeping with this directive, we developed a practical intervention

in which physiotherapists expand their roles beyond the walls of the hospital or clinic to coach patients with OA residing in rural settings to become more active.

This qualitative research is part of a larger study to test the feasibility of remote support of patients to engage in and increase their physical activity as part of their TKA rehabilitation and recovery. Patients with OA recovering from TKA were recruited to participate in a 12-week feasibility intervention consisting of remote, physiotherapist-led coaching support for physical activity behaviors. Experienced physiotherapists used the brief action planning approach (26) to help participants identify goals and plan attainable actions in terms of becoming more physically active during the long-term recovery from TKA.

As a companion study, the goal of the present work was to explore through an interpretive paradigm the secondary objective of understanding the following: 1) how patients with OA waiting for or recovering from TKA conceptualized and participated in physical activity behaviors in their rural setting and 2) how health care professionals and local decision-makers perceived the feasibility of the larger intervention within the broader rehabilitation landscape and what organizational or operational factors might influence the implementation, sustainability, and scale and spread.

PATIENTS AND METHODS

Design. The qualitative descriptive study sought to collect perspectives related to rehabilitation for patients with knee OA. This design was appropriate for describing the experiences and understanding the perspectives of participants in our three stakeholder groups (27,28). Our goal was to obtain the direct descriptions of participants' subjective experiences (27) on rehabilitation of rural older adults with OA through physical activity.

Context. This qualitative research served as a companion study to a larger rehabilitation intervention for patients with OA of the knee. A theory-based behavioral coaching intervention was offered to patients recovering from TKA. Weekly telephone calls were provided by an experienced physiotherapist over a 12-week intervention period. The physiotherapists provided tailored education regarding physical activity relative to the patient's recovery, provided review of and further goal-setting for physical activity over the short and long term aligned with the patient's values and preferences, and assessed and addressed barriers to activity. Intervention participants were provided a personal activity monitor, and the daily step count was shared with the physiotherapist as a means of providing an estimate of physical activity during the week.

Participants waiting for their surgery were deemed surgical candidates for TKA. They, however, had not received their surgical dates nor received the preoperative educational session that was a component of the provincial standardized care path.

Participants. Participants represented three stakeholder groups: 1) patients 60 years of age and older with knee OA waiting for or recovering from joint replacement surgery, 2) health professionals (physiotherapists) delivering a 12-week physical activity intervention to patients recovering 3 months after TKA, and 3) rehabilitation leaders involved in decision-making at the local or provincial level (Figure 1). Patients were recruited from a hospital located in a small town situated in central Alberta, Canada, which is primarily a farming community. The population of this health region was approximately 453,469 situated over a 95,000-km² area. All surgeries were performed by one orthopedic surgeon who was regarded as a high-volume (>75 total joint arthroplasties per year) surgeon for joint arthroplasty.

Data collection. *Patients.* We purposefully sampled patients within three constructs, TKA status (waiting for or recovering from TKA), sex (men and women), and rural settings (eg, farm, acreage, small centers), for a diversity of patient perspectives. Patients in the waiting cohort were recruited at their first preoperative education session, approximately 4 months before surgery, from the musculoskeletal clinic. Patients in the recovering cohort, also receiving care from the same clinic, were recruited at the conclusion of their participation in the larger intervention, approximately 6 to 9 months postoperatively. A provincial

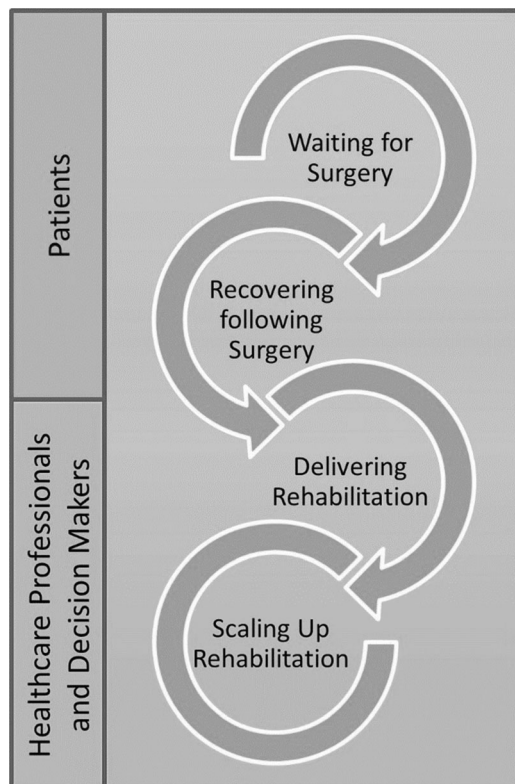


Figure 1. Total knee arthroplasty stakeholder perspectives included in the exploration of physical activity for patients with osteoarthritis living in a rural environment.

clinical pathway for medical, pharmaceutical, and rehabilitation care of patients who received TKA ensured that all patients were managed with the same perioperative regimen. Rurality was defined by population size and/or density of the patient's home community (17). Rural locales were either rural center areas (10,000-25,000 population) or rural areas that were rural farm or nonfarm households, hamlets, villages, and towns with populations less than 10,000 and up to 200 km in distance from an urban center) (16).

Consent to be contacted was secured, and semistructured telephone interviews were then conducted by the qualitative interviewer. Recruitment in both patient cohorts was conducted to saturation, the point at which no new information was obtained by additional data collection (29), and was operationalized as the observation of informational redundancy in both the scope of the data and their replication (29,30). The waiting cohort interview guide addressed the concepts of perceptions of physical activity, activity behaviors, impacts of OA on those activities, expectations following TKA, and being active in a rural environment. The recovering cohort interview guide addressed perceptions of physical activity, activity behaviors, influences of their rural environment on the ability to be active, and experiences participating in the larger intervention.

Health professionals. Recruitment in the health professional group was bound by the number of physiotherapists functioning as coaches to the recovery cohort in the larger feasibility intervention. All physiotherapists were experienced in assessing and treating patients with hip and knee arthroplasties in both the acute and recovery phases. All except one physiotherapist were from the nearest urban center, and all were familiar with the health region where the patients resided.

A remote focus group for the participating health care professionals was conducted via teleconference. Data collection by focus group was informed by pragmatic considerations. We were able to use a standing meeting time to reach all participants at one time without additional strain on busy schedules, thus maximizing participation while allowing participants to expand on one another's insights and examples. The discussion guide explored the unique facets of rehabilitation in a rural context, the advantages, the disadvantages, ideal patient-related features for remote coaching for physical activity, and factors that would influence implementation of this type of remote long-term follow-up into standard practice.

Decision-makers. The group of decision-makers, identified a priori, included key leadership positions that could provide perspectives on rehabilitation for patients residing in rural settings. Individuals held administrative and decision-making roles at the clinic, delivery area, and provincial levels. Participants were recruited by an email invitation and up to three follow-up attempts by email or telephone. Semistructured telephone interviews were conducted. The interview guide addressed the same topics as the interview guide for the health professionals focus group but was delivered as a semistructured interview.

Data preparation and analysis. The focus group and all interviews were audio recorded, transcribed verbatim, checked for accuracy, and analyzed. We employed thematic analysis to systematically identify, organize, and elucidate patterns (themes) in data (31). Braun and Clarke (31) state that thematic analysis provides “a way of identifying what is common to the way a topic is talked or written about and of making sense of those commonalities.” Thematic analysis has been used in studies of OA and rehabilitation (32–34) and was appropriately selected here to support the identification of patterns of shared meaning and significance for people involved in the provision and receipt of the intervention.

Code definitions and examples, emerging concepts, and preliminary findings were shared between the qualitative assessor (JF) and study lead (HMH) for discussion and feedback during analysis. After themes were identified, patterns were examined within and across our respondent groups to explore contrasting and triangulating data (35), including possible similarities and differences in responses between the patient cohorts, experiences of male and female patients, and perspectives of coaches and decision-makers on whether, and how, the intervention could be scaled up. Finally, credibility of the interpretation was sought through coinvestigator (HMH, JF, CAJ) discussion and agreement to ensure accurate representation of the underlying data (36,37). Ethics approval was obtained from the University of Alberta Health Research Ethics Board (Pro00070339), and participants provided informed consent.

RESULTS

Thirty-eight participants from three stakeholder groups contributed their perspectives on physical activity for patients with OA living in rural settings. Patient participants ($n = 25$) ranged in age from 61 to 77 years ($\bar{x} = 68$ years; $SD = 5.2$ years), and 13 (52%) were women. The majority lived in rural areas of farms, acreages, and small towns (76%) over rural center areas (24%). Additional details on the patient cohorts can be found in Table 1. All health care professionals who were involved in the delivery of the intervention ($n = 5$) were physiotherapists and predominantly female (80%). Organizational leaders and decision-makers ($n = 8$) were also predominantly female (88%) and held positions as rehabilitation decision-makers ($n = 2$), local health care administrators ($n = 3$), local rehabilitation opinion leaders ($n = 2$), and one orthopedic surgeon working in a different geographic area of the province.

Patients. Both patient cohorts described the types of physical activities they took part in while waiting for or recovering from their TKA. Walking was the single most cited type of activity undertaken by patient participants. Men were far less likely than women to cite participation in social physical activity settings, such as walking groups, in favor of work- and chore-based activities.

Table 1. Characteristics of patients waiting for or recovering from total knee arthroplasty

	Patients with osteoarthritis	
	Waiting cohort ($n = 12$)	Recovering cohort ($n = 13$)
Age (years), mean (SD)	68.1 (5.7)	67.9 (5.0)
Sex, n (%)		
Male	8 (67)	4 (31)
Female	4 (33)	9 (69)
Education, n (%)		
Junior high school	1 (8)	1 (8)
High school	5 (42)	1 (8)
Vocational or technical school	3 (25)	2 (15)
University or college	3 (25)	9 (69)
Employment status, n (%)		
Employed full-time	1 (8)	4 (31)
Employed part-time	1 (8)	0
Retired	10 (83)	9 (69)
Self-rated health, n (%)		
Poor	1 (8)	0
Fair	2 (17)	1 (8)
Good	3 (25)	3 (23)
Very good	4 (33)	4 (31)
Excellent	2 (17)	2 (15)
Type of rural locale, n (%)		
Rural area	10 (83)	9 (69)
Farm household	1 (8)	2 (15)
Nonfarm household	6 (50)	3 (23)
Hamlet, village, town	3 (25)	4 (31)
Rural center area	2 (17)	4 (31)

Patients commented on the attributes of their rural environment that supported their ability to participate in physical activities. Physical tasks associated with farm or acreage living were cited as sources of physical activity:

Oh just see, just the maintenance of the property instead of a 50 by 100 foot lot, you've got 400, 500, what's my, 500 feet, lots of lawn, lots of flower beds, my whipper snipper for example is a good hour where in town you know it's five minutes. That kind of thing. So it's like I said it's more of a productive activity doing something concrete as opposed to just exercising for the sake of exercising.

Participant 01-03

The rural context also contributed to the enjoyment of time spent participating in outdoor activities:

Oh just cause in this type of a setting I think rather than living in the city where you're just confined to a small yard in the city environment you're like I don't know how do I say it, when you look out our backyard you're looking at tons of trees, and a pond, and birds, and ducks and geese, you're just forced, or not forced, you want to be out there and be more active and do stuff.

Participant 01-07

Although pleasant and purposeful activities related to rural life were reported, patients described aspects of rural living that negatively influenced their ability to participate in physical activities. In some small communities, indoor recreation or exercise facilities did not exist. The physical distances to facilities were frequently cited as barriers to access, as the following participant stated when describing the seasonal availability of a facility for swimming: “But it is more difficult here because if you want to go to a pool, well there is an outdoor pool in the summer that we could go to, but there’s nothing in the winter unless you drive...an hour and 15 minutes” (Participant 02-10). Another participant spoke of the desire to take part in water aerobics but reported barriers, including winter driving conditions and financial costs, associated with travel:

Oh totally [the rural location influences her ability to be active] because you can’t, there’s no gyms, there’s no swimming pools, I have to drive 30 minutes to a swimming pool, I want to go swimming because they have aquasize and stuff but that’s 30 minutes away and if the weather is bad or the, or if it’s, it costs a lot to drive there.

Participant 01-01

Even walking looks different in a rural context than it does in an urban environment. This participant described what the options for walking look like after stepping out the front door: “There’s the laneway then there’s the road out to the highway on the pavement. We usually walk that way. Or you can walk the other way, there’s a dirt road that’s between a couple of fields” (Participant 02-10). The trade-off described here was the sure footing of the pavement versus the more pleasant path avoiding vehicles traveling at highway speeds. Participants also commented on their concerns regarding physical safety, which extended beyond walking on highways to walking in unmarked areas in fields and on the uncleared snow and ice during winter months.

Patients spoke about the significance of their pain in everyday life and their expectations post TKA. They described their awareness of the need to keep moving, even when they were experiencing pain. Patients appeared to focus on the discomforting pain associated with their OA or their surgery rather than instances of acute pain potentially related to infections, blood clots, or other complications. Somewhat surprisingly, the recovery cohort spoke more about chronic or regular pain than did the waiting cohort. Pain, or lack thereof, was also related to patients’ descriptions of their expectations for postsurgical life. Patients in the recovery cohort recalled having specific expectations for their recovery postoperatively, whereas the waiting cohort described their expectations for life after TKA with greater diversity. The waiting cohort was generally hopeful that the surgery would reduce their pain, whereas the recovery cohort expected to be more active more quickly following surgery.

Patients had a wide range of familiarity with, and knowledge of, the concept of “active living.” Participants in the waiting cohort

were much less familiar with the term than were participants in the recovering cohort: “I don’t know (laughs). I don’t know, that I would have to exercise? But I don’t do that that much” (Participant 01-01). In contrast, almost all of the recovering cohort was aware of the phrase and had a general sense of what it means when used in a health and/or health promotion context. One participant described active living as follows:

Well, it means getting out and doing things. Um, you know walking or, or just yeah, keeping active so you don’t – use it or lose it kind of thing, so keep doing it. Whatever it is, it could be anything, it could be walking it could be sports, whatever.

Participant 02-03

Finally, participants in the recovering cohort commented on their experiences participating in the intervention and were very positive in their accounts. They spoke about the benefits of working with the physiotherapy coaches on realistic goal-setting and their subsequent pride in obtaining those goals. One participant commented, “It was useful to get me to make a goal. Once you commit to a goal, keeping on the straight and narrow so that you’ve actually made plans to go through with it. It was good” (Participant 02-07). Participants highly valued the guidance provided by the coaches and the rapport they built over the intervention period:

[The physiotherapy coach] offered a lot of suggestions about how to get my knee straighter and I found it very helpful.

Participant 02-10

You feel really comfortable with them and if you did have anything that you didn’t think was quite right you know you just talked about it and so you know that was helpful as well because, sometimes you don’t just - sometimes you have something that’s kind of bugging you but you don’t feel like phoning the doctor or the clinic or whatever.

Participant 02-04

Health professionals. Health care professionals involved in the delivery of the coaching intervention ($n = 5$) cited both the advantages and disadvantages of the intervention to support physical activity following TKA. The activity monitor provided a valuable source of visual feedback for patients and served as a motivational tool and educational resource for the coaches to talk with patients about their rehabilitation. The monitoring data were perceived as supporting patient accountability:

Um basically being accountable to someone so you know these patients you know they know are going to talk to us once a week and are going to face, you know whatever we set out, we are going to chat that day and set out what did they do to achieve that goal? So being accountable really makes them step up and try to work harder toward achieving that. That

was a huge thing I think that contributed to some of our patients' successes.

The coaches strongly emphasized that the activity monitor supported the delivery of individualized coaching support and tailoring of rehabilitation strategies to the individual. This was particularly relevant to patients' pain levels and pain tolerance, emphasized as significant influencers on the rehabilitation strategy and coaching delivery.

The primary purpose of the activity monitors was to provide the coaches with a weekly estimate of physical activity as to inform their goal-setting with patient participants. The coaches noted challenges with the activity monitors in this patient population. The monitors were cited as being effective in capturing steps taken but not in capturing activity intensity. They also had limitations for recording activities other than walking. Walking aids, which reduce arm swing, interfered with the data capture, and the activity autodetect feature on the particular device employed was not consistently useful in this setting because the threshold for triggering continuous activity was higher than the activity tolerance for some patients, such as those only able to walk for 5 to 10 minutes before taking a break. Coaches also commented that some patients with less familiarity with technology experienced some challenges using the device and sharing its data.

Informed by clinical gestalt as practicing physiotherapists, the coaches described the ideal patient population for this type of intervention. Patients who were highly motivated were expected by the coaches to do well even without coaching support. Unmotivated patients were perceived to not be very responsive to goal-setting or coaching and were perceived as unlikely to achieve the goal. The somewhat motivated patient group was perceived to be generally motivated to support their own recovery but could use coaching support to stay focused on their rehabilitation and accountable to their goals. It was this middle group, not the highly motivated and not the unmotivated, that was believed to be the ideal target population for an intervention similar to the one they helped deliver.

Challenges to scaling up this type of intervention were noted by the coaches. Although technology support for those not technologically proficient or who encountered difficulties while using the device was raised, cost was the main barrier identified. The initial cost outlay for the activity monitor may be a major limiting factor, and patients without disposable income or health spending benefits may not be able to pay out of pocket. However, the coaches identified that the costs to patients may be comparable to costs they would incur for more traditional in-person physiotherapy appointments, once factoring in travel distances.

Finally, the potential future role of wearable technology in supporting patients residing in rural settings was discussed. The coaches advocated for the benefits of activity monitors to support rehabilitation following TKA for patients in rural areas as well as the benefits associated with increased use of remote technologies in general:

I just think using technology in health care is going to be something that we are seeing more and more of and you know especially like wearable technology like a Fitbit or a heart rate monitor or a blood pressure you know whatever, and I think that's going to really benefit the rural area probably more so than the urban areas.

Decision-makers. Similar to the findings of the health professionals focus group, participants in the decision-maker group ($n = 8$) spoke about future opportunities for similar interventions, describing the barriers and enablers to incorporating and scaling up this style of intervention within the current rehabilitation context. The challenges for rural rehabilitation were acknowledged by decision-makers. Current access challenges included the lack of physiotherapists in smaller communities, driving distances when travel to physiotherapy was required, and fewer types of and less diversity in facilities and infrastructure to support activity and rehabilitation.

Decision-makers commented on both the advantages and disadvantages of using activity monitoring to support rehabilitation. Advantages were predominantly motivational, with the device providing positive quantifications of exercise and activity levels for patient feedback. "That's where its real value lays in just quantifying what they're doing and then it gives them the reward of 'Oh, I'm at my goal today'" (Participant 03-04). Disadvantages included technological issues encompassing both the human errors and technology errors, the initial cost outlay, and potential concerns regarding data security and privacy for information sharing between patient and therapist.

Barriers for scaling up and spreading remotely delivered interventions like this one were cited. Funding issues related to the cost of the activity monitors and therapist preferences for in-person patient contact and relationship building were examples provided. However, significant enablers for spread were also cited. These included efficiency in the rural environment afforded by the telephone-based intervention and advantages for incorporation into centralized and standardized care pathways. Aspects of this type of intervention, such as incorporation of innovative technologies and use of tele-based health care services, were opportunities for better supporting of rural rehabilitation.

DISCUSSION

We aimed to identify how patients with OA waiting for and recovering from TKA conceptualize and participate in physical activity behaviors in their rural setting and gather perceptions of feasibility of a remotely led physical activity coaching intervention. Despite having different foci in the research questions and data collection guides, we found stakeholder triangulation of some themes across respondent groups. Participants across the stakeholder groups recognized the importance of physical activity for older adults with OA. Participants also identified challenges

unique to the rural context for maintaining or increasing physical activity as part of rehabilitation while waiting for or recovering from TKA.

The physical attributes of the rural environment were noted by all three stakeholder groups as unique facets of rehabilitation in this patient population. The patient and decision-maker groups cited challenges with a lack of accessible infrastructure for walking and the long driving distances required to use recreation facilities. However, the patient groups also cited the benefits of rural living as related to physical activity opportunities. They commented on the opportunity for utilitarian physical activity (38) related to their rural living, such as property maintenance, chores, and gardening, which mirrors the findings from the study by Hansen et al (39) that rural adults are more active in household physical activity than urban adults. This was particularly true for the men in our sample; the preference for work- or chore-based physical activity over social activities, such as walking groups, was the only substantial gender-based difference occurring in participant responses. Patients also commented on enjoying the beauty of natural surroundings while being active in their rural setting. These aspects should not go overlooked when counseling for physical activity behaviors. Harding and colleagues (40) interviewed patients post arthroplasty of the hip or knee and reported that participants perceived that regaining physical function allowed them to enjoy living through both physical and social activities. Although action planning should consider the constrained infrastructure resources of a rural setting, the positive aspects of rural living could be highlighted to promote physical activity that patients with OA may view as purposeful or pleasant.

Health promotion and physical activity literature has advocated for active living policy and strategies (39,41). Patients reported receiving guidance on remaining active as they waited for or recovered from TKA. However, more patients in the recovering group than the waiting group cited general understanding of the “active living” term. Therefore, advising patients to take up an active living lifestyle might not resonate the way health professionals intend. An understanding of the living environment of patients and the availability of local resources is necessary to tailor patient education and advice. Within the context of rehabilitation, we echo the rural active living call to action of Umstadt Meyer and colleagues (42) for recognition of, understanding of, and planning for the diversity that exists within the continuum of rurality.

Patients reported on their expectations following surgery. Patients in the waiting cohort expected their surgery to reduce their pain, whereas the recovery cohort commented on expecting to return to full function more quickly than was the general experience. These accounts mirror other patient reports in the literature, including expectations related to decreased pain and unimpeded mobility for patients waiting for surgery (43) and ongoing challenges with pain, discomfort, and mobility following surgery (44,45). The pain and discomfort within this patient population, as well as postsurgical expectations, combined with different

resources for activity in the rural setting, highlights the need for tailoring of and support during rehabilitation.

The health care professionals cited the tailoring, motivational, and goal-setting support they provided to participants to increase physical activity behaviors. The need for tailoring also emerged in the patient data. A one-size-fits-all rehabilitation program is unlikely to be as effective as rehabilitation tailored to the individual based on preferences and available resources for physical activity behaviors. Participants spoke positively about their specific and overall experiences when recounting participation in the larger intervention. They cited the support of the coaches for goal-setting and problems-solving concerns regarding their physical activity and recovery. Similar to findings in other settings (46), participants were uncertain about recovery postoperatively and appreciated the ability to ask questions and gain advice from the coach.

Innovation work, moving clinical interventions and practices from a limited implementation to delivery at a greater scale, is challenging and the spread to other sites and larger system scale-up need well-informed decisions to ensure success (47,48). Perhaps not surprisingly, cost was the main barrier mentioned by the coaches for scaling up the intervention. However, the initial cost outlay of physical activity monitors may be balanced if a societal perspective is taken into account when considering the cost-effectiveness of an intervention similar to the one employed here. Information from a formal cost-effectiveness analysis would be beneficial to support larger scale decision-making.

Incorporation of technology into clinical care is a growing trend in health care. The health care professionals and decision-makers identified that there are opportunities for technology in rehabilitation, particularly when considering the needs of patients residing in rural settings. Technologies that share details on recovery can assist in remotely delivered rehabilitation and decrease the need for patients and caregivers to travel long distances for clinic visits, increasing efficiency for the patient and the clinician. Furthermore, in this application, the health care providers were still able to build rapport with participants, a perceived downside of remote care (49).

This study adds to the qualitative literature on rehabilitation for people with knee OA residing in a rural setting; however, it is not without shortcomings. Our findings do not represent all rural settings nor all patients with OA. We have employed techniques to increase the trustworthiness of the research, particularly to address credibility and transferability of the findings to similar contexts, analogous to internal and external validity in quantitative research. This study makes an important contribution to the field by highlighting the aspects of rehabilitation distinct to patients living in a rural context and the promise shown by a tailored and technologically facilitated delivery of services to them. The perspectives shared by participants can inform future decisions regarding the design and delivery of rehabilitation interventions for patients with OA.

ACKNOWLEDGMENTS

We gratefully acknowledge the contribution of our participants in sharing their time and perspectives. We thank the clinic staff and research personnel for their assistance in identifying and recruiting participants.

AUTHOR CONTRIBUTIONS

All authors were involved in drafting the article or revising it critically for important intellectual content, and all authors approved the final version to be published. Dr. Hanson has full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Study conception and design. Hanson, Friesen, Beaupre, Jasper, Millington, Jones.

Acquisition of data. Friesen.

Analysis and interpretation of data. Hanson, Friesen, Jones

REFERENCES

- Cross M, Smith E, Hoy D, Nolte S, Ackerman I, Fransen M, et al. The global burden of hip and knee osteoarthritis: estimates from the Global Burden of Disease 2010 study. *Ann Rheum Dis* 2014;73:1323–30.
- Lang JJ, Alam S, Cahill LE, Drucker AM, Gotay C, Kayibanda JF, et al. Global Burden of Disease Study trends for Canada from 1990 to 2016. *CMAJ* 2018;190:E1296–304.
- Allen KD, Golightly YM. Epidemiology of osteoarthritis: state of the evidence. *Curr Opin Rheumatol* 2015;27:276–83.
- Zhang Y, Jordan JM. Epidemiology of osteoarthritis. *Clin Geriatr Med* 2010;26:355–69.
- Jones CA, Pohar S. Health-related quality of life after total joint arthroplasty: a scoping review. *Clin Geriatr Med* 2012;28:395–429.
- Hammitt T, Simonian A, Austin M, Butler R, Allen KD, Ledbetter L, et al. Changes in physical activity after total hip or knee arthroplasty: a systematic review and meta-analysis of six- and twelve-month outcomes. *Arthritis Care Res (Hoboken)* 2018;70:892–901.
- Arnold JB, Walters JL, Ferrar KE. Does physical activity increase after total hip or knee arthroplasty for osteoarthritis? A systematic review. *J Orthop Sports Phys Ther* 2016;46:431–42.
- Frimpong E, McVeigh JA, Meiring RM. Sedentary behavior in patients with knee osteoarthritis before and after total knee arthroplasty: a systematic review. *J Aging Phys Act* 2018;26:671–81.
- Fernandes L, Hagen KB, Bijlsma JW, Andreassen O, Christensen P, Conaghan PG, et al. EULAR recommendations for the non-pharmacological core management of hip and knee osteoarthritis. *Ann Rheum Dis* 2013;72:1125–35.
- Zhang W, Moskowitz RW, Nuki G, Abramson S, Altman RD, Arden N, et al. OARS recommendations for the management of hip and knee osteoarthritis. Part II. OARS evidence-based, expert consensus guidelines. *Osteoarthritis Cartilage* 2008;16:137–62.
- Kolasinski SL, Neogi T, Hochberg MC, Oatis C, Guyatt G, Block J, et al. 2019 American College of Rheumatology/Arthritis Foundation guideline for the management of osteoarthritis of the hand, hip, and knee. *Arthritis Rheumatol* 2020;72:220–33.
- Webster F, Perruccio AV, Jenkinson R, Jaglal S, Schemitsch E, Waddell JP, et al. Understanding why people do or do not engage in activities following total joint replacement: a longitudinal qualitative study. *Osteoarthritis Cartilage* 2015;23:860–7.
- Kanavaki AM, Rushton A, Efstathiou N, Alrushud A, Klocke R, Abhishek A, et al. Barriers and facilitators of physical activity in knee and hip osteoarthritis: a systematic review of qualitative evidence. *BMJ Open* 2017;7:e017042.
- Kärmeniemi M, Lankila T, Ikaheimo T, Koivumaa-Honkanen H, Korpelainen R. The built environment as a determinant of physical activity: a systematic review of longitudinal studies and natural experiments. *Ann Behav Med* 2018;52:239–51.
- Pelletier CA, White N, Duchesne A, Sluggett L. Barriers to physical activity for adults in rural and urban Canada: a cross-sectional comparison. *SSM Popul Health* 2021;16:100964.
- Alberta Health Services. Official standard geographic areas. Edmonton (Canada): Alberta Health Services; 2018.
- De Plessis V, Beshiri R, Bollman RD, Clemenson H. Rural and small town Canada analysis bulletin: definitions of rural. Ottawa (Canada): Statistics Canada; 2001.
- Hanson HM, Ashe MC, McKay HA, Winters M. Intersection between the built and social environments and older adults' mobility: an evidence review. Vancouver (Canada): National Collaborating Centre for Environmental Health; 2012.
- Millward H, Spinney J. "Active living" related to the rural-urban continuum: a time-use perspective. *J Rural Health* 2011;27:141–50.
- Roots RK, Brown H, Bainbridge L, Li LC. Rural rehabilitation practice: perspectives of occupational therapists and physical therapists in British Columbia, Canada. *Rural Remote Health* 2014;14:2506.
- Turcotte M, Schellenberg G. A portrait of seniors in Canada. Ottawa (Canada): Statistics Canada; 2006.
- Statistics Canada. Population counts, for Canada, provinces and territories, census divisions, population centre size groups and rural areas, 2016 Census – 100% data. Ottawa (Canada): Statistics Canada; 2018.
- Davis AM, Cott C, Landry MD, Li L, Jones A, Linneker S, et al. Care for people with arthritis: policy: decisions, impacts and gaps. Toronto (Canada): Arthritis Community Research and Evaluation Unit; 2010.
- Kamenov K, Mills JA, Chatterji S, Cieza A. Needs and unmet needs for rehabilitation services: a scoping review. *Disabil Rehabil* 2019;41:1227–37.
- Sallis JF, Linton L, Kraft MK. The first active living research conference: growth of a transdisciplinary field. *Am J Prev Med* 2005;28 Suppl 2:93–5.
- Gutnick D, Reims K, Davis C, Gainforth H, Jay M, Cole S. Brief action planning to facilitate behavior change and support patient self-management. *J Clin Outcomes Manag* 2014;21:17–29.
- Bradshaw C, Atkinson S, Doody O. Employing a qualitative description approach in health care research. *Glob Qual Nurs Res* 2017;4:2333393617742282.
- Kim H, Sefcik JS, Bradway C. Characteristics of qualitative descriptive studies: a systematic review. *Res Nurs Health* 2017;40:23–42.
- Morse JM. "Data were saturated...". *Qual Health Res* 2015;25:587–8.
- Saunders B, Sim J, Kingstone T, Baker S, Waterfield J, Bartlam B, et al. Saturation in qualitative research: exploring its conceptualization and operationalization. *Qual Quant* 2018;52:1893–907.
- Braun V, Clarke V. Using thematic analysis in psychology. *Qual Res Psychol* 2006;3:77–101.
- Kairy D, Tousignant M, Leclerc N, Côté AM, Levasseur M, The Telage Researchers. The patient's perspective of in-home telerehabilitation physiotherapy services following total knee arthroplasty. *Int J Environ Res Public Health* 2013;10:3998–4011.
- Papi E, Murtagh GM, McGregor AH. Wearable technologies in osteoarthritis: a qualitative study of clinicians' preferences. *BMJ Open* 2016;6:e009544.
- Pouli N, das Nair R, Lincoln NB, Walsh D. The experience of living with knee osteoarthritis: exploring illness and treatment beliefs through thematic analysis. *Disabil Rehabil* 2014;36:600–7.

35. Campbell R, Goodman-Williams R, Feeney H, Fehler-Cabral G. Assessing triangulation across methodologies, methods, and stakeholder groups: the joys, woes, and politics of interpreting convergent and divergent data. *Am J Eval* 2020;41:125–44.
36. Graneheim UH, Lundman B. Qualitative content analysis in nursing research: concepts, procedures and measures to achieve trustworthiness. *Nurse Education Today* 2004;24:105–12.
37. Krefting L. Rigor in qualitative research: the assessment of trustworthiness. *Am J Occup Ther* 1991;45:214–22.
38. Government of Canada. A common vision for increasing physical activity and reducing sedentary living in Canada: let's get moving. Ottawa (Canada): Federal, provincial and territorial governments; 2018.
39. Hansen AY, Umstatt Meyer MR, Lenardson JD, Hartley D. Built environments and active living in rural and remote areas: a review of the literature. *Curr Obes Rep* 2015;4:484–93.
40. Harding PA, Holland AE, Hinman RS, Delany C. Physical activity perceptions and beliefs following total hip and knee arthroplasty: a qualitative study. *Physiother Theory Pract* 2015;31:107–13.
41. Bercovitz KL. Canada's active living policy: a critical analysis. *Health Promot Int* 1998;13:319–28.
42. Umstatt Meyer MR, Moore JB, Abildso C, Edwards MB, Gamble A, Baskin ML. Rural active living: a call to action. *J Public Health Manag Pract* 2016;22:E11–E20.
43. Nyvang J, Hedström M, Gleissman SA. It's not just a knee, but a whole life: a qualitative descriptive study on patients' experiences of living with knee osteoarthritis and their expectations for knee arthroplasty. *Int J Qual Stud Health Well-being* 2016;11:30193.
44. Woolhead GM, Donovan JL, Dieppe PA. Outcomes of total knee replacement: a qualitative study. *Rheumatology (Oxford)* 2005;44:1032–7.
45. Jones CA, Suarez-Almazor ME. Patient expectations and total knee arthroplasty. *J Clin Outcomes Manag* 2017;24:364–70.
46. Stenquist DS, Elman SA, Davis AM, Bogart LM, Brownlee SA, Sanchez ES, et al. Physical activity and experience of total knee replacement in patients one to four years postsurgery in the Dominican Republic: a qualitative study. *Arthritis Care Res (Hoboken)* 2015;67:65–73.
47. Greenhalgh T, Papoutsi C. Spreading and scaling up innovation and improvement. *BMJ* 2019;365:l2068.
48. Cote-Boileau E, Denis JL, Callery B, Sabean M. The unpredictable journeys of spreading, sustaining and scaling healthcare innovations: a scoping review. *Health Res Policy Syst* 2019;17:84.
49. Pit SW, Bailey J. Medical students' exposure to, knowledge and perceptions of telehealth technology: is our future workforce ready to embrace telehealth service delivery? *Health Education in Practice: Journal of Research for Professional Learning*. 2018;1:55–72.