Applying the International Classification of Functioning, Disability and Health to understand osteoarthritis management in urban and rural community-dwelling seniors

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ABSTRACT

Objectives: The objectives of this study were to identify contextual factors as barriers or facilitators of osteoarthritis management in urban- and rural-dwelling seniors by applying the World Health Organization’s International Classification of Functioning, Disability and Health (ICF).

Design: Secondary analysis was performed on interview transcripts from urban- (n = 11) and rural-dwelling (n = 9) seniors living with osteoarthritis in Canada. Meaningful concepts were linked to ICF codes (Environmental Factors) according to established linking rules. Unclassified content (including Personal Factors) was subjected to qualitative content analysis.

Results: A total of 481 and 410 meaningful concepts were identified in interview transcripts from urban and rural groups, respectively. For Environmental Factors, the majority of meaningful concepts linked to “Environmental Factors”, then “Activities and Participation”, and then “Body Functions” in the ICF. The most frequently linked codes were “e355 Health professionals”, “e5801 Health systems”, “e5800 Health services”, and “e398 Support and relationships, other specified”. The most salient barrier and facilitator to osteoarthritis management reflected in our results were “e5801 Health systems” and “e398 Support and relationships, other specified”, respectively, for both urban and rural groups. For Personal Factors, qualitative content analysis of unclassified content revealed 3 key themes including (1) Coping Strategies; (2) Age of Osteoarthritis Diagnosis; and (3) Individual Circumstances.

Conclusion: Beyond physical limitations, community-dwelling seniors with osteoarthritis encounter a wide range of biopsychosocial factors that can impact disease management. Applying the ICF, we identify “Environmental Factors” as a significant contextual factor impacting osteoarthritis management in both urban and rural communities.

1. Introduction

Osteoarthritis (OA) is a leading cause of disability in older adults and represents an increasing burden at both individual and socioeconomic levels [1,2]. There is currently no cure, but effective self-management strategies can mitigate symptoms and enhance quality of life [3]. Though the onset and severity of OA symptoms may fluctuate, the condition is chronic in nature and requires long-term management [1]. As a result, it is essential that seniors with OA have the awareness, capacity, and resources to effectively self-manage their condition. Optimal self-management of chronic disease is influenced by a multitude of physical, psychosocial, and environmental factors that impact functional independence in community settings, but many of these factors are often overlooked in OA care [4].

Built on the biopsychosocial model, the World Health Organization’s International Classification of Functioning, Disability and Health (ICF) provides a framework stating that function and disability stem from a dynamic interaction between health conditions and contextual factors [5,6]. ICF has associated definitions that characterize how impairments (and body structure and function) and disability (activity and

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participation) are modified by personal factors and environmental factors (which includes the physical and social environment). In addition, it is a hierarchical descriptive classification system which has codes arranged in chapters to represent the content of areas of functioning, disability, and health. Because OA is a self-managed chronic condition with the potential to hinder participation in daily activities [7,8], it is important to examine the contextual factors impacting how seniors with OA live and function [9,10]. The comprehensive nature of the World Health Organization’s ICF framework represents a rigorous approach for better understanding the contextual factors that influence OA management in community settings [11].

It is well recognized that health-related differences and inequities exist between urban and rural populations [12-14], yet there is limited information on how OA is managed across these populations. In our previous study, the lived experiences of Canadian urban and rural community-dwelling seniors with OA were explored using hermeneutic phenomenology [15]. The major finding was that lived experiences of seniors with OA were predominantly similar across urban and rural settings, with key shared themes being the importance of a social network for OA information sharing, taking a trial-and-error approach to OA management, and the influence of individual positive or negative personal views towards living with OA. In the current study, we seek to expand our analysis of these data and identify the contextual factors that are potentially contributing to these lived experiences.

The objective of this study is to identify contextual factors that influence OA management by urban- and rural-dwelling seniors in Canada. Using the ICF framework as a classification system, we link meaningful concepts to codes within each of the components including “Environmental Factors” (meant to be coded from the perspective of the person whose situation is being described, consistent with lived experiences [5]), “Activities and Participation”, and “Body Functions”. We also classify key concepts into barriers and facilitators of OA management, intending to make our findings relevant to the planning and implementation of disease management services for community-dwelling seniors with OA.

2. Method

Secondary data analysis was performed on transcripts obtained from a previous study which included semi-structured interviews with 20 community-dwelling seniors in Ontario, Canada [15]. The study was approved by The University of Western Ontario Research Ethics Board (REB # 107183 for urban participants and 107308 for rural participants). Briefly, purposeful sampling was used to recruit 11 seniors from an urban setting and 9 seniors from a rural setting who were fluent in English, over the age of 65, and previously diagnosed with OA [15]. These participants were considered information-rich for OA management in urban and rural communities [16]. Broad questions were used to avoid biasing responses and to capture a holistic view of the experiences of community-dwelling seniors in managing OA. Interviews were guided using the following questions:

1. Where do you get information related to osteoarthritis?
2. How do you manage your osteoarthritis pain?
3. What can be done to improve osteoarthritis management for seniors?

Verbatim interview transcripts were analyzed using deductive qualitative content analysis methodology [17]. Transcripts were read and re-read multiple times in order for the coders (KL and SAA) to develop a sense of familiarity with the data [18]. Meaningful concepts related to contextual factors as described by the ICF were captured through open coding of the interview transcripts [19]. Meaningful concepts were identified as words or phrases that revealed information about the ICF contextual factors. Once all meaningful concepts were identified, a coding strategy was applied. The ICF was used as a classification system with the predetermined themes (components) “Environmental Factors”, “Activities & Participation”, and “Body Functions” as shown in Fig. 1 [18]. Meaningful concepts were organized into subthemes (codes) within each predetermined theme (component) through an iterative process [19].

Meaningful concepts were linked to ICF codes according to established linking rules [11,20]. Each concept was linked to the most precise ICF code possible. Two individuals (KL and SAA) independently linked meaningful concepts to ICF codes. Discrepant concepts were discussed until consensus was reached. A frequency count of the number of meaningful concepts linked to ICF codes was performed to ascertain the breadth of coverage across ICF components in the urban and rural groups. Three of the four most frequently occurring codes across the urban and rural groups (reflecting the most meaningful concepts) were selected to be further classified into facilitators or barriers to OA management. This classification was performed by the coders based on mutual interpretation of the concepts as either facilitators or barriers.

To determine the specificity of our linkage to ICF components to OA in particular, we referred to the Comprehensive ICF core set for OA which includes 55 ICF codes and the Brief ICF core set for OA which includes 13 ICF codes [21]. A complete list of the ICF codes in both core sets can be found here: https://www.icf-research-branch.org/icf-core-sets-projects2/musculoskeletal-conditions/icf-core-set-for-osteoarthritis. In accordance with the established linking rules, meaningful concepts that could not be classified under any ICF code but were identified as personal factors were labeled as a “Personal Factor” [20]. Meaningful concepts that were neither linked to an ICF code nor identified as personal factors were assigned “nc” (not covered) [20]. To facilitate interpretation of unlinked content (personal factors or not covered), we also applied deductive qualitative content analysis, but with no predetermined themes.

3. Results

3.1. Participant characteristics

Participant characteristics pertaining to the 20 individuals included in this study have been previously described in detail [15]. Briefly, urban and rural participants were of similar average age (72 years), sex (majority female), education (all completed high school), occupational status (majority retired), and living arrangement (majority living with spouse/partner). In terms of age of OA diagnosis among urban participants,
the majority were diagnosed after the age of 55 (n = 7), whereas for rural participants, the majority were diagnosed before the age of 55 (n = 6). For additional information pertaining to self-rated assessment of overall health, self-rated assessment of OA, age of onset of OA, and frequency of joint pain experienced, please see Ali et al. (2018) [15].

3.2. Linking meaningful concepts to ICF codes

A total of 891 meaningful concepts from 20 interview transcripts were linked to the most specific ICF level possible. Concepts spanned several ICF components, where 481 meaningful concepts identified by the urban group were linked to 54 ICF codes: 24 Environmental Factors, 21 Activities and Participation, and 9 Body Functions (Fig. 2). The remaining 410 meaningful concepts were derived from interviews with rural-dwelling seniors and linked to 57 ICF codes: 27 Environmental Factors, 24 Activities and Participation, and 6 Body Functions (Fig. 2).

The urban and rural code sets represented 15 and 14 ICF book chapters, respectively, and covered all 5 book chapters of the Environmental Factors section of the ICF.

3.3. Coverage of ICF codes

Across all 3 ICF components explored, “Chapter e5 services, systems and policies” was the ICF book chapter with the highest coverage, with 8 codes captured. Within the Environmental Factors component, “e355 Health Professionals” was the single most frequently identified ICF code in the urban group and in the rural group (Supplemental Table 1), and was mentioned in almost all urban and rural interviews (59 times in 9 of 11 urban and 45 times in 9 of 9 rural). Participants frequently discussed physician’s attitudes and misconceptions towards patients with OA. Several participants expressed frustration with having a physician that underestimated the severity of their OA, did not take their OA seriously, or de-prioritized OA relative to concurrent health issues that were discussed during an appointment. Other commonly identified ICF codes from the Environmental Factors component included “e5800 Health Services”, mentioned 24 times each by urban and rural seniors, “e5801 Health Systems”, mentioned 18 and 38 times by urban and rural seniors, respectively, and “e398 Support and relationships, other specified”, mentioned 26 and 18 times by urban and rural seniors, respectively (Supplemental Table 1). These three codes were further analyzed as potential barriers or facilitators of OA management (Table 1).

3.4. Classifying ICF codes as barriers or facilitators of OA management

Table 1 summarizes the frequencies of concepts within ICF codes that could be classified into barriers or facilitators of OA management. For the ICF codes “e5800 Health services” and “e5801 Health systems”, concepts were most frequently identified as barriers in the urban group (79.2% and 88.9% respectively) and in the rural group (75% and 100% respectively). For the ICF code “e398 Support and relationships, other specified”, concepts were most frequently identified as facilitators in the urban group (76.9%) and in the rural group (94.4%). These frequencies illustrate that the same code may capture concepts that are barriers or facilitators depending on the individual and the context.

The ICF code with the second most concepts overall was “e5801 Health systems” with n = 56 which also represented the most prominent barrier examined (88.9% in the urban group and 100% in the rural group). Among the concepts classified as barriers were “long wait times”, “being restricted to discussing one issue per visit”, “challenges with accessing services that required extended health coverage”, “long waiting lists for seeing specialists” and “lack of availability of community programs for managing OA”. Other examples of concepts classified as barriers and facilitators are provided in Table 2 for urban participants and Table 3 for rural participants.

3.5. Barriers to OA management among rural participants

We identified barriers and facilitators classified under each ICF code that were reported by rural participants but not urban participants. In particular, we identified elements of the physical environment that predominately acted as barriers to OA management in the rural group, such as “e225 Climate” and “e2253 Precipitation” (Supplemental Table 1). For example, rural seniors perceived “damp weather” and “barometric pressure” to be barriers to managing OA as it exacerbated their joint symptoms, while “winter weather” and “slippery weather” served as barriers to going outdoors. Furthermore, for the code “e5801 Health Systems”, there were notable barriers identified in the rural group (100%; Table 1). These included “living in a medically underserviced area”, “reliance on emergency rooms”, and “shortage of family physicians in the community” (Table 3).

3.6. Coverage of ICF core set for OA

Of the 55 ICF codes in the Comprehensive core set for OA, our findings covered more than half, with the Core Set Representation value calculated to be 52.9% [22]. Of the 13 ICF codes in the Brief Core Set for OA, we identified “e115 Products and technology for personal use in daily living”, “e150 Design, construction and building products and technology of buildings for public use”, “e310 Immediate family”, and “e580 Health services, systems and policies” within our data. This...
represents all four codes in the Environmental Factors component of the Brief Core Set for OA. Similarly we identified all three codes in the Activities and Participation component, including “d445 Hand and arm use”, “d450 Walking”, and “d540 Dressing”.

3.7. Qualitative content analysis of unclassified content

Personal factors, including life events and character traits, were analyzed by content analysis to augment the ICF linking, since these factors are not classified by existing linking rules. Salient personal factors from our study include coping styles, type of occupation, retirement status, past and current experiences with managing health issues, life events (i.e. death of spouse), lifestyle factors, previous joint injuries, and personal character traits impacting how OA is experienced by the individual. Content analysis of unclassified content (“Personal Factors” and “nc”) revealed 3 themes that emerged from the data: (1) Coping Strategies; (2) Age of OA Diagnosis; and (3) Individual Circumstances.

3.8. Coping Strategies

Urban and rural participants discussed varying coping strategies used to manage their OA. Taking active steps to maintain a normal life, being in control of OA, and adapting to life with OA were common subthemes mentioned by both groups. For example, one urban participant (U7) stated, “I adjust my life according to my body.” Regardless of urban or rural setting, individuals who believed that they managed their condition effectively employed active coping strategies. Such strategies included confronting their problems and finding new ways of maintaining a normal life. One rural participant (R2) explained, “I try to live my life as if it is not there. […] So I’m cautious and I slow down. I might not do as many things as I used to. I just pace myself differently.” Several participants discussed the importance of managing their own expectations to adapt to a new health condition, rather than dwelling on what they are no longer capable of doing.

3.9. Age of OA diagnosis

Age of OA diagnosis impacted participants’ determination and willingness to be proactive in managing their condition. Several seniors stated that being diagnosed with OA at a younger age became a motivating factor to take active steps in preventing the progression of the disease. One urban participant (U9) explained, “I was more motivated to do the exercises and stuff at seventy-four than I might have been at seventy-six or seventy-eight, you know?” This theme was exclusive to the urban group wherein OA diagnosis occurred later in life (after the age of 55).

3.10. Individual Circumstances

In both urban and rural groups, individual circumstances served as facilitators or barriers to effectively managing and living with OA. Individual circumstances were operationalized as events or changes that influenced an individual’s life course. Several of these factors were interrelated. For example, one urban participant (U3) stated, “I guess people, well, everyone’s different. Everybody’s timing is different, so I just retired two years ago. And I’m a caregiver for my husband, so I’ve managed to do extra stuff.” One rural participant (R2) explained, “I always had back pain but I was a nurse and I did a lot of lifting and heavy people and I always put it down to bending, the moving.” Individual circumstances varied and could include past life experiences, major life events, sudden life changes, and previous experiences with injuries or illness.

4. Discussion

Using the ICF as a conceptual framework, we describe the coverage of Environmental Factors, Activities and Participation, and Body Functions as contextual factors impacting OA management in 20 community-dwelling seniors [5,23,24]. After linking meaningful concepts to ICF codes, we classified them as barriers or facilitators to explore the contextual factors that enable or hinder seniors’ capacity to manage OA [9]. While other studies have explored barriers and facilitators in the context of OA, to the best of our knowledge, this is the first study to apply
ICF terminology as a coding strategy to explore contextual factors in urban and rural communities. We specifically identify common codes with both the Comprehensive and Brief ICF Core Sets for OA. This provides novelty and practicality to our findings since the ICF represents a common international language used in multidisciplinary teams devising or executing treatment programs for OA.

While a previous study explored lived experiences in urban- and rural-dwelling seniors in managing OA [15], here we explore contextual factors. The majority of meaningful concepts we identified were linked to ICF codes within Environmental Factors, then Activities and Participation, and then Body Functions, for both urban and rural groups. This suggests that the physical, social, and attitudinal environment had a large impact in shaping how these community-dwelling seniors experienced living with OA. The single most frequently linked ICF code was “e355 Health Professionals” for both urban and rural groups.

Rural participants expressed challenges with accessing health professionals in medically underserved areas, and both urban and rural participants expressed expectations about the quality of care they would like to receive – but were not receiving – from their physician. These findings highlight a public health challenge where OA is often viewed as an unimportant health concern despite the substantial disability it causes [25]. A review by Michie, Miles, & Weinman in 2003 examined factors influencing successful management of chronic illness and revealed that physician attitudes towards patients impacted patient perceptions about their condition and how proactive they were in self-management [26]. Given the chronic nature of OA, our findings support that the therapeutic relationship that seniors had with their physicians were instrumental in influencing patient engagement in disease management and in ultimately impacting disease outcomes [27].

The second and third most frequently linked ICF codes were “e5801 Health Systems” and “e5800 Health Services”. Consistent with existing research outlining key issues concerning Canada’s publicly funded health care system, participants repeatedly identified barriers associated with accessing health systems and services [28,29]. Among rural participants, our findings were predominantly related to shortage of health care services in medically underserved areas. Furthermore, our findings highlight challenges associated with the lack of availability of high-quality OA-specific community exercise programs in Canada [30]. This finding is particularly important given that extensive research and clinical practice guidelines consistently support the role of exercise as a first-line therapy to manage OA [31,32].

The fourth most frequently linked ICF code was “e398 Support and relationships, other specified”. Social support and relationships were recurrent topics and served as both facilitators and barriers to OA management. Consistent with previous findings [15,33,34], some participants felt that having physical or emotional support from others enabled them to maintain their independence and motivated them to continue engaging in meaningful activities. Conversely, several participants viewed the need for a support system to be a barrier as they felt they were being a burden to others and preferred to deal with OA alone. In their accounts of barriers to OA management, some participants expressed the common misconception that OA is an inevitable part of aging [35]. Such beliefs and behaviors are derived from societal attitudes towards OA and a general lack of understanding about the severity of the condition. Our findings also confirmed that traditional gender-role and family-role expectations impacted how participants prioritized OA management in both urban and rural groups [36−38]. Social role expectations, such as being a wife or caregiver to an ill spouse, may hinder how an individual prioritizes their own disease management amongst other personal or family responsibilities.

To understand personal factors, we performed qualitative analysis of meaningful concepts not coded in the ICF and identified three key themes, one of which included age at time of OA diagnosis. Because there is currently no cure for OA, early detection and prevention is critical [39, 40]. Although most participants in this study were of similar age at the time of the interview, they differed in their age at OA diagnosis, with rural participants being diagnosed at a younger age. This may have impacted approach to disease management since chronological age can serve as a barrier or facilitator to engaging in prevention strategies or therapeutic interventions. Linear regression analyses by Gignac et al. (2013) found that middle-aged adults diagnosed with OA reported significantly greater barriers and limitations to OA management [37]. A possible explanation might be that middle-aged adults received minimal guidance and professional attention for disease management. As a result, they experienced worse outcomes, greater depression, stress, behavioral coping, and health care utilization compared to older adults (60 or older) [39]. This may explain some of the barriers reported by our rural participants.

Adding to our understanding of the impact of age at time of diagnosis, our qualitative analysis revealed this could potentially serve as a facilitator to OA management. Several participants mentioned that if they were to be diagnosed with OA during “old age”, they would be less driven and motivated to seek intervention. They felt that they would be less likely to partake in strategies to preserve their functional independence if diagnosed at an older age. A study in 2013 estimated that over 50% of symptomatic knee OA in the United States was diagnosed prior to age 55, and emphasized the importance of offering OA prevention programs earlier in life [41]. Further research is required to better understand the impact of age of OA diagnosis on OA management. Whereas the ICF does not directly address life course issues, our findings indicate the importance of a life course perspective.

Despite research demonstrating the importance of taking a holistic approach to OA management and treatment [24,42], existing strategies continue to focus on addressing physical limitations of the disease and overlook the extent to which contextual factors impact disease outcomes. We found that attitudes of physicians, health service barriers, availability of OA-specific resources, social support, social role expectations, and personal factors were key factors influencing optimal management of OA regardless of urban or rural setting. It is possible that less attention is paid to environmental, health system, geographic, and political factors because these factors are more difficult to modify, at least in the short term. However, effective management includes strategies to accommodate or work around existing barriers; and more consistent attention to these factors could result in novel short-term solutions or instigate longer-term changes.

4.1. Limitations

The similarities we identified across urban and rural groups may be explained by the homogeneity of our participant population. In both urban and rural groups, participants were of similar age, sex, occupational status, and so on. Nevertheless, these characteristics are commonly found among community-dwelling seniors living with OA, thus our findings are relevant to this particular group. Since this was secondary data analysis from a previous study [15], we were unable to develop specific interview questions related to the perceptions and experiences of participants with their health care providers and therefore did not analyze “e355 Health Professionals” for barriers or facilitators. We were also unable to probe on specific contextual factors in urban versus rural environments, and therefore could not confirm whether ideas expressed by only one group were truly unique to that group. Additional factors related to OA management, such as socioeconomic status [43,44] and psychosocial predisposition to pain [45] were not examined due to the exploratory nature of this study. However, the breadth of the coverage of ICF book chapters suggest a diversity of concepts pertaining to contextual factors were captured in the interview transcripts.

5. Conclusion

To the best of our knowledge, this is the first study to investigate barriers and facilitators to OA management in urban and rural communities in Canada using the ICF as a conceptual framework. Our findings...
provide a better understanding of the contextual factors that impact OA management, where health professionals, health systems, and health services were among the most frequently mentioned ICF codes. Furthermore, the breadth of codes that were covered in the ICF and the ICF Core Sets for OA demonstrate the need for biopsychosocial factors to be taken into consideration for optimal OA management. Taken together, our results identify opportunities to maximize facilitators and remove barriers to OA management, and can be used to inform the design and implementation of services and programs for community-dwelling seniors living with OA.

Declaration of competing interest

The authors declare that there is no conflict of interest.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ocarto.2020.100132.

Author contributions

SAA conceived and designed the study; acquired, analyzed, and interpreted data; drafted and revised the article; and approved the final version to be submitted. KL acquired, analyzed, and interpreted data; drafted and revised the article; and approved the final version to be submitted. JCM conceived and designed the study; interpreted data; revised the article; and approved the final version to be submitted.

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Osteoarthritis and cartilage

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