Development of a core capability framework for qualified health professionals to optimise care for people with osteoarthritis: an OARSI initiative


PII: S1063-4584(19)31276-2
DOI: https://doi.org/10.1016/j.joca.2019.12.001
Reference: YJOCA 4561

To appear in: Osteoarthritis and Cartilage

Received Date: 12 August 2019
Revised Date: 24 October 2019
Accepted Date: 2 December 2019


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Running title: OA core capability framework

Key words: osteoarthritis; OA; capability; competency; quality care; health professionals; education.

Word Count: 3959
Abstract

Objective: Develop a generic trans-disciplinary, skills-based capability framework for health professionals providing care for people with OA.

Design: e-Delphi survey. An international inter-professional Delphi Panel (researchers; clinicians; consumer representatives) considered a draft framework (adapted from elsewhere) of 131 specific capabilities mapped to 14 broader capability areas across four domains (A: person-centred approaches; B: assessment, investigation and diagnosis; C: management, interventions and prevention; D: service and professional development). Over three rounds, the Panel rated their agreement (Likert or numerical rating scales) on whether each specific capability in Domains B and C was essential (core) for all health professionals when providing care for all people with OA. Those achieving consensus (≥80% of Panel) rating of ≥ seven out of ten (Round 3) were retained. Generic domains (A and D) were included in the final framework and amended based on Panel comments.

Results: 173 people from 31 countries, spanning 18 disciplines and including 26 consumer representatives, participated. The final framework comprised 70 specific capabilities across 13 broad areas i) communication; ii) person-centred care; iii) history-taking; iv) physical assessment; v) investigations and diagnosis; vi) interventions and care planning; vii) prevention and lifestyle interventions; viii) self-management and behaviour change; ix) rehabilitative interventions; x) pharmacotherapy; xi) surgical interventions; xii) referrals and collaborative working; and xiii) evidence-based practice and service development).

Conclusion: Experts agree that health professionals require an array of skills in person-centred approaches; assessment, investigation and diagnosis; management, interventions and prevention; and service and professional development to provide optimal care for people with OA.
Introduction

Osteoarthritis (OA), particularly of the knee and hip is the 12th highest contributor to global disability in adults aged 50-69 years\(^1\). Around 240 million people (1 in 11) have OA, with a substantial increase expected in the future\(^2\). Osteoarthritis can be debilitating, with pain being the dominant symptom that often becomes persistent and more limiting as OA progresses\(^3\). Physical function can become increasingly impaired over time, impacting substantially on quality of life and ability to participate in social, leisure and occupational activities\(^3\). Management of people with OA typically involves a wide range of clinicians, including medical practitioners, an array of allied health professionals, and spans primary to tertiary care settings\(^4\). Unfortunately, current care for people with OA is variable and frequently inconsistent with clinical guideline recommendations. A meta-analysis of studies evaluating community-based care in developed countries for people with OA, based on adherence to evidence-based quality indicators, showed a median overall pass rate of 41%\(^5\). Alarmingly, the pass rates for core first-line OA treatments (such as exercise, education and weight control) were below 40%.

Osteoarthritis is highly prevalent in low- and middle-income countries\(^6\), and it is likely that the quality of care received by people with OA in these countries is also sub-optimal\(^7\).

A major contributor to the quality of care received by people with OA is the capability of the healthcare workforce to deliver care that is aligned with evidence-based recommendations and a biopsychosocial approach to management\(^8\). Clinicians feel ‘under-prepared’ to manage OA, lacking knowledge about recommended practice and/or how to implement recommendations into routine care as well as the skills to support patients to make lifestyle changes (such as exercise or weight loss)\(^9\)\(^,\)\(^10\). This is particularly important given that common misconceptions about knee OA influence patients’ acceptance of non-surgical evidence-based treatments\(^11\). A “capability” may be defined as an integration of knowledge, skills, personal qualities and understanding used appropriately and effectively- not just in familiar and highly focused specialist contexts, but in response to new and changing circumstances\(^12\).
Defining the core capabilities of health professionals delivering care for people with OA is required to inform improvements to pre-licensure curricula and to ensure professional development programs are appropriately targeted to workforce needs\textsuperscript{13}. This is particularly relevant in contemporary healthcare, where skills are often no longer unique to one health professional group\textsuperscript{14} and innovative service re-design is advocated for implementation of OA evidence-based recommendations into practice\textsuperscript{15}. Although a UK framework exists for first point of contact musculoskeletal practitioners\textsuperscript{16} and EULAR has recommendations about generic core competencies for nurses, physiotherapists and occupational therapists in rheumatology\textsuperscript{17}, there is no framework describing the core capabilities generic to all health professionals specifically for OA management.

This study aimed to develop a generic trans-disciplinary, skills-based core capability framework for health practitioners to optimise care for people with OA, using consumer participation and an international inter-professional consensus process. The framework is intended to be applicable to all qualified health professionals involved in OA care across the disease spectrum and healthcare settings.

**Methods**

**Overview**

We established a Delphi Panel and conducted an e-Delphi survey between February and April 2019 to achieve expert consensus on the core capability framework. The study was overseen by an international inter-professional Steering Group, established by the *International Osteoarthritis Management Programs ‘Joint Effort’ Initiative* endorsed by OARSI in 2018\textsuperscript{18}. A Steering Group of 14 members from Australia, USA, UK, Netherlands, Denmark, France and Sweden and comprising physiotherapists (RSH; KLB; AMB; JPE; STS; KSD; ME), rheumatologists (DJH; SPY; AW; FB), an orthopedic
surgeon (LED), an exercise physiologist (KDA) and a consumer with OA (NB), was convened. Ethical approval was obtained from the University of Melbourne. Fig 1 overviews the study phases.

Survey development

In the formative phase, the Steering Group debated whether the final framework should be discipline-specific, or more generic and thus relevant to all health professionals who may provide care to people with OA. The Group recognised the array of health professions involved in OA care, in a wide variety of healthcare settings across countries, and with variable access to different health disciplines. To maximise generalisability, the Group decided upon a capability framework generic to all health professionals, which could provide a “scaffold” for professional groups to expand (if necessary) into specialised capability frameworks for specific health professions.

The Steering Group selected the “Musculoskeletal core capabilities framework for first point of contact practitioners” recently published by the Health Education England, Skills for Health and NHS England, UK for adaptation in the current study. This framework describes the capabilities that are applicable to clinicians with a role as a first point of contact for adults presenting with undiagnosed musculoskeletal conditions. It consists of 105 specific capabilities (mapped to 14 broader capability areas) across four domains, two describing more ‘generic’ capabilities relevant for all clinical encounters irrespective of health condition (Domain A: person-centred approaches; Domain D: service & professional development) and two describing capabilities relevant to assessment, care planning and management of patients with musculoskeletal conditions (Domain B: assessment, investigation and diagnosis; Domain C: management, interventions and prevention) and amenable to tailoring for a specific musculoskeletal condition.
With permission from Skills for Health, the Steering Group revised the specific capabilities to ensure they were as specific and relevant to OA as much as possible (rather than musculoskeletal conditions more broadly), and to acknowledge the varying scope and roles of health professionals involved in OA care. To do this, the Steering Group considered other relevant frameworks\textsuperscript{19,20}, used their knowledge of research evidence as well as their clinical expertise. For example, “Understand the role of common rehabilitative interventions for musculoskeletal conditions” was revised to “Understand the role of common rehabilitative interventions including pain education, therapeutic exercise, weight loss, manual therapy, cognitive behavioural approaches, aids and assistive devices, orthotic, braces and splints for managing OA, based on the best available evidence” and “Understand the role of joint injections, informed by the evidence base, in musculoskeletal practice” was revised to “Understand the role of intra-articular injections in managing OA (including corticosteroids, platelet rich plasma, hyaluronic acid and stem cells), based on best available evidence”. The Steering Group also suggested 12 additional capabilities for inclusion (mapping each to the most relevant broad capability area based on consensus of opinion, Appendix 1) and re-ordered the broad groupings of capabilities in a flow better suited to OA care. One specific capability was excluded as it was outside the scope of a capability framework for OA (Domain B: Diagnose common problems that can usually be managed at the first point of contact) and another was excluded because re-wording of other capabilities rendered it redundant (Domain C: Advise on the effects of smoking, obesity and inactivity on musculoskeletal health and conditions and, where appropriate promote change or refer to relevant services).

**Delphi Panel**

An international inter-professional Delphi Panel of experts (including Steering Group members) was established to reach consensus on a framework of capabilities, comprising:

a) Health professionals involved in OA human research (researchers);

b) Health professionals who provide clinical care for people with OA (clinicians); and
c) Consumer representatives.

Inclusion criteria for researchers were i) qualified and registered health professional and; ii) at least one of the following a) first or last author on at least two papers per year on primary human research in OA in the past five years or; b) invited to give a plenary or keynote presentation on OA at an international conference in the last five years. Inclusion criteria for clinicians were i) registered to practice as a health professional in their home country; and ii) have managed, on average, at least one patient with OA per week over the past six months. Inclusion criteria for consumer representatives were currently employed by an arthritis consumer advocacy organisation and/or previous diagnosis of OA from a doctor. All Panel participants understood English.

A list of potential Panel participants was developed by the Steering Group, drawing from their academic, research and clinical networks, the OARSI membership, and the field of published OA research. This was supplemented by an internet search of arthritis consumer advocacy organisations internationally. Potential Panel members were invited to participate via email (n=976 invitations sent). We also advertised for additional clinicians using advertisements in social media (Facebook). Potentially eligible Panellists completed a series of screening questions embedded at the beginning of the Round 1 e-Delphi survey to ensure they fulfilled the eligibility criteria. Ineligible volunteers were not admitted to the Delphi Panel and did not complete the Round 1 e-Delphi survey. For subsequent Delphi rounds, only those participants who had completed the preceding Delphi round were emailed the survey.

**e-Delphi Survey**

The Delphi Panel were asked to rate the specific capabilities in Domains B (assessment, investigation and diagnosis) and C (management, interventions and prevention) only. This was to reduce the time
burden on Panellists in completing iterative surveys and to focus efforts on the domains where opinions on “core” capabilities were likely to vary the most. In addition, the Steering Committee determined a priori that the more generic Domains A (person-centred approaches) and D (service & professional development) were core capabilities relevant to all health professionals and people with all health conditions, and thus should automatically be included in the final framework, given they had already been validated in another Delphi process\textsuperscript{16}. However, the Delphi Panel was invited to provide optional feedback on specific capabilities within these domains at the end of Round 1 if they wished. The survey was constructed using SurveyGizmo (SurveyGizmo; Colorado), an online survey software tool and administered iteratively over three rounds (Fig 1), with two weeks between each. Each round was open for 2 weeks, with three reminder emails sent over that time to non-responders to encourage completion. Each round took approximately 30-40 minutes to complete.

\textit{Round 1}

In Round 1, the Panel was asked to rate each specific capability (in Domains B and C) as either “not important” “somewhat important” “important” or “essential” to the care of people with OA. They were invited to add new capabilities not already included in the draft framework (which were later mapped by the Steering Group to the most relevant broad capability area based on consensus of opinion). Specific capabilities that reached Panel consensus (defined as at least 80\% of the Panel to ensure only the “core” capabilities remained and considering that 75\% is a median threshold of consensus\textsuperscript{21}) as “important” or “essential” were retained for further consideration in Round 2.

\textit{Round 2}

In Round 2, the Panel was asked to reconsider and rate the capabilities retained from Round 1, as well as any new capabilities identified by the Panel in Round 1. Summary Panel data from Round 1 (presented as n (%) across response categories) were provided against each capability to assist in this
process. For this Round, each Panel member was asked to rate how much they agreed/disagreed that each capability was essential (core) for ALL health professionals when providing care for ALL people with OA. Panel members were prompted to think about the wide range of health professionals involved in providing healthcare for people with OA (e.g. physicians, surgeons, nurses, physiotherapists, dieticians etc), and the wide variation in clinical presentation of people with OA. Panellists rated their level of agreement on an 11-point numerical rating scale (ranging from 0=strongly disagree to 10=strongly agree). Only capabilities that achieved a consensus (at least 80% of Panel) rating of at least six were retained for Round 3.

Round 3

In Round 3, the Panel was asked to reconsider and rate the capabilities retained from Round 2 using the same rating scale as Round 2. Panel summary data from Round 2 (presented as n (%) rating 4 or below; 5-6; 7-8 and; 9-10) were provided for consideration. Only capabilities that achieved a consensus (at least 80% of Panel) rating of seven or more were retained for inclusion in the final framework.

At the end of the e-Delphi Survey process, the Steering Group considered the free text optional comments provided by the Delphi Panel on Domains A and D in Round 1, with a view to amending the text and/or merging or removing capabilities, based on the feedback received.

Consumer involvement

A consumer was a member of the project Steering Group. As a research partner, the role of the consumer was to provide input at all stages, with a particular focus on reviewing capabilities included in the draft survey (including inserting additional capabilities if required), participating in the Delphi Panel, advising on content and design of the infographics for communicating key findings, as well as reviewing and co-authoring the manuscript.
Results

Table 1 describes the Delphi Panel. In Round 1, 173 participants from 31 different countries spanning 18 different health professions and including 26 (15%) consumer representatives participated. Over half of the Panel (58%) were currently involved in clinical care of people with OA. We retained 131 Panel members for Round 2 and 118 Panel members for Round 3 (Table 1, Fig 1), representing 76% and 68% retention of the initial (Round 1) Panel respectively.

Fig 1 summarises outcomes of each Delphi Round. In Round 1, 19 (21%) specific capabilities did not reach consensus as being “important” or “essential” for inclusion in Domains B and C of the core capability framework for health professionals managing people with OA and were excluded from Round 2 (Appendix 2). Furthermore, 34 individual members Panel suggested additional capabilities for consideration, generating an additional 17 unique capabilities for inclusion into Round 2. A total of 34 Panel members provided optional feedback on the generic capabilities within Domains A and D. This feedback was used to amend wording of 10 specific capabilities. The Steering Group merged six specific capabilities into three under Domain A to reduce redundancy. In Round 2, 23 (26%) specific capabilities did not reach consensus agreement for retaining in Round 3 (Appendix 3) and were thus excluded from the final round. In Round 3, 17 (25%) of capabilities considered across Domains B and C did not achieve Panel consensus for retention in the final capability framework and were excluded (Appendix 4). The final core capability framework comprised 70 specific capabilities mapped to 13 broader capability areas (Table 2, summarised in Fig 2).

Discussion

This study aimed to develop a generic trans-disciplinary, skills-based core capability framework for health professionals who deliver care to people with OA, using an international inter-professional
consensus process. This framework is a model that communicates the key capabilities required of health professionals to ensure excellence in best practice OA care. The final framework comprised 70 specific capabilities mapped to 13 broader capabilities i) communication; ii) person-centred care; iii) history-taking; iv) physical assessment; v) investigations and diagnosis; vi) interventions and care planning; vii) prevention and lifestyle interventions; viii) self-management and behaviour change; ix) rehabilitative interventions; x) pharmacotherapy; xi) surgical interventions; xii) referrals and collaborative working; and xiii) evidence-based practice and service development, across four domains.

Our framework was adapted from an existing UK musculoskeletal capability framework\(^\text{16}\). There are thus many similarities across the two, particularly regarding Domains A (person-centred approaches) and D (service and professional development), which remain largely unchanged in our framework for managing OA. Our framework does not include the broader capability area of injection therapy, probably because of the limited role that injections have in managing a subset of people with OA\(^\text{24}\). In contrast to the musculoskeletal framework, which was developed for first point of contact practitioners who require advanced skills in diagnosis and management across a range of diseases, our framework is intended solely for those health professionals who manage people with OA, which probably explains why ours comprises 33% fewer specific capabilities (70 versus 105). Patient-reported outcomes\(^\text{25}\) and objective measures of physical function\(^\text{26}\) are widely advocated in hip and knee OA management, and capabilities relating to these were included in the draft framework by the Steering Group at the formative phase (Appendix 1). It is thus surprising that these capabilities did not reach a consensus for inclusion in the final framework. It is unclear why these items were excluded. Many of these measures have been developed, validated and endorsed primarily for knee, and to a lesser extent, hip OA, and experts may have considered them less important in the context of all patients with OA (which may involve the hand, foot or spine for example) or healthcare settings where measurement of
these is impractical for all.

As our framework is not specific to any health discipline, we acknowledge that different professional groups may bring specialist knowledge and/or skills in addition to the core set. Specific professional groups may wish to validate our work in the future by subjecting our OA capability framework to a similar Delphi or other consensus process, which may lead to the inclusion of additional capabilities, or exclusion of others as appropriate for the different health professions involved in OA care. In addition, many of the capabilities within the framework have relevance to clinicians managing patients with other health conditions, particularly those with chronic conditions, where lifestyle strategies (exercise and weight control), pain control, prevention, self-management, rehabilitation and behaviour change are critical. Thus, our framework may be suited for future adaptation in other chronic conditions, such as low back pain, for example. It adds to the growing body of work articulating competencies for training of European rheumatologists\textsuperscript{27}, in pain assessment and management for prelicensure health professionals\textsuperscript{19}, of nurses, physiotherapists and occupational therapists in rheumatology\textsuperscript{17} and in health promotion and prevention of non-communicable diseases for physiotherapists\textsuperscript{28}, all of which serve to increase capability of the healthcare workforce.

Contemporary models of OA care demand a workforce of adequate volume capable of delivering safe, effective, evidence-based care (i.e. high-value care)\textsuperscript{8}. This includes knowledge and skills to disinvest in ineffective (low-value) care. This is particularly important given the misconceptions held by people with OA that ultimately influence acceptance of first-line (non-surgical) evidence-based treatments such as exercise and weight loss\textsuperscript{11}. A skilled workforce is required to combat inappropriate beliefs about OA and empower individuals to engage with effective evidence-based interventions. A survey of general practitioners, physiotherapists and nurses in Australia, New Zealand and Canada showed that 37-88\% of clinicians and 68-85\% of students perceived that their knowledge and skills
were barriers to implementing OA care. Skills gaps were evident regarding assessment, measurement and monitoring; exercise and nutritional/overweight management; supporting positive behaviour change; tailoring care; managing case complexity; and translating knowledge to practice. Confidence in OA knowledge and skills was consistently greatest among physiotherapists and lowest in primary care nurses. These findings are supported by qualitative research showing rheumatologists, orthopedic surgeons, physiotherapists and general practitioners perceive a lack of healthcare provider expertise as a major barrier to providing non-pharmacological, non-surgical OA care. Suboptimal organization of care, including inadequate inter-professional communication and lack of clarity about roles and responsibilities of disciplines, is also a barrier. Recognising these problems, Australia’s National Strategic Action Plan for Arthritis has prioritised the need to define skill sets and competencies for arthritis management and care across clinical disciplines, care settings, and levels of professional practice, in order to identify educational needs across professions, including general practitioners, nurses, allied health professionals and pharmacists. This study addresses this important priority with relevance to nations beyond Australia.

Strengths of our study include our large Delphi Panel, with high retention. We assembled 173 experts and retained two-thirds of them through all three survey rounds. There is no agreement on ideal Delphi panel size. For example, a systematic review of 80 Delphi studies reported a median panel size of 17, with a minimum of 3 and a maximum of 418 members. Thus, our Delphi panel may be considered large. Importantly, over half of the Panel were active clinicians involved in care of people with OA. Another strength of our Panel was its diversity, comprising experts from 31 different countries, spanning 18 different health professions and including 26 consumer representatives. Panel breadth ensured the final framework was relevant to a range of health professions, spanning first contact primary care though to tertiary management, across the globe. However, our Panel did not include experts from South Asia or Sub-Saharan Africa or low-income or lower-middle-income economies.
which may be due to the requirement that Panellists be fluent in English. This limits the generalisability of our framework to culturally and linguistically diverse populations, and to low and middle-income countries where health worker cadres differ to those of high-income settings. Our framework is non-specific to the joint affected by OA. Although this increases the generalisability of the capability framework to the wider population of people with OA, it is possible that particular sub-groups of people with OA (e.g. those with hand OA) may benefit from additional core capabilities.

Our Panel comprised more physiotherapists and rheumatologists relative to other professions. Best practice management of OA may require clinical expertise from a range of health professions to accommodate individual patient needs, however people with OA experience substantial challenges in accessing treatment, including difficulty obtaining referrals and appointments, long waiting times and limited availability of primary and specialist care in some areas. The under-representation of some professions in our Panel may be partially related to our inclusion criteria, whereby clinicians were required to have managed at least one patient with OA per week over the past six months to qualify as an “expert”. It is likely that few pain physicians, psychologists and dieticians (for example) could meet such criteria, due to the difficulties experienced by patients with OA in accessing care from these professions. Nonetheless, the framework outlines a core set of capabilities to ensure that any health professional managing OA is able to implement evidence-based pathways, either directly themselves or as part of an integrated multi-professional team. The core capability framework is not intended to dictate what any clinician should be doing within their specialist scope of practice. Rather, it aims to set a common standard across all professionals involved in OA care, at any point on the care pathway, across the disease spectrum and across healthcare settings.

Implementation of the core capability framework into the OA health workforce requires a multi-faceted approach (including but not limited to endorsement by discipline-specific professional bodies,
integration into pre-licensure curricula and focused training for the current workforce) across stakeholders including higher education, public and private healthcare and professional and consumer advocacy sectors. The framework is intended as a reference guide to be applied according to local priorities and needs. For example, in higher education, the framework may be used to audit, develop and refine pre-licensure educational curricula for health professionals, as well as guide assessment of learning. Private and public health service managers may use the framework when recruiting and training staff to deliver OA services, by identifying and articulating the skills required of individuals, including those employed in advanced practice roles and/or working as part of a broader integrated multi-disciplinary OA management “program”. The framework may be used at the level of individual clinicians as a self-evaluation tool to identify areas for personal professional development. This core capability framework will be used by the International Osteoarthritis Management Programs ‘Joint Effort’ Initiative of OARSI\textsuperscript{18} to inform the future development of strategies for training and educational activities. Implementation of this framework will likely encounter similar barriers experienced by clinical guidelines\textsuperscript{36}, including clinician factors (e.g. knowledge of and attitudes towards the framework, self-efficacy, motivation and confidence to change behaviours), framework-related factors (e.g. complexity, accessibility and applicability) and external factors (e.g. organizational constraints, healthcare funding models).

Conclusions

To provide optimal care for all people with OA, health professionals require a diverse array of skills in person-centred approaches; assessment, investigation and diagnosis; management, interventions and prevention; and service and professional development. Implementation of the core capability framework will help individual health professionals and organisations identify training and development needs of the OA workforce, ultimately improving the quality of care and effectiveness of OA services and improving outcomes for people with OA.
Acknowledgements

We wish to acknowledge all members of the Delphi Panel for the time and effort to participate. We also wish to acknowledge Skills for Health (UK) for granting permission to adapt the “Musculoskeletal core capabilities framework for first point of contact practitioners”,¹⁶ the support of OARSI in establishing the OARSI Joint Effort Initiative and assisting with recruitment for this study, and the broader Initiative membership who stimulated this project.

Author contributions

All authors conceived the study, contributed to its design and interpretation of findings, and read and approved the manuscript. RSH and ME oversaw data analysis and drafted the manuscript. PKC coordinated the survey and data collection and read and approved the final manuscript.

Funding

This study was supported by funding from a National Health and Medical Research Council (NHMRC) Centre of Research Excellence (#1079078). RSH is supported by an National Health and Medical Research Council Senior Research Fellowship (#1154217). KB is supported by an NHMRC Principal Research Fellowship (#1058440). DJH is supported by an NHMRC Practitioner Fellowship (#1079777). STS is funded by the European Research Council under the European Union’s Horizon 2020 research and innovation program (grant agreement #801790), the Independent Research Fund Denmark (DFF-6110-00045) and the Lundbeck Foundation. KDA is supported by the Department of Veterans Affairs Health Service Research and Development Service (CIN-13-410, RCS 19-332) and the National Institute of Arthritis and Musculoskeletal and Skin Disorders (P60 AR064166). KSD is a National Institute for Health Research (NIHR) Senior Investigator.
Competing interest statement

DJH provides consulting advice to Pfizer, Lilly, Merck Serono and TLCBio. NB has received consultancy fees from Amgen, Eli Lilly, Grunenthal, GSK, the Global Alliance for Patient Access, Pfizer, and Sanofi Genzyme. STS is co-founder of Good Life with Osteoarthritis in Denmark (GLA:D®), a not-for-profit initiative hosted at University of Southern Denmark aimed at implementing clinical guidelines for osteoarthritis in clinical practice. LED is co-founder and Chief Medical Officer of Joint Academy, a company which provides digital first line treatment for patients with hip and knee OA. LED owns stocks in, is a board member of, and is since May 1st 2019, a paid part-time consultant of Joint Academy.

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consensus: a systematic review recommends methodologic criteria for reporting of Delphi


Table 1: Characteristics of the Delphi Panel.

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<th>Round 2 (n=131)</th>
<th>Round 3 (n=118)</th>
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<td><strong>Type of expert, n (%)</strong></td>
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<td>Researcher</td>
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<td>38 (29)</td>
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<td>Clinician researcher</td>
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<td>Consumer representative</td>
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<td><strong>Health profession, n (%)</strong></td>
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Country of residence, n (%)
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<tr>
<th>Country</th>
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<th>Round 2</th>
<th>Round 3</th>
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<tbody>
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† n=147 health professional members of Delphi panel in Round 1; n= 114 in Round 2; n= 104 in Round 3
Table 2. The core capability framework for health professionals involved in the clinical care of people with osteoarthritis.

<table>
<thead>
<tr>
<th>DOMAIN A: Person-centred approaches</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Capability 1. Communication</strong></td>
</tr>
<tr>
<td>Within their role and scope of professional practice in OA, the health professional can do the following:</td>
</tr>
<tr>
<td>a) Apply a critical self-awareness of their own values, beliefs, prejudices, assumptions and stereotypes especially related to pain and overweight/obesity to mitigate the impact of these in how they interact with others.</td>
</tr>
<tr>
<td>b) Listen to and communicate with others, recognising that both are an active, two-way process.</td>
</tr>
<tr>
<td>c) Modify conversations to optimise engagement and understanding, and convey information in ways that avoid jargon, negative or potentially threatening descriptors and assumptions.</td>
</tr>
<tr>
<td>d) Respond to individuals’ communication and information needs by adapting communication style (verbal and non-verbal) and supporting the use of accessible information as needed.</td>
</tr>
<tr>
<td>e) Engage with individuals and carers and respond appropriately to questions and concerns about their OA and its impact on their current situation and potentially in the future.</td>
</tr>
<tr>
<td>f) Direct individuals appropriately and effectively to sources of accurate and reliable information and support.</td>
</tr>
<tr>
<td>g) Communicate efficiently and effectively with colleagues to serve individuals’ best interests and to expedite and integrate care.</td>
</tr>
<tr>
<td>h) Respect and draw on colleagues’ knowledge and expertise within the inter-disciplinary team (where available) to serve individuals’ best interests.</td>
</tr>
<tr>
<td><strong>Capability 2. Person-centred care</strong></td>
</tr>
<tr>
<td>Within their role and scope of professional practice in OA, the health professional can do the following:</td>
</tr>
<tr>
<td>a) Recognise the expertise that individuals bring to managing their own care, demonstrating sensitivity to the individuals’ background, identity, language, culture, resources, values, needs, preferences and experiences of pain and functional limitations related to OA.</td>
</tr>
<tr>
<td>b) Explore the impact of persistent pain and disability on individuals' lives, including on their relationships, family and social roles, self-esteem and ability to participate in what they need and want to do (including paid and unpaid work).</td>
</tr>
<tr>
<td>c) Take account during care planning of the burden (financial and time) of treatment for individuals with OA, including regular appointments that may also be for the management of their other healthcare needs.</td>
</tr>
<tr>
<td>d) Progress care, recognising that meaningful positive outcomes (such as restoring and maintaining function and independence, and improving quality of life) may be achieved without a reduction in pain (whilst preferable).</td>
</tr>
<tr>
<td>e) Enable individuals to make decisions about their care by:</td>
</tr>
<tr>
<td>· empowering them to identify the priorities and outcomes that are important to them and supporting them to set goals</td>
</tr>
<tr>
<td>· explaining in non-technical language all available options (including doing nothing), and the evidence base underpinning the interventions</td>
</tr>
<tr>
<td>· exploring with them the risks, benefits and consequences of each available option and discussing what these mean in the context of their life and goals</td>
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<table>
<thead>
<tr>
<th>DOMAIN B: Assessment, Investigation &amp; Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Capability 3. History-taking</strong></td>
</tr>
<tr>
<td>Within their role and scope of professional practice in OA, the health professional can do the following:</td>
</tr>
<tr>
<td>a) Listen to individuals, ask questions and obtain appropriate additional information, with due sensitivity and consideration of what information needs to be sought to optimise the effectiveness and efficiency of the subjective examination.</td>
</tr>
<tr>
<td>b) Gather and synthesise information on the nature of the individual’s symptoms taking account of how these issues relate to the presenting and past history, their activities, any prior injuries, falls, frailty, comorbidities or other determinants of health and the characteristics of OA.</td>
</tr>
<tr>
<td>c) Assess patient preferences and values to determine pain-related goals and priorities.</td>
</tr>
<tr>
<td>d) Assess the impact of individuals' presenting symptoms on their quality of life, including the impairment of function, limitation of activities and restriction on participation, including work, social roles and relationships.</td>
</tr>
<tr>
<td>e) Gather information on the treatments the individual has previously undertaken to manage their OA symptoms, including whether these were</td>
</tr>
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</table>
Effective or ineffective.

f) Record the information gathered through taking individuals’ history concisely and accurately for clinical management, and in compliance with local protocols, legal and professional requirements.

**Capability 4. Physical assessment**
Within their role and scope of professional practice in OA, the health professional can do the following:

a) Appropriately obtain individuals’ consent to physical examination, respect and maintain their privacy, dignity and comfort, as far as practicable, and comply with infection prevention and control procedures.

b) Adapt their practice to meet the needs of different groups and individuals (including cultural and religious factors, and those with particular needs such as cognitive impairment or learning disabilities), working with carers, where appropriate.

c) Undertake observational and functional assessments of individuals, relevant to their OA and problem(s), to identify and characterise any impairments.

d) Record the information gathered through assessments concisely and accurately, for clinical management and in compliance with local protocols, legal and professional requirements.

**Capability 5. Investigations and diagnosis**
Within their role and scope of professional practice in OA, the health professional can do the following:

a) Understand that diagnosis of OA is based on clinical presentation (symptoms) rather than structural changes observed on imaging, and that routine use of imaging is not necessary for a clinical diagnosis of OA.

b) Assess the importance and meaning of presenting features from the clinical assessment, recognising the wide variation in how OA may manifest.

c) Identify potential serious pathology and make appropriate onwards referral.

d) Identify risk factors for symptomatic, functional and/or structural OA progression.

e) Recognise and act where an early referral and diagnosis may be particularly important for optimising individuals’ long-term outcomes.

f) Recognise how OA and its impact can interact with other comorbidities (eg mental health, cardiovascular disease, obesity), and identify when this is relevant.

g) Use accurate and non-threatening language in talking about the diagnosis of OA, including avoidance of phrases such as ‘wear and tear’, ‘grinding’, and ‘bone on bone’.

**Domain C: Management, Interventions & Prevention**

**Capability 6. Interventions and care planning**
Within their role and scope of professional practice in OA, the health professional can do the following:

a) Work in partnership with the individual to develop management plans that take account of individuals’ needs, goals, preferences, local service availability and relevant guidelines.

b) Recognize that different types of pain (nociceptive, neuropathic, nociplastic) may require different management approaches.

c) Identify pain treatment options that can be accessed by the individual in a comprehensive pain management plan.

d) Ensure the management plan considers all options that are appropriate for the care pathway, as well as the benefits and risks of available treatments, and the underlying evidence for each.

e) Advise on pharmacological and non-pharmacological aspects of pain management.

f) Review management plans regularly, including monitoring of the individual’s symptoms and effectiveness and tolerability of treatments, and adjust the plan of care as needed.

**Capability 7. Prevention and lifestyle interventions**
Within their role and scope of professional practice in OA, the health professional can do the following:

a) Advise on the effects of inactivity on OA, promote participation in physical activity (that is appropriate for and acceptable to the individual), and refer to relevant services where appropriate.

b) Advise on the effects of overweight and obesity on OA (including risk of OA development), promote weight management, and refer to relevant services where appropriate.

c) Use interactions to encourage changes in behaviour that can have a positive impact on the health and wellbeing of individuals, communities and populations.

d) Facilitate behaviour change using evidence-based approaches that support self-management.

**Capability 8. Self-management and behaviour change**
Within their role and scope of professional practice in OA, the health professional can do the following:

a) Explain how health promotion and self-management strategies are important to the management of pain.

b) Support individuals to self-manage and fulfil their role in their management plan, and where appropriate use principles of behaviour change theory and patient activation, to optimise their physical activity, mobility, fulfilment of personal goals and independence relevant to their OA.

c) Support individuals to explore the consequences of their actions and inactions on their health status and the fulfilment of their personal health goals (e.g. their engagement in exercise and their use of medication).

d) Support individuals to get the most from conversations about the management of their OA and its impacts (e.g. loss of independence) by supporting and encouraging them to ask questions about what is a priority or concern for them.

e) Identify risk factors for the persistence and impact of OA on pain and functional ability.

**Capability 9. Rehabilitative interventions**

Within their role and scope of professional practice in OA, the health professional can do the following:

a) Understand the role of common rehabilitative interventions, including pain education, therapeutic exercise, weight loss, manual therapy, cognitive behavioural approaches, aids and assistive devices, orthotics, braces and splints for managing OA, based on best available evidence.

b) Advise on the expected benefits, limitations and risks of different rehabilitative interventions used in managing OA, providing impartial information and advice on the advantages and disadvantages of specific interventions in the context of other management options.

c) Provide advice on managing pain and optimising function, including graded activity, navigation to self-management resources, and activity pacing.

d) Understand that some individuals such as those living with mental health issues, co-morbidities or frailty might need additional support during rehabilitation.

e) Work in partnership with individuals to explore suitability of rehabilitation interventions, including community-based exercise programmes where appropriate.

f) Refer individuals to specialist rehabilitation practitioners (e.g. physiotherapists, dieticians, occupational therapists, psychologists) where this is appropriate.

**Capability 10. Pharmacotherapy**

Within their role and scope of professional practice in OA, the health professional can do the following:

a) Understand the role of medications used in managing OA, including acetaminophen, non-steroidal anti-inflammatory drugs, corticosteroids and opioids, based on best available evidence.

b) Refer for advice about pharmacotherapy, when considered appropriate.

**Capability 11. Surgical interventions**

Within their role and scope of professional practice in OA, the health professional can do the following:

a) Understand the role of arthroscopy and arthroplasty in managing OA, based on best available evidence.

b) Advise on the expected benefits, limitations and risks of arthroscopy and arthroplasty in managing OA (where these are relevant to individuals’ care) and inform them impartially on the advantages and disadvantages in the context of other management options.

c) Refer for surgical opinion when an appropriate course of non-surgical management does not provide sufficient control of pain.

**Capability 12. Referrals and collaborative working**

When managing people with OA, the health professional can do the following:

a) Practise within their professional and personal scope of practice and access specialist advice or support for the individual or for themselves when appropriate.

b) Engage in effective inter-professional communication and collaboration with clear documentation to optimise the integrated management of the individual with OA.

c) Engage in effective inter-professional communication and collaboration to optimise care for OA within the population.

d) Know and be able to draw on the expertise of all members of the inter-disciplinary team and social support to meet individuals’ best interests and optimise the integration of their care.

e) Contribute effectively to inter-disciplinary team activity (including service delivery processes and learning and development).

f) Participate as an effective team member and understand the importance of effective team dynamics.

g) Make appropriate referrals using appropriate documentation to other health and care professionals and agencies when this is in individuals’ best interests.
### Domain D: Service & Professional Development

**Capability 13. Evidence-based practice and service development**

Within their role and scope of professional practice in OA, the health professional can do the following:

a) Critically apply relevant national clinical practice guidelines and other best available evidence on OA care and service delivery, identifying where local modifications may be required.

b) Monitor and evaluate their practice and its outcomes, including through data collection and analysis to assure and improve the quality of OA care, service delivery and address health inequalities.

c) Engage in the distinct activities of clinical audit, service evaluation and research (leading or contributing, as appropriate) adhering to the national and local requirements, and regulatory frameworks that relate to each.

d) Seek input from individuals and their carers to improve the person-centred design and quality of services.

e) Act appropriately when service deficiencies are identified (e.g. frequent long waiting times) that have the potential to affect the effective management of individuals’ OA care, including by taking or advocating for corrective action, where needed.

f) Plan, engage in and record learning and development relevant to their role and in fulfilment of professional, regulatory and employment requirements.

g) Engage in reflective practice and clinical supervision as an integral part of their professional development and to inform OA service development and quality improvement with reference to local needs.
# Appendix 1: Additional capabilities suggested by the Steering Group in the survey formative phase

<table>
<thead>
<tr>
<th>Overarching broad capability</th>
<th>Specific capability</th>
</tr>
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</table>
| # 3- History taking          | - Assess patient preferences and values to determine pain-related goals and priorities.  
                               | - Administer and score patient-reported outcome measures to assess pain, and the impact of OA on function, informed by an understanding of the measures’ respective validity, reliability, specificity and sensitivity in people with OA.  
                               | - Gather information on the treatments the individual has previously undertaken to manage their OA symptoms, including whether these were effective or ineffective.                                                                 |
| #4- Physical assessment      | - Apply outcome measures of physical performance that enable objective measurement of physical function, informed by an understanding of the measures’ respective validity, reliability, specificity and sensitivity in people with OA.                                                                 |
| #5- Investigations & diagnosis | - Understand that diagnosis of OA is based on clinical presentation (symptoms) rather than structural changes observed on imaging, and that routine use of imaging is not necessary for a clinical diagnosis of OA. |
| #6- interventions & care-planning | - Understand how contextual factors may influence the magnitude of treatment effects on OA symptoms, in order to optimize outcomes of management.  
                                   | - Identify pain treatment options that can be accessed by the individual in a comprehensive pain management plan.  
                                   | - Review management plans regularly, including monitoring of the individual’s symptoms and effectiveness and tolerability of treatments, and adjust the plan of care as needed.                                                                                           |
| #8- Self-management & behaviour change | - Explain the complex, multidimensional and individual-specific nature of pain to the individual.  
                                   | - Explain how health promotion and self-management strategies are important to the management of pain.  
                                   | - Help individuals manage the psycho-social implications of OA.                                                                                                                                                             |
| #9- Rehabilitative interventions | - Suggest the use of digital technology (e.g. apps and wearables) to deliver treatment and support adherence.                                                                                                            |
## Appendix 2: Capabilities excluded after Round 1

<table>
<thead>
<tr>
<th>Overarching broad capability</th>
<th>Specific capability excluded</th>
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</table>
| # 3- History taking          | - Administer and score patient-reported outcome measures to assess pain, and the impact of OA on function, informed by an understanding of the measures’ respective validity, reliability, specificity and sensitivity in people with OA.  
- Critically appraise complex, incomplete, ambiguous and conflicting information presented by individuals, distilling and synthesising key factors from the appraisal, and identifying those elements that may need to be pursued further. |
| #4- Physical assessment      | - Apply outcome measures of physical performance that enable objective measurement of physical function, informed by an understanding of the measures’ respective validity, reliability, specificity and sensitivity in people with OA. |
| #5- Investigations & diagnosis | - Instigate appropriate investigative tests to aid diagnosis and assessment. |
| #7- Prevention & lifestyle interventions | - Appraise the impact that a range of social, economic, and environmental factors can have on outcomes for individuals with OA, their carers and their circles of support.  
- Recognise and promote the importance of social networks and communities for individuals and their carers in living well with OA.  
- Advise individuals and relevant agencies on how OA-related work loss can be prevented through acting on effective risk assessments and providing appropriate working conditions, including adaptation to meet the individual’s needs. |
| #8- Self-management & behaviour change | - Advise on and refer individuals to psychological therapies and counselling services, in line with their needs, taking account of local service provision.  
- Advise individuals on the effects of their OA and their response to it, including the causal links between absence from work, prolonged absence, reduced return to work and subsequent loss of employment.  
- Advise and assist individuals to identify and use strategies to address work instability and to improve work retention.  
- Advise on sources of relevant local or national self-help guidance, information and support including coaching. |
| #9- Rehabilitative interventions | - Suggest the use of digital technology (e.g. apps and wearables) to deliver treatment and support adherence.  
- Make recommendations to employers regarding individuals’ fitness to work, including through seeking of appropriate occupational health advice. |
| #10- Pharmacotherapy         | - Identify sources of further information (e.g. websites or leaflets) and advice (e.g. pharmacists) and be able to signpost individuals as appropriate to complement the advice given.  
- Keep individuals’ response to medication under review, recognising differences in the balance of risks and benefits that may occur in the context of polypharmacy, multimorbidity, frailty and cognitive impairment. |
| #11- Injection therapy       | - Advise on the expected benefits, limitations and risks of injection therapy for managing OA and inform individuals impartially on its advantages and disadvantages in the context of other management options.  
- Work in partnership with individuals to explore the suitability of injection therapy, addressing and seeking to allay individuals’ fears, beliefs and concerns.  
- Refer for advice about local injections, when considered appropriate. |
| #13 Referrals & collaborative working | - Advise on local non-clinical services that individuals and their carers may benefit from accessing to help manage OA and its impact, including those relating to employment, voluntary activities, counselling services and leisure facilities. |
## Appendix 3: Capabilities excluded after Round 2

<table>
<thead>
<tr>
<th>Overarching broad capability</th>
<th>Specific capability excluded</th>
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</thead>
</table>
| #4- Physical assessment     | - Select and conduct an appropriate initial musculoskeletal screening assessment.  
|                             | - Apply a range of physical assessment techniques appropriately, systematically and effectively, informed by an understanding of techniques’ respective validity, reliability, specificity and sensitivity in people with OA and the implications of the limitations they may have within an assessment.  
|                             | - Assess multi-directional three-dimensional movement patterns |
| #5- Investigations & diagnosis | - Understand how OA may be a manifestation of injury not only from trauma but also abuse, recognising particular at-risk groups (such as older people with frailty and those with cognitive impairment) and take appropriate action when there are grounds for concern.  
|                             | - Understand and interpret test results and act appropriately, demonstrating an understanding of the indications and limitations of different tests to inform decision-making.  
|                             | - Interpret radiographs. |
| #6- Interventions & care planning | - Advise on the links between OA symptoms and reduced mental well-being and refer individuals to sources of mental health support when in their best interests.  
|                             | - Understand the importance of joint load management in a patient-specific context |
| #7- Prevention & lifestyle interventions | - Understand the role of different weight reduction strategies, based on best available evidence. |
| #8- Self-management & behaviour change | - Explain the complex, multidimensional and individual-specific nature of pain to the individual.  
|                             | - Recognise in their management approach that OA is often coupled with mental health issues, frailty, multimorbidity or other determinants of health.  
|                             | - Help individuals manage the psycho-social implications of OA.  
|                             | - Use an understanding of contemporary pain biology in order to deliver evidence-based and accurate pain education.  
|                             | - Use motivational interviewing principles to engage and empower people with OA to self-manage according to evidence-based guidelines.  
|                             | - Advise on social welfare and sources of financial support.  
|                             | - Understand the important link between the language used to describe OA and how it may adversely impact pain perception and self-management behaviours. |
| #9- Rehabilitative interventions | - Prescribe tailored (personalised) rehabilitation programmes to help individuals enhance, restore and maintain their mobility, function and independence.  
|                             | - Manufacture custom-made orthoses.  
|                             | - Prescribe and modify an appropriate exercise program (including dosage) according to individual needs, considering potential barriers to adherence.  
|                             | - Provide advice on optimising function, including goal-orientated functional movement strategies.  
|                             | - Provide advice on managing pain and optimising function, including strategies to reduce joint loading. |
| #11- Injection therapy    | - Appreciate that patients without an effusion will require guidance by imaging (Fluoroscopy or ultrasound) to ensure adequate placement of intra articular injections. |
| #14- Evidence-based practice & service development | - Work within the constraints of the health service, including the time available for consultations and the resources available. |
## Appendix 4: Capabilities excluded after Round 3

<table>
<thead>
<tr>
<th>Overarching broad capability</th>
<th>Specific capability excluded</th>
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</table>
| **#3- History taking**       | - Gather and synthesise information on the nature of individuals’ issues from various appropriate sources e.g. previous histories and investigations, considering how symptoms of OA may manifest as pain, stiffness, weakness, fatigue, limitation of activities, restriction of participation, sleep disturbance and mood disorders  
- Explore and appraise with individuals’ perceptions, ideas or beliefs about their pain and OA and whether these may act as a driver or form a barrier to improvement.  
- Appraise factors affecting individuals’ ability to participate in life situations, including work and social activities, and their perceptions of the relationship between their work and health.  
- Critically appraise information obtained, taking account of the potential for OA symptoms to be features of other health conditions, compounded by psychological and mental health factors, and affected by lifestyle factors (including overweight/obesity and physical inactivity). |
| **#4- Physical assessment**  | - Identify, analyse and interpret potentially significant information from the physical assessment (including any ambiguities). |
| **#6- Interventions & care planning** | - Understand how contextual factors may influence the magnitude of treatment effects on OA symptoms, in order to optimize outcomes of management.  
- Advise on and instigate a management plan for OA- instigating this may be through referral to digital management programs and/or to other practitioners with specific relevant capabilities.  
- Identify when first-line intervention has been successful and discharge the patient with appropriate advice. |
| **#7- Prevention & lifestyle interventions** | - Advise on the effects of joint injury on risk of OA, promote injury-prevention strategies, and refer to relevant services where required.  
- Advise individuals living with frailty and their carers how to adapt the physical environment to promote independence, orientation and safety (e.g. to reduce risk of falls).  
- Work collaboratively across agencies and boundaries to improve OA-related health outcomes and reduce health inequalities.  
- Develop a personalised physical activity plan to assist the individual to meet recommended levels of physical activity. |
| **#8- Self-management & behaviour change** | - Advise individuals on how limitations of activities and restriction of participation associated with OA can be reduced through adaptations to meet the individual’s needs. |
| **#10- Pharmacotherapy**     | - Use their understanding of the most common medications used in OA to advise individuals on the pharmacological management of their OA, the expected benefits, limitations and risks, and inform them impartially on the advantages and disadvantages in the context of other management options.  
- Address and seek to allay individuals’ fears, beliefs and concerns |
| **#11- Injection therapy**   | - Understand the role of intra-articular injections in managing OA (including corticosteroids, platelet rich plasma, hyaluronic acid and stem cells), based on best available evidence. |
| **#12- Surgical interventions** | - Work in partnership with individuals to explore suitability of surgical intervention, discussing individuals’ fears, beliefs and concerns, seeking guidance when appropriate. |
Figure 1: Overview of study phases and outcomes of e-Delphi survey

“Musculoskeletal core capabilities framework for first point of contact practitioners”

Domain A- 2 broad; 16 specific capabilities
Domain B- 3 broad; 25 specific capabilities
Domain C- 8 broad; 57 specific capabilities
Domain D- 1 broad; 7 specific capabilities

Steering Committee adaptation

Optional open text comments invited in Round 1 e-Delphi (n= 173 participants)

Comments against each specific capability provided (n=34 respondents)

Steering Committee review

Merged 6 specific capabilities into 3 (Domain A)
Amended wording of 10 specific capabilities (Domains A & D)

Final core capability framework:
Domain A- 2 broad; 13 specific capabilities
Domain B- 3 broad; 17 specific capabilities
Domain C- 7 broad; 33 specific capabilities
Domain D- 1 broad; 7 specific capabilities

Round 1 e-Delphi (n= 173 participants)

19 (21% of 92 considered) specific capabilities excluded:
Domain B- 4 excluded
Domain C- 15 excluded
17 new specific capabilities generated:
Domain B- 3 included
Domain C- 13 included
Domain D- 1 included

Round 2 e-Delphi (n= 131 participants, 76% Round 1)

23 (26 % of 90 considered) specific capabilities excluded:
Domain B- 6 excluded
Domain C- 16 excluded
Domain D- 1 excluded

Round 3 e-Delphi (n= 118 participants, 68% Round 1)

17 (25 % of 67 considered) specific capabilities excluded:
Domain B- 5 excluded
Figure 2: Infographics summarising the core capability framework for health professionals involved in the clinical care of people with osteoarthritis.