

## Capabilities, opportunities and motivations within Australian community pharmacy to deliver clinical standard-aligned care for knee osteoarthritis: A mixed-methods evaluation

Kim Watkins # †, Kim L. Bennell ‡, Helen Slater #, Rana S. Hinman ‡, Tin Fei Sim †, Ben Darlow §, Andrew J. McLachlan ¶, Jason Chua # ||, Andrew M. Briggs # \* <sup>1</sup>

# Curtin School of Allied Health, Curtin University, Perth, Australia

† Curtin Medical School, Curtin University, Perth, Australia

‡ Centre for Health, Exercise and Sports Medicine (CHESM), Department of Physiotherapy, University of Melbourne, Melbourne, Australia

§ Department of Primary Health Care and General Practice, University of Otago, Wellington, New Zealand

¶ Sydney Pharmacy School, University of Sydney, Sydney, Australia

|| Traumatic Brain Injury Network (TBIN), Auckland University of Technology, Auckland, New Zealand



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### SUMMARY

**Objective:** To evaluate the capabilities, opportunities, and motivations of community pharmacists and pharmacy assistants to deliver osteoarthritis (OA) care, aligned with the Australian Osteoarthritis of the Knee Clinical Care Standard.

**Method:** Quantitative data from pharmacists and pharmacy assistants working in Australian community pharmacies were collected via e-surveys. Behaviour-change theory-informed items measured pharmacists' capabilities, opportunities, and motivations to provide Standard-aligned care. Pharmacy assistants reflected on their perceived role in OA care through focus groups.

**Results:** 407 pharmacists and 148 pharmacy assistants responded. Most pharmacists (>80%) reported high motivations to engage in OA care, with >80% agreeing that five of the seven quality statements were within their scope of practice. Across quality statements, median feasibility to deliver Standard-aligned care (measured on 9-point numeric rating scale; 1 = not at all feasible; 9 = highly feasible) ranged from 6–7 within knowledge, 5–7 within workload, 6–7 within workflow, 8 within pharmacy layout/infrastructure, and 1–5 in absence of additional remuneration. More time-consuming care (e.g., self-management support, patient review) was rated less feasible. Adjusted linear regression models identified that perceived workload and workflow feasibility increased when more pharmacists were on duty ( $R^2$ : 0.02–0.11). Three themes (with sub-themes) emerged from pharmacy assistants' qualitative data (n = 13): 1) professional activities related to OA care; 2) capabilities and scope of practice; and 3) managing workflow and alleviating workload pressures.

**Conclusion:** While pharmacists self-reported high motivation and capabilities to deliver Standard-aligned OA care, implementation feasibility will likely depend on addressing workload, workflow, and, particularly, remuneration barriers. Role delineation and training for pharmacy assistants may support better OA care within community pharmacies.

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### Introduction

Initiatives to reduce unwanted care variation and increase delivery of high-value care are central to Australia's health system strengthening responses to osteoarthritis (OA) care.<sup>1–4</sup> These initiatives emphasise strengthening primary care to better identify people with OA and initiate high-value management strategies, particularly core recommended treatments for knee OA, such as education, exercise and weight management.<sup>5</sup> However, these

\* Correspondence to: Curtin School of Allied Health, Curtin University, GPO Box U1987, Perth, Western Australia 6845, Australia.

E-mail addresses: [kim.watkins@curtin.edu.au](mailto:kim.watkins@curtin.edu.au) (K. Watkins), [k.bennell@unimelb.edu.au](mailto:k.bennell@unimelb.edu.au) (K. Bennell), [H.Slater@curtin.edu.au](mailto:H.Slater@curtin.edu.au) (H. Slater), [ranash@unimelb.edu.au](mailto:ranash@unimelb.edu.au) (R. Hinman), [T.Sim@curtin.edu.au](mailto:T.Sim@curtin.edu.au) (T. Sim), [ben.darlow@otago.ac.nz](mailto:ben.darlow@otago.ac.nz) (B. Darlow), [andrew.mclachlan@sydney.edu.au](mailto:andrew.mclachlan@sydney.edu.au) (A. McLachlan), [jason.chua@aut.ac.nz](mailto:jason.chua@aut.ac.nz) (J. Chua), [A.Briggs@curtin.edu.au](mailto:A.Briggs@curtin.edu.au) (A. Briggs).

<sup>1</sup> <https://staffportal.curtin.edu.au/staff/profile/view/A.Briggs/>

treatments remain under-utilised<sup>6</sup> and challenging for clinicians to deliver.<sup>7,8</sup> Most reforms and research in primary care have focussed on building workforce capacity in general practitioners (GPs) and physiotherapists,<sup>9,10</sup> with less attention given to service models involving other health workers. Yet, consumers expect awareness and participation in OA care across all health professions,<sup>11</sup> and primary care workforce reforms highlight the importance of clinicians working to their full scope of practice.<sup>12</sup> Community pharmacists represent a workforce cadre well-suited to contribute to OA care in a way that aligns with consumers' preferences.<sup>13,14</sup>

Community pharmacies are highly accessible, with nearly 6000 locations nationwide and an average of 18 visits per Australian annually.<sup>15</sup> In urban areas of Australia, 97% of people have access to a community pharmacy within a 2.5 km radius, with 66% coverage in non-urban regions.<sup>15</sup> Community pharmacists play a growing role in managing chronic diseases,<sup>16–20</sup> including musculoskeletal conditions.<sup>13,21–25</sup> Despite being the primary source for non-prescription analgesics for people with knee OA in Australia (accounting for 75–80% of purchases), only 3.5% of individuals consult their pharmacist for OA-related knee pain management, and just 17% seek advice about non-prescription analgesics, reflecting a missed opportunity for pharmacist-delivered OA care.<sup>21</sup> While accumulating evidence points to the potential role of community pharmacists in delivering non-pharmacologic OA care,<sup>13,14,22,23,26,27</sup> evidence about what care is delivered remains unexplored.

Australian and New Zealand pharmacists have shown a strong interest and perceived capability in OA care delivery.<sup>13</sup> A New Zealand feasibility trial demonstrated that community pharmacists, with appropriate training and remuneration, could effectively screen customers for knee OA and provide a tailored education intervention.<sup>22</sup> While this approach offers promise, there are several potential barriers to a similar service model in the Australian context. Pharmacies face workforce shortages, rising service demands, and a rapidly expanding scope of practice.<sup>28</sup> Pharmacists may also lack the knowledge, skills or motivation for delivering OA care, with remuneration models often tied to dispensing rather than clinical services, limiting financial incentives for expanded roles.<sup>29</sup> These challenges underscore the need to assess the feasibility of integrating best-practice OA care in pharmacies, considering contemporary standards for OA care, workload constraints, and remuneration models. A recent study of Australian pharmacists highlighted the need for training, consideration of workflow and workload requirements to meet protocols, and reimbursement when approaching a new service model.<sup>30</sup> Further, there is limited research into the roles, responsibilities and capabilities of pharmacy assistants related to the provision of healthcare services. Although a critical workforce within community pharmacies,<sup>31</sup> it is unknown how pharmacy assistants perceive their role(s) in relation to care delivery to people with knee OA.

We aimed to evaluate the capabilities, opportunities, and motivations of a representative sample of the Australian community pharmacy workforce to contribute to knee OA care, as aligned with the Australian Osteoarthritis of the Knee Clinical Care Standard.<sup>1,2</sup> The specific objectives were to:

1. Measure community pharmacists' self-reported motivations to participate in knee OA care, their confidence in OA-related clinical skills, and barriers to contributing Standard-aligned knee OA care.
2. Assess community pharmacists' capabilities and opportunities to address five of the seven quality statements within the Standard, based on their existing workflow, workload, infrastructure, knowledge, and remuneration frameworks, and measure the proportion of feasibility explained by pharmacy busyness.
3. Measure pharmacy assistants' knowledge of OA and explore their perceptions of their roles, responsibilities, and capability to support OA care.

## Methods

### Design

A cross-sectional, convergent parallel mixed-methods design was used. Quantitative data were collected from pharmacists and pharmacy assistants via e-surveys. A qualitative arm adopting a phenomenological theoretic approach explored pharmacy assistants' experiences in OA care, as this workforce has not been studied in-depth, unlike pharmacists.<sup>13,14</sup> Convergence was explored through parallel analysis and interpretation of the quantitative and qualitative data collected from pharmacy assistants. Data were collected between 30 September 2023 and 1 August 2024. The research was approved by the Curtin University Human Research Ethics Committee (HRE2023-0410). All participants provided consent to participate. Reporting is consistent with the Good Reporting of a Mixed Methods Study (GRAMMS), Strengthening the Reporting of Observational Studies in Epidemiology (STROBE), Checklist for Reporting Results of Internet E-Surveys (CHERRIES) and Consolidated Criteria for Reporting Qualitative Research (COREQ-32) checklists. Public and patient involvement is reported against the Guidance for Reporting Involvement of Patients and the Public Version 2 (GRIPP2) short form checklist ([Supplementary File](#)).

### Sampling

A convenience sampling frame was used for the surveys. Pharmacists were eligible to participate if they were currently registered to practice and were practising as a pharmacist in an Australian community pharmacy for at least eight hours per week, either currently or within the past six months. Pharmacy assistants (including dispensary technicians, pharmacy students and other support roles) were eligible, irrespective of professional training history, if they were aged 16 years or over and currently employed in an Australian community pharmacy. From this group, purposive sampling was used to identify a subset to participate in focus groups, sampling for heterogeneity in Australian jurisdictions, pharmacy types, and years of experience in pharmacy assistant roles.

### Recruitment

A comprehensive, multimodal recruitment strategy was employed to maximise the reach of the research opportunity to pharmacists and pharmacy assistants. This strategy included a targeted social media campaign and engagement of key opinion leaders and prominent professional, industry and not-for-profit organisations (both state-based and national). Several of Australia's largest pharmacy franchise groups were engaged to directly promote the study to their employees. Further outreach was achieved through advertisements at a national pharmacy conference, articles in pharmacy trade magazines, and radio interviews. As a strategy to reach community pharmacies directly, we developed contact databases for pharmacies in each Australian jurisdiction through desktop internet searches and open access Pharmacy Board of Australia databases, enabling direct email communication. The study was also promoted to pharmacy assistants via pharmacists enrolled in the study, by providing these participants with recruitment flyers that they could disseminate to their pharmacy assistant colleagues.

### Data collection

Separate surveys were developed for pharmacists and pharmacy assistants, each deployed using Qualtrics™ (Provo, UT, USA) ([Supplementary File](#)). Both surveys were co-designed with industry partners, including eight pharmacists from various franchise groups

and two pharmacy assistants: one from a franchise group and one from an independent pharmacy. Pharmacists provided feedback on survey items via written feedback and a focus group discussion, followed by pilot testing of the instruments. Pharmacy assistants contributed through individual semi-structured interviews.

Survey components for pharmacists were anchored to the evidence-informed Capability, Opportunity and Motivation Behaviour change framework (COM-B) theoretic model of behaviour change,<sup>32</sup> which proposes three components to any behaviour (B), including: Capability (C), Opportunity (O) and Motivation (M). We co-designed items to measure these model constructs in relation to OA care using custom and

standard tools (Table 1).<sup>33</sup> Capability and opportunity to participate in OA care were specifically evaluated alongside pharmacist-specific behaviours aligned to five of the seven quality statements within the Osteoarthritis of the Knee Clinical Care Standard (first edition) (Table 1).<sup>1</sup> A revision to the Standard was published in August 2024,<sup>2</sup> after we concluded data collection. Although the revised (second edition) Standard presents a slightly altered structure of quality statements, the same conceptual components of care are described as in the first edition. The description of each quality statement was adapted to reflect pharmacists' roles. For each quality statement, we measured the feasibility (opportunity) of the care behaviour in relation to pharmacists' perceived

Construct	Pharmacists		Pharmacy assistants	
	Description	Tool/items	Description	Tool/items
Motivation	Motivation to participate in OA care was measured with custom items that explored desires, needs, beliefs and aspirations related to OA care in community pharmacy.	4 custom items measured on a 5-point Likert scale (1 = strongly disagree; 5 = strongly agree)	Not assessed	
Opportunity	Opportunity to deliver OA care against each quality statement contained in the Standard was evaluated across five feasibility domains, including current OA knowledge, workflow, workload, infrastructure (pharmacy layout) and remuneration structure (i.e. without an additional service fee). The quality statements within the Standard aligned with pharmacists' scope of practice included <sup>31</sup> : <ul style="list-style-type: none"> <li>– Quality statement 2 – Diagnosis;</li> <li>– Quality statement 3 – Education and self-management;</li> <li>– Quality statement 4 – Weight loss and exercise;</li> <li>– Quality statement 5 – Medicines to manage symptoms; and</li> <li>– Quality statement 6 – Patient review.</li> </ul>	4 custom items for each Standard measured on a 9-point NRS (1 = not at all feasible; 9 = highly feasible)	Not assessed	
Capability	Capability to deliver Standard-aligned OA care was assessed through self-reported confidence in clinical skills. The 16-item tool, originally developed for rheumatoid arthritis care, has sound measurement properties and has been subject to content validity assessment for use in OA care. <sup>33,34</sup>	16 items were measured on a 5-point Likert scale (1 = not at all confident; 5 = very confident) to derive a total score (range 16–80), with higher scores indicating greater self-rated confidence	Capability to deliver Standard-aligned OA care was assessed through self-reported confidence in OA knowledge and OA clinical skills; and Self-reported knowledge about OA	2 custom items measured on a 5-point Likert scale (1 = not at all confident; 5 = very confident) Knee Osteoarthritis Knowledge Scale (KOAKS). The KOAKS is a unidimensional instrument consisting of 11 items that measures knowledge about knee OA and its measurement properties have been established. <sup>35</sup> Scores range from 11–55, with higher scores indicating greater OA-related knowledge. <sup>35</sup>
Barriers to Standard-aligned care	Barriers to Standard-aligned OA care were measured with custom items across personal, patient, workplace and health system domains.	20 custom items measured on a 4-point Likert scale (1 = not at all applicable to me; 4 = highly applicable to me)	Not assessed	
Role of pharmacy assistants in OA care	Pharmacists' perceptions of the role of pharmacy assistants in contributing to OA care	7 custom items measured on a 5-point Likert scale (1 = strongly disagree; 5 = strongly agree)	Pharmacy assistants' perceptions of their role in contributing to OA care	5 custom items measured on a 5-point Likert scale (1 = strongly disagree; 5 = strongly agree)

<sup>a</sup> Quality statement description from the Standard:

*Quality statement 2 – Diagnosis:* A patient with knee pain and other symptoms suggestive of OA is diagnosed as having knee OA based on clinical assessment alone. X-rays are considered only if an alternative diagnosis is suspected (for example, insufficiency fracture, malignancy). Magnetic resonance imaging is considered only if there is suspicion of serious pathology not detected by X-ray.

*Quality statement 3 – Education and self-management:* A patient with knee OA receives education about their condition and treatments for it, and participates in the development of an individualised self-management plan that addresses both their physical and psychosocial health needs.

*Quality statement 4 – Weight loss and exercise:* A patient with knee OA is offered support to lose weight, if they are overweight or obese, and advice on exercise, tailored to their needs and preferences. The patient is encouraged to set weight and exercise goals, and is referred to services to help them achieve these, as required.

*Quality statement 5 – Medicines to manage symptoms:* A patient with knee OA is offered medicines to manage their symptoms according to the current version of Therapeutic Guidelines: Rheumatology (or concordant local guidelines). This includes consideration of the patient's clinical condition and their preferences.

*Quality statement 6 – Patient review:* A patient with knee OA receives planned clinical reviews at agreed intervals, and management of the condition is adjusted for any changing needs. If the patient has worsening symptoms with severe functional impairment that persists despite the best conservative management, they are referred for specialist assessment.

**Table 1**

OA knowledge, workflow, workload, infrastructure (pharmacy layout) and current remuneration (i.e. without an additional service fee). Barriers to the delivery of Standard-aligned care and pharmacists' perceptions about the role of pharmacy assistants in OA care were measured with custom items (Table I). Barriers items were aligned with domains of the Consolidated Framework for Implementation Research,<sup>29</sup> as used previously to assess barriers to delivery of high-value OA care among multidisciplinary clinicians.<sup>7</sup>

Pharmacy assistants responded to custom items and standard tools to measure their capabilities and perceptions about their role in OA care (Table I).<sup>35</sup> Pharmacy assistants who were sampled for focus group discussions participated in one of six online focus groups following best practice processes (Supplementary File).<sup>36</sup> A semi-structured interview schedule was developed by KW and refined with input from the research team. Led by KW, each session was recorded using Microsoft Teams® and verbatim transcripts were generated via Descript® software and shared with the participants for member checking. No corrections were requested.

### Data analysis

Quantitative data were analysed using descriptive statistics. Feasibility outcomes were expressed as medians (interquartile range) for each of the five feasibility domains for each quality statement. Aligned with standard approaches,<sup>37</sup> we transformed primary ordinal data from the 9-point numeric rating scale (NRS) into tertiles (1–3 = low feasibility; 4–6 = uncertain feasibility; 7–9 = high feasibility) for visual graphing interpretation. General linear models were used to estimate the proportion of variance in workload and workflow feasibility explained by predictor variables that characterise pharmacy busyness (number of pharmacists on duty; daily volume of prescriptions dispensed), by quality statement. Separate analyses were undertaken for workflow feasibility and workload feasibility. Relationships and linearity of associations were explored in univariate models and then in a combined multivariate model.<sup>38</sup> Data were analysed using IBM SPSS Statistics (Chicago, IL, USA).

Qualitative data were analysed through inductive thematic analysis, following Braun and Clarke's principles.<sup>39</sup> Initially, each transcript was read by KW to familiarise with the data. Subsequently, four transcripts were open-coded line-by-line using an inductive approach, resulting in a codebook of raw codes. A senior researcher (AMB) independently reviewed two transcripts against the codebook to verify that the codes accurately represented the data. The final two transcripts were coded using the same method, at which time no new codes emerged, signalling data redundancy. Following the open coding, raw codes were grouped into categories by KW. This iterative process involved going back and forth between the primary data, raw codes and emerging categories to ensure conceptual clarity and grounding in the primary data. AMB evaluated the category framework for face validity. The finalised categories informed the development of themes and subthemes. A reflexivity statement is included (Supplementary File).

## Results

### Quantitative outcomes

The pharmacist and pharmacy assistant surveys were accessed 686 and 197 times, respectively. Valid responses (inclusion criteria met, consent to participate provided, at least one data point provided) were recorded for 407 (59%) pharmacists and 148 (75%) pharmacy assistants. Demographic characteristics are summarised in Table II.

### Pharmacists

Pharmacists were sampled from all Australian jurisdictions, with most residing in metropolitan areas (68%) and working full-time

(62%) in a franchise business model (67%) located in shopping centres or shopping strips (62%). Most pharmacists were motivated to deliver OA care. Among respondents ( $n = 370$ ), the majority agreed or strongly agreed they held desire to contribute to knee OA care (85%), perceived need to contribute (78%), believed in the importance of contributing (93%), and were motivated to include knee OA care as part of routine pharmacy practice (81%). Pharmacists' mean (SD) confidence in their OA clinical skills was 49.8 (12.5;  $n = 303$ ) with individual item outcomes detailed in the Supplementary File. Most pharmacists agreed that delivering OA care consistent with the Standard's quality statements was within their professional scope of practice (80–97%; Table III).

*Feasibility to deliver Standard-aligned care.* Feasibility to deliver OA care, expressed as the median from the 9-point NRS ranged from 6–7 within current knowledge, 5–7 within current workload, 6–7 within current workflow, 8 within current pharmacy layout, and 1–5 in the absence of additional remuneration (Table III).

Approximately half of pharmacists identified Standard-aligned care as highly feasible for diagnosis, education, weight management, exercise advice and review (50–56%) based on their current OA knowledge. A greater proportion (64%) identified Standard-aligned care as highly feasible for medicines to manage symptoms, but a lower proportion (39%) for self-management support, based on current knowledge. Similarly, approximately half identified Standard-aligned care as highly feasible for diagnosis, exercise advice and medicines to manage symptoms (49–53%) based on workload, while for the other Standards, less than half of pharmacists identified care as being highly feasible, particularly self-management support (24%), based on workload. Considering workflow, Standard-aligned care was rated as highly feasible for diagnosis, education, exercise advice, and medicines to manage symptoms by more than half of respondents (54–64%), while high feasibility based on workload was less commonly identified for self-management support (34%), weight management (44%) and patient review (45%). Across all quality statements, most pharmacists (69–75%) rated care delivery as highly feasible based on store layout/infrastructure, while a minority (7–29%) rated care delivery as highly feasible without additional service fees. Overall, Standard-aligned care delivery was most feasible for medicines to manage symptoms and least feasible for those quality statements associated with longer time commitments (self-management support and patient review).

Outcomes of univariate regression model are summarised in the Supplementary File. Across the quality statements, multivariate models explained 2–12% of the variance in workload and workflow feasibility (adjusted  $R^2$ ; Table IV) to deliver OA care. Higher staff volume was associated with higher feasibility to deliver Standard-aligned care. Adjusting for daily prescription dispensing volume, feasibility to deliver Standard-aligned care increased by 0.3–1.2 points on the 9-point NRS with each category of increasing staff volume (categories defined in Table II). Conversely, higher prescription dispensing volume reduced the feasibility to deliver Standard-aligned care. Adjusting for staffing volume, feasibility to deliver Standard-aligned care decreased by 0.2–0.7 points on the 9-point NRS with each category of increasing daily prescription dispensing volume.

*Barriers to delivery of Standard-aligned care.* Barriers for pharmacists ( $n = 284$ ) emerged across all domains. Personal-level barriers were the least commonly identified as applicable or highly applicable (6–20%), while health system barriers were the most frequently identified (31–83%), strongly driven by the absence of financial support for care delivery (Figs. 1 and 2).

*Role of pharmacy assistants in OA care.* Among pharmacists ( $n = 280$ ), most agreed or strongly agreed that pharmacy assistants have a role in selling complementary therapies (68%), unrestricted non-prescription

Characteristic	Pharmacists	Pharmacy assistants	Pharmacy assistants (focus groups)
N	407	148	13
Gender, n (%) woman	240 (61.2), [n = 392]	122 (89.1), [n = 137]	12 (92.3)
Age, mean (SD) years	39.5 (11.6), [n = 392]	34.6 (12.3), [n = 137]	36.6 (14.7)
Area of residence <sup>a</sup>	[n = 407]	[n = 148]	
Geographic area, n (%)			
– Metropolitan area	275 (67.6)	93 (63.5)	7 (53.8)
– Regional centre	30 (7.4)	13 (8.8)	1 (7.7)
– Rural town (large, medium, small)	69 (16.9)	29 (19.6)	5 (38.5)
– Remote or very remote community	33 (8.1)	12 (8.1)	0 (0)
Socioeconomic decile based on SEIFA band (1–10), median (IQR); range	7 (5); 1–10	6 (6); 1–10	5 (7); 2–10
Primary location of work by Australian jurisdiction, n (%)	[n = 407]	[n = 148]	
– Australian Capital Territory (ACT)	10 (2.5)	6 (4.1)	0 (0)
– New South Wales (NSW)	64 (15.7)	36 (24.3)	4 (30.8)
– Victoria (VIC)	34 (8.4)	31 (20.9)	3 (23.1)
– Tasmania (TAS)	5 (1.2)	5 (3.4)	0 (0)
– South Australia (SA)	54 (13.3)	16 (10.8)	3 (23.1)
– Western Australia (WA)	183 (45.0)	45 (30.4)	2 (15.4)
– Northern Territory (NT)	1 (0.2)	0 (0)	0 (0)
– Queensland (QLD)	9 (2.1)	9 (6.1)	1 (7.1)
Professional experience in community pharmacy, n (%)	[n = 392]	[n = 134]	
– 0–5 years	103 (26.3)	71 (53.0)	5 (38.5)
– 6–10 years	66 (16.8)	24 (17.9)	2 (15.4)
– 11–15 years	83 (21.2)	12 (9.0)	2 (15.4)
– 16–20 years	42 (10.7)	12 (9.0)	2 (15.4)
– > 21 years	98 (25.0)	15 (11.2)	2 (15.4)
Primary role, n (%)	[n = 381]		
– Pharmacist proprietor	116 (30.4)		
– Pharmacist manager (store/staff)	81 (21.3)		
– Pharmacist in charge	55 (14.4)		
– Pharmacist employee	122 (32.0)		
– Locum pharmacist	4 (1.0)		
– Other	3 (0.8)		
Primary roles, n (%) <sup>b</sup>		[n = 134]	
– Dispensing technician/assistant		76 (56.7)	8 (61.5)
– Webster packing technician		47 (35.1)	3 (23.1)
– Retail pharmacy manager		42 (31.3)	7 (53.8)
– Retail sales assistant		66 (49.3)	3 (23.1)
– Purchasing officer		20 (14.9)	2 (15.4)
– Stock control manager		28 (20.9)	2 (15.4)
– Cosmetic/beauty consultant		10 (7.5)	1 (7.7)
– Vitamin and health food consultant		9 (6.7)	3 (23.1)
– Cashier		49 (36.6)	3 (23.1)
– Other		2 (1.5)	0 (0)
Work hours per week, n (%)	[n = 392]	[n = 134]	
– ≤12 h	25 (6.4)	9 (6.7)	1 (7.7)
– 13–24 h	41 (10.5)	15 (11.2)	0 (0)
– 25–36 h	85 (21.7)	49 (36.6)	5 (38.5)
– 37–48 h	211 (53.8)	56 (42.5)	6 (46.2)
– > 49	30 (7.7)	4 (3.0)	1 (7.7)
Professional training history, n (%) <sup>b</sup>		[n = 134]	
– Certificate-level training		83 (61.9)	11 (84.6)
– Other pharmacy assistant training program		50 (37.3)	4 (30.8)
– Employer training course		59 (44.0)	4 (30.8)
– Industry (drug company) training course		61 (45.5)	4 (30.8)
– Self-directed learning		38 (28.4)	3 (23.1)
– On the job training		87 (64.9)	6 (46.2)
– Pharmacist trainee (enrolled in university course)		5 (3.7)	1 (7.7)
– Non-clinical training (retail or management)		3 (2.2)	1 (7.7)
– Other		1 (0.7)	0 (0)
– Training in OA care, specifically		9 (6.7)	2 (15.4)
Pharmacy business model, n (%)	[n = 381]	[n = 131]	
– Discount/warehouse	23 (6.0)	16 (12.2)	3 (23.1)
– Franchise (non-discount model)	258 (67.7)	64 (48.9)	7 (53.8)
– Independent	93 (24.4)	51 (38.9)	3 (23.1)
– Other	7 (2.6)		
Pharmacy staffing, n (%)	[n = 381]		
Usual number of pharmacists working during weekday business hours			
– 1 pharmacist only	95 (24.9)		
– 1–2 pharmacists	154 (40.4)		
– 2–3 pharmacists	99 (26.0)		
– > 3 pharmacists	33 (8.7)		
Usual number of non-pharmacists working during weekday business hours, n (%)			
– No non-pharmacists	9 (2.4)		
– 1–2 non-pharmacists	131 (34.4)		
– 3–4 non-pharmacists	142 (37.3)		
– > 5 non-pharmacists	99 (26.0)		

(continued on next page)

Table II (continued)

Characteristic	Pharmacists	Pharmacy assistants	Pharmacy assistants (focus groups)
Average daily prescription dispensing, n (%)	[n = 381]		
– 0–100	63 (16.5)		
– 101–200	114 (29.9)		
– 201–300	101 (26.5)		
– 301–400	66 (17.3)		
– > 400	36 (9.4)		
– Unsure	1 (0.3)		

Sample size [n] is provided for each variable.

IQR, Interquartile Range; IRSAD, Index of Relative Socio-Economic Advantage and Disadvantage; SD, standard deviation; SEIFA, Socio-Economic Indexes for Areas.

<sup>a</sup> Geographic area defined according to the Australian Modified Monash Model, which defines whether a location is metropolitan, rural, remote or very remote according to 7 classification bands, including 1 (metropolitan), 2 (regional centres), 3–5 (large, medium and small rural towns), and 6–7 (remote and very remote communities). Socioeconomic band based on the SEIFA, Australia, a product developed by the Australian Bureau of Statistics that ranks areas in Australia according to relative socio-economic advantage and disadvantage. The IRSAD summarises information about the economic and social conditions of people and households within an area. This index includes both relative advantage and disadvantage measures. Expressed in deciles (1–10), a low score indicates relatively greater disadvantage and a lack of advantage in general, while a high score indicates a relative lack of disadvantage and greater advantage in general.

<sup>b</sup> Respondents could select more than one role, hence total > sample size and 100%.

Table II

Osteoarthritis and Cartilage

Demographic characteristics of pharmacists, pharmacy assistants and the subset of pharmacy assistants who participated in focus groups.

products (83%) and restricted non-prescription products (55%). Fewer perceived that pharmacy assistants' role should extend to "handing out" prescriptions and providing basic medicines information (40%). Many felt that patients seeking pharmacologic products or OA management advice should be routinely referred to the pharmacist (63% and 69%, respectively) (Fig. 3).

#### Pharmacy assistants

Among respondents (n = 131), the largest proportion was 'somewhat confident' in their OA knowledge (n = 53, 41%) and skills (n = 53, 41%). Across the remainder of the sample, a relatively equal distribution reported lower confidence ('not at all or not very confident') and higher confidence ('confident or very confident') in their knowledge (n = 42 (32%) and n = 36 (28%), respectively) and skills (n = 39 (30%) and n = 39 (30%), respectively). Among the respondents (n = 130), the mean (SD) Knee Osteoarthritis Knowledge Scale score was 36.1 (4.6). 42% of pharmacy assistants (n = 128) agreed or strongly agreed that all queries about knee OA should be referred to the pharmacist. The majority agreed or strongly agreed that pharmacy assistants have a role in recommending or selling different products for knee OA (77–94%) and supply prescription medications dispensed by the pharmacist (60%; Fig. 3).

#### Qualitative findings

Six focus groups consisting of n = 13 pharmacy assistants (Table II) were conducted (duration: 22–79 min). Thematic analysis derived three themes, supported by sub-themes: 1) professional activities related to OA care; 2) capabilities and scope of practice; and 3) managing workflow and alleviating workload pressures in community pharmacy (Table V). These data suggest that pharmacy assistants engage in OA care with patients based on their comfort level, often relying on experiential knowledge and confidence. Many identified gaps in their OA-specific knowledge that had not been addressed in their prior certificate training. Rather than having defined roles, their involvement in OA care is shaped by personal familiarity with OA, either through their own health experiences or those of family and friends, and informal learning, such as listening to pharmacists and receiving feedback from patients. Pharmacy assistants also play a role in managing workflows for the pharmacist. They expressed a strong desire for more formal training in OA care and defined career pathways to enhance their ability to support OA

care, pharmacists and patients. These qualitative findings converged with the survey results, with both highlighting knowledge gaps, role ambiguity, and operational challenges experienced by pharmacy assistants.

#### Discussion

This study highlights the potential for community pharmacies to contribute meaningfully to the implementation of Australia's Osteoarthritis of the Knee Clinical Care Standard.<sup>1,2</sup> Our data suggest that most community pharmacists are motivated and self-report capability to deliver Standard-aligned care for knee OA, consistent with findings from the UK.<sup>14</sup> However, the feasibility of delivering this care in a 'real world' context varies considerably across quality statements and across pharmacies. This variable feasibility is largely due to perceived systemic barriers related to workload, workflow, and, in particular, remuneration structures. Addressing these systemic barriers could increase the opportunity for community pharmacies to sustainably implement Standard-aligned OA care. Our data indicate pharmacy assistants could potentially support pharmacists to mitigate some systemic barriers to Standard-aligned OA care, but further development of their capability and role delineation is required.

Pharmacist's strong *motivation* to participate in OA care reflects a broader willingness to embrace expanded clinical roles, consistent with international evidence and Australian primary care reforms.<sup>12–14</sup> These roles include activities beyond traditional dispensing, such as patient education, self-management support, and chronic disease management,<sup>41</sup> which are central components of OA care. Over 80% of pharmacists agreed that the quality statements aligned with their professional scope of practice, reinforcing their readiness to contribute. This motivation, combined with evidence of pharmacists' involvement in related clinical areas such as chronic pain care,<sup>42,43</sup> highlights their strong potential to support the implementation of the Standard within Australia's primary care reforms.<sup>12</sup>

Self-reported *capabilities*, including confidence in clinical skills and knowledge across each quality statement, suggest that Standard-aligned care is feasible for pharmacists. As expected, the mean score for confidence in clinical skills was lower than that of physiotherapists and GPs,<sup>33,34</sup> yet targeted education in OA care could address these deficits,<sup>34</sup> building on established core

Quality statements within the Standard described in relation to a pharmacist’s behaviour (description and approx. time commitment required)	Perceived as within a pharmacist’s scope of practice, n (%)	Feasibility domains: median (IQR) from 9-point NRS and proportions by tertile				
		Within current OA knowledge	Within current workload	Within current workflow	Within current pharmacy layout (infrastructure)	Without additional service fee
<p><b>Diagnosis of knee OA.</b> A pharmacist can assess a person presenting with knee pain using a screening tool that can accurately diagnose OA in people aged over 45 years. They can refer patients to their GP or other relevant health professionals to discuss the screening test results. Estimated time commitment: 5 min.</p>	yes: 331 (93.0) unsure: 13 (3.7) no: 12 (3.4)	7 (3) 	6 (3) 	7 (2) 	8 (3) 	4 (3) 
<p><b>Patient education.</b> A pharmacist can offer general evidence-based verbal and/or written information to a person with knee OA to enhance their understanding of the condition and its management. They can provide this information in a format the person can understand and refer to other professionals who can provide in-depth and tailored education. Estimated time commitment: 5-10 min.</p>	yes: 332 (96.5) unsure: 6 (1.7) no: 6 (1.7)	7 (3) 	6 (3) 	7 (2) 	8 (3) 	4 (4) 
<p><b>Patient self-management.</b> A pharmacist can have a consultation with a person with OA and develop a documented, tailored, self-management plan (i.e., outline what the person with OA can do themselves to manage their condition). The plan would be derived from assessments of the person’s knowledge, physical and psychosocial needs and include shared decision-making and agreed management goals. The consultation would be revisited to provide ongoing monitoring and any necessary adjustments, based on progress. Appropriate referrals to other health care professionals or services would be suggested to optimise self-management strategies. Estimated time commitment: 30 min x 2 occasions.</p>	yes: 270 (80.1) unsure: 28 (8.3) no: 39 (11.6)	6 (3) 	5 (4) 	6 (4) 	8 (3) 	1 (3) 
<p><b>Weight management.</b> A pharmacist can measure a person’s weight/BMI, encourage them to set achievable weight loss goals if they are overweight, and monitor their progress. They can support a person with OA by providing education about appropriate ways to approach weight loss and optimise nutrition and offer referrals other health professionals who can manage weight loss interventions, where appropriate. Estimated time commitment: 5-15 min.</p>	yes: 301 (90.4) unsure: 15 (4.5) no: 17 (5.1)	6 (3) 	6 (3) 	6 (3) 	8 (3) 	3 (4) 

(continued on next page)

Table III (continued)

<p><b>Exercise.</b> A pharmacist can explain the role of exercise in knee OA care. They can encourage participation in exercise based on the person's needs and preferences and refer to a health profession skilled in exercise prescription for further support. Estimated time commitment: 5 min.</p>	<p>yes: 300 (91.5)  unsure: 14 (4.3)  no: 14 (4.3)</p>	<p>7 (2)</p> 	<p>7 (3)</p> 	<p>7 (2)</p> 	<p>8 (3)</p> 	<p>5 (4)</p> 
<p><b>Medicines to manage symptoms.</b> A pharmacist can recommend and supply medicines including oral and topical analgesics and NSAIDs in accordance with clinical guidelines. This includes assessing a person's risk-benefit profile by considering factors such as the presence of comorbid conditions, concomitant medications, and potential drug interactions. They can counsel people on the appropriate use of medicines and provide information about doses, treatment expectations and potential side effects. For people who commence a trial of medication, a pharmacist can provide monitoring and suggest appropriate adjustments. They can refer people with unmanaged pain to other health professionals for care. Estimated time commitment: 5-15 min.</p>	<p>yes: 310 (96.0)  unsure: 6 (1.9)  no: 7 (2.2)</p>	<p>7 (2)</p> 	<p>7 (3)</p> 	<p>7 (3)</p> 	<p>8 (2)</p> 	<p>5 (5)</p> 
<p><b>Patient review.</b> A pharmacist can arrange planned check-ups at pre-determined intervals to monitor a person's symptoms and well-being. This would include revisiting the patient's medical history, evaluating their psychosocial wellbeing, re-evaluating their symptoms and response to any treatments, and a thorough review of medications, including the use of complementary medicines. The patient's goals would be discussed and adjusted as required. For people experiencing ongoing impacts related to OA, referral to other health professionals would be provided. Estimated time commitment: 15-20 min.</p>	<p>yes: 271 (86.3)  unsure: 21 (6.7)  no: 22 (7.0)</p>	<p>7 (3)</p> 	<p>6 (3)</p> 	<p>6 (4)</p> 	<p>8 (3)</p> 	<p>3 (4)</p> 

Feasibility was measured on a 9-point NRS for each of the five feasibility domains for each quality statement. Estimates are expressed as the median (IQR) for each feasibility domain and proportions by tertile shown in donut plots (low feasibility tertile (NRS 1–3) = red; uncertain feasibility tertile (NRS 4–6) = amber; high feasibility tertile (NRS 7–9) = green) for pharmacists who indicated 'yes' or 'unsure' that the quality statement fell within perceived scope of practice. BMI, Body Mass Index; IQR, Interquartile Range; NSAIDs, Nonsteroidal Anti-Inflammatory Drugs.

Table III

Feasibility of pharmacists contributing to the Australian Clinical Care Standard for Knee Osteoarthritis.

capabilities for OA care.<sup>44</sup> Notably, while pharmacists reported the highest confidence in medicines to manage symptoms, their moderate confidence in other aspects of OA care highlights opportunities for capability development, particularly in supporting self-care, where pre-licensure training curricula are limited in scope. In this context, the [Australian Arthritis Training, Learning and Upskilling \(ATLAS\)](#) program, a trans-professional training program in arthritis

care that targets core competencies for OA care, presents an opportunity to further enhance pharmacists' capabilities.

While targets and mechanisms exist to enhance pharmacists' capabilities in OA care, our data strongly signal that external factors pose the greatest threat to pharmacists' *opportunity* to deliver Standard-aligned OA care. Consistent with principles of implementation science,<sup>29</sup> addressing these systemic barriers is critical

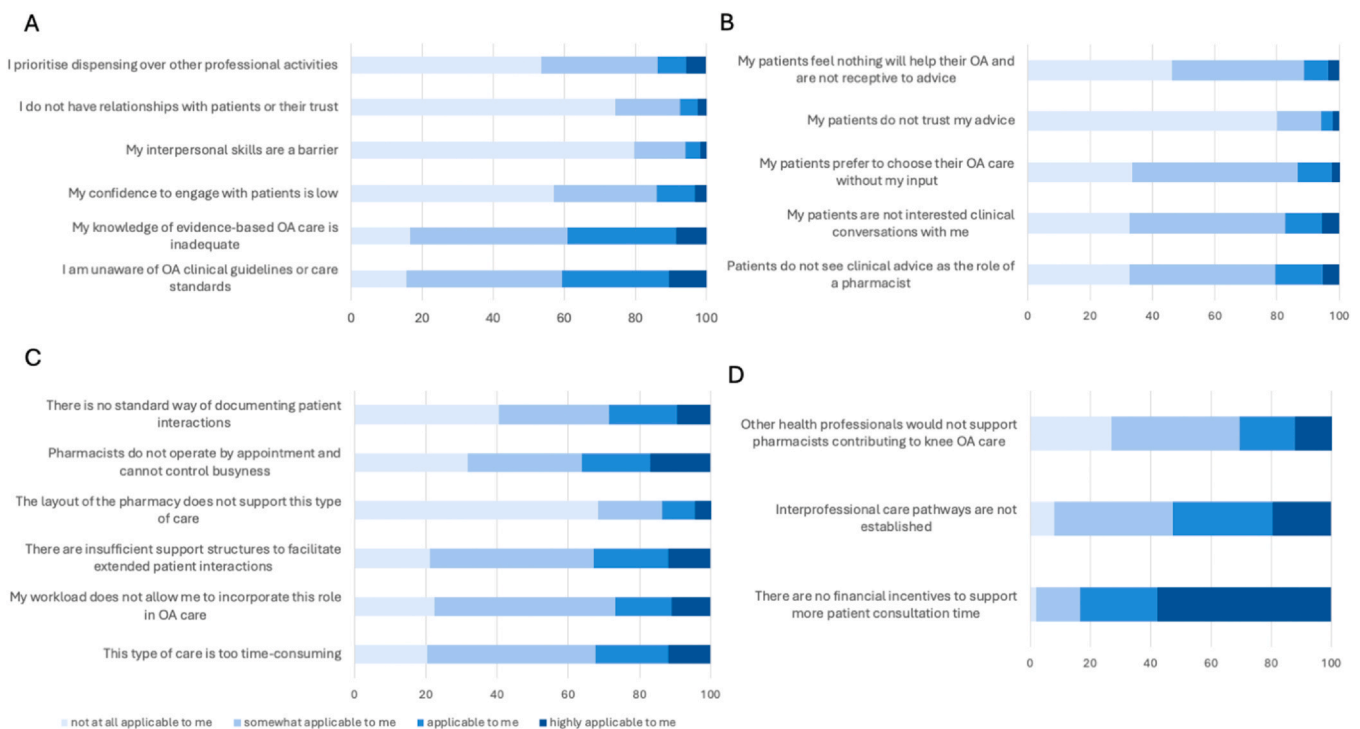
Quality statements contained in the Standard	Independent variables	Workload feasibility		Workflow feasibility	
		Regression coefficient (95% CI)	Model fit (adjusted R <sup>2</sup> )	Regression coefficient (95% CI)	Model fit (adjusted R <sup>2</sup> )
Diagnosis of knee OA	Prescription dispensing volume	-0.48 (-0.69, -0.27)	0.06	-0.28 (-0.48, -0.09)	0.02
	Number of pharmacists	0.49 (0.17, 0.81)		0.35 (0.05, 0.64)	
Patient education	Prescription dispensing volume	-0.50 (-0.71, -0.28)	0.06	-0.35 (-0.55, -0.15)	0.04
	Number of pharmacists	0.70 (0.38, 1.03)		0.59 (0.29, 0.90)	
Patient self-management	Prescription dispensing volume	-0.70 (-0.95, -0.45)	0.11	-0.65 (-0.90, -0.39)	0.12
	Number of pharmacists	1.11 (0.72, 1.49)		1.23 (0.84, 1.63)	
Weight management	Prescription dispensing volume	-0.47 (-0.69, -0.24)	0.08	-0.48 (-0.70, -0.26)	0.07
	Number of pharmacists	0.90 (0.56, 1.25)		0.83 (0.49, 1.16)	
Exercise	Prescription dispensing volume	-0.39 (-0.60, -0.18)	0.05	-0.26 (-0.46, -0.07)	0.03
	Number of pharmacists	0.60 (0.28, 0.92)		0.47 (0.17, 0.76)	
Medicines to manage symptoms	Prescription dispensing volume	-0.32 (-0.56, -0.09)	0.02	-0.23 (-0.44, -0.01)	0.02
	Number of pharmacists	0.49 (0.14, 0.84)		0.34 (0.02, 0.67)	
Patient review	Prescription dispensing volume	-0.54 (-0.79, -0.29)	0.09	-0.39 (-0.64, -0.14)	0.07
	Number of pharmacists	1.03 (0.66, 1.40)		0.90 (0.52, 1.27)	

CI, confidence interval.

**Table IV**

Osteoarthritis and Cartilage

Multivariate general linear model outcomes for independent variables of daily dispensing volume and pharmacy staffing volume associated with workload and workflow feasibility, by quality statement.



**Fig. 1**

Osteoarthritis and Cartilage

Percentages of pharmacist respondents ( $n = 284$ ) by level of applicability for barriers related to the delivery of Standard-aligned care for OA. Shading gradients refer to barriers at different levels of self-reported applicability, from 'not applicable' (light blue) to 'highly applicable' (navy). Items are organised by domain: personal-level barriers (A); patient-level barriers (B); workplace-level barriers (C); and health system-level barriers (D).

to the success and sustainability of novel service models. Pharmacists generally viewed their existing pharmacy infrastructure as adequate for care delivery. However, workload, inefficient workflows, and lack of remuneration for specific clinical services reduced

their opportunity to provide time-intensive Standard-aligned care, such as self-management support and patient review. These services are highly valued by people with OA,<sup>45,46</sup> but often compete with revenue-generating activities, creating a disconnect that limits

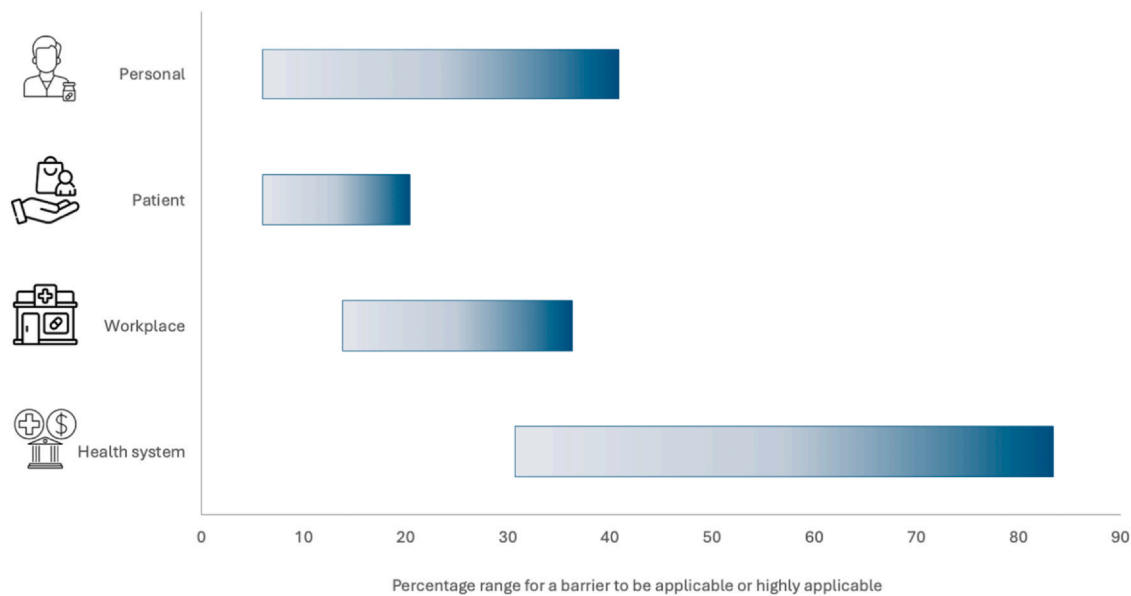


Fig. 2

Osteoarthritis and Cartilage

Barriers perceived by pharmacists ( $n = 284$ ) as ‘applicable’ or ‘highly applicable’ to providing OA care, by domain (personal, patient, workplace, health system). Range bars reflect the proportion of pharmacists who identified a barrier item within a domain (refer to Fig. 1) as applicable or highly applicable. Icons provided by the Noun Project under a Creative Commons Attribution License (CC BY 3.0) (<https://thenounproject.com/legal/terms-of-use/#icon-licenses>). Icons produced by Muhammad Ikraam (personal), Naba A’la (patient), Lokaasset Studio (workplace), and Bold Yellow (health systems) from Noun Project.

pharmacists’ opportunity to provide care, leaving patients without the support they value most. Pharmacy assistants echoed these challenges, noting that knowledge and skills gaps in OA care hindered their capability to support service delivery.

Remuneration was the most significant barrier that limited the opportunity to provide Standard-aligned OA care. Most pharmacists reported that delivering such care, particularly time-intensive services, was not feasible without additional payments. The absence of fee-for-service payment models discourages pharmacies from prioritising these services, as dispensing remains the primary source of revenue. Similar challenges have been reported by pharmacists in the UK,<sup>14</sup> and other health professions involved in OA care, where delivering high-value services is neither financially viable nor incentivised.<sup>7</sup> Yet, evidence suggests that delivery of core OA treatments could yield substantial cost savings in national health expenditure.<sup>47</sup> Without reforms to remuneration structures, integrating OA care into routine pharmacy practice is unlikely to be scalable or sustainable. Investing in the primary care workforce to improve OA care will require funders to determine where the maximal health return on investment and potential savings can be achieved. Indeed, there is potential within pharmacy to act as an entry point for quality OA care, as demonstrated in Canada.<sup>23,24</sup>

Pharmacies with fewer pharmacists or higher prescription dispensing volumes faced greater workload and workflow feasibility limitations in delivering Standard-aligned care. However, these factors accounted for only a small proportion of the variance in feasibility. This suggests that additional factors beyond staffing levels and dispensing volumes may need to be explored with pharmacists. Approaches such as qualitative research or time and motion studies could provide deeper insights into the enablers and constraints of workload and workflow feasibility, helping to

distinguish ‘high feasibility’ from ‘low feasibility’ environments to optimise novel service models. Pharmacy assistants who participated in focus groups echoed these findings, describing how operational realities, such as the workload burden on sole pharmacists, often made them unavailable for patient consultations. This misalignment between the growing demands for OA care and the dispensing-focused workflows entrenched in community pharmacies signals a barrier to the scalability of Standard-aligned OA care in community pharmacy.

As the first point of contact for many patients, pharmacy assistants play a vital role in managing workflows and supporting pharmacists. However, their lack of mandatory qualifications and formal disease-specific training often leaves them reliant on inconsistent, informally acquired knowledge and skills,<sup>31</sup> which can compromise the consistency and safety of patient care. This also increases the burden on pharmacists, who must fill knowledge gaps and provide clinical oversight as part of their legal responsibilities. Evidence from a pharmacy-delivered asthma care,<sup>48</sup> demonstrates that the absence of structured training programs limits pharmacy assistants’ ability to provide consistent, high-quality care. Encouragingly, pharmacy assistants expressed motivation to adopt more defined roles and participate in training, highlighting untapped potential to improve OA care delivery and ease pharmacists’ workload. Structured training programs in OA care could equip pharmacy assistants with the competencies needed to effectively triage patients and refer them to pharmacists, supporting Standard-aligned care. This, in turn, could enhance the feasibility of activities such as self-management support and patient review. Any expanded roles for pharmacy assistants must include safeguards to ensure patient needs are managed appropriately and to allow pharmacy assistants to operate confidently within their scope, while contributing to comprehensive care.

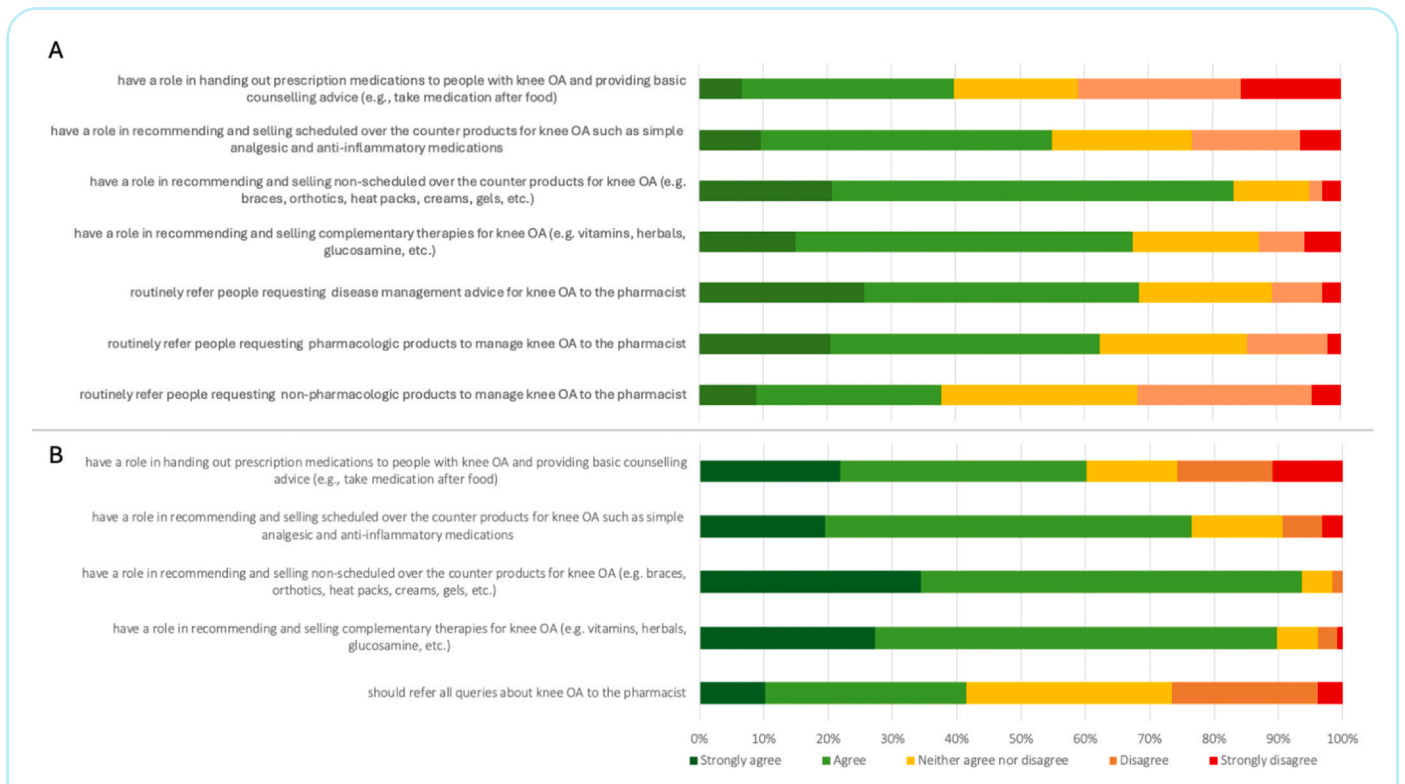


Fig. 3

Pharmacists' (n = 280) (A) and pharmacy assistants' (n = 128) (B) level of agreement (5-point nominal response scale) with statements related to potential professional role dimensions of pharmacy assistants in OA care. Each item is framed as "Pharmacy assistants...". The terminology used in the survey reflects Australian medicine classifications, where "scheduled medicines" refer to both S2 (Pharmacy Medicine) and S3 (Pharmacist Only Medicine), collectively categorised as restricted non-prescription medications. "OTC medicines" encompass both scheduled (S2 and S3) and unscheduled (unrestricted) non-prescription medications. For ease in the manuscript, these are referred to as "restricted non-prescription medications" and "unrestricted non-prescription medications", respectively. The term "prescription medications" remains consistent across both contexts. The term complementary therapies refers to complementary and alternative medicines. In this context, complementary therapies commonly sold in Australian community pharmacies for OA symptom relief include glucosamine, chondroitin, turmeric, and fish oil. According to the Royal Australian College of General Practitioners Guideline for the management of knee and hip osteoarthritis,<sup>40</sup> evidence supporting these therapies is mixed, and their use is not consistently recommended.

To our knowledge, this is the largest study that has evaluated the potential role of community pharmacy in OA care aligned to a national Standard and anchored to a behaviour change model, incorporating both pharmacists and pharmacy assistants. Nonetheless, the sample is modest relative to the national community pharmacy workforce volume that includes some 28,297 pharmacists and 35,174 pharmacy assistants (2021 Census data), distributed across 5935 community pharmacies,<sup>49</sup> yet considerably larger than a recent survey conducted in the UK involving 33 pharmacists.<sup>14</sup> Our sample included participants from all Australian jurisdictions, representing diverse socioeconomic strata, areas of residence, and community pharmacy operational characteristics, supporting some transferability of the findings. Although our sampling frame targeted pharmacies in each Australian jurisdiction to approximate a nationally representative sample, the convenience-based approach and multimodal recruitment strategy precluded calculation of a response rate, as we did not sample a pre-defined cohort, potentially introducing selection bias. We acknowledge this may have introduced responder bias, with more motivated pharmacists likely to participate, although our data

demonstrate variability. Responder bias is also potentially introduced from self-reported data collection (e.g., participants may have overestimated their capabilities in OA care), and observed attrition in sample size across survey items owing to some participants prematurely discontinuing the survey.

Future research should explore scalable solutions to overcome the systemic barriers to community pharmacy-based Standard-aligned OA care. Key areas include evaluating strategies to train and define pharmacy assistant roles, establishing a regulatory framework for their scope of practice, and measuring health-related return on investment through implementing fee-for-service remuneration structures. Additionally, research should incorporate the perspectives of pharmacists through targeted qualitative research and local patients and other healthcare professionals to co-create and refine pharmacy-led services, identify opportunities for interprofessional collaboration, and align services with stakeholder values and preferences, building on work from New Zealand<sup>13,26</sup> and the UK.<sup>14</sup> Crucially, future efforts must prioritise the assessment of patient health outcomes to demonstrate the value of these interventions and guide sustainable healthcare reform.

**Theme 1: Professional activities related to OA care delivery by pharmacy assistants**

Subthemes	Description
1.1 Identifying people with OA and providing advice and support	Pharmacy assistants described handling product requests, providing guidance on medicines (including assisting customers unfamiliar with their prescriptions), suggesting pain management options, recommending complementary medicines, and offering non-pharmacological advice for OA. They often recognised OA through customers' treatment preferences such as requests for products like Panadol Osteo®.
1.2 On-referral for more specific or specialised OA care (within the pharmacy or externally)	Pharmacy assistants frequently reported referring customers to pharmacists when care requirements surpassed their capabilities or scope of practice to ensure appropriate care, especially for issues such as medicines interactions. They also described directing customers to other healthcare providers, such as medical practitioners or physiotherapists, especially when urgent attention was needed, sometimes suggesting telehealth options. Barriers to adopting on-referral suggestions, as perceived by assistants, included customer reluctance, financial constraints, and lack of pharmacist availability. Assistants noted that referrals served as learning opportunities, enhancing their skills, while they operated within professional boundaries to support patient care.
1.3 Developing trusted relationships to cultivate person-centred OA care	Pharmacy assistants shared that they worked to cultivate trusted relationships with customers through active listening, showing genuine interest, especially with their regular customers. They felt this engagement helped create a welcoming environment, enhanced their job satisfaction and supported aspects of person-centred care for OA, such as providing lifestyle advice or recommending assistive products.
1.4 Collaborating within the pharmacy and with external healthcare providers to provide holistic care	Pharmacy assistants described collaborating with pharmacists to deliver care for people with OA and other health conditions. They perceived their role as handling customer interactions, addressing initial inquiries, and helping streamline workflow to support a patient-centred environment, whilst managing pharmacists' competing responsibilities. Pharmacy assistants also recognised opportunities to expand collaboration beyond the pharmacy, including with medical practitioners, physiotherapists, and other allied health professionals, to provide more comprehensive care. However, they noted that achieving this level of collaboration required stronger relationships and greater interaction with external providers.

**Theme 2: Capabilities and scope of practice of pharmacy assistants**

Subthemes	Description
2.1 Balancing an expanding role with the need for support, training and career progression	Pharmacy assistants perceived themselves as increasingly embracing an expanded role, often serving as an initial point of contact and providing direct patient care, such as explaining medications and treatments. However, they acknowledged role limitations and gaps in their knowledge, emphasising the need for further training. Many expressed a desire for greater recognition of their contributions and the establishment of clearer career progression pathways.

**Exemplar quotes**

"75% of them are over 65. So, we have a lot of OA customers in our pharmacy." – FG1-1#  
 "in our demographic, pretty much one out of every two customers come in for a box of Panadol Osteo®" – FG1-1#  
 "we have elderly patients that have no idea what medication they're on, why they're on it, and what it's for, it's quite outstanding." – FG2-2#  
 "I also like to put in a bit of like a natural alternative to pharmacy as well. Yeah, so there's a few things that I like to implement if someone is asking for some advice. I always like to kind of add that natural alternative in as well" – FG4-2#  
 "We get it (patient with OA presenting at the pharmacy) daily, especially (asking for) Panadol Osteo®. Like, I'm talking about, on average, we do 30 bottles a day." – FG6-3#  
 "Let me just grab the pharmacist to see if they can recommend (something) or what they think ...just to back up (my advice)." – FG4-1#  
 "I personally don't know too much about osteoarthritis, so if they have any further questions about that, I would make sure they get to speak to the pharmacist." – FG6-2#  
 "If it was a drug interaction, I would check with the pharmacist." – FG6-1#  
 "Sometimes they don't want to divulge information. So then, we have to refer them to the pharmacist because they go...that's... private. I don't want to have to talk to you about that." – FG1-3#  
 "Physiotherapy... it's around \$60 a session or something... and because it's not covered on concession, it can be hard to afford." – FG2-2#

"Some people might just say, no, yes, no, with regards to the questions that you ask them, just like, just give me the Panadol Osteo® and let me get out of here." – FG1-3#  
 "I treat almost everyone that comes into the pharmacy, like a family member. So, I take the time, listen. It's just, it's just who I am. I love hearing people's stories." – FG1-1#  
 "They (patients) do come to us for so much rather than even the pharmacist." – FG2-1#  
 "I really like community pharmacy especially because you build that rapport with your customers, and you constantly see them and it's nice to be able to help somebody and also like kind of be their friend at the same time." – FG6-1#  
 "...trying to not convince them (patients) of anything, but trying to say to them, you know, ...this is going to, we're trying to help you...and I think they do have a lot of faith in us, so they are willing to give lifestyle advice a go." – FG2-1#  
 "the relief on her face, she got instant relief from (the arthritis gloves I recommended), just having that pressure on (her hands gave relief)... It, was like a win...I'm like, yes, like we've had a success here." FG6-3#  
 "My pharmacists... are very supportive... if the patient doesn't want to (speak to me), the pharmacists ask me to stand beside (them) and listen to what they're saying." – FG5-1#  
 "It's a team effort to make sure your customers are given the right advice." – FG1-2#  
 "That's another point that could be made is maybe (we need to have) more inter-collaboration between the allied health people." – FG4-1#  
 "Sometimes they're (pharmacists) in the middle of two or three different jobs. They might say, can you explain this to the customer for me?" – FG1-3#  
 "We try and make it more bearable for the pharmacist by doing as much as we can, asking the relevant questions, and then passing that information on to the customer based on what the pharmacist has told us." – FG1-3#  
 "when you say go to see your doctor about this...it's very difficult to get a doctor's appointment." FG1-1#  
 "Referrals to physios, chiro, osteos, any, any of those sorts of things are reasonably easy in our community because almost everybody knows everybody." FG1-1#  
 "we're lucky I guess, we can do telehealth ...so I just hand them .... a telehealth number ... and just say look if you can't get into your doctor give these people a call. We're a part of a banner group, so we've actually got access to a code...it's usually like \$45 for an instant consult." FG1-2#

**Exemplar quotes**

"(given the workload of pharmacists) maybe there is an opportunity for those well-established or well-experienced pharmacy assistants (to do more)... – FG1-1#  
 "...our scope of practice is increasing..." – FG1-1#  
 "We are the first point of call, which is how I've always been trained and how I train staff..." – FG1-3#  
 "According to my experience in the past few years, I feel the pharmacy assistant should gain more knowledge and awareness... When they're recommending (a) product, they should know what it is useful for and if it is going to benefit the person... I think many of the pharmacy assistants don't have experience and don't have knowledge." FG5-1#  
 "it almost feels like you get to a point where that's the only amount of knowledge that you are allowed to have." – FG1-1#  
 "the last couple of years, I've also loved, pharmacy assistants expanding role in the pharmacy." – FG4-1#  
 "you have your practice nurses that can do prescriptions and things like that. It'd be good if we could do something like that as far as, not so much prescribe, but offer the advice and have the certificates, because as said, you can't go any further than what we're at." FG1-3#  
 "If we had more education, it would mean that we could help that patient a lot quicker... quicker and more effective conversations." – FG2-3#

(continued on next page)

Table V (continued)

2.2 Frustrations in service delivery and limitations in care options for OA	Pharmacy assistants reported frustrations with challenging customer interactions, such as uncooperative behaviour and unrealistic expectations. They described encountering therapeutic challenges due to limited safe and effective pain relief options for OA and being unable to dispense some medicines for OA. Assistants highlighted that their scope of practice restricted their ability to fully assist patients, necessitating reliance on support systems. They noted dependence on pharmacists for guidance and support but recognised the limited availability of busy pharmacists often constrained this support. External limitations, such as reduced access to healthcare providers (such as GPs or nurse practitioners) further complicated referrals. Many pharmacy assistants felt undervalued and unrecognised, perceiving that they were treated merely as retail staff by employers, customers, and the healthcare system.	<p>"You can make the same money in "Woolies" (Woolworths supermarket/grocery store) stacking shelves. You know, we're all under the same award, which is ridiculous (given the knowledge we have and advice we give)." – FG1-2#</p> <p>"Customers don't want to a hundred percent listen to pharmacy assistants because they're there for the pharmacist." – FG4-1#</p> <p>"(Pharmacy assistants) cannot give any advice on S3 (OTC) medications...we need to refer to the pharmacist and the pharmacist should act on (our referrals). We cannot answer everything (that) the customers need." – FG5-1#</p> <p>"You...almost feel like you're being attacked. Because they (patients with OA) take it out on you because you're the reason why they can't have what they want." – FG2-2#</p> <p>"If it is like too long (waiting for the pharmacist), there are customers I have seen who walked out of the pharmacy... So, people (have) just walked out in a rude way." – FG5-1#</p> <p>"All we have at the moment in town is a nurse practitioner that's working only three days a week. So we don't have any GPs." – FG2-2#</p> <p>"A lot of people say pharmacy assistants... we're just sales (assistants), we're just working retail kind of thing." FG6-3#</p>
2.3 Reliance on lived experience and experiential learning versus formal OA-specific training	Pharmacy assistants described relying on personal experience and continuous learning to perform their roles effectively. They spoke of engaging in on-the-job learning, self-directed study, adjunctive training, and mentorship. Some acknowledged knowing very little about OA and noted a lack of access to OA-specific training opportunities. Many observed that training was often product-based and provided by industry.	<p>"A lot of it (knowledge) becomes just a life experience and learning on the job, which is how we've (pharmacy assistants have) all learned. The piece of paper (pharmacy degree) is nothing compared to what we (pharmacy assistants) learn as we get older and the knowledge that we receive (through life experiences)." –FG1-2#</p> <p>"It's all about learning yourself... the more learning we all do, whether it be from personal or learning about the products or getting the pharmacist to give you more advice on it, it's easier to consult a customer and they believe, hopefully believe, 90% of the words you tell them." – FG1-2#</p> <p>"I honestly don't know anything about osteoarthritis. I know that people come in for Panadol Osteo. I can tell you what that is, but I don't know how that's really going to help them." – FG3-1#</p> <p>"A lot of that (information and training for pharmacy assistants) is product-based... It's the company's putting out that information." – FG6-3#</p> <p>"I'm pretty confident with osteoarthritis. I feel pretty confident, like, recommending products and talking to customers about osteoarthritis." – FG6-1#</p> <p>"I'm not super knowledgeable in the area (of arthritis management), so I'm not very confident with it." – FG6-2#</p> <p>"I don't know that much (about OA). I do a lot of training on specific products, not really certain illnesses, which I think should be more of a focus." – FG3-1#</p> <p>"(There's) no consulting courses. There are no courses for giving advice for OA or anything like that." – FG1-3#</p>
2.4 Appetite for training & development	Pharmacy assistants expressed a desire for training and development to build knowledge and confidence in patient interactions, aiming to positively impact customers' health outcomes. While career progression was not always a primary motivator, some senior staff expressed frustration over the lack of recognition or remuneration for their experience and raised concerns about the retention of younger staff due to limited career pathways. They emphasised the need for practical, job-relevant training, such as advanced qualifications tailored to community pharmacy to better equip them to support pharmacists' expanding roles. They also noted inadequacies in their existing training options, which focused on retail or general management skills, rather than the clinical knowledge to support people with chronic conditions, like OA. Barriers such as high training costs, limited on-the-job learning opportunities, and insufficient employer support were significant challenges. Pharmacy assistants suggested shared financial responsibility for training, reflecting a desire for greater investment in their professional growth.	<p>"I feel like there's this amazing opportunity for a level above a Cert IV that focuses on community pharmacy for those pharmacy assistants who want to assist the pharmacist in the increased scope of practice that they're currently providing." – FG1-1#</p> <p>"The payment of these training courses, even the ones at the moment can be outrageous... that upfront cost (is a barrier to getting more pharmacy assistants trained)." – FG4-1#</p> <p>"I feel like I probably could have had some more on-the-job training. I feel like I wasn't set up for some of the situations that I've been faced with and maybe more one-on-one with an experienced pharmacy assistant before kind of being thrown in a little bit." – FG3-1#</p> <p>"There should be the opportunity to, even if the pharmacist is happy or the owner is happy to say there's a course I want to put you through, meet you halfway, you pay half, I pay half." – FG1-2#</p> <p>"I'm doing my CERT4 at the moment in community pharmacy, but it's the management stream. It's not really about conditions or healthcare. It's more about managing the shop." FG6-2#</p> <p>"Really (the) S2S3 course is all about qualifying a customer...it doesn't really help me sell a product or help with a health condition" FG6-3#</p>

## Theme 3: Pharmacy assistants' role in workflow management and alleviating workload pressures

3. Pharmacy assistants' role in workflow management and alleviating workload pressures	Description	Exemplar quotes
	Pharmacy assistants described managing routine customer interactions and supporting pharmacists, often stepping in to assist when needed. They recognised legal limitations on their role, particularly regarding the supply of Schedule 3 medicines (which require pharmacist involvement). Assistants noted that increasing workloads and expanding responsibilities in pharmacy often pushed them to the edges of their scope or training, creating significant pressures. They also observed that pharmacists faced high stress and limited availability due to competing tasks, which sometimes shifted additional responsibilities onto pharmacy assistants. Customer impatience and staffing shortages were frequently cited as further challenges, making it difficult to maintain quality care. Assistants emphasised the difficulty of balancing operational demands with customer expectations in an increasingly resource-constrained environment.	<p>"We want to be able to help more and take the pressure off the pharmacist whose workload is just expanding." – FG1-1#</p> <p>"Only one pharmacist working, which means that with customer interactions most of the time it's with pharmacy assistants." – FG6-1#</p> <p>"I believe that there is some sort of guideline that the pharmacist should only do the counselling, which may have been realistic... but now that the workload is increasing so much (for pharmacists)." – FG1-1#</p> <p>"We never want to rush them (patients) and just give them anything just to get them out... But it is, it is an environment at the moment where, yeah, we were pushed." – FG2-1</p> <p>"A lot of our pharmacists are just like, Oh, look, whatever you can do to help me, honestly, like I'm drowning here... Let's get you more qualified in whatever we can with regards to what we're currently allowed to do." – FG1-1#</p>

Note: Panadol Osteo® is a proprietary brand of paracetamol (known as acetaminophen in some countries) designed for extended-release pain relief. In Australia, pack sizes containing 96 tablets or more of paracetamol are restricted to pharmacy supply only.

<sup>a</sup> In focus group discussions, pharmacy assistants referred to individuals with OA as "patients" or "customers," reflecting common terminology in the community pharmacy setting. These terms are preserved in the quotes to accurately represent participants' language and perspectives.

## Table V

## Osteoarthritis and Cartilage

Summary of the three themes and their corresponding subthemes derived from qualitative analysis of focus groups with pharmacy assistants<sup>a</sup>(n=13).

## Author contributions

- Conception and design: KW, KLB, HS, RSH, TFS, BD, AJM, AMB
- Analysis and interpretation of the data: KW, KLB, HS, RSH, TFS, BD, AJM, JC, AMB
- Drafting and revision of the article: KW, AMB
- Critical revision of the article for important intellectual content: KLB, HS, RSH, TFS, BD, AJM, JC, AMB
- Final approval of the article: KW, KLB, HS, RSH, TFS, BD, AJM, JC, AMB
- Support in sampling and recruitment: KW, KLB, HS, RSH, TFS, BD, AJM, AMB
- Statistical expertise: AMB, see acknowledgements
- Obtaining of funding: KW, KLB, HS, RSH, TFS, BD, JC, AMB
- Administrative, technical, or logistic support: AMB, HS, JC
- Collection and assembly of data: KW, JC, AMB

AMB takes responsibility for the integrity of the work as a whole, from inception to finished article.

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## Conflict of interest

TFS is the National President of the Pharmaceutical Society of Australia.

AJM has been remunerated for providing pharmacy education and expert consulting on pain management by Haleon, Reckitt and Bayer Australia.

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## Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.joca.2025.04.012.

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