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A mixed-methods study of patient and healthcare professional perceptions of care pathways for knee osteoarthritis

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Abstract

Background This study aimed to address research gap concerning the perception of the care pathway for knee osteoarthritis (KOA) patients, focusing on both the patient and health professional perspectives in countries with inefficient health systems, such as Slovenia, by examining patient satisfaction with conservative treatment, assessing the perceptions of both patients and health professionals regarding the latter's involvement, and justifying the chosen KOA treatment approaches.

Methods A mixed-methods approach was employed, combining quantitative surveys and qualitative interviews with KOA patients ($n=82$) and healthcare professionals ($n=68$).

Results The care pathway for conservative KOA treatment in Slovenia begins with general practitioners (GPs), who conduct initial examinations, prescribe analgesics, and refer patients to radiologists and orthopaedic surgeons. GPs received high satisfaction ratings ($\mu=4.32$). Orthopaedic surgeons, who confirm diagnoses and create treatment plans involving physiotherapy, medication, or joint injections, also received high satisfaction scores ($\mu=4.47$), despite long waiting times. Consultations with radiologists, mentioned less frequently, again received high satisfaction scores ($\mu=4.67$). Physiotherapists, consulted later, received high satisfaction scores ($\mu=4.16$) but long waiting times resurfaced. Referrals to rheumatologists occur for systemic diseases or ineffective conservative treatments. Psychologists, occupational therapists, and dieticians are rarely consulted, indicating limited integration into the treatment pathway. A comparison of health professionals' involvement showed that health professionals consider GP involvement less necessary ($\mu=2.47$) than patients do ($\mu=2.82$, $p=0.015$). The same applies to radiologists ($\mu=2.47$ vs. $\mu=2.87$, $p=0.004$), reflecting different views on diagnostic imaging. Our qualitative investigation revealed that, due to long waiting times, an alternative care pathway is developing with orthopaedic surgeons as the initial point of contact, bypassing GPs, and highlighted that patients and healthcare professionals differently perceive the latter's treatment roles.

Conclusions The current conservative KOA care pathway lacks initial lifestyle change advice from the GP, referrals for conservative treatments, and a multidisciplinary team engaged in regular treatment monitoring and adjustment. Our mixed-methods research approach highlighted significant differences in perceptions of the treatment process

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and the roles of health professionals; the knowledge supplied of those differences should support experts and policymakers to optimise care pathways in Slovenia.

Keywords Knee osteoarthritis, Integrated care pathway, Patient satisfaction, Health professional involvement, Slovenia, Conservative treatment

Background

Knee osteoarthritis (KOA) is a widespread disease in people over the age of 40. Worldwide, almost 23% of this population age group is affected, which corresponds to around 654 million people [1]. It is the most diagnosed form of OA in Slovenia [2, 3]. KOA is characterised by stiffness, pain, and functional limitations that impair daily activities and mobility, greatly lowering the patient's quality of life [4, 5]. The persistent nature of the disease means that KOA patients require continuous treatment, which places a significant burden on both patients and healthcare systems [6, 7].

Since KOA is a chronic condition, long-term treatment plans are required, often involving physical therapy, pain management, dietary changes, and occasionally surgery. In KOA treatment, exercise, self-management, and patient education are the three main pillars according to reputable organisations such as Osteoarthritis Research Society International (OARSI) and the American College of Rheumatology (ACR). The effectiveness of such non-pharmacological methods has been demonstrated; however, significant barriers impede their actual use. Major barriers include individual factors such as ignorance, low self-efficacy, and a willingness to rely on incorrect information from untrustworthy internet sources [8–11]. In addition, inadequate training of health professionals and problems with patients' peer support pose professional and interpersonal challenges, respectively [12–16]. Moreover, institutional constraints, such as limited access to resources and legal barriers, exacerbate these challenges and complicate care pathways [17, 18].

Numerous studies suggest that many patients referred to orthopaedic surgeons have not received adequate conservative treatment prior to their referral, despite established guidelines [19–24]. A 2021 systematic review of existing studies on the quality of care for patients with KOA found that only one in three patients with KOA receives conservative treatment options in structured treatment programs [24] that include an effective OARSI-based intervention with the following key elements [25]: (1) land-based exercises (strengthening, cardio, balance, neuromuscular, and mental/physical exercises), (2) patient education, (3) self-management of symptoms via lifestyle changes, for example, increasing physical activity, independent exercise, and weight control, and (4) nutritional counselling for overweight or obese individuals. The reason for this low figure is that there are not many viable, clearly defined methods or pathways for determining which treatments are necessary and in what order [26]. When tested, the application of an evidence-based care pathway (a structured multidisciplinary treatment plan designed to translate guidelines or evidence to the level of basic care processes locally, a treatment algorithm, and a list of services for a specific patient group) has produced improvements in health-related quality of life (HRQoL) for patients with KOA [27]. Moreover, rehabilitation programs to improve muscle strength and range of motion [26], as well as nutritional counselling [27], have been shown to be highly beneficial to KOA patients in relieving pain and improving functionality. As structured programs with education, physiotherapy, self-management of symptoms, and nutritional counselling (if needed) are also more cost-effective than unstructured and non-integrated programs, taking all findings into account, we suggest treating patients with KOA through an integrated care pathway [25, 26]. Accordingly, we propose that it is an important next step to develop an integrated care pathway for the treatment of patients with KOA. Today, integrated care pathways involving different professional groups in the conservative management of patients with KOA, as described by van den Bogaart [26], are successfully implemented in the Netherlands. However, the question arises as to how they may be implemented in Slovenia, a typical Central Eastern European country with a less efficient health system, characterized by long waiting times, limited access to specialized care, and resource allocation challenges, bureaucratic hurdles, suboptimal allocation of healthcare funding, and workforce shortages, which collectively hinder the timely and effective delivery of care [28].

According to van den Bogaart et al. [26], a stepped care approach involves general practitioners (GPs) diagnosing OA and providing initial advice on lifestyle changes and analgesics, if necessary. GPs then refer patients to appropriate professionals for further conservative management, including physiotherapy, dietary advice, psychological support, and occupational therapy. Physiotherapists play a critical role by delivering tailored information and initiating individualised treatment plans aimed at reducing pain and enhancing functional capacity through exercise programs. These programs encourage patients to adopt more active lifestyles. After approximately six months, GPs reassess the conservative treatment outcomes. A successful reduction in symptoms leads to continued lifestyle advice, while persistent complaints may necessitate additional analgesics,

corticosteroid injections, or referrals to orthopaedic specialists for advanced care.

Building on existing literature [29, 30], the role of patient engagement and shared decision-making are recognized as critical adjuncts to conservative care pathways, ensuring that patient-centred approaches are more effectively tailored to individual preferences and needs. As studies suggest that the optimal evaluation of a care process requires assessing the involvement and satisfaction of key stakeholders [31–34], we propose that it is crucial to examine patients' and health professionals' perceptions of the most important aspects of conservative KOA treatment, which may be uncovered by reviewing their descriptions of the care process, the involvement of health professionals, and their satisfaction with treatment. Accordingly, we set out to examine how Slovenian patients and health professionals evaluate the treatment process and the involvement of the latter in the conservative care pathway for patients with KOA.

Integrated care pathways for the treatment of KOA have been demonstrated to improve health-related quality of life and are being successfully implemented in several countries. However, there is a notable research gap in examining these pathways from both the patient and health professional perspectives, particularly in countries with inefficient healthcare systems such as Slovenia and comparable Central Eastern European countries. This study aimed to address the existing gap by employing a mixed-methods approach to examine patient satisfaction with conservative treatment, and to assess both patients' and health professionals' perceptions of the involvement of the latter in the care pathway for KOA patients. Additionally, we sought to justify the chosen treatment approaches, providing a comprehensive understanding of the acceptance of the care pathway for patients with KOA.

Methods

A mixed-methods approach integrating both quantitative and qualitative methods was used to gain a thorough understanding of Slovenia's conservative care pathway for KOA patients. This approach enabled a multifaceted examination of patient and health professional perspectives, the satisfaction with healthcare treatment, and the involvement of health professionals in KOA patient care. The quantitative component provided measurable data on satisfaction levels and professional involvement, while the qualitative component offered in-depth insights into the rationale behind chosen treatment approaches. This combination allowed for a thorough analysis of the care pathway, ensuring we gained a robust understanding of the complexities involved. Ethical approval for this study was obtained from the National Committee on Medical Ethics of the Republic of Slovenia (No. 0120–471/2023-2711-4).

Quantitative survey

To gather opinions on the involvement of health professionals in the care of patients with KOA, we conducted a quantitative survey from March to June 2024. A purposive, heterogeneous sample of 82 KOA patients and 68 health professionals was selected according to specific inclusion criteria, which ensured diversity in terms of age, gender, education, and disease severity among patients, as well as professional roles and qualifications among health professionals, thereby capturing a broad range of perspectives relevant to the study (Table 1). Patients were recruited after specialist examinations at Artros, the leading Slovenian orthopaedic clinic. The inclusion criteria for patients were direct experience with the KOA treatment pathway and having symptomatic KOA with a rating of 1–3 on the Kellgren–Lawrence scale, while we excluded patients with cognitive impairment, wheelchair dependency, comorbidities, or impaired language. All patients gave informed consent and completed a 10-minute questionnaire, resulting in 82 completed surveys.

Health professionals, including orthopaedic surgeons, nurses, physiotherapists, health administrators, and others (dieticians, occupational therapists, psychologists), were recruited based on the care KOA pathway of van Bogaart et al. [26]. Participants were invited by email to complete a 10-minute questionnaire and then participate in an in-depth interview. Email addresses were obtained from public websites, and a total of 68 completed questionnaires were received from the health professionals (Table 1). The overall survey response rate was 79%, with a completion rate of 95% among all respondents.

The survey instrument was developed based on scales from previous studies [25–27] and refined through interviews with five experts in integrated care pathways, including academics and health professionals. It was piloted with 25 professionals and patients to ensure its clarity and relevance. The questionnaire allowed patients to order conservative KOA treatments from different health professionals and rate their satisfaction with the treatment provided by each health professional on a 5-point scale from 1 'Completely dissatisfied' to 5 'Completely satisfied'. Both patients and health professionals also evaluated the need for the involvement of different health professionals in the treatment pathway, using a scale of 1 'No need for involvement', 2 'Optional involvement', or 3 'Mandatory involvement' as described by van den Bogaart et al. [26]. In addition, the questionnaire was used to collect socio-demographic data. The questionnaire had a high internal consistency, with a Cronbach's alpha of 0.85.

Table 1 Socio-demographic characteristics of the sample ($N=150$)

Attribute	Category	Share of Total Respondents (in %)	
		Health professionals ($n=68$)	Patients ($n=82$)
Gender	Male	29.4	32.9
	Female	70.6	67.1
Age	21–30	47.1	-
	31–40	20.6	2.4
	41–50	14.7	18.3
	51–60	5.9	30.5
	61–70	11.8	28.0
	71–80	-	20.7
Highest education level	Secondary school or less	38.2	65.9
	Undergraduate	29.4	29.3
	Master's / specialisation	20.6	4.9
	Doctoral degree	11.8	-
Primary occupation/qualification	Nurse	11.8	-
	Orthopaedic surgeon	29.4	-
	Physiotherapist	11.8	-
	Administrator	29.4	-
	Other	17.6	-

The normality of the data distribution was tested using the Shapiro–Wilk test, which indicated that the data followed a normal distribution ($p>0.05$). Consequently, parametric tests were considered appropriate for subsequent analysis. Differences between the observed groups were assessed using a t-test for independent samples. The statistical significance was set at $p<0.05$. Data analysis was performed using SPSS, version 25.0 (IBM Corp, Armonk, NY, USA).

Qualitative study

To gain a comprehensive and in-depth understanding of the conservative care pathway for patients with KOA in Slovenia, in-depth interviews were also conducted. Following the completion of a quantitative survey by patients ($n=82$) and health professionals ($n=68$) (see Table 1), all participants were automatically invited to participate in qualitative interviews. These interviews took place in a confidential and comfortable setting, for instance, in a quiet room in a healthcare facility or at another mutually agreed location. Each interview lasted between 45 and 90 min and allowed for a detailed exploration of individual experiences and perspectives, enriching the quantitative results with qualitative insights.

A thematic interview guide was developed for this data collection, based on the conservative care pathway for KOA patients as identified through literature reviews and contextual knowledge. Patients were asked to provide detailed descriptions of their KOA conservative treatment experiences, rate their satisfaction with the treatment received, and share their opinions on which health professionals should be included in the conservative treatment process. They were also asked to justify their choices regarding the involvement of specific health professionals in their care. Meanwhile, health professionals were asked to evaluate the treatment of KOA patients and provide their perspectives on which health professionals should be included in KOA conservative treatment, along with their justifications. This approach ensured that the most important aspects of conservative KOA treatment (description, involvement of health professionals, and satisfaction with treatment) were systematically recorded.

All in-depth interviews were recorded with participants' consent, and an expert transcription service accurately transcribed the recordings. To maintain confidentiality, the transcripts were assigned unique codes and anonymised to remove any identifying information. To enhance the trustworthiness and credibility of the results, we employed triangulation by integrating multiple data sources, including both interview groups. We maintained reflexivity through continuous reflection by different project members to minimise bias, conducted an independent audit to verify the data accuracy and reliability, and undertook participant verification to review and validate our preliminary findings. These measures ensured that the qualitative data robustly and accurately reflected the views of KOA patients and health professionals on the care pathway.

The thematic analysis followed Braun and Clarke's six-phase framework [32], ensuring a systematic and rigorous examination of the qualitative data. The process began with familiarisation, involving repeated reading of transcripts and noting initial ideas. This was followed by generating initial codes, where key data features were identified and systematically coded across the entire

dataset, resulting in a comprehensive list of codes. In the third phase, these codes were organised into potential themes, gathering all relevant data for each theme. The following phase of reviewing the themes involved checking these themes against the coded data and the entire dataset to ensure they accurately reflected the data, and in the process, making necessary refinements for coherence and consistency. Subsequently, each theme was further refined and then clearly defined and named, with detailed analyses contributing to outlining the scope and focus of each theme. Ultimately, when producing this report, the final themes were synthesised into a coherent and compelling narrative, connecting back to the research questions and relevant literature.

Results

The results will be presented in two thematic sections, explaining the quantitative data with qualitative findings.

Patient ratings of health professional treatment order and satisfaction

Table 2 presents the order of health professionals and the satisfaction ratings for each, as reported by patients. General practitioners were usually the first point of contact (73 patients, $\mu=1.08$, $\sigma=0.327$) and received high satisfaction ratings ($\mu=4.32$, $\sigma=0.983$). Our analysis of the in-depth interviews confirmed there was a high level of satisfaction among KOA patients with their GPs. Patients positively rated the role of their GPs in the initial diagnosis, including carrying out investigations, ordering diagnostic imaging such as X-rays and Magnetic resonance imaging (MRIs), and prescribing analgesics. When GPs met patients' expectations and wishes, they were particularly valued for the quality of their communication, care, and support in disease management. For example, Patient 1 commented: 'My doctor is good; she writes me the treatment and medication I tell her to.' Patient satisfaction was closely related to accessibility and the time GPs took to discuss treatment. This was reflected in a complaint from Patient 2: 'I was happier with my old GP, who retired, because I could see her the same day and she took more time with me… I understand that the new one does not have time because she has more patients, but it's still not right.' Continuous care and coordination by the GPs, including referrals to specialists, monitoring of disease progression, and adjustment of therapies, were also important satisfaction factors. However, eleven patients bypassed GPs due to the shortage of those in Slovenia, their possession of supplementary insurance that provided faster access to specialists, or their willingness to personally cover the cost of consulting an orthopaedic specialist to expedite their treatment. In these cases, GPs acted mainly as referral agents. As Patient 3 commented: 'At first I had to pay for an orthopaedic surgeon out of my own pocket, even though I have full health insurance. Just because I was in so much pain, I could not wait for months. Where has our health system gone! Then I went to my GP, who gave me a referral to a physiotherapist. That was all she did.'

Table 2 The order of and satisfaction with the treatment from health professionals, as rated by patients ($n=82$)

Health professional	*n*	Order of treatment (μ)	σ	Satisfaction with treatment (μ)	σ
General physicians	73	1.08	0.327	4.32	0.983
Orthopaedic surgeon	71	2.26	0.688	4.47	0.973
Radiologist	6	2.50	0.837	4.67	0.516
Physiotherapist	33	3.00	0.791	4.16	1.027
Other: Rheumatologist	5	3.00	1.225	3.75	1.893
Psychologist	4	3.30	0.675	3.60	1.075
Occupational therapist	1	7.00	-	1	-
Dietician	1	8.00	-	1	-

Orthopaedic surgeons were frequently consulted (71 patients; $\mu=2.26$, $\sigma=0.688$), with similarly high satisfaction ratings ($\mu=4.47$, $\sigma=0.973$). The in-depth interviews revealed that most patients were referred to an orthopaedic surgeon by their GP, with an average wait time of around six months. Those who paid privately or had supplementary insurance reported that they experienced significantly shorter wait times, ranging from a few days to a few weeks. The orthopaedic surgeons confirmed the diagnosis and developed treatment plans, which usually included physiotherapy, analgesics, anti-inflammatory medication, or joint injections. Patients expressed satisfaction with the orthopaedic surgeons' treatment and emphasised their expertise and experience in treating KOA. Patient 4 noted, 'The orthopedic surgeon was very knowledgeable and provided a clear diagnosis,' while Patient 5 commented, 'I appreciated the detailed written and verbal information about my condition.' In addition, patients expressed their appreciation for the orthopaedic surgeons' individualised approach. As Patient 6 described, 'He really took time for me, explained everything to me and created a plan that significantly improved my recovery.' Despite the long wait times, the high level of satisfaction with the treatment received suggests that the quality of treatment provided by orthopaedic surgeons mitigates the negative effects of an initial delay.

The number of patients mentioning treatment by radiologists was very low ($n=6$), but those who did see a radiologist often did so slightly later ($\mu=2.50$, $\sigma=0.837$), and the radiologists received high satisfaction scores ($\mu=4.67$, $\sigma=0.516$). Our in-depth interviews revealed that the radiologists treated patients either after their consultation with an orthopaedic surgeon or sometimes before, and most patients were not fully aware of the radiologist's specific role in their treatment; the majority of them

considered radiological examinations a standard part of the general diagnostic process, and some did not note that they had seen a different specialist. This perception obscured the radiologist's distinct role; as Patient 7 explained, 'I did not mark [in the questionnaire] because that's all one.' Nonetheless, patients who had direct contact with radiologists valued their contribution highly and recognised the professionalism and accuracy of their radiological examinations. For instance, Patient 8 affirmed 'that he played his key role in confirming the diagnosis perfectly and was very kind.'

The results of our quantitative survey showed that physiotherapists ($n=33$) were generally consulted later in the treatment process ($\mu=3.00$, $\sigma=0.791$), and they received high satisfaction scores ($\mu=4.16$, $\sigma=1.027$). Analysis of the in-depth interview statements revealed that patients were satisfied with the physiotherapists due to their high level of qualification, individualised approach, and support in educating them about the correct exercise techniques and the importance of regular physical activity, which improved their quality of life. Patients who paid for physiotherapy treatments reported higher levels of satisfaction. Patient 9 described their treatment as follows: 'It hurts a lot at first, but over time it becomes less painful, and the knee works better.' However, long waiting times for physiotherapy negatively impacted patients' overall satisfaction, as they limited the scope for quick access to the necessary therapies. Patients who received physiotherapy through a referral labelled 'very quickly' waited three to six months, while those labelled 'quickly' waited eight to twelve months. A typical statement came from Patient 10: 'Everything is fine, and they are good and friendly, but what about waiting so long. I waited nearly six months with a 'very quick' referral, but I should only have waited 14 days. But this lady setting beside me waited almost a year with a 'fast' referral, which should have been three months at most. That's a disaster!'

Rheumatologists ($n=5$) and psychologists ($n=4$) were also consulted later in the treatment sequence ($\mu=3.00$, $\sigma=1.225$ and $\mu=3.30$, $\sigma=0.675$, respectively), and they received moderate satisfaction ratings ($\mu=3.75$, $\sigma=1.893$ and $\mu=3.60$, $\sigma=1.075$, respectively). Five interviewees reported that they consulted a rheumatologist when systemic conditions such as rheumatoid arthritis were suspected and conservative treatments such as physiotherapy and non-steroidal anti-inflammatory drugs were not sufficient. These consultations were necessary to initiate further therapies such as intra-articular injections of corticosteroids or hyaluronic acid. The analysis revealed that KOA patients were only moderately satisfied with the rheumatologists, primarily due to the long waiting times of more than a year, which led to considerable frustration. As Patient 11 remarked, 'Waiting more than a year for an appointment with a rheumatologist that you urgently need is a violation of human rights!' In addition, patients felt unable to discuss their problems and needs fully as the consultation slots were limited due to the high number of patients. Overall, their expectations of receiving fast and effective treatment were not always met, contributing to a moderate level of satisfaction.

Four patients reported seeing a psychologist at least once to manage their chronic pain and cope with stress and anxiety caused by persistent pain and limitations in their daily activities. The psychologists provided pain management strategies, including relaxation techniques and cognitive behavioural therapy, and supported lifestyle changes. However, KOA patients were only moderately satisfied with their psychological treatment. Our analysis revealed that the patients struggled to gain access to these psychological services, and long waiting times again caused frustration. In addition, the limited time psychologists devoted to individual patients due to their high workload led to a feeling of having received inadequately individualised care. Moreover, the patients saw no immediate improvement in their mental state, which affected their satisfaction. Patient 12 explained: 'At first I waited more than a year and a half for treatment, then I went at least ten times, but nothing helped.'

Occupational therapists and dieticians, who were only consulted by one patient each, were consulted very late in the process ($\mu=7.00$ and $\mu=8.00$, respectively) and received the lowest satisfaction scores ($\mu=1.00$ for both). Patient 13 expressed dissatisfaction with occupational therapy and noted that their treatment was limited to the hand, which is common in Slovenia, while failing to cover the legs: 'I needed both, but I only got therapy for the hand.' This highlights a gap in the provision of comprehensive occupational therapy for KOA patients.

Meanwhile, Patient 14 reported that he was dissatisfied with the dietary support he received as he found it ineffective for weight loss: 'The orthopedic surgeon told me to go to the Center for Health Promotion to see a dietitian. I'm just telling you that was pointless because the weight loss plan didn't work.' This underscores the need for more effective and individualised nutritional interventions to help KOA patients manage their weight.

Health professionals' involvement in treatment: perspectives of health professionals and patients

Table 3 outlines the statistical characteristics of the perceived need for the involvement of different health professionals in KOA patients' treatment, comparing health professionals' and patients' perceptions. Significant differences can be observed for multiple roles. For instance, health professionals indicated a lower need for GP involvement ($\mu=2.47$) than patients ($\mu=2.82$, $p=0.015$), and the same was true for radiologists' involvement

Table 3 Need for health professionals' involvement in treatment, as perceived by health professionals and patients ($N=150$)

Health Professional	*Observed group*	*f%*			*μ*	*σ*	*t-test*	
		No need for involvement	Optional involvement	Mandatory involvement			*t*	*p*
General physicians	Health professionals	11.8	29.4	58.8	2.47	0.706	-2.531	0.015
	Patients	2.0	14.3	83.7	2.82	0.441		
Physiotherapist	Health professionals	2.9	14.7	82.4	2.79	0.479	-	-
	Patients	2.9	7.2	89.9	2.87	0.417		
Orthopaedic surgeon	Health professionals	5.9	5.9	88.2	2.82	0.521	-	-
	Patients	1.8	5.5	92.7	2.91	0.348		
Radiologist	Health professionals	11.8	29.4	58.8	2.47	0.706	-3.022	0.004
	Patients	0.0	12.8	87.2	2.87	0.339		
Rheumatologist	Health professionals	11.8	67.6	20.6	2.09	0.570	-	-
	Patients	13.6	50.0	36.4	2.2	0.685		
Psychologist	Health professionals	20.6	73.5	5.9	1.85	0.500	-	-
	Patients	50.0	44.4	5.6	1.56	0.616		
Occupational therapist	Health professionals	26.5	61.8	11.8	1.85	0.610	-	-
	Patients	41.2	35.3	23.5	1.82	0.809		
Dietician	Health professionals	35.3	50.0	14.7	1.79	0.687	-	-
	Patients	40.0	40.0	20.0	1.80	0.775		
	Patients	16.1	35.5	48.4	2.32	0.748		

(health professionals $\mu=2.47$; patients $\mu=2.87$, $p=0.004$). These results underline that when compared to health professionals, more patients perceive the involvement of GPs and radiologists as obligatory. Meanwhile, no significant differences were found for other professional groups such as physiotherapists, orthopaedic surgeons, rheumatologists, psychologists, occupational therapists, and dieticians, suggesting greater agreement between the two sampled groups regarding the need for these professionals' involvement.

Nonetheless, for certain health professionals, both Table 3 and the in-depth interview analysis revealed different views on their involvement in the conservative care pathway for patients with KOA. We found that more patients (83.7%) than healthcare professionals (58.8%) considered the role of GPs to be important, and we propose that this discrepancy arose since patients value GPs for their continuous support throughout the treatment process. As one patient commented: 'My GP gave me the initial diagnosis and accompanies me throughout the entire process' (Patient 15). In contrast, health professionals prefer specialists such as orthopaedic surgeons and physiotherapists who have specialist knowledge on treating certain aspects of KOA. They believe that GPs provide more basic and broad-based care, which is not always sufficient for the complex treatment of KOA. In addition, the health professionals we interviewed emphasised that GPs often provide insufficient information to their patients about KOA and inadequate support for lifestyle changes such as increased exercise and weight loss. However, they acknowledged that GPs are often under time pressure and lack clear health system instructions on providing in-depth information. One orthopaedic surgeon explained: 'I am a surgeon, and my job is to operate. But I must educate patients about the disease, advise them to lose weight and exercise. GPs should do that. … But I know that there are not enough of them, and they do not have time, … and there are no clear system instructions that they must do this' (Orthopaedic surgeon 1).

Furthermore, patients (87.2%) and health professionals (58.8%) agreed on the importance of radiologists, though patients more frequently rated their involvement as mandatory. It was clear from the in-depth interviews that patients see imaging tests such as X-rays, MRIs, and Computed Tomography (CT) as essential to understanding their health condition. They believe that radiologists play a crucial role in providing accurate diagnoses that give them clarity about their condition and treatment options. Patients seek confirmation of their symptoms through imaging tests because they believe that involving radiologists in their treatment will provide objective evidence of their condition, which will inform further treatment decisions. Aligning with this, Patient 16 commented, 'I think the images are more accurate because they show the true condition of my knee.' Conversely, health professionals are less likely to see the involvement of radiologists as a necessity because they may also be trained to interpret imaging diagnoses.

Likewise, more health professionals (67.6%) than patients (50.0%) rated the role of rheumatologists in the treatment of KOA as optional. Analysis of the in-depth interviews revealed several reasons for this difference. For one, many patients lack a deep understanding of the differences between the types of arthritis and of rheumatologists' specific expertise, as reflected in one patient's

belief that 'arthritis should automatically be treated by rheumatologists' (Patient 18). Meanwhile, since rheumatologists specialise in autoimmune diseases, health professionals often consider their involvement unnecessary for the treatment of KOA, a primarily degenerative disease. They believe that rheumatologists should only be consulted for complex or atypical symptoms, partly due to the limited number of rheumatologists and also their longer waiting lists compared to orthopaedic surgeons. This difference in perception between the two sampled groups emphasises the need for better 'communication and education of patients about the nature of their disease and the most effective specialists for their treatment' (Orthopaedic surgeon 2).

In a further finding, more health professionals (73.5%) than patients (44.4%) noted an optional need to involve psychologists in the treatment of KOA patients. Analysis of the statements from both groups revealed several key reasons for this discrepancy. On the patient side, most do not recognise the need for psychological involvement (which health professionals do recognise) because they are primarily focused on the physical symptoms of KOA and receiving immediate pain relief. Furthermore, over half of the patients interviewed did not understand the connection between mental health and the physical condition, or they indicated that they are reluctant to seek psychological help due to the stigma still associated with mental illness in Slovenia. Plus, among those who did understand the connection between the mind and the body, we found a tendency for patients to underestimate the influence of psychological factors on their pain and overall well-being, leading them to consider the involvement of psychologists as less necessary than it was perceived as being by health professionals. Overall, we found that patients often believe the involvement of psychologists is unnecessary. In comparison, health professionals have a better understanding of the overall impact of chronic diseases on mental health. Nurse 1 highlighted, 'KOA causes our patients chronic pain, limited movement, and reduced quality of life, which often leads to psychological problems such as anxiety, and stress. Treating these psychological aspects is key to comprehensive disease management, as mental problems can worsen the perception of pain and hinder effective treatment.' Similarly, Orthopaedic surgeon 3 emphasised, 'Psychologists are trained to help patients accept long-term lifestyle changes and manage ongoing symptoms, which is crucial for successful long-term disease management.'

A relatively small proportion of both patients and health professionals consider the role of occupational therapists to be mandatory, with patients (23.5%) more likely to hold this view than health professionals (11.8%). In the interviews, around one-quarter of patients expressed a need for greater support with their daily activities and adaptations. For example, one patient stated, 'I think the occupational therapist should teach me how to adapt my work at home and at work and how to perform activities to reduce joint strain and prevent worsening of symptoms' (Patient 19). Meanwhile, we found that health professionals are more likely to rely on physiotherapists than occupational therapists to improve patients' mobility and relieve their pain, as well as other specialist services directly involved in the treatment of KOA. This preference is partly due to the current focus of occupational therapy in Slovenia on hand-related interventions.

As in the case of occupational therapists, a relatively small proportion of respondents asserted that the involvement of dietitians in the treatment of patients with KOA is mandatory; yet, patients (20.0%) were more likely than health professionals (14.7%) to express this view, highlighting their greater perceived need for nutritional support in the treatment of KOA. This contradictory finding that although patients do not see dietitians, they view their role as more obligatory than health professionals do was discussed in-depth in the interviews. We found that a lack of referrals is an important factor; in Slovenia, GPs and orthopaedic surgeons rarely refer their patients to dietitians as they do not see nutritional support as an important part of KOA treatment. Nonetheless, the patients interviewed had high expectations of receiving nutritional support and expressed the belief that 'the dietitian has to make a plan so that I will definitely lose weight' (Patient 20). Meanwhile, health professionals rated the role of dietitians as less obligatory and emphasised the responsibility of the individual: 'I think it is the responsibility of each individual patient to ensure they have a healthy diet, appropriate weight and exercise' (Physiotherapist 2).

Most patients (89.9%) and health professionals (82.4%) expressed the belief that the involvement of physiotherapists in the care pathway is mandatory, reflecting a general recognition of their importance in the treatment of KOA. Patients referred to the 'immediate benefits of physiotherapy, such as reducing pain and improving mobility' (Patient 21), while health professionals emphasised 'the proven positive effects of physiotherapy on long-term disease management' (Orthopaedic surgeon 3). Most patients (92.7%) and health professionals (88.2%) also rated the role of orthopaedic surgeons as mandatory in the care pathway, underlining the crucial role of these specialists in the diagnosis and treatment of KOA. Patients emphasised the expertise of orthopaedic surgeons in 'providing accurate diagnoses and specific treatments, which may include techniques such as joint injections or surgical procedures' (Patient 22). Health professionals added that 'orthopedic surgeons bring specialized knowledge and experience that is critical to the

effective treatment of advanced cases of KOA' (Physiotherapist 2).

Discussion

This study has addressed a research gap by examining patient and health professional perspectives on the conservative KOA treatment pathway in a country with an inefficient healthcare system, in this case, Slovenia. In doing so, this study has demonstrated the effectiveness of adopting a mixed-methods approach when seeking to determine the satisfaction with a care pathway, the need for different professionals' involvement, and the reasons why certain treatments are chosen. Our findings have highlighted significant differences in perceptions of the treatment process and the roles of health professionals, and the knowledge supplied of those differences should support experts and policymakers to optimise care pathways in Slovenia.

In particular, this study's findings have underscored the important roles of physiotherapists and orthopaedic surgeons in KOA treatment. Both patients and health professionals recognise the contributions of these specialists to diagnosis, treatment, and long-term management. Similarly, the important role of orthopaedic surgeons in the treatment of severe osteoarthritis is well-documented [35, 36]. Meanwhile, the high level of patient satisfaction that we found with physiotherapy is consistent with its proven effectiveness in relieving pain and improving mobility [37, 38]. However, our analysis of the in-depth interviews carried out also revealed that long waiting times for both groups of specialists negatively impact patients' overall satisfaction and lead to considerable frustration, as they prevent timely access to necessary therapies.

Moreover, our results have shown that the roles of GPs and radiologists are seen differently. The patients emphasised support, communication, coordination of care, and meeting their expectations and wishes as key elements defining the GP's role and their satisfaction. In contrast, the health professionals evaluated the role of the GP based on clinical effectiveness and specialisation and thus viewed it as less critical than the roles played by specialists in the treatment of KOA. The patient findings are consistent with the results of previous studies to have suggested that GP involvement and communication are critical to patient satisfaction, though it was noted that GP care provision often overlooks patients' expectations and wishes [39]. In regard to radiologists, the in-depth interviews in this study revealed that patients often view radiologists' involvement as mandatory because they trust imaging examinations, which they consider to be objective and essential for understanding their health condition. This finding is consistent with a previous study that emphasised the importance of the visualisation of evidence for patients [40].

Beyond this, the difference that we have found in perceptions of the need for a rheumatologist's involvement indicates an educational gap. Most patients lack a comprehensive understanding of the differences between the various arthritis types and of rheumatologists' specific expertise. This finding emphasises the need for improved patient education about the roles of specialists in the management of KOA [40].

Additionally, this study has revealed that the roles of psychologists, nutritionists, and occupational therapists in conservative KOA treatment are largely unrecognised by patients. Our qualitative results suggest that patients often go without meeting these professionals due to the expected long waiting times and the need they express for faster psychological and nutritional support and results. Meanwhile, more health professionals than patients emphasised the importance of psychological support, highlighting the role of mental health in chronic disease management; increasing patient awareness and reducing the stigma associated with psychological support could improve the rate of KOA patients receiving comprehensive care. Beyond this, the low satisfaction we found with occupational therapists and dietitians indicates that many patients currently encounter difficulties in managing their daily activities and nutrition, suggesting that improvements in the multidisciplinary care delivered may facilitate more holistic support for KOA patients.

This study has determined that the care pathway for conservative KOA treatment in Slovenia begins with GPs conducting initial exams, prescribing analgesics, and referring patients to radiologists and orthopaedic surgeons, with orthopaedic wait times spanning several months. Orthopaedic surgeons confirm diagnoses and create treatment plans, potentially involving physiotherapy, medications, or joint injections, and they may refer to dietitians. Physiotherapy, despite being crucial, also requires long wait times. Rheumatologist referrals occur for suspected systemic conditions or ineffective conservative treatments. Regular GP and specialist visits are scheduled to monitor and adjust the patient's treatment as needed.

However, this existing care treatment pathway lacks several essential components. In addition to incorporating land-based exercise (strengthening, cardio, balance, neuromuscular, and mental/physical exercises), for an effective intervention based on OARSI, the pathway should include patient education, self-management of symptoms in the form of lifestyle changes such as increasing physical activity, independent exercise, and weight control, and nutritional counselling for overweight or obese individuals [25]. Unlike GPs in the

successfully implemented care pathways in the Netherlands presented by van den Bogaart et al. [26], GPs in Slovenia often do not advise lifestyle changes from the outset or refer patients to appropriate professionals for conservative treatment, including dietary counselling, psychological support, and occupational therapy. Moreover, the lack of a multidisciplinary team of orthopaedic surgeons, physiotherapists, nutritionists, psychologists, and other professionals regularly monitoring patients' progress and adjusting their treatment indicates the absence of a truly integrated care pathway. Thus, there is insufficient support for lifestyle changes and psychological well-being. Furthermore, regular multidisciplinary check-ups would allow for adapting patients' treatments and encourage active patient participation. Hence, we propose that implementing an integrated care pathway in Slovenia and comparable healthcare systems is an essential next step. This approach will ensure faster access to specialists, continuous multidisciplinary monitoring, and comprehensive support, leading to better coordination of care and an improved quality of life for patients. Moreover, enhanced integration will address current gaps in the care provision—chiefly, lifestyle change support, psychological assistance, and regular multidisciplinary check-ups—thereby optimising the management of KOA patients and aligning with best practices observed in other healthcare systems, such as the care pathway in the Netherlands [26].

Slovenia and other Eastern European countries have not yet introduced an integrated care pathway for KOA patients, leaving them lagging behind countries with more efficient health system. This lack of progress can be attributed to several factors. First, the centralised public health insurance system limits flexibility and the introduction of innovative approaches, which are made easier in decentralised systems. Second, long waiting times for specialist consultations and physiotherapy hinder the scope for patients to receive timely treatment. For example, access to physiotherapy is very limited, with waiting times of several months to a year. This scenario has arisen because there is a significant shortage of physiotherapists, with their numbers below the EU average and with at least twice as many needed [41]. In addition, Slovenia has well-documented institutional constraints, such as limited access to resources and legal barriers [17, 18], and cultural and organisational factors also play a role, with patients in Slovenia less involved in contributing to treatment decisions than patients elsewhere. This weak tradition in regard to taking a patient-centred approach, coupled with the lack of interorganisational and multidisciplinary collaboration, affects the design and implementation of conservative care pathways [28].

Furthermore, the qualitative interviews in this study revealed that due to the long waiting times in Slovenia, an alternative KOA care pathway is developing in which the first contact is with an orthopaedic surgeon, meaning GPs are bypassed in the initial phase. While this marks a change that stands out from the lack of progress otherwise noted, we assert that it is a step in the wrong direction rather than a move forward. In effect, this alternative care pathway, rather than bringing in a multidisciplinary approach, is instead removing one professional role traditionally involved in the KOA care pathway.

The results of this study have several important implications for clinical practice and health policy in the treatment of KOA patients in Slovenia and comparable Eastern European countries. First, they demonstrate a need for faster access to specialists and physiotherapy, which highlights the importance of curbing waiting times to reduce delays in treatment initiation and thus improve health outcomes. Second, the lack of a multidisciplinary approach highlights the need to involve different health professionals in KOA management for coordinated and comprehensive patient care. Third, based on our findings, we propose that involving patients in educational programs and support groups could improve their participation in treatment and disease management. In addition, we assert that regular adjustment of pharmacological treatment and support for lifestyle changes are essential to improve patients' quality of life. Finally, it is our proposal that systemic changes are needed to implement an ideal integrated clinical pathway, which can serve as a model for similar healthcare systems. In that regard, collaboration between healthcare professionals, policymakers, and patients is crucial to improving the comprehensive care delivered and the health outcomes for KOA patients.

This study has several limitations. For a start, the sample size was relatively small, which may limit the generalisability of the findings. Additionally, this study was conducted within a specific cultural and healthcare context, meaning the findings may not be directly applicable to other regions. Future research should aim to include larger and more diverse populations, to validate these findings and explore the impacts of integrated care pathways in different healthcare settings. Further studies could also investigate the long-term outcomes of these pathways and their effectiveness, to provide a more comprehensive picture of their benefits and limitations.

Conclusions

This study has demonstrated the effectiveness of a mixed-methods approach when seeking to determine the satisfaction with a care pathway, the need for different professionals' involvement, and the rationale for choosing certain treatments. Significant differences emerged between patients and health professionals, with the latter perceiving a lower need for the involvement of both

general practitioners and radiologists. The findings expose gaps in the conservative care pathway for KOA patients in Slovenia and comparable Eastern European countries, emphasising the need for work to introduce an integrated, multidisciplinary approach.

Both patients and health professionals recognise the importance of physiotherapists and orthopaedic surgeons. However, there are discrepancies in the perceived need for dietitians, psychologists, and occupational therapists. Meanwhile, the current Slovenian care pathway lacks patient education, self-management of symptoms through lifestyle changes, nutritional counselling, and a multidisciplinary team for regular monitoring and adjustment of treatment.

Ultimately, introducing an integrated care pathway that includes initial lifestyle change counselling, referrals for conservative treatments, and a multidisciplinary team could improve care coordination and enhance patients' quality of life.

Supplementary Information

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Supplementary Material 1

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Author contributions
K.M.P . and E.K. wrote the main manuscript text; K.S. did statistical analysis and defined methodology; K.P. performed investigation; all authors reviewed and edited manuscript text; H.M. provided resources and performed supervision. All authors reviewed the manuscript.

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Data availability
The data that support the findings of this study are available on request from the corresponding author, [S.K.].

Declarations

Ethics approval and consent to participate
Ethical approval for this study was obtained from the National Committee on Medical Ethics of the Republic of Slovenia (No. 0120–471/2023-2711-4). Informed consent to participate was obtained from all individual participants included in the study.

Consent for publication
Not applicable. This manuscript does not contain any individual person's data in any form (including individual details, images, or videos) that would require consent for publication.

Competing interests
The authors declare no competing interests.

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