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Patients', healthcare providers', and insurance company employees' preferences for knee and hip osteoarthritis care: a discrete choice experiment

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SUMMARY

Objective: To determine patients', healthcare providers', and insurance company employees' preferences for knee and hip osteoarthritis (KHOA) care.
Design: In a discrete choice experiment, patients with KHOA or a joint replacement, healthcare providers, and insurance company employees were repetitively asked to choose between KHOA care alternatives that differed in six attributes: waiting times, out of pocket costs, travel distance, involved healthcare providers, duration of consultation, and access to specialist equipment. A (panel latent class) conditional logit model was used to determine preference heterogeneity and relative importance of the attributes.
Results: Patients ($n = 648$) and healthcare providers ($n = 76$) valued low out of pocket costs most, while insurance company employees ($n = 150$) found a joint consultation by general practitioner (GP) and orthopaedist most important. Patients found the duration of consultation less important than healthcare providers and insurance company employees did. Patients without a joint replacement were likely to prefer healthcare with low out of pocket costs. Patients with a joint replacement and/or low disease-specific quality of life were likely to prefer healthcare from an orthopaedist. Patients who already received healthcare for knee/hip problems were likely to prefer a joint consultation by GP and orthopaedist, and direct access to specialist equipment.
Conclusions: Patients, healthcare providers, and insurance company employees highly prefer a joint consultation by GP and orthopaedist with low out of pocket costs. Within patients, there is substantial preference heterogeneity. These results can be used by policy makers and healthcare providers to choose the most optimal combination of KHOA care aligned to patients' preferences.

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Introduction

Osteoarthritis is one of the most prevalent chronic diseases, affecting 10% of the people over 60 years[1]. The knee and hip are the most commonly affected joints[2,3]. Currently, treatment for knee and hip osteoarthritis (KHOA) focuses on controlling symptoms and improving function.

Guidelines advocate pro-active, non-surgical treatment for KHOA, which can be provided in primary care. Patients who do not respond sufficiently to non-surgical treatment are referred to secondary care for surgical treatment[4–6]. Despite the wide range of treatment options, not every patient receives healthcare as they should according to the guidelines[7–9]. Moreover, many patients who are referred to secondary care do not need surgical treatment (yet), leading to high healthcare costs and overuse of secondary care[10]. To prevent too early referral to secondary care, intermediate

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care setting has recently been developed, in which specialist services are implemented in primary care[11]. However, it is unknown whether this development matches the preferences of patients.

Healthcare tailored to patients' preferences could optimise care for KHOA and thereby improve its uptake, adherence, and effectiveness[12]. In addition, comparing preferences of healthcare providers, policy makers, and patients might reveal differences that change the view of policy makers and healthcare providers on how to arrange KHOA care.

A common quantitative technique used to determine preferences is a discrete choice experiment (DCE)[13,14]. In DCEs, participants are repeatedly asked to make choices between different hypothetical alternatives, which eventually reveals their preferences[15]. Previous DCEs on osteoarthritis focused on patients' preferences for outcomes and content of treatments[16–21], such as efficacy and side-effects, benefits and risks associated with drug treatment, and joint replacement. No study to date has examined patients' preferences for structure aspects of healthcare settings for KHOA (i.e., attributes of material and human resources used for providing care), such as the type of healthcare providers present during consultation. Furthermore, the preferences of other stakeholders and heterogeneity in preferences within patients for KHOA care has not been identified in previous studies. This information is important for policy makers and healthcare providers to choose the most optimal combination of healthcare for KHOA aligned to patients' preferences.

We therefore aimed to determine the preferences of patients and the heterogeneity in their preferences for the characteristics of different healthcare settings of KHOA care. Secondly, we aimed to determine similarities and differences between the preferences of healthcare providers and insurance company employees with patients' preferences.

Methods

Discrete choice experiment

A DCE was performed to gain insight into the participants' preferences and how they evaluate and trade off characteristics of healthcare settings for KHOA. A DCE assumes that preferences of people are based on the underlying characteristics of healthcare services/goods/products, so-called attributes (e.g., waiting time)[13,16,22]. Those attributes are specified by their attribute levels that refer to possible values (e.g., for waiting time: one or 2 weeks)[14,16]. We presented several alternatives of KHOA care with different combinations of attribute levels in a questionnaire to participants, so-called choice tasks. We repeatedly asked them to make a choice between hypothetical alternatives. This enabled us to identify how much they were willing to give up one attribute, to gain something on another attribute. As such, it provided information on the relative importance of each attribute and its levels.

Attributes and levels

We composed a list of potential attributes from previous qualitative studies on patients' preferences for KHOA care[23–27]. We interviewed experts in KHOA care ($n = 3$ general practitioners (GPs); $n = 2$ orthopaedists; $n = 1$ healthcare manager; $n = 4$ healthcare researchers) and KHOA patients ($n = 3$) to complement this list and rank the attributes from most to least important with respect to their preferences. The list of potential attributes from the literature and interviews is presented in Supplementary File 1. In a DCE, the number of attributes to include is limited, because of the rising cognitive burden of the participant when the number increases. To reduce the number of attributes, we selected the six most relevant attributes from the ranking results (Table I), since the attributes ranked seven or more were deemed substantially less important by the experts and patients. Attribute levels were specified by the same experts and from publications of national sources[28] based on realistic values from KHOA healthcare settings.

DCE design and questionnaire

The combination of six attributes with two to four levels would result in many potential alternatives. It is not feasible to present all these alternatives to a single participant. Therefore, we generated a fractional design which takes a subset of the alternatives[14,16] and optimized which choice tasks to present (i.e., to consider statistical properties and participant burden) using the D-efficient criterion and NGene software[29]. We created a design of 24 choice tasks and divided these into two blocks of 12 to limit cognitive burden following good research practice guidelines[14]. We randomly presented one of the two blocks to the participants[14]. Each choice task contained two alternatives of KHOA care. The Dutch healthcare system requires that all citizens are registered with a GP[30]. Therefore, patients can always access their general practitioner (GP). As a consequence, we did not allow participants to choose none of the alternatives (i.e., 'opt out'), because the option of 'no treatment' is not applicable to the Dutch healthcare system. Fig. 1 shows an example of a presented choice task. We repeatedly asked patients with KHOA which of the alternatives they preferred most, and asked healthcare providers and insurance employees which of the alternatives they preferred most for their patients with KHOA.

The questionnaire for patients also contained: demographic questions (e.g., gender, age, employment status), health-related questions (duration of knee/hip complaints, The Western Ontario and McMaster Osteoarthritis Index (WOMAC) pain questions[31], Knee Injury and Osteoarthritis Score (KOOS)[32] and the Hip Injury and Osteoarthritis Outcome Score (HOOS)[33] quality of life (QoL) questions, the EQ5D-3L[34]), and questions about experiences with healthcare. Questionnaires for healthcare providers and insurance company employees included demographic questions and work-related questions (e.g., profession and educational level). All questionnaires included an explanation of the attributes and levels, and a warm-up choice task before starting the choice tasks.

Questionnaires were pre-tested using a think-aloud strategy, where five patients and four healthcare providers were asked to read and think aloud while completing the questionnaire[35]. As a result, some textual alterations to the questionnaires were made. Also, we restricted the design to make sure that two unrealistic combinations of attribute levels as identified by patients (i.e., consultation by a GP with out of pocket costs of €90,-, and consultation by a GP with waiting time of 4 weeks) were not included. After roughly 20% of the data was collected ($n = 150$ patients), prior estimates of the attribute-levels in were updated to increase the statistical efficiency of the DCE design[14,36].

Study sample

Participants were recruited through a commercial survey sample provider, Dynata. Participants of 45 years and older who gave informed consent and fulfilled at least one of the following criteria were included: (1) meeting the criteria for KHOA according to the National Institute for Health and Care Excellence (NICE) guidelines[5]: activity-related joint pain, and either no morning joint-related stiffness or morning stiffness that lasts no longer than 30 min; (2) having a joint replacement; (3) reported that they have been told by a physician and/or physiotherapist as having KHOA. All patients received a financial compensation (€8,-). Healthcare providers were recruited through sources of the Erasmus MC

Attribute	Definition	Levels
Waiting times	The length of time the patient has to wait to get access to the healthcare.	No waiting time 2 weeks 4 weeks
Out of pocket costs	Out of pocket costs are the costs the patient has to pay to get access to the healthcare.	€ 0,- € 45,- € 90,-
Travel distance to the healthcare provider	This is the distance the patient has to travel to the location of the healthcare provider(s).	1 km 7 km 20 km
Health care providers during consultation	Healthcare providers at the consultation for the patient.	General practitioner General practitioner and orthopaedist (joint consultation) Orthopaedist
Duration of consultation	This is the length of time the patient has with the healthcare provider(s) for one consultation.	10 min 15 min 30 min
Access to specialist equipment	Specialist equipment (e.g., MRI) is additional assessment which can only be done at another location and another day than where the patient has the consultation. It can also be done at the same location and same day as where the patient has the consultation.	Another location and another day than the consultation. (indirect) Same location and same day as the consultation. (direct)

Table I   Attributes and levels used in the discrete choice experiment

Osteoarthritis and Cartilage

Imagine that you can choose which healthcare you receive for your complaints, which of the following would you choose, Scenario 1 or Scenario 2? Please select the Scenario that you prefer most by checking the box below.

	Scenario 1	Scenario 2
Waiting time to visit	1 week	No waiting time
Healthcare providers during consultation	Orthopaedist	General practitioner
Out of pocket costs	€90,-	€0,-
Duration of consultation	10 minutes	10 minutes
Travel distance	7 kilometres	1 kilometre
Access to specialists equipment	Same location and same day as the consultation. (direct)	Another location and another day than the consultation. (indirect)

I would choose: ☐ ☐

Fig. 1   Example of a choice task.

Osteoarthritis and Cartilage

University Medical Center and approached via email. Insurance employees from all departments of the health insurance company CZ were also approached via email in collaboration with the Department of Innovation and Advice of the insurance company CZ. Healthcare providers and insurance employees did not receive a financial compensation. Non-responders received a reminder within 2 weeks of the invitation.

Statistical analyses

We analysed the choice observations from patients, healthcare providers, and insurance company employees separately using a logit model[37]. In addition, considering our interest in the heterogeneity of patients' preference, the model fit, and our sample size,

we used a *panel* latent class model[38]. This model takes the panel structure of the data (i.e., each respondent completed 12 choice tasks) into account and determines whether different preference patterns can be found among participants; so-allocated latent classes. Furthermore, this model can incorporate participants' characteristics, which provides insight into how likely participants with certain covariates (e.g., joint replacement) are to belong to a certain latent class, so-called class assignment model. To determine the number of classes, we selected the model with the best model fit (AIC). Stepwise forward selection using log likelihood tests was used to determine which participant characteristics to include. We tested for linearity of the attributes and two-way interaction terms ('healthcare providers' and 'waiting times', and 'healthcare providers' and 'out of pocket costs'). As a result, we identified the utility

function as presented in Supplementary File 2. Statistical analyses were performed using NLogit six software.

A significant coefficient (β) indicates that the attribute (level) is important for the participants' decision for KHOA care. The utilities were converted into odds ratios (ORs) and indicated the relative importance of each attribute level compared to its reference level. A statistically significant OR (P-value < 0.05) indicates that the attribute level had an impact on the choice process of the participants. An OR higher than one indicates that the attribute level is desirable and an OR lower than one indicates that participants are less likely to select the attribute level, all compared to the reference attribute level. We additionally calculated the importance of each attribute relative to other attributes by computing the difference in the utility of the highest and lowest level of that attribute, divided by the sum of differences of all attributes. The larger the resulting percentage, the greater the importance relative to other attributes. For the panel latent class model, this was done stratified for each class.

Lastly, we calculated the willingness to wait (WTW) in weeks for the attributes, since literature suggests waiting time to be an important negative factor in the patients' experience[39], prolonged with the fact that it is an important health policy issue in many countries nowadays[40]. Further information is provided in Supplementary File 3.

Variable	Knee and hip patients $n = 648$
	n (%)
Female	359 (55.4)
Age, mean (sd)	61.7 (8.9)
Joint	
Knee	418 (64.5)
Hip	230 (53.5)
Joint replacement	150 (23.1)
Of whom still have joint complaints with joint replacement	75 (50)
No joint replacement, but included for:	498 (76.9)
Only clinical OA (NICE-guidelines)	246 (49.4)
Only OA diagnosed by clinician	97 (19.5)
Clinical OA (NICE-guidelines) and OA diagnosed by clinician both	155 (31.1)
Education level*:	
Low	207 (31.9)
Intermediate	275 (42.4)
High	164 (25.3)
Nationality Dutch	639 (98.6)
Employment status:	
Paid work	229 (35.3)
Unemployed	41 (6.3)
Incapacitated	111 (17.1)
Volunteer work	58 (9.0)
Caregiver	22 (3.4)
Retired	232 (35.8)
Other	18 (2.8)
Urbanization:	
Rural	277 (57.3)
Urban	371 (42.7)
Joint complaints (yes)	577
Duration of complaints in months, median (IQR)**	48 (90)
WOMAC pain score (0–100), mean (sd)	37.01 (22.52)
HOOS/KOOS QoL score (0–100), mean (sd)	51.56 (18.50)
Currently receiving healthcare for knee/hip complaints by any healthcare provider	142 (21.9)
Previously received healthcare for knee/hip complaints (yes)	560 (82.4)
From the following healthcare providers:	
GP	460 (71)
Physiotherapist	350 (54)
Medical specialist in hospital setting	349 (53.9)
Medical specialist at private clinic	26 (4.0)
Dietician	16 (2.5)
Podiatrist	55 (8.5)
Occupational therapist	18 (2.8)
Other	17 (2.6)
Satisfaction with received healthcare (1–10), median (IQR)	7 (2)
EQ5D-3L score, mean index value (sd)	0.702 (0.237)

Notes. A higher WOMAC pain score indicates more severe joint pain in daily life activities. A higher HOOS/KOOS QoL score indicates a better disease-specific QoL. A higher EuroQol score indicates a better generic QoL.
* Missings ($n = 2$; 0.3%).
** Missings ($n = 26$; 4.5%).

Table II Characteristics of knee and hip osteoarthritis patients

Osteoarthritis and Cartilage

Attribute levels	Patients		Healthcare providers		Employees of healthcare insurance company	
	OR	(95%CI)	OR	(95%CI)	OR	(95%CI)
ASC	1.05	(0.99; 1.11)	1.12	(0.93; 1.35)	0.92	(0.80; 1.05)
Waiting time (per week)	**0.88**	**(0.86; 0.90)**	**0.89**	**(0.82; 0.97)**	**0.86**	**(0.81; 0.91)**
Out of pocket costs (per euro €)	**0.98**	**(0.98; 0.98)**	**0.98**	**(0.98; 0.98)**	**0.98**	**(0.98; 0.99)**
Duration of consultation (per minute)	**1.01**	**(1.01;1.02)**	**1.02**	**(1.01; 1.03)**	**1.02**	**(1.01; 1.02)**
Travel distance to healthcare provider (per km)	**0.97**	**(0.97; 0.98)**	**0.97**	**(0.96; 0.98)**	**0.97**	**(0.97; 0.98)**
Healthcare providers during consultation						
General practitioner *(reference level)*	1.00		1.00		1.00	
Orthopaedist	**2.04**	**(1.84; 2.26)**	**1.39**	**(1.01; 1.92)**	**2.17**	**(1.71; 2.75)**
General practitioner and orthopaedist	**2.39**	**(2.17; 2.63)**	**1.93**	**(1.45; 2.58)**	**4.44**	**(3.55; 5.54)**
Access to specialist equipment						
Indirect *(reference level)*	1.00		1.00		1.00	
Direct	**1.54**	**(1.45; 1.64)**	**1.88**	**(1.56; 2.26)**	**2.25**	**(1.97; 2.57)**

Bold = statistically significant at 5% level.
Abbreviations: OR = odds ratio; SE = standard error; CI = confidence interval; ASC = alternative specific constant.
Note: For a correct interpretation of the results, it is important to notice the different units of measurement, e.g., price is a continuous variable that is measured per euro, whereas healthcare providers and specialist equipment are categorical variables that are compared to their reference level. The alternative specific constant (ASC) was not statistically significant, indicating that the choice process of patients was free from left-right bias.

Table III   Results of the logit model of patients, healthcare providers and insurance company employees

Osteoarthritis and Cartilage

Results

Characteristics of participants

A total of 730 participants met the inclusion criteria and gave informed consent. Of those, 648 participants (88.8%) completed DCE and were therefore included in the analyses. These participants had a mean age of 61.7 years (sd = 8.9), 55.4% of them were female, and 42.4% had an intermediate education level (Table II). A total of 49.4% was included for having KHOA according to NICE-guidelines only, 19.5% for a KHOA diagnosis by a clinician only, and 31.1% for both criteria. The remaining 23.1% had a joint replacement. In addition, 76 healthcare providers and 150 insurance company employees fully completed the questionnaire (see Supplementary File 4).
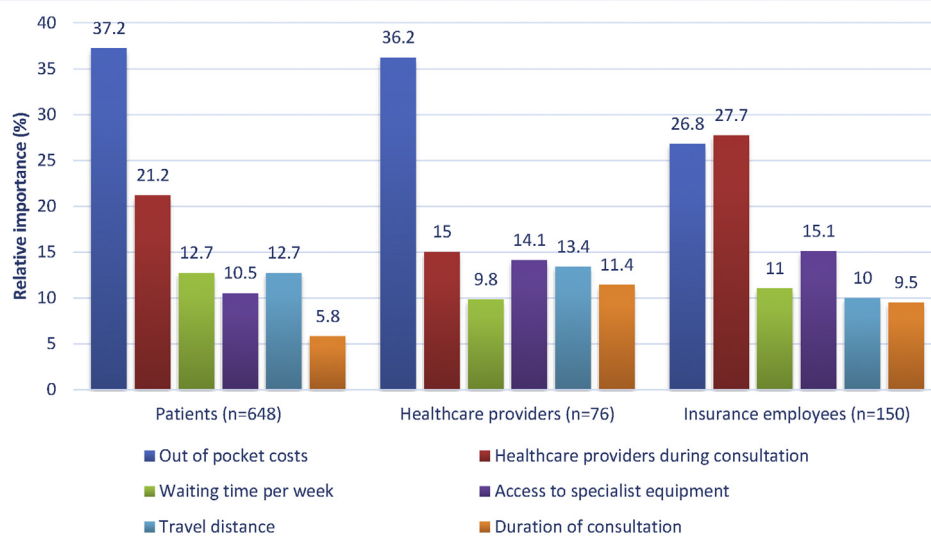

Fig. 2   Relative importance of the KHOA care attributes for patients, healthcare providers, and insurance company employees.

Osteoarthritis and Cartilage

	Class 1		Class 2		Class 3		Class 4	
Class probability								
Average	0.333		0.303		0.197		0.167	
Attribute levels	OR	(95%CI)	OR	(95%CI)	OR	(95%CI)	OR	(95%CI)
ASC	**1.22**	**(1.07; 1.38)**	0.90	(0.73; 1.08)	**0.75**	**(0.63; 0.90)**	0.85	(0.67; 1.09)
Waiting time (per week)	**0.75**	**(0.70; 0.80)**	**0.73**	**(0.64; 0.82)**	**0.86**	**(0.77; 0.95)**	0.95	(0.85; 1.05)
Out of pocket costs per euro (per euro €)	**0.99**	**(0.98; 0.99)**	**0.92**	**(0.91; 0.94)**	**0.99**	**(0.99; 1.00)**	**0.99**	**(0.98; 0.99)**
Duration of consultation (per minute)	1.00	(0.99; 1.01)	1.00	(0.99; 1.01)	1.00	(0.99; 1.01)	**1.03**	**(1.01; 1.04)**
Travel distance to healthcare provider (per km)	**0.94**	**(0.93; 0.95)**	**0.96**	**(0.94; 0.98)**	1.00	(0.99; 1.02)	**0.97**	**(0.94; 0.99)**
Healthcare providers during consultation								
General practitioner *(reference level)*	1.00		1.00		1.00		1.00	
Orthopaedist	**1.43**	**(1.17; 1.75)**	**1.67**	**(1.19; 2.34)**	**23.57**	**(11.94; 46.06)**	**2.44**	**(1.45; 4.14)**
General practitioner and orthopaedist	**1.65**	**(1.35; 2.01)**	**3.53**	**(2.34; 5.31)**	**21.54**	**(12.18; 38.09)**	**4.71**	**(2.72; 8.25)**
Access to specialist equipment								
Indirect *(reference level)*	1.00		1.00		1.00		1.00	
Direct	**1.32**	**(1.14; 1.54)**	**1.55**	**(1.26; 1.90)**	**1.46**	**(1.19; 1.80)**	**5.10**	**(3.60; 7.32)**
Class assignment model								
Constant	1.00	–	0.91	(0.54; 1.54)	**0.51**	**(0.29; 0.90)**	**0.25**	**(0.11; 0.58)**
Higher disease-specific QoL (HOOS/KOOS>50)	1.00	–	1.23	(0.75; 2.03)	**0.54**	**(0.31; 0.94)**	1.68	(0.86; 3.29)
Having a joint replacement	1.00	–	0.55*	(0.29; 1.05)	**2.32**	**(1.28; 4.18)**	0.80	(0.37; 1.73)
Experience with healthcare for knee/hip complaints	1.00	–	0.93	(0.58; 1.51)	1.39	(0.80; 2.44)	**2.03**	**(1.05; 3.90)**
Model fit								
Log-likelihood	−4,185.39							
AIC	1.088							
BIC	1.113							

Bold = statistically significant at 5% level.
* = Statistically significant at 10% level.
Abbreviations: OR = odds ratio compared to the reference level of the attribute; SE = standard error; CI = confidence interval; ref. Level = reference level; ASC = alternative specific constant.
Note: The ASC was statistically significant in class three and 4, indicating that there could be a systematic tendency for patients in these classes to choose the alternative presented left. However, the ORs are relatively low compared to other variables in the model. Class one does not have coefficients in the class assignment model as this class is the reference category; class two to four are relative to class 1.

Table IV   Results of the latent class logit model of patients   Osteoarthritis and Cartilage

Discrete choice experiment

Table III presents the preferences of patients, healthcare providers, and insurance company employees (for utilities see Supplementary Table 5). In general, all ORs were statistically significant ($P < 0.05$), meaning that all attributes played a role in their decision for KHOA care. The signs (positive/negative) of the ORs of the attribute levels were on average similar for healthcare providers, insurance company employees, and patients, and had the a priori expected signs. That is, healthcare with low out of pockets costs, joint consultation by GP and orthopaedist with long duration, direct access to specialist equipment, short travel distances, and short waiting times. Participants preferred an orthopaedist alone during consultation instead of a GP alone (the reference category), and a joint consultation by GP and orthopaedist instead of a GP alone even more.

Figure 2 shows the relative importance of the attributes. Out of pocket costs were most important for patients and healthcare providers, relative to all other attributes. In contrast, insurance company employees found the healthcare providers during consultation most important. The duration of consultation was least important for patients and insurance company employees, while for healthcare providers this was waiting times.

Latent class analysis of patients

Four latent classes of patients' preference patterns were identified. The average probability that a patient belong to these classes was respectively 33.3%, 30.3%, 19.7%, and 16.7% (Table IV). The probability of patients to belong to a specific class depended on three patient characteristics: their disease-specific QoL, having a joint replacement or not, and their experiences with healthcare. Patients who belong to class one were used as the reference category and all attributes significantly influenced their preferences with the a priori expected signs, except for the duration of consultation. Patients without a joint replacement had a higher probability to belong to class two and a strong preference for low out of pocket costs. Patients with low disease-specific QoL and/or a joint replacement had a higher probability to belong to class three and a strong preference for an orthopaedist during consultation. The travel distance did not significantly influence their preferences. Patients who received healthcare for their knee or hip complaints previously had a higher probability to belong to class four and had a strong preference for direct access to specialist equipment and joint consultation by a GP and orthopaedist, while waiting time did not significantly influence their preferences. Only in this class, the duration of consultation significantly influenced their preferences. Fig. 3 shows the relative importance of the attributes relatively to
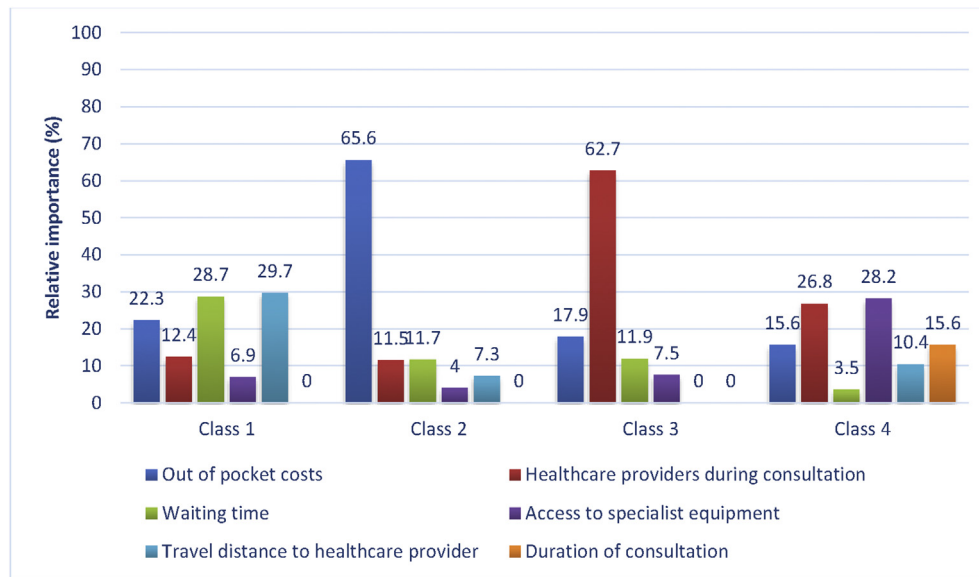
Fig. 3   Relative importance of the KHOA care attributes for patients, stratified by latent class.

all other attributes for patients to choose for KHOA care, stratified by latent class.

Willingness to wait

On average, patients were willing to wait the longest for their preferred healthcare provider(s) and direct access to specialist equipment. However, there were some differences between the four classes (Supplementary Table 6). Relatively to the other classes, patients who received healthcare for their knee or hip complaints previously (class 4) were willing to wait the longest for a joint consultation by a GP and orthopaedist, instead of a GP alone (31 weeks). They were also willing to wait the longest for direct access to specialist equipment (32.6 weeks). Patients with low disease-specific QoL and/or a joint replacement (class 3) were willing to wait almost as long for a joint consultation instead of a GP alone (20.5 weeks) than for an orthopaedist instead of a GP alone (21.07 weeks).

Discussion

Patients and healthcare providers valued low out of pocket costs the most, while insurance company employees valued the involved healthcare providers during consultation as most important. Moreover, insurance company employees and healthcare providers attached greater importance to the duration of consultation than most patients did. Patients without a joint replacement had a higher probability to prefer care with the lowest out of pocket costs. In contrast, patients with a joint replacement and patients with low disease-specific QoL had a higher probability to prefer care from an orthopaedist; they were willing to wait 21 weeks additional instead of a GP alone. Patients who already received healthcare for their complaints also had a high probability to prefer an orthopaedist during consultation, but were willing to wait the longest for a joint consultation (21 vs 31 weeks respectively). Furthermore, they had

the highest probability to prefer direct access to specialist equipment (willingness to wait of 33 weeks).

This is the first study that specifically investigated preferences for KHOA care focusing on aspects from various healthcare settings. Results from previous DCEs on OA care that included out of pocket costs as an attribute[16,19,21] correspond to our result that patients generally attach the greatest importance to low out of pocket costs. Furthermore, results from a previous observational study[41] showed that longer consultations are associated with better medical advice of the GP and more shared decision-making. This might explain why healthcare providers value the duration of consultation in the current study.

Previous studies have shown that a sample size of at least 40–100 respondents provides reliable parameter estimates in DCEs[42]. We reached at least these numbers and therefore provided reliable statistical analyses of our choice data. In our study, we identified patients' preferences, but also those of healthcare providers and insurance company employees. This information gives insight into the differences in preferences to tailor KHOA care better to patients' preferences, for example awareness of healthcare providers about the finding that patients value the duration of consultation less than they do. For optimal policy-making, insurance companies should be aware that out of pocket costs and healthcare providers are important factors for patients. Furthermore, the identified preference heterogeneity informs policy makers about the optimal and most preferred combination of characteristics of healthcare for more individualised KHOA care[15]. For example, for patients without a joint replacement who preferred a quickly accessible care joint consultation by GP and orthopaedist, the most suitable healthcare setting might be intermediate care with joint consultations. This healthcare setting may also prevent the existing hospital overuse and contribute to lower healthcare costs, since secondary care is generally more expensive[11].

One limitation of this study may be that we included people with self-reported KHOA and might deviate from the physician-

diagnosed KHOA patient population. However, respondents were screened using the same clinical criteria for KHOA as recommended by current guidelines[4,5]. Hence, we believe it has not influenced the validity of our results. Furthermore, preferences might be country-specific, as health systems and other structural factors such as geographical distribution of health services (e.g., travel distances) may differ across countries. Lastly, due to the low sample size of some subgroups, we were not able to perform subgroup analyses that could reveal additional information on preferences, such as preferences of patients with a joint replacement with complaints vs without complaints.

This study showed that patients who received healthcare for their knee or hip complaints previously and/or low disease-specific QoL and/or a joint replacement strongly preferred an orthopaedist during consultation. Since orthopaedist consultations are generally more expensive than GP consultations, future research in GPs with special interest may be valuable. Moreover, previous research showed that a substantial part of patients referred to secondary care could instead be seen by a GP with special interest[43]. Furthermore, further research is needed to gain better understanding of the rationale behind the revealed preferences. For example, the rationale behind our finding that most patients prefer care provided by an orthopaedist instead of a GP alone. Also, the results of this study cannot be interpreted as the best practice for KHOA care. Patients' preferences is just one aspect of care, and should be evaluated in relation to healthcare costs and health outcomes in further research[44].

Conclusions

In conclusion, KHOA care including joint consultations by GP and orthopaedist, and low out of pocket costs is most preferred. KHOA care can be optimised through more focus on: 1) care with low out of pocket costs for patients without joint replacement, 2) joint consultations and direct access to specialist equipment for patients who already received healthcare, and 3) consultation by an orthopaedist for patients with a joint replacement and/or with low disease-specific QoL. Results of this study can be used by policy makers and healthcare providers to choose the most optimal combination of more individualised healthcare for KHOA aligned to patients' preferences.

Author contributions

All authors developed the first idea for the DCE. IGA, RMR, and DS carried out the participants' recruitment and data-collection. IGA, SPIH, EBG, and DS carried out the statistical analysis. All authors gave their comments on the first and final version of this manuscript.

Conflict of interest

This work was supported by the Dutch health insurance company CZ. MCTP and MEPH contributed during their employment at the Dutch health insurance company CZ, but independently from the interests of the company. As such, the funders had no role in the study design, data collection and data analysis and interpretation and reporting of results.

Patient consent

Not required.

Ethics approval

The Medical Ethics Committee of the Erasmus MC assessed the research proposal and confirmed that the rules laid down in

Medical Research Involving Human Subjects Act do not apply to this research (MEC-2018-1076).

Appendix ASupplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.joca.2020.07.002.

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