CHAPTER 5

HEALTH CARE USE OF PATIENTS WITH OSTEOARTHRITIS OF THE HIP OR KNEE AFTER IMPLEMENTATION OF A STEPPED CARE STRATEGY: AN OBSERVATIONAL STUDY

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ABSTRACT

Objective

To enhance guideline-based non-surgical management of osteoarthritis (OA), a multidisciplinary stepped care strategy (SCS) has been implemented in clinical practice. This study aims to describe health care use after implementation of this strategy and identify factors related to such use at multiple levels.

Methods

For this 2-year observational prospective cohort, patients with symptomatic hip or knee OA were included by their general practitioner (GP). Activities, aligned to patients and health care providers, were executed to implement the strategy. Health care use was described as the cumulative percentage "users" for each modality recommended in the strategy. Determinants were identified at the level of the patient, GP, and practice using backward stepwise logistic multilevel regression models.

Results

313 patients were included by 70 GPs of 38 practices. Their mean +/- SD age was 64 +/- 10 years, 120 (38%) were male. The most frequently used modalities were education, acetaminophen, lifestyle advice, and exercise therapy, which were used by 242 (82%), 250 (83%), 214 (73%), and 187 (63%) patients respectively. Fourteen percent of the overweight patients reported being treated by a dietician. Being female, having an active coping style, using the self-management booklet "Care for Osteoarthritis", and having limitations in functioning were recurrently identified as determinants of health care use.

Conclusion

After implementation of the SCS, most recommended non-surgical modalities seem to be well used. Health care could be further improved by providing dietary therapy in overweight patients and making more effort to encourage patients with a passive coping style to use non-surgical modalities.

Significance and innovations

- This is the first study to describe health care use and its determinants at the level of the patient, physician, and organization after active implementation of a SCS for the management of hip or knee OA in clinical practice.
- Non-surgical evidence-based treatment modalities, which are recommended in the SCS, seem to be well used after implementation of this strategy.
- Variance in health care use is mainly located at the patients' level and hardly at the level of the GP or general practice.
- Health care use could be further improved by providing dietary therapy in overweight patients and encouraging patients with a passive coping style to use non-surgical modalities.

Introduction

Despite the availability of several guidelines about the management of hip or knee osteoarthritis (OA)[1-3], quality of OA care remains suboptimal in terms of effectiveness, timeliness and appropriateness, and efficiency.[4] In an initiative to improve the quality of care, a multidisciplinary patient-centered stepped care strategy (SCS) has been developed, named BART (i.e. Beating osteoARThritis).[5] This strategy presents the optimal sequence for care in three steps, is based on recommended modalities in guidelines, and considers advanced treatment modalities only if the options listed in the previous steps failed to produce satisfactory results. At each step, recommendations for diagnostic procedures, non-surgical treatment modalities (both advised and optional), and length of treatment before evaluation are made (Table 1).

Table 1. Summary of the SCS-recommendations in each step[5]

	Step 1	Step 2	Step 3
Diagnostic procedures and assessment	- Medical history and physical examination - Assessment function and activity limitations - Setting mutual goals	- Radiological assessment* - Assessment of pain coping and psychosocial factors - Adjust goals	- Consultation specialist - Adjust goals
Treatment modalities	- Education (regarding the disease, treatment modalities, and prognosis) - Lifestyle advice (regarding exercise, weight reduction, and prevention of overload) Medication - Acetaminophen - Glucosaminesulphate	- Exercise therapy - Dietary therapy (i.e. counselling by a dietician) if overweight† Medication - (topical) NSAIDs - Tramadol	- Multidisciplinary care - TENS Medication - Intra-articular injections
Evaluation	After 3 months‡	After 3-6 months‡	Patient sets interval

The SCS recommends all advised step-1 modalities to patients with symptomatic hip or knee OA. Only if these modalities lead to unsatisfactory results, modalities of the subsequent steps should be advised. The SCS recommends, explicitly, to evaluate treatment goals in interaction with the patient after a preset period of time.
Abbreviations: SCS = Stepped Care Strategy, NSAIDs = Non-Steroidal Anti-Inflammatory Drugs, TENS = Transcutaneous Electrical Nerve Stimulation.

* If there is a discrepancy between medical history and physical examination.

† According to the definition overweight of the Zorgstandaard obesitas NL 2010: Body Mass Index > 25kg/m^2.

‡ Or earlier if the symptoms persist or increase.

It is expected that implementation of the SCS in clinical practice will reduce underutilization of non-surgical treatment modalities and inadequate use of medication or diagnostic procedures. In preparation of a nation-wide implementation, assessment of the feasibility of the implementation on a limited scale is needed.[6,7] Therefore, first an observational study was conducted in one region in the Netherlands, aiming to assess the health care use of patients with hip or knee OA after implementation of the SCS in clinical practice. This implementation was focused on all different disciplines involved in OA care, while this study focuses particularly on the health care use of patients visiting their general practitioner (GP) as the core treatment is mainly delivered in general practice.

Although health care use of patients with hip or knee OA has been studied before, no study has identified its determinants at the different levels, i.e. the patient, physician, and organization, after active implementation of the SCS. A comprehensive insight in the factors related to health care use can be used to define the potentially most effective tailored implementation strategy. Previously identified factors related to health care use in hip or knee OA included coping style, health insurance, limitations in functioning, and number of comorbidities.[8-11] So far, no studies are available describing determinants at the level of the GP or general practice. Therefore, we based the operationalization of these factors on studies describing determinants of physician adherence to guidelines and determinants that may facilitate or impede introduction of innovations in clinical practice.[12,13]

Given the lack of insight into barriers and facilitators for optimal health care use in hip or knee OA, the aim of this study was twofold: 1) to describe health care use of patients with hip or knee OA after implementation of the SCS and 2) to identify factors related to this health care use at the level of the patient, GP, and general practice.

Methods

This 2-year observational prospective cohort study was executed from August 2010 to March 2013 in the region Nijmegen, The Netherlands. GPs of the Nijmegen University Network of General Practitioners (NUHP) were invited to implement the SCS and to participate in the study. Patients were recruited by their GP. GPs received two questionnaires (at baseline and two months after the inclusion period) and patients received 5 biannual questionnaires by mail. GPs were reminded by email and by phone if required. Patients were reminded by letter and by phone. The study was approved by the Medical Ethics Committee on Research Involving Human Subjects (CMO) Regio Arnhem-Nijmegen (approval number: CMO 2009/246).

Study population

General practitioners

The members of the NUHP were informed by their board before they were invited by phone by one of the researchers. This network consists of 157 GPs working in 70 general practices and is associated with the department of primary and community care of the

Radboud University Nijmegen In addition, 6 practices outside this network were approached. Practices with GPs expressing willingness to participate were visited by the principal investigator to receive additional information.

Patients

Individuals were eligible to participate in the study if they visited their GP with a new episode of hip or knee complaints due to symptomatic hip or knee OA, but only if they had not visited their GP for the same condition during the preceding 3 months, and if they were aged 18 years or older. Exclusion criteria were: a joint replacement procedure for hip or knee in the history or on the waiting list for it, or inability to complete the questionnaire due to language barriers or terminal illnesses.

Patients were recruited in two different ways: First, consecutive patients visiting their GP and being eligible received information about the study from their GP. After the consultation, patients were contacted by one of the researchers by telephone and decided whether or not to participate. Second, patients were recruited after an extraction from GP-records based on the coded diagnoses of hip or knee OA, i.e. L89 or L90 according to the International Classification of Primary Care (ICPC) in the preceding 6 months. These patients received an invitation letter from their GP and, if interested, were contacted by one of the researchers.

Implementation activities

A regional implementation advisory board, consisting of a patient representative and nine experts representing the main disciplines involved in OA care, i.e. two GPs, one practice nurse, one physical therapist, one dietician, one rheumatologist, one orthopaedic surgeon, and two researchers, was set up to agree on implementation activities aligned to patients as well as different health care providers. The format and content of these activities were based on previous implementation studies in related research fields describing the effectiveness of different types of interventions.[7,14-19] Grol et al. have presented an overview of effective implementation strategies that can target knowledge, attitude, and motivation in different phases of the change process.[18] The expert panel selected those activities that were also considered suitable to integrate in the existing routines of the Dutch health care system. For example, we used patient education in the form of a self-management booklet "Care for Osteoarthritis" (in Dutch: "Zorgwijzer Artrose©")[20] and education outreach visits at general practices. The interventions described in Table 2 were executed from May 2010 till July 2012.

Questionnaires

General practitioners' questionnaire

GPs received two questionnaires; a short baseline questionnaire to assess demographics and practice characteristics and a second questionnaire which was based on a cross-sectional study on GPs' agreement with the SCS.[21] In this study, we collected data regarding their organization of OA care and attitudes about OA management and the SCS.

Table 2. Executed multifaceted implementation activities to implement the SCS in clinical practice

Target group	Activity	Description
Patients	Education material	All 313 participating patients received the self-management booklet "Care for Osteoarthritis"[20] from their GP or from one of the researchers. This booklet is developed for patients with hip or knee OA to provide information about OA and the non-surgical treatment modalities (according to the SCS) and provides tools to enhance patients' active role and the communication with health care providers (see for more detailed information about this booklet in Cuperus et al., submitted).
	Reminder material	All 313 participating patients were sent information about the booklet "Care for Osteoarthritis" and SCS in the form of newsletters and postcards.
General practitioners	Education outreach visits	One of the researchers visited the 38 participating general practices to inform the GPs about the SCS, the self-management booklet "Care for Osteoarthritis", and the study.
	Education material	The 70 participating GPs received information material, a flyer, and pocket card about the SCS on several occasions during the study period.
	Seminar	The 70 participating GPs and over another 1000 GPs in the city-region Nijmegen were personally invited for a seminar about OA with interactive workshops. Twenty physicians attended the seminar. Six of the physicians were participating GPs.
	Reminder material	The 70 participating GPs were reminded about the SCS and the study in the form of equivalent data and postcards.
Rheumatologists and orthopaedic surgeons	Education outreach visits	The heads of 26 departments' orthopedics and rheumatology in the city-region Nijmegen received an invitation for an education outreach visit. Sixteen of the 26 heads of these responded to the invitation for an educational outreach visit. Of those, 6 heads of the departments' orthopedics and 4 heads of the departments' rheumatology were interested and, thus, were visited by one of the researchers for an educational outreach visit.
	Reminder material	The heads of these 26 departments also received similar reminder materials as the participating GPs.
Physical and exercise therapists and dieticians	Education material	Regional societies for physical therapists of the Royal Dutch Society for Physical Therapy (KNGF), exercise therapists of the Dutch Association of Cesar and Mensendieck Exercise Therapists (VvOCM), and dieticians of the Dutch Dietetic Association (NVD) were approached to inform their members about the SCS, the self-management booklet "Care for Osteoarthritis", and the study on their websites and by mail.
	Seminar	About 400 physical and exercise therapists in the city-region Nijmegen were also invited to the seminar about OA. Seventy-three physical therapists attended the seminar.

Abbreviations: SCS = Stepped Care Strategy, GP = General Practitioner, OA = Osteoarthritis.

- **Demographics and practice characteristics** concerned age, sex, and how long working in practice. Moreover, one of the GPs of each practice was asked to answer the following additional questions regarding their general practice; practice type (group/duo/solo), and practice location (rural/suburban/urban).
- **Organization of OA care** was assessed on the involvement of practice nurses in the OA care in their setting (yes/no) and the type of collaboration with other health care providers, i.e. physical and exercise therapists, dieticians, rheumatologists, or orthopaedic surgeons. We considered the collaboration "structural" if the GP reported at least one of the two following types: 1) participation in periodic meetings concerning individual patients with OA or 2) following protocols or agreements concerning specific working procedures to treat patients with OA.
- **Attitude regarding OA management** included GPs' special interest in musculoskeletal disorders (yes/no), their attendance at the educational outreach visit (yes/no), and their attitude concerning the self-management booklet "Care for Osteoarthritis" with the question: "Would you recommend the booklet" (Yes, certainly/yes, probably/no, probably/no, certainly).
- **Attitude regarding the SCS** was assessed using 3 indices. One index concerned GPs' attitudes regarding the effectiveness of all advised and optional modalities of the SCS. The second index concerned GPs' attitudes regarding non-recommended modalities (such as massage, manual therapy, and laser therapy). Both indexes were scored on a 4-point Likert scale (ranging from 0 to 3 in which 3 is "effective"). Finally, we calculated an index regarding GPs' agreement with 7 recommendations of the SCS (ranging from 0 to 4 in which 4 is "totally agreed").

Patients' questionnaire

Patients received a questionnaire each 6 months, i.e. at baseline (T_0), after 6 months (T_6), after 12 months (T_{12}), after 18 months (T_{18}), and after 24 months (T_{24}), which included socio-demographics and health characteristics (at T_0), disease-related factors and health care use (at T_0, T_6, T_{12}, T_{18}, and T_{24}), and psycho-social factors (at T_0, T_{12}, and T_{24}).

- **Socio-demographics and health characteristics** included age, sex, weight and length, level of education (low/medium/high), household composition (alone/with partner/with partner and children/with children with others), employment (paid work/no paid work), health insurance (basic/basic with additional coverage), and residence (rural/suburban/urban). The number of important comorbidities (ranging from 0 to 15) according to the Dutch Arthritis Impact Measurement Scales,[22] i.e. diabetes, stroke, myocardial infarction, cancer, severe heart insufficiency, migraine, high blood pressure, peripheral or abdominal arterial disease, asthma or chronic obstructive pulmonary disease, psoriasis, chronic eczema, dizziness with falling, severe intestinal problems > 3 months, incontinence, and chronic inflammation of the joint, was calculated.

- **Disease-related factors** included the location (i.e. hip, knee, and other joints such as feet, ankles, hands, elbows, shoulders, wrist, back, and neck) and number of painful joints and the duration of hip or knee symptoms (<1 year/1-5 years/5-10 years/> 10 years ago). Pain and limitations in activities were assessed with the Western Ontario McMaster University Index of osteoarthritis (WOMAC).[23] Standardized scores, ranging from 0 to 100, were used where higher scores reflect better health status.
- **Health care** use was assessed by asking the patients at baseline and after each period of 6 months which treatment modalities they had used in the preceding 6-months period related to their hip or knee symptoms. The list of modalities was based on the recommended modalities of the SCS. These non-validated questions were pilot-tested regarding the readability and comprehensiveness in 10 patients with OA by one of the researchers (AS). The use by the patient of the self-management booklet "Care for Osteoarthritis" was assessed at T_6 by the question; "Do you use the booklet?" (Yes, regularly/yes, occasionally/yes, but not in the past six months/no, never).
- **Psycho-social factors**, i.e. self-efficacy and active pain coping, were assessed with validated questionnaires; the Dutch General Self Efficacy Scale (DGSS)[24] and Pain Coping Inventory List (PCI)[25] respectively. Higher scores on the DGSS, ranging from 10 to 40, reflect higher self-efficacy. Higher score on the subscale active coping, ranging from 12 to 48, indicates more use of an active coping style.

Statistical analyses

Differences between groups were analyzed using the chi-square test and the t-test or Mann-Whitney U test when appropriate. Nine variables with over 5% missing cases were found. These variables mainly concerned GP characteristics.

Health care use

For each modality, the cumulative percentage "users" was calculated. We considered the patient as a user, if the patient reported having used that particular modality in one of the preceding time periods. If more than 30% of the items (i.e. values on two or more time periods) was missing, the scores were treated as missing. Furthermore, we considered referral to a dietician only applicable in overweight patients (if Body Mass Index > 25kg/m^2).

Determinants of health care use

Previously identified determinants of health care use at the level of the patient were selected and categorized according to the Andersen's Behavioral Model of Health Care.[26] This commonly-used model divides factors into predisposing, enabling, and disease-related factors. As there are no previously identified determinants at the level of the GP or practice, we selected determinants that were identified in related research fields; i.e. physician adherence to guidelines and influencing factors of a successful introduction of innovations

in clinical practice. GP-related and practice-related factors were categorized into individual, social, and organizational factors.[12,13] Potential determinants are shown in Table 3.

We assessed the determinants of the most frequently used recommended treatment modalities. Given the hierarchical structure of the dataset, i.e. patients (level 1) were nested in the sample of GPs (level 2), who are nested in general practices (level 3), logistic multilevel regression models were built. Missing data were imputed using switching regression, which is an iterative multivariable regression technique, to preserve power and obtain less biased results.[27]

Considering that the number of determinants in the models would be likely to lead to overfitting,[28] we selected the most important determinants before fitting the final model. For this selection procedure we divided the variables in 3 blocks. One block included the predisposing and enabling factors, another block included the disease-related factors, and a third block included the GP-related and practice-related variables. In the case that two variables were highly correlated (correlation greater than 0.8), only one was entered in the model. Subsequently, the most important variables within each block were selected using backward stepwise regression models based on 5 imputed datasets (in each step, a variable was removed if there was no deterioration in fit using the -2log likelihood). The overall final model then consisted of entering the selected variables simultaneously from each of the three blocks and was based on 20 imputed datasets combined using Rubin's rules.[29,30] If necessary, the final model was reduced to the maximum allowable number of variables using also backward stepwise regression. The relative contribution of each determinant selected in the previous steps, corrected for all other selected variables, was expressed in an odds ratio with 95% confidential interval (CI). Statistical analyses were executed using STATA/IC 10.1 software (StataCorp LP, College Station TX).

Results

Participants

General practitioners

Of the 76 approached practices, 40 (53%) expressed their willingness to participate. The main reasons not to participate were "lack of time" (n=30), "not interested" (n=3), "no response" (n=2), and "retired" (n=1). Seventy GPs in 38 different practices included patients for this study.

Patients

The GPs identified 528 patients as eligible. Eighty-three patients (16%) were excluded by one of the researchers because they did not meet the eligibility criteria (Figure 1). Another 132 patients (25%) did not participate of which 76 patients were not interested, 48 patients gave no reason, and 8 patients reported another reason not to participate. In total, 313 patients (59%) were included in the study of which 29 patients (9%) were lost to follow-

Table 3. Baseline characteristics, unless otherwise specified, of patients, their general practitioners, and the general practice

Baseline characteristics	Value		Missing values (n)
Patient-related factors (n=313)			
Predisposing factors			
- Age, years; mean (SD)	64	(10)	0
- Sex, male; n (%)	120	(38)	0
- Overweight, BMI>25kg/m2; n (%)	218	(71)	4
- Number of comorbidities (range 0-15); median (IQR)	2	(1-3)	0
- Education, higher education; n (%)	37	(20)	126
- Employed, paid work; n (%)	96	(31)	1
- Self efficacy (range 10 to 40)*; mean (SD)	31	(5)	8
- Active pain coping (range 12 to 48)†; mean (SD)	26	(6)	8
- Used the booklet, at 6 months; n (%)	182	(61)	16
Enabling factors			
- Health insurance, with additional coverage; n (%)	282	(91)	2
- Household composition, with partner; n (%)	229	(73)	1
- Residence, rural; n (%)	194	(62)	1
Disease-related factors			
- Location			
- Hip; n (%)	159	(51)	0
- Knee; n (%)	246	(79)	0
- Number of painful joints (range 0-9); median (IQR)	1	(1-3)	0
- Duration of symptoms, > 1 year; n (%)	247	(79)	1
- WOMAC pain (range 0-100)‡; mean (SD)	62	(22)	8
- WOMAC functioning (range 0-100)‡; mean (SD)	64	(21)	12
GP-related factors (n=70)			
Individual factors			
Demographics			
- Age, years; mean (SD)	49	(9)	4
- Sex, male; n (%)	51	(73)	0
- Length of time working, years; median (IQR)	17	(10-25)	4
Attitude and behavior (at 2 months)			
- Special interest in MSD; n (%)	6	(10)	12
- Present at educational outreach visit; n (%)	38	(54)	0
- Would recommend the booklet; n (%)	42	(79)	17
- Effectiveness recommended modalities (range 0-3); mean (SD)	1.8	(0.3)	12
- Effectiveness non-recommended modalities (range 0-3); mean (SD)	1.0	(0.5)	18
- Agreement with SCS statements (range 0-4); mean (SD)	3.0	(0.3)	12
Social factors (at 2 months)			
- Practice nurse involved in OA management; n (%)	13	(22)	12
- Structural collaboration with other disciplines; n (%)	20	(34)	12
Practice-related factors (n=38)			
Organizational factors			
- Practice type, solo; n (%)	6	(17)	3
- Location practice, rural; n (%)	23	(61)	0

up; 13 due to a (terminal) illness, 9 were not interested in the study anymore, 4 due to an incorrect diagnosis of OA, and 3 due to other reasons.

Baseline characteristics

The baseline characteristics of the patients (n=313), their GPs (n=70), and their general practices (n=38) are shown in Table 3. Eighty-eight patients (28%) were recruited by their GP during their consultation and 225 patients (72%) were recruited after extraction from GP-records. Patients who were recruited during their consultation reported less comorbidities than the patients who were recruited from GP-records (median 1 (Interquaritile range (IQR) 1-2) versus median 2 (IQR 1-3); $P<0.05$ by Mann-Whitney U test. Moreover, more patients who were recruited during their consultation reported having symptoms of hip or knee OA for at least 1 year compared with the patients who were recruited from GP-records; n (%)=62 (71%) vs 185 (82%), $P<0.05$ by Mann-Whitney U test.

Health care use

The most frequently used modalities were education, acetaminophen, lifestyle advice, exercise therapy, and NSAIDs (Figure 2). The cumulative percentage users of all modalities gradually increased during the study period. After two years, step-1 modalities i.e. education, acetaminophen, lifestyle advice, and glucosamine were used by 242 (82%), 250 (83%), 214 (73%), and 95 (34%) patients respectively. Step-2 modalities, i.e. exercise therapy, NSAIDs, consultation with a dietician (if overweight), and tramadol, were reported by 187 (63%), 155 (54%), 27 (14%), and 43 (15%) patients. Step-3 modalities, e.g. intra-articular injections and multidisciplinary care, were reported by 65 (23%) and 23 (8%) patients. Consultation in secondary care in the first time period (T_0-T_6), e.g. with an orthopaedic surgeon or rheumatologist, was reported by 67 (21%) and 25 (8%) patients. After two years, these numbers increased to a total of 129 (45%) and 45 (16%) patients. After 6, 12, 18, and 24 months, the cumulative percentages of surgical procedures were 16 (5%), 28 (10%), 39 (14%), and 49 (18%) patients respectively.

Table 3:

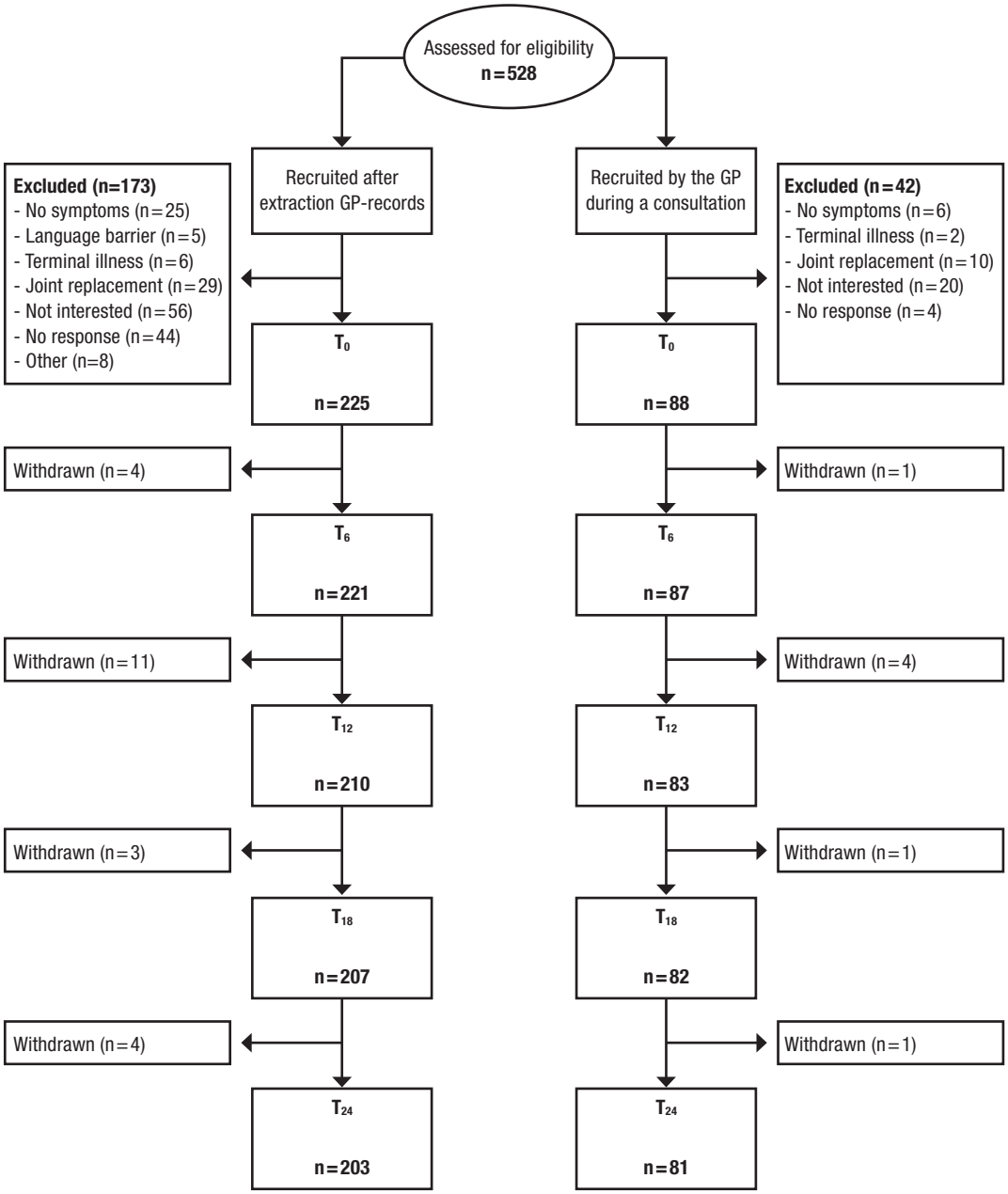
Abbreviations: n=Number, SD=Standard Deviation, BMI=Body Mass Index, IQR=Interquartile Range, WOMAC=Western Ontario McMaster University Index of Osteoarthritis, GP=General Practitioner, MSD=Muscular Skeletal Disorder, SCS=Stepped Care Strategy, OA=Osteoarthritis.

* Higher scores reflect higher self-efficacy.

† Higher score indicates more use of an active coping style.

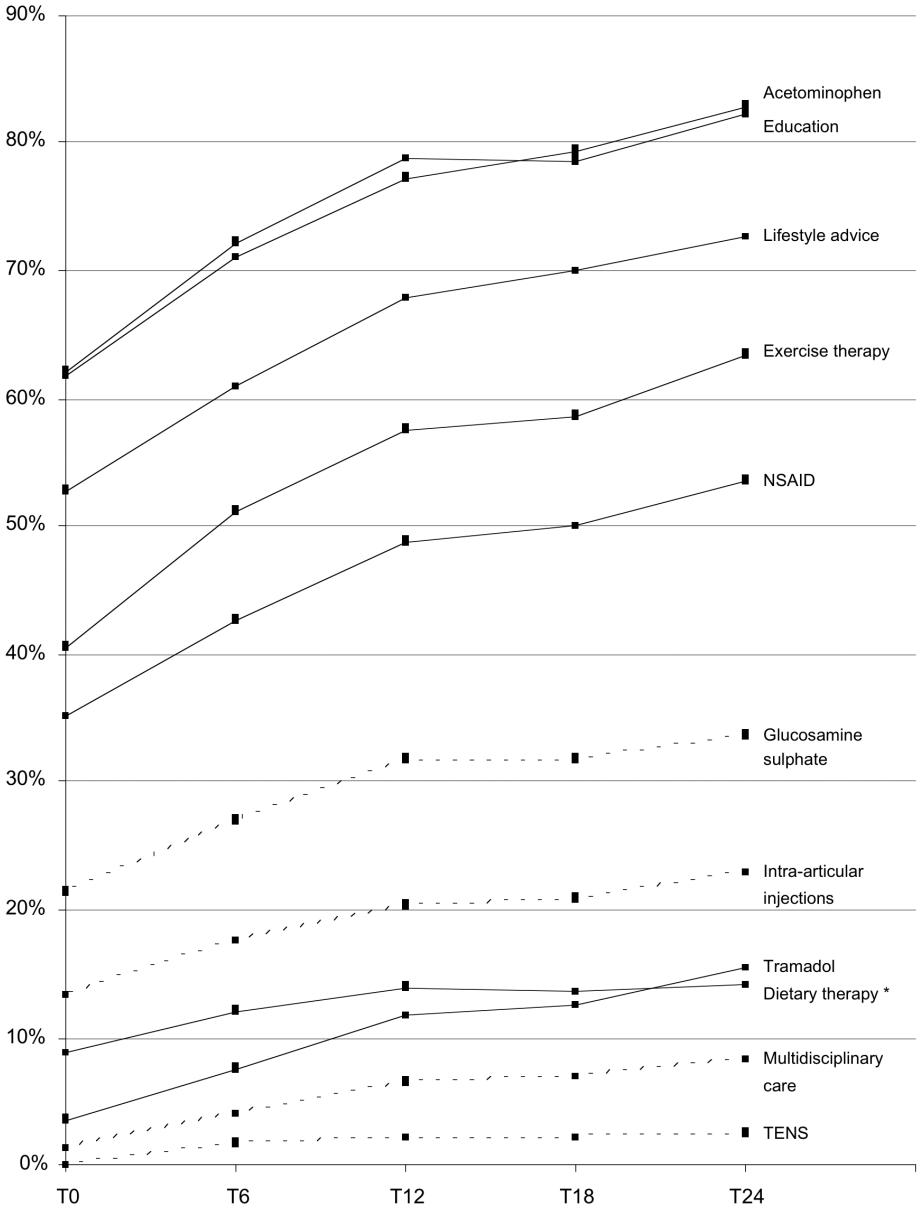
‡ Standardized scores were used where higher scores reflect better health status.

Figure 1. Number of patients participating during the study



Abbreviations: n=Number, T_0=baseline, T_6=6 months, T_{12}=12 months, T_{18}=18 months, T_{24}=24 months.

Figure 2. Percentage cumulative health care users in patients with a new episode of symptomatic hip or knee osteoarthritis per treatment modality



Abbreviations: OA = Osteoarthritis, NSAIDs = Non-Steroidal Anti-Inflammatory Drugs, TENS = Transcutaneous Electrical Nerve Stimulation, T_0 = baseline, T_6 = 6 months, T_{12} = 12 months, T_{18} = 18 months, T_{24} = 24 months. Solid lines show advised modalities and the dotted lines show optional modalities of the stepped care strategy.
* Dietary therapy if overweight (Body Mass Index > 25kg/m^2).

Determinants of health care use

We assessed the determinants of health care use in those modalities that were used by more than 50% of the patients, i.e. acetaminophen, education, lifestyle advice, exercise therapy, and NSAIDs. The determinants WOMAC pain, GPs' age, and location of the practice were not included as they were highly correlated with WOMAC functioning, GPs' working years, and patients' residence respectively.

The variances in use of all assessed treatment modalities located at the level of the GP ranged from <0.01% (for use of NSAIDs) to 7.32% (for the use of acetaminophen). The variances at the level of the general practice were <0.01% for all five modalities. Thus, the variances in health care use were mainly located at the patients' level (ranging from 93% to 100%). Sixteen variables were selected as important determinants for at least one of the treatment modalities, of which 11 determinants (69%) were found at the level of the patient (Table 4). Having an active coping style, using the self-management booklet "Care for Osteoarthritis", and having limitations in functioning were identified as determinants for more than one modality. Four GP characteristics and one practice characteristic were identified as determinants of health care use for one of the modalities (either for education, lifestyle advice, or acetaminophen), i.e. not being present at the education outreach visit, not recommending the booklet, having a positive attitude regarding the effectiveness of recommended modalities, having a positive attitude regarding the effectiveness of non-recommended modalities, and not working in a solo practice.

Discussion

This study comprehensively describes the health care use of patients with hip or knee OA after implementation of the SCS in clinical practice and its determinants at multiple levels, i.e. the level of the patient, GP, and general practice. Our results indicate that the use of health care in the first two years after a consultation for a new episode of hip or knee complaints was in line with that recommended in the SCS; education, lifestyle advice, acetaminophen, and exercise therapy were used by the great majority of the patients. However, dietary therapy was found to be relatively underutilized, as only 1 out of 6 overweight patients reported being treated by a dietician. A notable high number of patients was referred to secondary care. Variance in health care use was mainly located at the patients' level. Also, most determinants of the use of education, lifestyle advice, acetaminophen, exercise therapy, and NSAIDs were found at the patients' level. In particular, being female, having an active coping style, using the self-management booklet "Care for Osteoarthritis", and having limitations in functioning were recurrently identified as determinants.

Table 4. Logistic multilevel regression analysis of predictors of the use of different treatment modalities in patients with symptomatic hip or knee osteoarthritis

	Education Yes (n=242)/No (n=52)			Lifestyle advice Yes (n=214)/No (n=81)			Acetaminophen Yes (n=250)/No (n=52)			Exercise therapy Yes (n=187)/No (n=108)			NSAIDs Yes (n=155)/No (n=134)		
	OR	(95% CI)	*P*-value	OR	(95% CI)	*P*-value	OR	(95% CI)	*P*-value	OR	(95% CI)	*P*-value	OR	(95% CI)	*P*-value
Patient-related factors															
Predisposing factors															
- Sex, male							0.58	(0.28-1.19)	0.14				0.75	(0.44-1.30)	0.31
- Overweight, >25kg/m^2													1.45	(0.80-2.62)	0.22
- Education, higher education										0.29	(0.13-0.65)	0.00			
- Employed, paid work															
- Self efficacy (range 10-40)*	0.95	(0.89-1.01)	0.11												
- Active pain coping (range 12-48)†				1.05	(1.00-1.10)	0.06	1.01	(0.95-1.08)	0.67				1.04	(0.99-1.09)	0.15
- Used the booklet, at 6 months				2.19	(1.27-3.76)	0.01				1.93	(1.12-3.34)	0.02			
Enabling factors															
- Health insurance, with additional coverage										2.53	(1.02-6.28)	0.05			
- Household composition, with partner													2.58	(1.32-5.05)	0.01
Disease-related factors															
- Location, hip							2.54	(1.17-5.51)	0.02						
- WOMAC functioning (range 0-100)‡	0.98	(0.97-1.00)	0.05	0.99	(0.98-1.01)	0.35	0.94	(0.92-0.97)	0.00	0.98	(0.97-0.99)	0.00	0.97	(0.95-0.98)	0.00
GP-related factors															
Attitude and behavior (at 2 months)															
- Present at educational outreach visit							0.45	(0.17-1.19)	0.11						
- Would recommend the booklet	0.32	(0.11-0.92)	0.04												
- Effectiveness recommended modalities	3.62	(0.97-13.5)	0.06												
- Effectiveness non-recommended modalities				1.85	(1.05-3.25)	0.03									
Practice-related factors															
Organizational factors															
- Practice type, solo	0.43	(0.19-0.98)	0.04												

Abbreviations: n=Number (at 24 months), OA=Osteoarthritis, NSAIDs=Non-Steroidal Anti-Inflammatory Drugs, OR=Odds Ratio, CI=Confidence Interval, WOMAC=Western Ontario McMaster University Index of Osteoarthritis, GP=General Practitioner, MSD=Muscular Skeletal Disorder, SCS=Stepped Care Strategy.

* Higher scores reflect higher self-efficacy.

† Higher score indicates more use of an active coping style.

‡ Standardized scores were used where higher scores reflect better health status.

Although most recommended modalities seem to be frequently used, our results provide starting points to further optimize the health care use. The determinants that were found in this study provide possible explanations for the non-use of these modalities: for example, an active coping style and using the self-management booklet "Care for Osteoarthritis" were positively associated with utilization of recommended treatment modalities. This is in line with previous findings that show a positive association between an active coping style and health care use.[8] Possibly, GPs could make more efforts to encourage patients with a passive coping style to use non-surgical treatment modalities and use behavioral approaches like motivational interviewing to encourage patients to self-manage their disease. The self-management booklet "Care for Osteoarthritis" could be a helpful tool.

Another possible target for improvement is to offer patients guidance in reducing weight by a dietician, as only 14% of the overweight patients reported to have had dietary therapy within two years after a consultation for a new episode of hip or knee complaints. The impact of weight reduction on patients' symptoms has been well demonstrated in a meta-analysis that shows a significant reduction in disability if patients achieve 5% weight loss (effect size=0.34).[31] Providing GPs and patients with the knowledge that modest changes in weight improve symptoms in OA could possibly enhance implementation of weight reduction efforts. Previous research findings show that only a minority of overweight patients recall receiving lifestyle advice from their GP.[32] As weight reduction is very difficult to achieve and to maintain, we recommend that patients should be encouraged to get structured guidance in achieving weight loss, which is in line with the OARSI recommendation that patients with hip OA should be encouraged to lose weight and maintain their weight a lower level (level of evidence IV).[3]

To our knowledge this is the first study on determinants of health care use in OA which takes different levels into account. Interestingly, the variance in health care use was almost entirely located at the patients' level. GP-related determinants of use of non-surgical treatment modalities included a positive outcome expectancy on SCS-recommended treatment modalities, not being present at the educational outreach visit, and not recommending the booklet. The outcomes of the latter two determinants were not as expected. It is possible that those GPs who were confident in providing the optimal care for patients with OA, were less likely to have attended the visits and use materials and that, thus, these factors reflect self-confidence regarding OA management. However, those factors were not consistently found across the treatment modalities and, thus, might have been found by chance.

This study is not without its limitations. First, it is an observational prospective study and, not a randomized controlled trial in which we could give statements about the efficacy of implementation activities. However, our design allowed us to identify useful and practical targets to improve health care use in patients with OA. Second, the uptake of several implementation activities seems to be poor, as 9% of the participating GPs and 18% of the invited physical/exercise therapists were present at the seminar and 38% of the heads of the rheumatology and orthopaedic departments were visited for an educational outreach

visit. When implementing the SCS nationwide, these GP-oriented activities need to be reconsidered. However, the simultaneous use of different implementation activities might have contributed to a greater reach of the target population. Third, GPs in our study sample may have been more interested and dedicated in OA and/or guideline-consistent clinical practice (after the implementation of the SCS) than the average GP in the Netherlands. This might affect the generalizability of our study findings. Fourthly, we do not have data concerning health care use before the implementation. As a result, our study design does not allow inferences about changes in provision of health care after implementation of the SCS. Further research is necessary to study the impact of implementation of the SCS on health care use and its outcomes. Furthermore, characteristics of health care providers other than GPs were not taken into account. Finally, the power of this study was not sufficient to assess all determinants. However, we found a good alternative to preselect the potential determinants first within content-matter motivated blocks using backward regression models.

In conclusion, after implementation of the stepped care strategy for the management of hip or knee OA, most recommended evidence-based non-surgical treatment modalities seems to be well used. Health care use could be further optimized in patients with a relatively passive coping style and by providing dietary therapy in overweight patients.

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