
CHAPTER 6

NON-SURGICAL CARE IN PATIENTS WITH HIP OR KNEE OSTEOARTHRITIS IS MODESTLY CONSISTENT WITH A STEPPED CARE STRATEGY AFTER ITS IMPLEMENTATION

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Objective

To improve the management of hip or knee osteoarthritis (OA), a stepped care strategy (SCS) has been developed that presents the optimal sequence for care in three steps. This study evaluates the extent to which clinical practice is consistent with the strategy after implementation and identifies determinants of SCS-consistent care.

Design

Two-year observational prospective cohort study.

Setting

General practices in the region of Nijmegen in the Netherlands.

Participants

313 patients with hip or knee OA and their general practitioner (GP).

Interventions

Multifaceted interventions were developed to implement the SCS.

Main outcome measures

Consistency between clinical practice and the strategy was examined regarding three aspects of care: 1) timing of radiological assessment, 2) sequence of non-surgical treatment options, 3) making follow-up appointments.

Results

Out of the 212 patients who reported to have had an X-ray, 92 (44%) received it in line with the SCS. The sequence of treatment was inconsistent with the SCS in 58% of the patients, which was mainly caused by the underuse of lifestyle advice and dietary therapy. In 57% of the consultations, the patient reported to have been advised to make a follow-up appointment. No determinants that influenced all three aspects of care were identified.

Conclusions

Consistency with the SCS was found in about half of the patients for each of the three aspects of care. Health care can be further optimized by encouraging GPs to use X-rays more appropriately and to make more use of lifestyle advice, dietary therapy, and follow-up appointments.

Introduction

In the Netherlands, the multidisciplinary patient-centered stepped care strategy (SCS), named BART (i.e. Beating osteoARThritis), has been developed to improve the quality of care in patients with hip or knee osteoarthritis (OA).¹ A stepped care approach has been suggested to improve the management of a heterogeneous chronic disease like OA.² The SCS presents the optimal sequence for care in three steps, is based on recommended modalities in guidelines, and considers the sequence as optimal if all the (advised) modalities in the previous steps have been offered to the patient before the more advanced modalities in the subsequent steps. At each step, recommendations included three aspects of care, i.e. diagnostic procedures, non-surgical treatment modalities (both advised as optional), and the monitoring of treatment (Table 1).

The main SCS-recommendations regarding these three aspects are: 1) *Radiological assessment is only advised if treatment modalities of the first step (information, lifestyle advice, and acetaminophen) failed to produce satisfactory results.* This recommendation has been based on the fact that X-rays have limited additional value in the diagnostics, particularly in the early stages of the disease.^{3,4} 2) *More advanced treatment modalities are only advised if modalities of the previous steps have failed to produce satisfactory results.* In this way, the SCS describes the optimal use of the available evidence-based non-surgical treatment modalities.⁵

Table 1. Summary of the SCS-recommendations in each step¹

	Step 1	Step 2	Step 3
Diagnostic procedures and assessment	<ul style="list-style-type: none"> - Medical history and physical examination - Assessment function and activity limitations - Setting mutual goals 	<ul style="list-style-type: none"> - Radiological assessment* - Assessment of pain coping and psychosocial factors - Adjust goals 	<ul style="list-style-type: none"> - Consultation specialist - Adjust goals
Treatment modalities	<ul style="list-style-type: none"> - Education - Lifestyle advice <p>Medication</p> <ul style="list-style-type: none"> - Acetaminophen - Glucosaminesulphate 	<ul style="list-style-type: none"> - Exercise therapy - Dietary therapy[†] <p>Medication</p> <ul style="list-style-type: none"> - (topical) NSAIDs - Tramadol 	<ul style="list-style-type: none"> - Multidisciplinary care - TENS <p>Medication</p> <ul style="list-style-type: none"> - Intra-articular injections
Evaluation	After 3 months [‡]	After 3-6 months [‡]	Patient sets interval

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/m².

‡ Or earlier if the symptoms persist or increase.

3) *A follow-up appointment should be advised in order to monitor the treatment progress and, if necessary, to start with other treatment options.* Strategies to improve patient' involvement have already found to be effective in patients with diabetes mellitus.⁶ A follow-up appointment might stimulate health care providers to play a more active role and stimulate patients with OA to get more involved in the management of their disease and, ultimately, improve health care use.

In preparation of a nationwide implementation, we considered testing and evaluating the success of the implementation to be necessary on a limited scale. Therefore, we conducted an implementation study among general practitioners (GPs) in one region in the Netherlands, aiming to measure the extent to which health care in general practice is consistent with the SCS after implementation of the SCS. We focused on three aspects: the timing of radiological assessments, the sequence of non-surgical treatment, and making follow-up appointments. Results of this study will help to improve tailored implementation activities at the level of the patient, GP, and general practice.

Methods

Study design

We conducted a two-year observational prospective cohort study. Consecutive patients were recruited by their GP during a consultation or by a letter after a recent consultation. After giving informed consent, GPs received two questionnaires (at baseline and two months after the inclusion period), and patients received five biannual questionnaires (at baseline and 6, 12, 18, and 24 months after baseline).

To implement the SCS in the district Nijmegen, we developed and implemented several activities directed at both health care providers and patients. Patients received educational material and tools to enhance self-management in the form of a self-management booklet ("Care for Osteoarthritis", in Dutch: "Zorgwijzer Artrose®"),⁷ had the use of this booklet explained to them, and received reminder material. General practitioners received educational outreach visits, education and reminder materials, and were invited for a multi-disciplinary seminar with interactive workshops. The study was approved by the Medical Ethics Committee on Research Involving Human Subjects (CMO) Regio Arnhem-Nijmegen (approval number: CMO 2009/246). More detailed information has been described in our previous study.⁸

Study population

General practitioners

The members of the Nijmegen University Network of General Practitioners were invited to participate in the study. This network consists of 157 GPs working in 70 different general practices and is associated with the department of primary and community care of the Radboud University Medical Center. In addition, six practices outside this network were approached.

Patients

Individuals were eligible to participate in the study if they visited their GP with a new episode of hip or knee symptoms due to (symptomatic) OA, did not visit their GP for the same symptom during the preceding three months, and were aged 18 years or older. Exclusion criteria were: a joint replacement in the hip or knee or on the waiting list for it and inability to complete the questionnaire, i.e. language barriers or terminal illness.

Assessment methods

The participating GPs received a short baseline questionnaire including demographics and practice characteristics. The second questionnaire was based on a cross-sectional study on GPs' agreement with the SCS.⁹ In this study, we collected data regarding their organization of OA care (e.g. involvement of practice nurses in OA-related tasks) and GPs' attitudes about OA management (e.g. their view regarding the effectiveness of treatment modalities for patients with OA) and the SCS (e.g. their view on different statements which were based on SCS-recommendations).

The participating patients received a questionnaire concerning demographics, disease-related factors, psychosocial factors, health care utilization, and attitude towards the received booklet every six months. Thus, health care use was assessed in five "time periods" of six months, from six months prior to baseline to two years after baseline. All aspects were questioned in each questionnaire except for the attitude towards the received care booklet, which was only questioned after 6 and 18 months.

Outcome measures

Three aspects of care were assessed with the patient questionnaires, i.e. timing of radiological assessments, sequence of non-surgical treatment, and making follow-up appointments.

Radiological assessment:

For each of the five time periods, the proportion of patients who received radiological assessment was calculated. Also, we calculated the number of radiological assessments per patient. Finally, we assessed the proportion of patients who received radiological assessment timely according to the SCS, i.e. not performed before the use of step-2 modalities (yes/no).

Sequence of non-surgical treatment:

First, we described the sequence in detail, i.e. per step.

Step 1: The SCS recommends offering patients with (symptomatic) hip or knee OA all advised step-1 modalities. As all patients in this study visited their GP due to (symptomatic) hip or knee OA, we considered that each participating patient should at least have been offered or should actually have used the advised step-1 modalities during the study period. Therefore, we assessed the proportion of patients who were offered or actually used the advised step-1 modalities (i.e. information, lifestyle advice, and acetaminophen).

Step 2 (or step 3): The SCS recommends offering modalities in the previous steps before the more advanced modalities in the subsequent steps. Therefore, we determined the first time period in which a patient was offered at least one of the step-2 (or step-3) modalities. If applicable, we assessed the proportion of patients who had been offered all the advised modalities of the previous step(s) prior to this time period or in this same time period. Furthermore, we constructed an overall variable regarding the sequence of non-surgical care that was considered *consistent with the SCS* if the patient received at least education and lifestyle advice during the whole study period AND all advised step-1 modalities prior to any step-2 modality, if applicable AND all advised step-1 and step-2 modalities prior to any step 3 modality, if applicable (Table 1). We calculated the proportion of patients who were offered all advised modalities of previous steps before modalities of the subsequent steps.

Follow-up appointments:

In each questionnaire, patients reported if they had consulted their GP because of OA-related symptoms in that time period. If they had consulted their GP, patients could also report if they had been advised by their GP to make a follow-up appointment. We constructed a dichotomous variable that was considered consistent with the SCS if the patient reported to have been advised to make a follow-up visit after every time period in which they had consulted their GP for their hip or knee symptoms and, thus, the variable was considered *inconsistent with the SCS* if the patient reported that the GP did not advise them to make a follow-up visit after a GP-consultation regarding their hip or knee symptoms during the study period.

Statistical analysis

This study was originally powered to estimate the prevalence for patients who were provided SCS-consistent care with a maximal error margin of 6%. Allowing 10% loss to follow-up, a minimal sample of 297 patients was necessary.

Potential determinants of the three aspects of care were based on previously identified determinants of health care use and physicians' adherence to guidelines (Table 2).¹⁰⁻¹² Factors were selected at the level of the patient, GP, and general practice. Patient-related factors were categorized according to the Andersen's Behavioral Model of Health Care.¹⁰ GP and practice related factors were categorized into individual factors (demographics, attitude and behavior) and social factors and organizational factors, respectively.^{11,12} Missing data were imputed using switching regression, which is an iterative multivariable regression technique, to preserve power and obtain less biased results.¹³

Given the hierarchical structure of the dataset, i.e. patients (level 1) were nested in the sample of GPs (level 2), who were nested in general practices (level 3), logistic multilevel regression models were built for the three outcome measures. Considering the fact that the number of determinants in the models would be likely to lead to overfitting,¹⁴ we selected the most important determinants before fitting the final model. For this selection

procedure we divided the variables into three blocks. One block included the predisposing and enabling factors, another block included the disease-related factors, and a third block included the GP and practice variables. Subsequently, the most important variables within each block were selected using backward stepwise regression models based on five imputed datasets. The overall final model then consisted of entering the selected variables from each of the three blocks simultaneously and was based on 20 imputed datasets combined using Rubin's rules.^{15,16}

Results

Participants

Seventy GPs from 38 different general practices agreed to participate. The participating GPs selected 528 patients eligible for the study. Out of these patients, 83 patients (16%) were excluded by one of the researchers because they did not meet the eligibility criteria. Another 132 patients (25%) did not participate because they were not interested (n=76), reported another reason not to participate (n=8), or gave no reason (n=48). Finally, we included 313 patients of whom 29 (9%) were lost to follow-up. The characteristics are described in Table 2.

Radiological assessment

One hundred seventy-two patients (55%) reported that they had a radiological assessment in the first time period. After two years, 212 patients (72%) reported to have had at least one assessment. Out of these 212 patients, 95 (45%) patients reported to have had a radiological assessment more than once. The timing of radiological assessment was consistent with the SCS in 92 patients (44%).

Sequence of non-surgical treatment

The sequence of non-surgical treatment during the 24-months follow-up was consistent with the SCS in 117 patients (42%). Hundred seventy-three patients (58%) received all three advised step-1 modalities during the whole study period (Table 3). Out of the 238 patients who received at least one step-2 modality, 127 patients (56%) were offered all three advised step-1 modalities before. Twenty-one (28%) of 82 patients who received at least one step-3 modality were offered all six advised modalities of step 1 and 2 before. Lifestyle advice and referral to a dietician (if overweight) were both offered infrequently, which is not consistent with the SCS.

Follow-up appointments

The number of patients who consulted their GP because of their hip or knee symptoms at least in one of the four time periods after baseline was 181 (58%). Of those, 13 patients (7%) consulted their GP in each time period, 76 patients (42%) consulted their GP in two or three time periods, while the other 92 patients (51%) consulted their GP in one of the

Table 2. Baseline characteristics of patients, general practitioners, and practices

Baseline characteristics	Value	Missing values
Patient-related factors (n=313)		
<i>Predisposing factors</i>		
- Age, years; mean (SD)	64 (10)	0
- Sex, male; n (%)	120 (38)	0
- Overweight, BMI > 25kg/m ² ; 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
- Used the booklet, at 6 months; n (%)	182 (61)	16
<i>Enabling factors</i>		
- Health insurance, with additional coverage; n (%)	282 (91)	2
<i>Disease-related factors</i>		
- 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		
<i>Demographics</i>		
- Age, years; mean (SD)	49 (9)	4
- Sex, male; n (%)	51 (73)	0
- Length of time working, years; median (IQR)	17 (10-25)	4
<i>Attitude and behavior (at 2 months)</i>		
- 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)		
<i>Organizational factors</i>		
- Practice type, solo; n (%)	6 (17)	3
- Location practice, rural; n (%)	23 (61)	0

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.

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

[†] Recommended modalities of the SCS (i.e. education, lifestyle advice, acetaminophen, glucosamine, oral or topical NSAIDs, tramadol, physical therapy, intra-articular injections, and transcutaneous electrical nerve stimulation)

[‡] Modalities that are not recommended in the SCS (i.e. massage, manual therapy, and other passive physical therapy modalities like cold or heat therapy, ultrasound, laser or electrotherapy).

[§] The involvement of a practice nurse was questioned regarding the following care tasks; providing information and lifestyle advice, distribution of patient information material, referrals, and evaluation of the treatment with the patient.

Table 3. Consistency between the sequence for care and SCS in patients with hip or knee osteoarthritis

		n	(%)	Missing values
Step 1:		297^a		
Number of patients who received the advised step-1 modalities during the study period				
Step 1 modalities:	1. information	242	(82)	19
	2. lifestyle advice	214	(73)	18
	3. acetaminophen	250	(83)	11
	All three modalities	173	(58)	17
Step 2:		238^b		
Number of patients who received the advised step-1 modalities prior to step-2 modalities				
Step 1 modalities:	1. information	168	(75)	13
	2. lifestyle advice	147	(65)	12
	3. acetaminophen	206	(89)	6
	All three modalities	127	(56)	11
Step 3:		82^c		
Number of patients who received the advised step-1 and step-2 modalities prior to step-3 modalities				
Step 1 modalities:	1. information	63	(83)	6
	2. lifestyle advice	50	(65)	5
	3. acetaminophen	76	(94)	1
Step 2 modalities:	4. exercise therapy	58	(73)	2
	5. referred to a dietician (if overweight)*	15	(28)	7
	6. NSAIDs or tramadol	55	(71)	5
	All six modalities (if applicable)	21	(28)	6

Abbreviation: OA=Osteoarthritis, SCS=Stepped Care Strategy, n=Number,

NSAIDs=Non-Steroidal Anti-Inflammatory Drugs.

a Total number of patients who received ≥ 1 step-1 modality during the study period.

b Total number of patients who received ≥ 1 step-2 modality during the study period.

c Total number of patients who received ≥ 1 step-3 modality during the study period.

* According to the definition overweight of the zorgstandaard obesitas NL 2010: Body Mass Index $> 25 \text{ kg/m}^2$:
n=60 patients.

four time periods. Figure 1 shows that the number of patients that consulted their GP diminished during the study period, as well as the percentage of patients that were subsequently advised to make a follow-up appointment. In 186 out of the 325 reported GP-consultations (57%), the patient also reported to have been advised by their GP to make a follow-up appointment.

Determinants of SCS-consistent care

Table 4 presents the selected variables derived from the three blocks for each of the three outcomes. An optimal timing of radiological assessment was associated with female gender and with having symptoms for more than one year. An optimal sequence of non-surgical treatment was associated with a smaller number of comorbidities or painful joints, having an additional health insurance, having a female GP, and having a GP who was positive about the effect of non-recommended treatment modalities (e.g. massage). Receiving the advice to make a follow-up appointment was associated with less use of an active coping style, better physical functioning, and having a GP who was negative about the effect of modalities that are recommended in the SCS.

Figure 1. Number of patients with GP-consultations per time period and, if so, the number of patients who received the advice to make a follow-up appointment

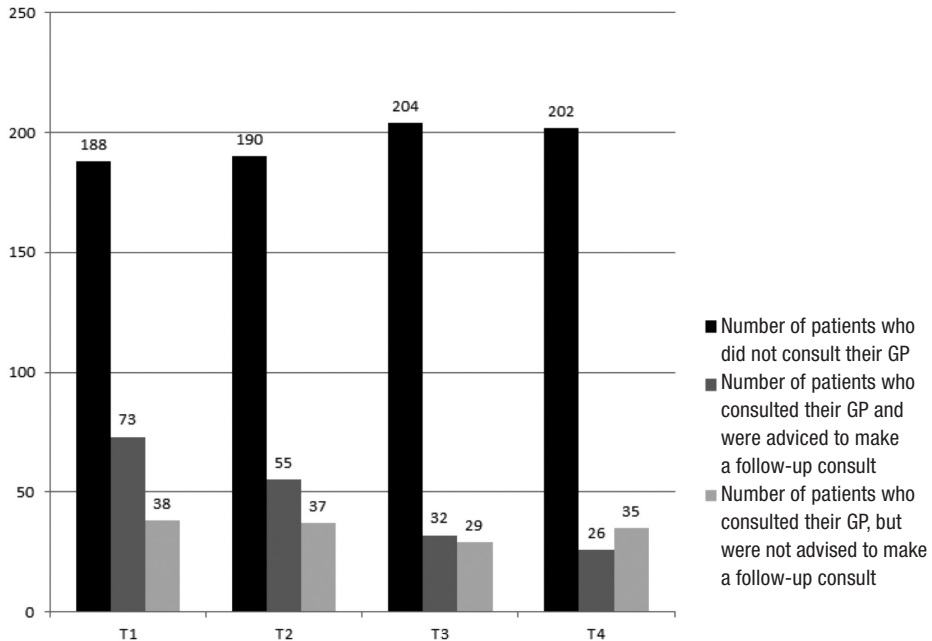


Table 4. Predictors of SCS-consistent care for 3 aspects in patients with hip or knee osteoarthritis (logistic multilevel regression analysis)

	SCS-consistent regarding radiological assessment ($n_{yes}=177$; $N_{no}=116$)*		SCS-consistent regarding sequence of treatment ($n_{yes}=117$; $N_{no}=171$)**		SCS-consistent regarding follow-up appointments ($n_{yes}=85$; $N_{no}=96$)**	
	OR	95% CI	P-value	OR	95% CI	P-value
Patient-related factors						
Predisposing factors						
- Sex, male	0.50	0.30-0.82	<0.01			
- Number comorbidities (range 0-15)				0.68	0.48-0.98	0.04
- Active pain coping (range 12-48)†						0.94
						0.89-1.01
						0.08
Enabling factors						
- Health insurance, with additional coverage				3.21	1.12-8.79	0.02
Disease-related factors						
- Number of painful joints (range 0-9)				0.71	0.49-1.02	0.07
- Duration symptoms, > 1 year	1.90	1.07-3.36	0.03			
- WOMAC functioning (range 0-100)‡				1.02	1.01-1.04	<0.01
GP-related factors						
Individual factors						
<i>Demographics</i>						
- Sex, male				0.53	0.27-1.05	0.07
<i>Attitude and behavior</i>						
- Effectiveness recommended modalities (range 0-3)				1.82	0.98-3.40	0.06
- Effectiveness non-recommended modalities (range 0-3)				0.49	0.15-1.58	0.23

Abbreviation: SCS = Stepped Care Strategy, OA = Osteoarthritis, n = Number, OR = Odds Ratio, CI = Confidence Interval,

WOMAC = Western Ontario McMaster University Index of osteoarthritis, GP = General Practitioner.

* Total number of patients with < 33% missing values=293.

** Total number of patients with < 33% missing values=288.

*** Total number of patients that consulted their GP during the study period (applicable patients)=181.

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

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

Discussion

This study evaluated the extent to which current practice is consistent with recommendations of a SCS about the management of hip or knee OA after implementation of this SCS in clinical practice. Our results show that important aspects in the management of hip or knee OA were in accordance with the SCS in about half of the patients. In general, guideline recommendations are followed in, on average, 67% of the decisions,¹⁷ thus there is still considerable room for improvement. Our study focused on the sequence for care, which is a relatively understudied area of recommendations; nevertheless, consistency between SCS-recommendations and current practice is considered to be modest. In particular, unnecessary radiological assessments were provided in almost half of the patients. Especially, in male patients and patients with symptoms for less than one year. Furthermore, inconsistency with the SCS regarding the sequence of non-surgical treatment was mainly caused by the under-use of lifestyle advice and referral to a dietician in overweight patients. Finally, in about half of the consultations, patients were not advised to make a follow-up appointment. Especially patients with a passive coping style and with more limitations in functioning were less likely to have received this advice.

Our results are in line with other studies on use of X-rays in the management of hip or knee OA.¹⁸⁻²⁰ A study on the reasons why GPs order X-rays, shows that X-ray was used because it could aid in the discussion of management with the patient, could provide reassurance for patients, was sometimes required before a referral to secondary care, and/or could positively affect the doctor-patient relationship.^{20,21} In a German study, it was concluded that the importance of X-ray regarding the diagnosis of OA among GPs was overrated as GPs considered an X-ray to be more important than the opinion of a specialist.²² Because it has been reported that radiological assessment is associated with lower referral rates to physical therapists (OR=0.64) and higher referral rates to orthopaedic surgeons, (OR=31.0)¹⁸, timely use of radiological assessment might be a key target to optimize the management of OA. Therefore, we suggest using educational tools for patients, like self-management booklets that could aid in the decision making process, and focus implementation activities for GPs on their knowledge regarding the value and limitations of radiological assessment in OA in order to limit use of radiological assessments in those cases in which it has no additional value.

Although non-surgical treatment modalities in patients with hip or knee OA are recommended in many national and international guidelines,²³⁻²⁵ our results clearly demonstrate under-use of lifestyle advice and referral to a dietician (if overweight). The under-use of lifestyle advice has also been shown in an Australian study showing that only the minority of overweight patients recall receiving lifestyle advice.²⁶ Lifestyle advice and referral to a dietician are also recommended modalities in many other (chronic) conditions, e.g. cardiovascular diseases²⁷ and diabetes mellitus²⁸, which are prevalent comorbid diseases in patients with OA²⁹. Considering that the consistency with the SCS regarding the sequence of non-

surgical treatment is lower in patients with more comorbidities, the potential effect of adequate lifestyle advice and treatment by a dietician on the general health of patients with OA could be even higher. Our results indicate the need for tools to stimulate weight loss in overweight patients with OA.

The SCS advocates mutual goal setting, systematic monitoring, evaluation, and if necessary, adjustment to the previously set goals to optimize the treatment results.¹ This requires follow-up appointments of patients with their GP. In this study, in almost half of the consultations patients reported that they were not advised to make a follow-up appointment. We observed that patients with an active pain coping style are more likely to have follow-up appointments. This implies that health care providers should closely watch patients, especially those with a passive coping style, to make a follow-up appointment.

The effect of GPs' attitude regarding the effectiveness of recommended (as recommended in the SCS) and non-recommended modalities (i.e. massage, manual therapy, and other passive physical therapy modalities) on SCS-consistent care was not as expected; we assumed that GPs were positive about the effectiveness of recommended modalities and/or were negative about the effectiveness of non-recommended modalities were more likely to provide SCS-consistent care, however the opposite effect was found. A possible reason is the fact that some implementation activities, e.g. providing education and reminder material, were executed after assessing GPs' attitude. Thus, it is conceivable that these activities triggered change, particularly in those GPs who were not providing SCS-consistent care. We need to further explore GPs' reasons to provide SCS-inconsistent care.

This study has its limitations. First of all, it is an observational prospective study and, not a randomized controlled trial to examine the efficacy of implementation activities. However, our design allowed us to identify useful and practical targets to improve health care in patients with OA. Secondly, GPs in our study sample were academically engaged and, thus, may have been more dedicated to guideline-consistent care (even more, after the implementation of the SCS) than the average GP in the Netherlands. This might affect the generalizability of our study findings. Thirdly, the sequence for care as described in this study only includes the fact that advanced modalities should not be used too early in the treatment. Because of practical reasons it was not possible to measure which modalities were provided too late or inadequately. Fourthly, we used self-reported data, which could have resulted in an underestimation of the actual health care use.³⁰ Fifthly, our results might show an overestimation of SCS-consistent care regarding radiological assessments, as we could not take all requirements for SCS-consistent care into account. A possible discrepancy between medical history and physical examination is required in order to use X-rays according to the SCS-recommendations. However, this discrepancy could not be assessed with the patient-reported data. As a consequence, probably even less than 44% patients received X-ray as recommended in the SCS. Moreover, no justifiable reasons for providing care that was inconsistent with the SCS were identified. Finally, the power of

this study was not sufficient to assess all determinants. However, a good alternative was used to preselect the potential determinants first within content-matter motivated blocks using backward regression models.

Conclusions

To conclude, consistency between clinical practice and SCS was found in about half of the patients for each of the three aspects after implementation of the SCS in clinical practice. Health care can be further optimized by encouraging GPs to use less X-rays for the diagnosis (in the early stages) of OA and to be more active to advice follow-up appointments to evaluate and monitor the effect of the treatment in patients with OA. Furthermore, the sequence for care can be improved by well-timed use of lifestyle advice and dietary therapy in overweight patients. More insight is necessary regarding the reasons for providing SCS-inconsistent care and the impact on the outcomes of care.

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