Treatment of Knee Osteoarthritis: non-compliance or non-adherence? A qualitative study from the perspective of the professional.

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Abstract

Context

Hoewel er verschillende internationale richtlijnen over de niet-chirurgische aanpak van knieartrose beschikbaar zijn, worden deze niet altijd in de dagelijkse praktijk geïmplementeerd. Het doel van deze studie is dan ook om allereerst de huidige aanpak van knieartrose in de huisartsenpraktijk van de student te objectiveren. Vervolgens werden barrières en bevorderende factoren in het toepassen van deze richtlijnen geïdentificeerd voor drie groepen van professionals: de huisarts, de orthopedist en de kinesitherapeut.

Methoden

Binnen de huisartsenpraktijk van de student werd een retrospectieve, observationele studie uitgevoerd. Om de huidige aanpak van knieartrose in kaart te brengen, werden alle knieartrose patiënten opgespoord en hun huidige behandeling werd vergeleken met de aanbevolen richtlijnen. Hiervoor werd gebruik gemaakt van kwaliteitsindicatoren.

Drie groepen van professionals werden afzonderlijk geïnterviewd aan de hand van semigestructureerde vragenlijsten, gebaseerd op kwaliteitsindicatoren. Met gerichte analyse werden barrières en bevorderende factoren in de volgende zeven domeinen van het voorbestaand raamwerk van Flottorp gestructureerd: domein van de richtlijn, domein van de professional, domein van de patiënt, domein van professionele interacties, domein van organisatie, domein van beweegredenen en het domein betreffende sociale en legale aspecten. Data-analyse gebeurde aan de hand van NVIVO 12 software.

Resultaten

In totaal werden er 202 patiënten met knieartrose gevonden in de huisartsenpraktijk van de student. In 28,7% van de gevallen werd de diagnose klinisch gesteld. Uiteindelijk kregen 94% van de patiënten een of meer beeldvormende onderzoeken. NSAID bleken de meest gebruikte medicatie te zijn, gezien zij voor 69% van onze patiënten werden voorgeschreven. Minder dan 5% van de patiënten werden naar een kinesitherapeut verwezen. Bij 69% van de patiënten werd een arthroscopie uitgevoerd.

In totaal werden er 123 barrières geïdentificeerd: 40 in de groep der huisartsen, 50 voor de orthopedisten en 33 in de groep van kinesitherapeuten. Al deze barrières konden ondergebracht worden in een van de zeven domeinen volgens Flottorp. Voor alle professionals werden de meeste barrières geregistreerd binnen het domein van de gezondheidsprofessional.

Conclusies

De observationele studie in de huisartsenpraktijk van de student bevestigt het huidige gebrek aan richtlijnimplementatie. Er is verbetering mogelijk wat betreft de niet-chirurgische aanpak van knieartrose binnen onze praktijk. Belangrijke aspecten zijn: het optimaal gebruik van paracetamol, verwijzing naar een kinesitherapeut en minder

verwijzing voor beeldvormend onderzoek en orthopedisch chirurg, om de kans op arthroscopie te beperken.
Voor alle professionals, betrokken in de aanpak van knieartrose, werden verschillende barrières geïdentificeerd. Met deze barrières kunnen alle professionals rekening houden in de dagelijkse klinische praktijk. Verder onderzoek naar de ontwikkeling van implementatie strategieën voor richtlijnen met het oog op betere klinische zorg, is aangewezen.

Abstract

Objectives

However multiple international guidelines on knee osteoarthritis care are available, their implementation in daily clinical practice seems to be suboptimal. The objective of this study was to first investigate the assessment of knee OA in the practice of the master student. Second, barriers and facilitators for guideline adherence were identified for three groups of professionals, namely the general practitioner, the orthopedic surgeon and the physiotherapist.

Methods

A retrospective, observational study was performed in the general practitioner's office where the master student works. In order to investigate knee OA management, all knee OA patients were identified and their current treatment was compared to recommended clinical care by means of quality indicators.

Three groups of professionals were interviewed separately using a semi-structured script based on quality indicators. Directed content analysis, within the framework of Flottorp, was performed to describe barriers and facilitators in 7 domains: guideline factors, health care professional, patient, professional interactions, organization, incentives and social/legal context. Data were analyzed using NVIVO 12 software.

Results

In total, 202 patients with knee OA were found in the general practitioner's office. The diagnosis of knee OA was made on a clinical basis in 28,7% of these cases. Ultimately 94% of the patients got one or more types of imaging. NSAID were the most used drug for knee OA, as they were prescribed to 69% of our patients. Less than 5% of patients were referred to a physiotherapist. 69% of the patients got an arthroscopic intervention.

In total 123 barriers were identified: 40 in the group of general practitioners, 50 in the group of orthopedic surgeons and 33 in the group of physiotherapists. All these barriers could be attributed to one of the seven domains according to Flottorp. For all groups of professionals, most barriers were registered on the level of the health care professional.

Conclusions

The observational study within the general practitioner's office confirms the current lack of guideline adherence. There is room for improvement considering the conservative, non-surgical approach in our practice. Optimal use of acetaminophen, referral to a physiotherapist, using less imaging and less referral to an orthopedic surgeon to reduce the use of arthroscopy are important recommendations to keep in mind.

For all healthcare professionals involved in knee OA care a variety of barriers were identified. All professionals should take these barriers into account during daily practice. Further research is necessary for the development of guideline implementation strategies in order to improve guideline adherence and thus clinical care.

Table of Contents

ABSTRACT - DUTCH 3

ABSTRACT - ENGLISH 5

INTRODUCTION 7

I. AUDIT: GENERAL PRACTICE PROJECT 9

1. AIM 9
2. METHODS 9
2.1 STUDY DESIGN AND STUDY POPULATION 9
2.2 DATA COLLECTION 9
2.3 ANALYSIS 10
3. RESULTS 11
4. DISCUSSION 14

II: QUALITATIVE RESEARCH: BARRIERS AND FACILITATORS IN KNEE OA CARE FROM THE PROFESSIONALS' PERSPECTIVE. 19

1. AIM 19
2. METHODS 19
2.1 STUDY DESIGN 19
2.2 STUDY POPULATION 19
2.3 DATA COLLECTION 20
2.4 ANALYSIS 21
3. RESULTS 21
3.1 GENERAL PRACTITIONERS 22
3.2 ORTHOPEDIC SURGEONS 22
3.3 PHYSIOTHERAPISTS 22
3.4 IDENTIFIED BARRIERS IN THE SEVEN DOMAINS OF THE FRAMEWORK FOR ALL PROFESSIONALS 23
3.5 IDENTIFIED FACILITATORS IN THE SEVEN DOMAINS OF THE FRAMEWORK FOR ALL PROFESSIONALS 28
4. DISCUSSION 28

LITERATURE 32

APPENDICES 35

1. SET OF QUALITY INDICATORS BY GRYPDONCK ET AL. 35
2. QUALITATIVE RESEARCH PROJECT: VISUALIZATION OF DATA COLLECTION 36
3. QUALITATIVE RESEARCH PROJECT: SUMMARIZATION OF RESULTS (TABLE 3-6) 37
4. APPROVAL ETHICS COMMITTEE 47

Introduction

Osteoarthritis (OA) is the most common joint disease worldwide, affecting about 9,6% of men and 18% of women older than 60 years of age (1). Mainly due to aging populations and increase in obesity rates, it is expected to be the fourth leading cause of disability by the year 2020 (1,2). Clinically, OA is characterized by joint pain and stiffness, limitation of movement, occasional effusion, crepitus and variable degrees of local inflammation. This can have a large impact on a person's day-to-day activities and therefore reduce his quality of life (3). The knees, hips and small hand joints are the most commonly affected peripheral joints (2). Lots of studies focus on knee OA in particular, as it is an important contributor to the burden of OA. Worldwide approximately 251 million people are known with knee OA (4). In Flanders, the incidence of knee OA in 2015 was 3,85 per 1000 persons, the prevalence 44,8 per 1000 persons (5). Incidence and prevalence rise rapidly from the age of 45. The course of the disease can vary as symptoms fluctuate substantially over time. As it predominantly affects older people, the prognosis and outcome are often influenced by other comorbidities associated with aging and obesity. Progression, resulting in joint failure and joint replacement surgery, cannot yet be prevented, nor can the disease be cured. This makes knee OA a chronic condition and a common cause of disability worldwide.

A wide range of healthcare professionals, such as general practitioners, orthopedic surgeons and physiotherapists, are involved in the treatment of knee OA. There are guidelines on knee OA care available for every discipline, but considering the non-surgical treatment there is a lot of consensus (2, 6-12). All guidelines agree to start with conservative treatment to limit disease progression and reduce symptoms. Surgical intervention is only advised when conservative treatment fails. Nevertheless, these guidelines fail to be implemented in daily practice. Research showed that conservative treatment options in knee OA seem to be underused, whereas surgical treatment modalities are increasing (13,14). Exercise therapy is an important treatment option in knee OA, but seems to be rarely advised by general practitioners (15). Studies show that patients are being referred to orthopedic practice without receiving all recommended non-surgical treatment options (16). Physiotherapists sometimes use treatment modalities, like massage therapy, that are not recommended by evidence-based guidelines (17).

This poor guideline adherence indicates that health care professionals experience barriers in implementing experience-based clinical guidelines in clinical practice. Yet, it is proven that efforts to enhance guideline adherence can result in clinical improvement in pain and physical function (18). Looking at the future, with the expected rise in prevalence, the expected burden of OA on health care systems and the worldwide socioeconomic cost, knee OA and its treatment is, and should be, a hot topic in primary healthcare (3). Therefore, it would be useful to have more insight in the barriers and facilitators that professionals experience considering the non-surgical treatment of knee

OA. The aim of this study is to first have a look at current knee OA assessment in the practice of the master student. Second, we will try to identify current barriers for guideline adherence from the perspective of multiple professionals, namely the general practitioner, the orthopedic surgeon and the physiotherapist.

I. Audit: general practice project

1. Aim

Worldwide, there are multiple (inter)national guidelines on knee OA available (2, 6-12). But the question is: are they being implemented in daily practice? The first step in trying to improve clinical practice is to assess whether current care adheres to advised care. As general practitioner to be, I first wanted to take a look in our own practice. Despite the fact that knee OA has a high and increasing prevalence, not every general practitioner (GP) approaches this problem in the same way. When asking around in our practice, the GP mostly handles from what he learned during his education and from his own experience. There seems to be no clear-cut plan in the assessment of this chronic disease. In 2014 Grypdonck et al. developed a set of evidence-based quality indicators for multidisciplinary knee OA care, measurable in clinical practice. Based on existing guidelines and with the help of an expert panel, a core set of 21 quality indicators on diagnosis, lifestyle/education/devices, therapy and follow-up was constructed (19). In the first, descriptive part of this master's thesis, we will try to map the epidemiology of patients with knee OA within the doctor's office of the master student, using these quality indicators. Afterwards, we will be able to compare these results to recommended care and see if current care in our practice can be improved. For detailed descriptions on the set of quality indicators by Grypdonck et al., we refer to appendix 1.

2. Methods

2.1 Study design and study population

We performed a retrospective, observational study in the general practitioner's office 'De Berm' in Paal-Beringen. In this practice, two GP's and one master student in general medicine, work together using shared medical software: Windoc. Patient files were maintained electronically since 2007, paper files and reports on patients proceeding 2007 are still being classified in the practice. When possible, the paper files, dating from before 2007, were introduced manually in the computer system.

2.2 Data collection

First, we did an exhaustive search action in the software program to identify all possible knee OA patients. The software program itself, Windoc, contains a search engine in which multiple research terms were inserted. Because knee OA is a complex diagnosis, we used multiple research terms: L90 (ICPC-2 code for knee OA), gonartrose, gonarthrose, knie artrose, knie-artrose, knieartrose, kniearthrose, artrose knie, arthrose knie, artroscopie + age > 40y, arthroscopie + age > 40y, glucosamine, donacom, hyalgan, adant, Adant. These research terms were entered as free text in the following domains: 'antecedenten', 'reden', 'klacht', 'bevinding' and 'planning'. Medication was searched for

in the specific domain, as well as free text. An overview of the used research terms is visualized in table 1.

TABLE 1: *Overview of the used research terms in Windoc*

ICPC-2 code L90 (gonartrose)
Free text: "gonartrose" ; "gonarthrose"
Free text: "knieartrose" ; "kniearthrose"
Free text: "knie artrose" ; "knie arthrose"
Free text: "artrose knie" ; "arthrose knie"
Free text: "knie-artrose" ; "knie-arthrose"
Medication: Glucosamine ; Donacom ; Hyalgan ; Ostenil ; Adant
Free text: "Glucosamine" ; "Donacom" ; "Hyalgan" ; "Ostenil" ; "adant" ; "Adant"
Free text: "Artroscopie" + age > 40y ; "Arthroscopie" + age > 40y

The patients we found were listed in alphabetical order in an Excel sheet. Patients that answered to multiple research terms, were only included once. Afterwards, all these unique patient files were analyzed individually.

Because not all research terms were very specific, we first had to make sure the patient could be included. In the patient's file, we used the search function to browse through the journal. All contacts that mentioned 'knee' or 'art(h)roscopie' were read. All documents considering contacts with radiologists, orthopedic surgeons, rheumatologists, physiotherapists or other relevant specialties were read as well. Some patients were excluded. For instance, patients found with the term 'art(h)roscopie + age > 40y' could also have had arthroscopy of other joints, not all knee arthroscopies were for knee OA, sometimes the diagnosis knee OA was only suggested in the differential diagnosis, we found patients who had no knee problems at all with the term 'adant'. Beforehand, we decided to only include patients that were diagnosed or being treated for knee OA between the time period of 01/01/2008 and 31/12/2018. Patients who did not answer to this criterion were excluded as well. Patients that were diagnosed with knee OA before the year 2007, but did not consult with complaints of the knee anymore afterwards, were excluded. Furthermore, we also found a number of patients that had not consulted in our practice since multiple years, changed GP or that were deceased, however their files were still registered as 'active'. Nevertheless, we decided to exclude these patients as well.

2.3 Analysis

When the patient could be included, we withheld relevant information about their knee OA with the help of the above mentioned quality indicators. Following data were extracted from patient's files and registered in the Excel file: sex, age, age at diagnosis,

affected knee. We checked if the diagnosis was made on a clinical basis or if the patient got imaging, and if so what kind of imaging. Therapeutic interventions were registered. A distinction was made between non-surgical and surgical treatment. For non-surgical options we looked at advice in lifestyle, physical therapy, braces, oral and intra-articular medication. For surgical options arthroscopy and (partial or total) joint replacement therapy were considered. We also tried to map the follow-up of a patient with knee OA. This information was mostly found in the patient's journal, which keeps track of each patient contact and in the documents, which contain all referral letters and specialist reports.

3. Results

After the first screening we had 620 hits in a total of 7191 patient files. Multiple patients were found with more than one research term. Ultimately, we found 472 unique patients. We excluded patients that did not meet inclusion criteria as mentioned before, which led to a total of 202 patient files.

Of these 202 patients 105 (50,5%) were men and 100 (49,5%) were women. In this population, the average age was 68,4 years old, the youngest patient was 41, and the eldest was 93 years old. The diagnosis knee OA was made when the patient had an average age of 58,97 years. The youngest age a patient had when diagnosed was 30 years old, the eldest was 86 years old (Figure 1).

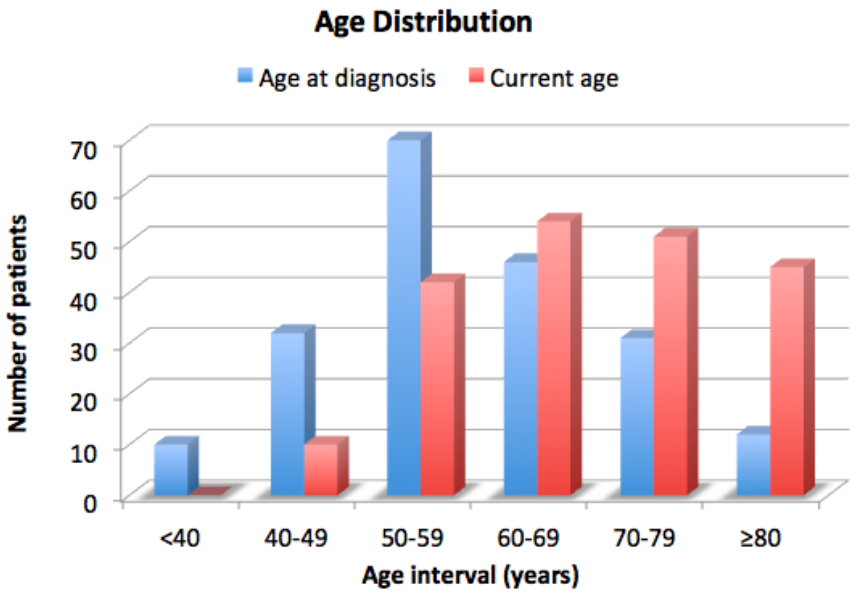


FIGURE 1: *Age distribution at the moment of diagnosis and at the moment of registration.* This chart shows the number of patients per age group, represented at the moment of diagnosis and at the moment of registration for this master's thesis. The diagnosis knee OA was made when the patient had an average age of 58,97 years. At the moment of diagnosis the youngest patient was 30 years old, the eldest 86 years old.

In 101 (50%) patients both knees were affected, 54 (26,7%) patients had left side knee OA, 47 (23,3%) patients had right side knee OA. The diagnosis was made on a clinical basis in 58 (28,7%) patients; in 126 (62,4%) patients imaging was required. In 16

(0,08%) patients the osteoarthritis was found during arthroscopy and for two patients it remains unclear how the diagnosis was made exactly.

Looking at imaging in the assessment of knee OA, we mainly considered the use of standard radiographs, ultrasound, CT and MRI. They were used for diagnosis and to visualize the severity of the disease. Only 12 patients did not get any imaging at all. 88 out of the 202 patients got only one kind of imaging: 40 got RX, 46 got MRI and two got CT. The other 102 patients received two or more different types of imaging. Nine patients also got other imaging than the ones we specifically looked at: two got a full leg RX, four got arthro-CT, one got a SPECT-CT and three got a bone scan.

A punction of the knee was conducted in 28 (14%) cases, however this was never diagnostic. It was only used for pain relieve and patient's comfort, and was often followed by an intra-articular corticosteroid injection. Technical investigations are visualized in figure 2.

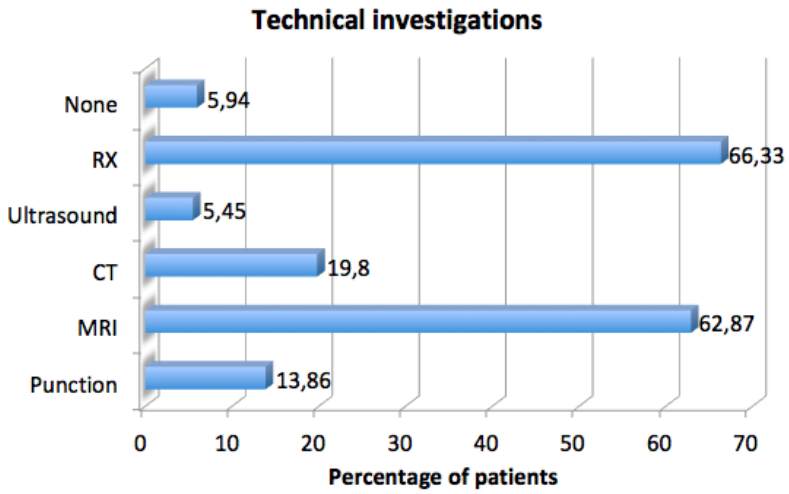


FIGURE 2: *Technical investigations that were conducted in knee osteoarthritis patients in our practice.*

We analyzed the patient files and referral letters to see if there was given any education, advice on lifestyle changes or if the use of a device such as a brace was recommended. From our 202 patients, 53 (26%) seemed to do so. 15/53 were advised an unloader brace, this were all patients with unicompartmental knee OA. Six patients got knee bandage. Nine patients were told to lose weight. Sports advice was given, some patients were told to go biking or to stop playing soccer. Other advice that was mentioned: 'how to use the knee correctly', 'education' not further specified, 'avoiding stairs', 'stretching of the hamstrings', 'tonification exercises'.

Regarding conservative treatment, a rather small amount of patients (10/202) was referred to a physiotherapist. Oral non-steroidal anti-inflammatory drugs (NSAID) were prescribed for 139 (69%) patients, which make them the most commonly used medication for knee OA. In three cases this is combined with the use of topical NSAID

and one time the combination with an intramuscular injection with NSAID is mentioned. 26 (13%) patients received acetaminophen, for three of them this was the only medication they got prescribed. Eight patients got opioids. This was always given in combination with acetaminophen, NSAID or both.
Glucosamine, chondroitin or combinations of both were suggested as therapy to 44 (22%) patients, by GP's as well as by orthopedic surgeons. Products based on curcuma, boswellia serrata, collagen and comfrey were also suggested. We found these in 11 patient files.

Out of all knee OA patients 123 have gotten an intra-articular injection, 68 (34%) with corticosteroids and 89 (44%) with hyaluronic acid. Over time, these injections are often repeated and 34 (17%) out of these 123 patients eventually got both.

When we look at second line referral, we see that 155 (77%) patients were referred to an orthopedic surgeon and two of them also went to see a rheumatologist.

More than half of our patients, 127/202 (63%) eventually got an arthroscopic intervention (Figure 3). More invasive surgery was mentioned in 42 (21%) cases, where 41 patients got a total or unicompartmental knee replacement. Two patients had an osteotomy because of axial deviation and one of them also had a total knee replacement in the other knee. In total, 11 patients had surgery on both knees.

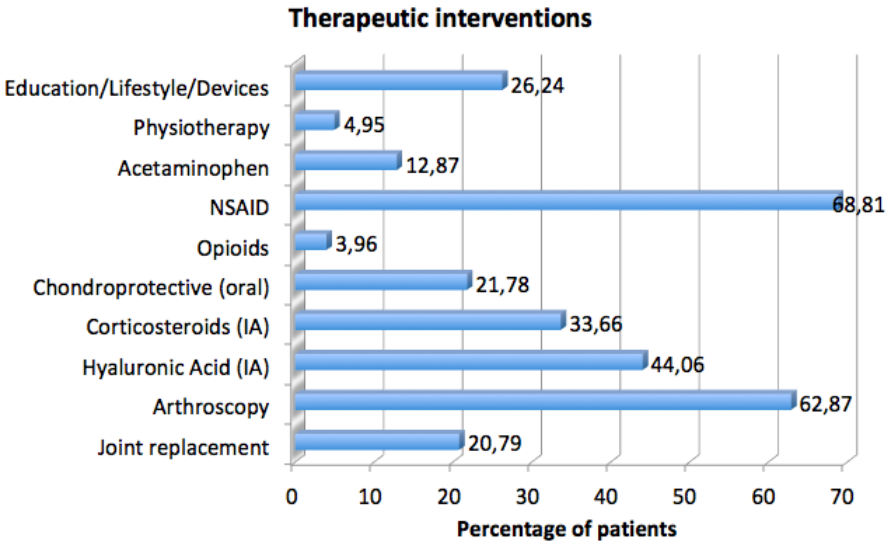


FIGURE 3: *Therapeutic interventions that were offered to patients with knee osteoarthritis in our practice.*

As last indicator, we checked if there were regular evaluations concerning exercise therapy in our knee OA patients. We could not find this in any of the analyzed patient files.

4. Discussion

It soon became obvious that searching our software system was not as simple as I thought it would be. The system does not allow finding all knee OA patients with one simple search. This was even harder due to the fact that diagnoses in our practice were never registered with ICPC-2 (International Classification of Primary Care) codes. The ICPC code for knee OA is L90, this was only found in one patient's history, and this code was registered by his previous GP. Furthermore, it is notable that the diagnosis: 'knee OA' was not always written down in the patient's history. It is possible it is mentioned somewhere in the journal or that it says 'might be knee OA'. It is also possible that the diagnosis is mentioned in the documents, through which a search action cannot even be performed. Clear-cut registration is a problem.

Because I wanted to find all possible knee OA patients, most patients had to be found with free text and all possible ways of spelling had to be checked, as mentioned in 'methods'. When starting this audit, I already had some experience working in this practice and how knee OA was assessed. I knew one of the doctors had a specific interest in knee OA and its treatment with intra-articular injections. Multiple patients are being treated with a specific type of hyaluronic acid (Adant), so I added this to the search terms as well. Because this is not considered as a pharmaceutical, it cannot be searched for in the 'medication' option in the search engine. Numerous extra patients were found using this search term as free text. However, a whole different list of patients was found because the search was performed as 'adant' and 'Adant'. With 'adant', patients who did not have any knee problems at all were found, because this combination of letters is found in certain medication (for example '*furadantine*'). Initially, there were 472 unique patient files found that had to be analyzed one by one to see if inclusion criteria were met. Eventually less than half of the files were withheld. From these 202 files, data were registered manually in an Excel file, which made it prone to small mistakes as well. All this made performing this audit, a rather time consuming process.

The incidence of knee OA in Flanders in 2015 was 3,85 per 1000 persons, according to the Intego database (5). In our practice we found an incidence of 2,6 per 1000 persons (202 patients in a total of 7191 active files, over a period of 11 years). It seems to be there still is an underregistration in our practice. This can be ascribed to the previously mentioned problems with coding and registration, as well as to the fact that knee OA still is considered a less important or critical disease in general practice. On the other hand, we also note that there seem to be an amount of patient files in our practice that are registered as 'active' however the patient switched GP, was deceased or did not consult for several years. Inactivating these files, could lead to a higher incidence. Conclusions about incidence are strongly biased.

We found a slightly higher amount of men in our study population, which does not correspond to the fact that knee OA rates are usually twice as high in women. The average age on diagnosis is 59 years old. When we compare this to the Intego database, this seems to be quite adherent. There are numbers available for the year 2013, where

we see a strong rise in the incidence from the age of 40 (2,5 per 1000), but also a higher increase in the age group between 55-59 (5,6 per 1000) (5).

The European League Against Rheumatism (EULAR) and the National Institute for Health and Care Excellence (NICE), as well as Dutch guidelines say that knee OA is a clinical diagnosis (2, 11, 12) . Dutch guidelines for general praxis, Nederlands Huisarts Genootschap (NHG), state that OA of the knee is very likely when the three following criteria are present: age > 45 years old, knee pain associated with activities, no morning stiffness of the knee or short-lasting morning stiffness (<30 minutes). Flexion- and extension deficits, knee crepitation, tenderness of the joint and a bony broadening of the joint are findings that make the diagnosis even more likely (12). Radiographs are only recommended when pain is resistant to conservative treatment. The expert panel in the study for quality indicators limited the application of radiographs to the affected knee(s)(19). They also considered analysis of synovial fluid in patients with recurrent, clinically evident knee-effusion, an important indicator for diagnosis.
However the diagnosis of knee OA is preferably clinical, 62,4% of patients in our study got imaging. We often see, that when the diagnosis is suspected, the GP asks for RX to confirm diagnosis and start treatment with intra-articular hyaluronic acid. When a patient presents with knee pain without previous trauma, MR is the examination of choice, especially in younger patients. There also is a discrepancy between different GP's. Some are rather quick to refer for CT scan or, since the last couple of years, MRI, where others tend to wait a while. Orthopedic surgeons sometimes ask for extra imaging prior to surgery. Still, 63% of patients got an MRI and 66% got an RX and more than 50% of our patients got more than one imaging investigation. It is striking that some patients get multiple X-rays in a short period of time with the same questioning.

Education and advice in lifestyle changes, exercise and weight loss, together with pain medication are key in the treatment of knee OA (19). Considering the use of braces in knee OA, guidelines are inconsistent. The panel decided that this was only useful for unicompartmental knee OA with axial deviation. In patients that do not obtain adequate pain relief and/or functional improvement with this non-surgical treatment options, joint replacement or unicompartmental knee replacement is recommended. Arthroscopic surgery on the other hand, is not considered useful in the treatment of knee OA unless there is locking of the knee from a large meniscal fragment, a loose body, or an extension loss from an anterior osteophyte. Looking at these quality indicators on education/lifestyle/devices, we found that a quarter of our patients got one of these. Unloader braces were used for the right indication that is axial deviation. However six patients got knee bandage for tricompartmental knee OA, for which there is no evidence. Education is extremely important and maybe this is the one thing every patient should get. Because we looked at these three parameters as a whole, probably less than the found 26% got any education at all. Yet, it must be mentioned that it is possible that more patients have gotten education or information about lifestyle, but it was not specifically mentioned in the patient's file. However, we can also turn this the other way

around: if the doctor writes down that he told the patient to lose weight, how much did a patient actually hear from it? This quality indicator is rather difficult to find out in a retrospective manner.

The biggest improvement can be made in referring patients to a physiotherapist. Up until now not even one percent of our patients is being referred. Post surgery, physical therapy is obvious. In a conservative way, the GP seems to forget that this is an option.
Although acetaminophen 3g/d should be the first drug of choice, we see that this was suggested to only 13% of the patients. Systemic NSAID were the most commonly prescribed, with a percentage of 69%. Sometimes, there was no mention of any medication in the patient's file, so it is possible that the doctor suggested medication verbally, but did not write it down. Acetaminophen is a drug that a lot of people have at home at all time, which is logic because it is available without prescription. Also, when a patient visits specifically because of knee pain, it is more likely that he is in a lot of pain which makes the GP go on to 'something stronger'. Again, communication and education should play a more important role here. When patients understand their disease better, they possibly also understand better why and how they can use their medication in the best possible way.

Despite the obvious lack of evidence, one out of five patients were suggested to take glucosamine, chondroitin or both. Lots of different brands were proposed. It is noteworthy that some patients had good results with it, as they kept on taking it. Some patients ask for it their selves, because they heard about it from family, neighbors or their pharmacist. When we found this suggestion in referral letters from orthopedic surgeons, it mostly read: 'recommended to try it for three or four months, quit when no results'. That is also how the GP's in our practice suggest it nowadays. The last couple of years, there seem to be a strong development in this area of supplements as also curcuma and boswellia serrata are being used. The representatives of pharmaceutical firms seem to do their jobs well as we seem tempted to try these products from time to time.

Grypdonck et al. did not select the use of intra-articular corticosteroids and hyaluronic acid as quality indicator in their study, because this was considered not measurable (19). The NHG guidelines support the use of intra-articular corticosteroids, keeping in mind adverse effects and the fact that the effect only lasts for a short period of time (<3 weeks). There should be at least six weeks in between two injections and no more than four injections per year. This guideline does not recommend the use of intra-articular hyaluronic acid (12). OARSI (Osteoarthritis Research Society International) guidelines agree about the use of corticosteroids for short term pain relieve, but remain inconclusive about intra-articular hyaluronic acid (20). NICE guidelines also found corticosteroid injections reduce pain for a short period, but mention no effect on functional outcome. There is no clear advice on whether any particular corticosteroid preparation is more effective, or which dose should be used. These guidelines do not

recommend the use of intra-articular hyaluronic acid, due to lack of compelling evidence (2). The American Academy of Orthopedic Surgeons (AAOS) are inconclusive about the use of corticosteroids and do not recommend the use of hyaluronic acid (6). However, a survey among American orthopedic surgeons showed a discrepancy between current practice and the AAOS recommendations for treatment of moderate to severe knee OA, considering the respondent's excessive use of intra-articular injections. There seems to be a lack in treatment consensus among specialists. Further investigation about the use of intra-articular treatments is encouraged (21).

In our practice, intra-articular injections with hyaluronic acid are more frequently used than those with corticosteroids. This is rather striking, but easy to explain. As mentioned before, one of our doctors has a specific interest in the locomotoric system and the use of intra-articular hyaluronic acid. Despite the fact that most guidelines do not recommend the use of it because of lack of evidence, his own experience says otherwise. Patients, who have gotten this treatment, seem to have good effects for a certain amount of time and some of them ask for a series of injections from time to time. We also see multiple orthopedic surgeons who work with these injections and who refer the patient back to our practice for financial reasons. The guidelines and quality indicators will probably not be a reason to alter treatment concerning this topic.

Arthroscopy should not be used with diagnostic purposes, yet sixteen patients got one. It must be said that this depends strongly on the orthopedic surgeons in the neighborhood. From one specialist that used to work in our area, it is known that he performed arthroscopy easily and without previous imaging. Eventually 63% of our patients got one or more arthroscopic interventions, which is a high number for an intervention that is proven not useful. The only indications to perform arthroscopy are locking of the knee or extension deficits due to osteophytes. Arthroscopic treatment of degenerative menisci has no proven benefits. Research showed that the rates of arthroscopy in Belgium, and more specific in Flanders, are too high, which we see confirmed in our practice (22).

Because knee OA should be considered a chronic condition, the expert panel in the quality indicator study also stressed the importance of follow-up in clinical practice (19). Follow-up for the conservative treatment of knee OA was nowhere to be found. Even after arthroscopy or joint replacement surgery follow-up was scarce. The main reason for this is probably that we expect patients to consult anyways when they are not satisfied with treatment and that they do not like it when they have to pay you a visit when they have no complaints. Another thing to keep in mind is the inevitable fact that some patients get lost to follow-up because they move away or switch GP.

For our practice, there are certain points of improvement. First of all, we should pay more attention to register diagnoses properly in our software system. Second, it would be helpful if everyone within the practice were on the same line considering the assessment of knee OA. However, this goes for every professional who is involved in the

treatment of knee OA. We notice here that there is no clear-cut pathway to follow. For example, the society of Dutch GP's Domus Medica does not have any guidelines on knee OA. As it will be a more common problem in the future, it could be interesting to have a summery on knee OA treatment and clear referral criteria. Furthermore, we could educate our patients more or give them patient letters or referrals to websites where they can learn about their disease. We could also try to stimulate them more by sending them to a physiotherapist. We should also give better information about medication use and keep in mind that acetaminophen is first choice. Explaining the patient when, how and how long to use NSAID is worth the effort. We should refer patients to an orthopedic surgeon only when it is strictly necessary. This way, unnecessary arthroscopies could be avoided. And finally, we should assess knee OA as a chronic condition and arrange some kind of follow-up, maybe by simply asking: 'how is your knee' when we have the occasion and of course, the time.

II: Qualitative research: barriers and facilitators in knee OA care from the professionals' perspective.

1. Aim

Knee osteoarthritis (OA) is a chronic disease and patients often consult many professionals: general practitioner, physiotherapist, orthopedic surgeon, a specialist in physical and rehabilitation medicine or a rheumatologist. Already, multiple management guidelines about this topic are available, some specific for every specialist, but concerning the non-surgical treatment there is a lot of consensus. On the other hand, there is literature available describing the low adherence to imply these guidelines in daily practice. In this second part of this master's thesis, we will perform a qualitative research study. In this study we will try to expose barriers and facilitators for non-surgical treatment of knee OA on the level of multiple different professionals.

2. METHODS

2.1 Study design

In this study, qualitative interviews were performed with healthcare professionals to identify possible barriers and facilitators in the management of knee OA. Three groups of professionals were interviewed. A semi-structured interview script, based on the Belgian set of quality indicators, was used (19). General practitioners were interviewed in focus groups. Face-to-face in-depth interviews were conducted with orthopedic surgeons and physiotherapists.

2.2 Study population

General practitioners

General practitioners related to the Academic Center of General Practice in Leuven asked local peer groups if they were interested to participate in this study. When given consent, they were interviewed in focus groups. Participants could be general practitioners as well as trainees in general practice. At the beginning of the discussion, all participants signed an informed consent.

Orthopedic surgeons

Eligible participants were orthopedic surgeons or residents in orthopedic surgery involved in the care of patients with knee OA. To recruit participants, a maximum variation sampling was used. The interviewer contacted possible participants by phone or email. They were given information about the subject, the length of the interview and anonymity was guaranteed. Before conducting the interview, participants were asked to sign a consent form.

Physiotherapists
Physiotherapists from the Flemish region were chosen in a goal-oriented way to make sure a varied sample size was reached, concerning characteristics for gender, age and type of practice (solo vs group). The interviewer contacted possible participants by phone to ask for their willingness to participate. Afterwards, a meeting was arranged. Before the interview, participants were informed about the study protocol and an informed consent was signed.

2.3 Data collection

General practitioners
Initially, two focus groups were organized under guidance of one investigator, LG, a PhD student in medicine. In case of lack of data saturation, additional focus groups would be performed. The discussions were audiotaped.

Orthopedic surgeons
All interviews were performed by PT, who was a medical student in postgraduate training for general practitioner at that moment. Planning and analysis of these interviews happened under the guidance of an expert in the field of qualitative research, RH. The interviews were audiotaped, while keynotes were being taken during the interview. Interviews were conducted until data saturation was reached.

Physiotherapists
These interviews were performed by TD, who was a master's student in physical therapy and revalidation sciences at that moment. Planning and analysis of these interviews happened under the guidance of an expert in the field of qualitative research, RH. All interviews were audiotaped. Interviews were conducted until data saturation was reached.

Different investigators performed the interviews for the three groups of professionals separately (23, 24) For all groups a semi-structured interview script was developed to identify barriers and facilitators professionals experience in knee OA care. The questions for these scripts were all based on the national set of quality indicators for knee OA (19). This set is based on recommendations from international guidelines for knee OA management and was developed with the help of a multidisciplinary Belgian expert panel. It consists of 21 measurable quality indicators, divided over four aspects of care: diagnosis, lifestyle/education/devices, therapy and follow-up.

To structure the identified barriers and facilitators found in each group of professionals, the framework suggested by Flottorp et al. was chosen (25). In this conceptual framework different topics for reaching guideline adherence are grouped in 7 domains, namely guideline factors, individual health professional factors, patient factors, professional interactions, incentives and resources, capacity for organizational change, and social, political and legal factors.

2.4 Analysis

All interviews were audiotaped and verbally transcribed afterwards. The interviews were analyzed through directed content analysis. Two researchers (DS and HV) independently reviewed all focus group and interview transcripts. As guidance, the Qualitative Analysis Guide of Leuven (QUAGOL) was used. This is a theory- and practice-based guide that supports and facilitates the process of qualitative data analysis (26). First, data was read and reread, making notes on paper. Second, data was coded with the qualitative data analysis software package QSR NVIVO 12. This was performed separately for every group of professionals. A method of half open coding was used. This means words or phrases that could be attributed to the same concept, were clustered in nodes according to the 7 domains of the framework. For every domain subnodes were defined during the coding process. After coding all data per group of professionals, researchers came together. Within every domain, overarching concepts were defined. This was reached by constructing a visual tree structure for which all individual codes of both researchers were printed and cut out. An example of this process is visualized in appendix 2. Discrepancies were discussed with a third researcher (RH) until consensus was reached.

3. Results

For every group of professionals participant demographics are summarized in table 2.

	General practitioners	Orthopedic surgeons	Physical therapists
Number of participants	21	10	12
Men	7	9	8
Women	14	1	4
Age in years			
Average	46	43,1	
Range	26-73	27-62	23-61
Years of experience			
Average		18,3	
Range		3-37	1-40
Type of practice/hospital			
Solo	9		4
Duo	6		4
Three or more	6		4
University hospital		4	
Non-university hospital		6	

TABLE 2: *Participant demographics.*

3.1 General practitioners

Two focus groups were conducted, after which data saturation seemed to be reached. The local peer-groups were composed of eight and 13 general practitioners, respectively. In total, 14 of them were women and seven of them were men. Practitioners from solo-, duo- and group practices were all represented. Their age ranged between 26 and 73 years. The focus groups occurred in October and November 2013 in Flanders, Belgium. The discussion lasted for 106 minutes in one focus group and for 104 minutes in the other one.

In total 40 barriers were found, which are listed in table 3 (appendix 3). All of these unique barriers could be attributed to one of the seven pre-existing domains of the framework: 5 at the domain of the guideline, 11 at the domain of the health care professional, 7 at the domain of the patient, 4 at the domain of professional interactions, 3 at the domain of incentives, 7 at an organizational level and finally, three on the social/legal level. Most barriers were registered in the domain of the health care professional, followed by the domain of the patient and the organizational level.

3.2 Orthopedic surgeons

Out of the sixteen contacted individuals, ten agreed to participate. These ten orthopedic surgeons were composed of nine men and one woman and were employed in four different hospitals. Six professionals were employed in a non-university hospital and four in a university hospital. Out of all participants, six were currently specialized in knee surgery, three of them were still in training and therefore had no specific specialty yet and one surgeon used to be specialized in knee surgery, but recently changed his field of interest to feet and hands. Their age ranged between 27 to 62 years old, with an average of 43,1 years. Their total years of experience in orthopedic surgery ranged from 3 to 37 years, residency included. The average years of experience were 18,3. Contacting the participants and conducting the interviews was done between October 2014 and March 2015. All interviews took place in the eastern part of Flanders, Belgium, in the hospital were the participant was working. The interviews had an average duration of 32 minutes.

In this group of professionals 50 unique barriers were exposed, covering all seven domains of the framework. Most barriers, a number of 11, were found on the level of the health care professional and on the level of professional interactions. Furthermore there were 6 barriers described on the domain of guidelines, 7 on the domain of the patient, 5 on the organizational level, 4 at the level of incentives and 6 on a social/legal level (table 4, appendix 3).

3.3 Physiotherapists

Initially, eight in-depth interviews were planned and conducted. However, this was not sufficient to reach data saturation. Eventually, a total of twelve interviews were performed. This group of therapists was composed of eight men and four women. Four

of them worked solo, four worked in a duo practice and four in a group practice that consisted of three or more therapists. Ages ranged between 23 and 61 years, corresponding with a working experience between 1 and 40 years. The interviews took place at the participants practice or in their homes; they each took about one hour.

The group of physiotherapists mentioned a total of 33 barriers. All seven domains were covered. Most barriers, a number of 9, were found on the domain of the health care professional, followed by the domain of the patient, where six barriers were mentioned. For the domains of guidelines, organization and incentives, we each found 4 barriers. On the level of professional interactions and social/legal level, 3 barriers were found for each level. All barriers are enlisted in table 5 (appendix 3).

3.4 Identified barriers in the seven domains of the framework for all professionals

For every group of professionals a rich variety of barriers were exposed. All of these barriers could be attributed to one of the 7 domains of the chosen framework. Most barriers were found in the group of orthopedic surgeons.

In what follows, the most striking barriers in all seven domains of the framework are described for all three groups of professionals.

3.4.1 Domain of the guideline

General practitioners, orthopedic surgeons and physiotherapists all mentioned **accessibility** to the guideline as a major barrier. All three of them admitted that they have limited **knowledge** about whether guidelines about knee OA exist. For most electronic medical records, an evidence linker is available, Yet, general practitioners experience difficulties in finding the right guideline at the right moment, due to login problems or because they lack experience in using the evidence linker. This makes it difficult to use on the spot.

> *"I think, that evidence linker can help once and a while, but the tempo during consultation is so high, it's just not possible…" (GP)*

All professionals consider **alternative sources of information** about knee OA more important than guidelines. They seem to trust more in information given in seminars, courses, journals, and etcetera. General practitioners value advice from specialists more than guidelines. Orthopedic surgeons expressed doubts concerning the scientific evidence used for creating guidelines.

> *"When big changes happen, you will not learn this from guidelines, but from articles that are being published." (OS)*

Furthermore, all professionals believe that **guidelines are too rigid**, not allowing guideline use for the individual patient. An important notice for the group of physiotherapists was that guidelines often are **not practical**, meaning that written guidelines cannot 'show' the treatment like, for example, an instruction movie can.

"Good for some kind of mass medicine. But my idea of medicine is not 'one solution fits all'. Rather the opposite." (OS)

3.4.2 Domain of the health care professional

General practitioners seem to have a wait-and-see **attitude** when it comes to knee OA. When patients consult repeatedly with the same complaints, the GP tends to take them more seriously or will refer them faster. Some physicians declared they do not give their patients certain advice about the conservative treatment options because they do not believe in it themselves or because they think the patient will not listen to conservative advices anyways. **Own experience** is often more important than the use of guidelines and this is a considerable reason to use or not use certain kinds of medication. In general practice, a patient often consults with multiple complaints at once. In this case, chances are that this **other pathology** has a bigger priority and treating the knee OA seems to be less important.

"They can consult for something else too, sometimes for ten problems at once." (GP)

Another prominent barrier in adhering guidelines is the fact that physicians feel pressured by their patients to prescribe a specific treatment, even though they do not always think it is necessary.

This **patient's pressure** is something orthopedic surgeons also experience. In addition, they feel a high need to please the patient in fear of losing them to another colleague. Orthopedic surgeons do not consider the use of guidelines an additional value as they rather rely on their own personal **education and experience**. Their **position** in second line medicine is a reason to perform further technical investigations. This makes them feel like they cannot afford to miss important diagnoses or underlying pathology. Also, imaging is expected by the patient as well as by the GP. It is easy to perform and it takes little time.

"It takes us longer to explain to the patient why he does not need an X-ray than sending him to radiology for a quick photo." (OS)

Arthroscopy is often used because it is known to be a quick and easy solution. It is easy to win time or it is used as a stepping-stone to joint replacement surgery. Another reason to perform arthroscopy is because patients demand it, believing it will fix their pain problem. Considering the advice in lifestyle changes, orthopedic surgeons often feel **fear to offend the patient**. On the other hand they are also skeptical about a patient's **motivation to change**. Furthermore, lifestyle changes are not considered to be mandatory before performing surgery and some surgeons do not believe lifestyle changes and physical therapy are enough to solve knee OA.

Physiotherapists enlisted **lack of knowledge** as an important barrier. Limited knowledge of disease pathology leads to wrong ideas about the effect of conservative treatment. **Habits and routines** are considered way more important than the use of

guidelines. Lack of further education after graduating was also mentioned. Physiotherapists perceive their **professional position** in the treatment of knee OA as rather uncertain. They fear that educating the patient too much will have a negative effect on their relationship with the patient.

> *"Weight loss is not easy. I think you'll need serious help from a doctor. According to the patient, doctors are way better in this matter than physiotherapists. They are way higher on the ladder when it comes to giving advice." (PT)*

As well as the orthopedic surgeons, they also **fear to offend the patient** by confronting them about their weight and they rather avoid this confrontation. **Prejudice** about the patient's motivation considering lifestyle changes and exercising is another barrier. Every physiotherapist likes a fixed training program for his or her selves. This is used to not miss anything during treatment. When patients do not persevere in treatment, PT's experience this as disappointing. However most physiotherapists think that the motivation should come from the patient. They do not really consider it their task to keep the patient motivated.

> *"The patient has to realize that they have to do it their selves. Not the therapist." (PT)*

3.4.3 Domain of the patient

Both general practitioners and orthopedic surgeons mention that patients are keen on **quick solutions and fast results**, which makes it more difficult to motivate them for conservative treatment options. Also, the patient seems to be **easily offended** when addressing lifestyle changes.

> *"(Ironically): If it's easy? If it were easy, we would not have overweight people…" (GP)*

All groups of professionals enlighten a **lack of knowledge** as an important barrier. Patients have fixed ideas about their disease process, thinking that it owes to ages and nothing can be done about it. They often do not fully understand all treatment options or how to use medication in the best way possible.

Compliance is another barrier found for all groups of professionals. When the patient is asymptomatic, it seems to be hard to keep working on lifestyle changes and exercising. Patients also like for their treatment to be comfortable, which often makes them less motivated for conservative treatment.

> *"They often expect a fixed solution. Preferably without putting any effort in it their selves." (OS)*

GP's mention the patient's **attitude** to only consult when there is an upsurge in their knee OA complaints as an important difficulty. Also, the **patient's history** is considered a barrier in general practice setting. Some patients have multiple comorbidities, which

makes their knee OA less important to them. On the other hand, we see that patients who have had joint replacement surgery in one knee, experience a lower threshold to ask for surgery on the other knee as well.

An important remark on behalf of orthopedic surgeons is that **patient's needs** have developed over time. Nowadays, the activity level of elderly is higher and these patients also expect a high quality of life. This can be a motivation to look for permanent treatment options earlier on in the knee OA process.

> *"Nowadays, people that are 70 years old… They go into the mountains; they want to go backpacking and things like that. So they want to have good knees…" (OS)*

The most prominent barrier that physiotherapists experience in their patients is the **lack of motivation**. Some patients believe that the therapist should solve their problem or they use lack of time as an excuse for exercising. There are patients who are afraid that active exercise treatment will further harm their knee or will cause too much pain. Sometimes they are not interested in active training and rather get a massage, because they think that is what the physical therapist is for. Some physiotherapists use this massage as a motivation technique as well.

> *"Massage. The masseur is coming! 'Cause when you say: exercise… Ha, exercise! Aunt Julia, she has a masseur as well, and he massages the knee. Massage is being expected." (PT)*

Another specific barrier is that **follow-up** can be difficult due to the long time interval between treatment sessions. Some patients want to determine their own treatment, based on their own **preferences**, which can limit the PT in applying the most appropriate treatment.

3.4.4 Domain of professional interactions

Difficult communication and **lack of feedback** are barriers that we found in all groups of professionals. No one seems to know how the other professional assesses knee OA exactly. Following problems were enlightened. GP's and orthopedic surgeons have no concrete idea of the treatment a patient gets from the PT, as there is no report about the given treatment afterwards. The only contact between GP and PT is the prescription note. Patients consult orthopedic surgeons without referral notes or on their own initiative. Orthopedic surgeons do not report about given treatment.

The most striking barrier for GP's considering professional interactions is that there are **no clear referral criteria** for knee OA. General practitioners find it difficult to find the right timing for referral and which technical investigations should be done before referral. This barrier was also one that the orthopedic surgeons their selves experienced. For patients with obvious knee OA, the specialist GP's refer to, is the orthopedic surgeon. Orthopedic surgeons think that patients that are referred by the GP are more likely to already have a more advanced knee OA. They also indicate that they

expect these patients to already have had lifestyle advice from their GP. They feel like the GP is in the best position to give this advice, because they have a better understanding of the patient as a whole. Because GP's know the patient best, they also have a clearer view on their medication use, which makes that orthopedic surgeons often do not want to interfere with this treatment.

> *"Yes, I just leave it like that. Because I don't know the rest of the patient's file and sometimes they use it for other problems. I don't like to interfere with that." (OS, on changing medication)*

On the other hand, orthopedic surgeons mention that some GP's sometimes wait too long to refer patients, which can lead to a poorer outcome post surgery. Another aspect that disappoints orthopedic surgeons is that few GP's seem to be interested in the symposia they organize. One of the most striking barriers that were mentioned by orthopedic surgeons is the **fear of competition**. Almost every participant expressed the fear of losing patients to a colleague when they waited too long to perform surgery.

> *"In Belgium, they can go for a second opinion very easily. And where they get what they want, you'll loose them." (OS)*

3.4.5 Domain of incentives

Both general practitioners and orthopedic surgeons mention **expensive medication and devices** such as braces as a barrier to prescribe them. Orthopedic surgeons frequently refer patients back to their GP for performing intra-articular injections, because this is less expensive for the patient.

Physiotherapists often use non evidence-based equipment for their own **profit** or to induce **psychological effects** on the patient. Also the fact that there are a limited number of **reimbursed** therapy sessions is considered a barrier.

3.4.6 Domain of organizational level

The **lack of a clear follow-up protocol** is a huge barrier in the general practice setting. The GP expects patients with knee OA to return when they are having complaints. There is no follow-up to evaluate conservative treatment. This way, GP's often have no idea how the patient uses their medication exactly. This is considered extra difficult because medication needs to be prescribed by box and not by daily defined dose. Also, not every kind of medication requires a prescription, so sometimes patients get medication on their own initiative. The **lack of a regional care program** on knee OA is also perceived as a barrier for GP's. Finally, consultations at the GP usually last for 15 minutes, which creates **lack of time** and a great time pressure during these consultations. Time pressure and a lack of follow-up post surgery are also perceived barriers for orthopedic surgeons. This lack of time has a huge influence on whether and how thoroughly a patient gets educated. The **structure of the health care system** creates another important barrier. Patients are not obligated to have a referral note for consulting specialists and orthopedic surgeons notice that lots of patients consult multiple colleagues about the same problem.

"If you won't perform surgery, someone else will. That's what it's like in Belgium nowadays. You can go doctor hopping without any problems." (OS)

Physiotherapists also mention difficulties in **time management**. They feel like the treatment of a chronic pathology like knee OA needs to be spread over a greater period of time. Most PT's also give priority to acute pathology, which makes that there is less time left for treating knee OA. It also became clear that there was more room for active exercise therapy in a group practice, because more PT's are present and patients can exercise together at the same time. A lack of these **capacities** was also a barrier.

3.4.7 Social and legal aspects

Marketing by the pharmaceutical industry can cause patients to buy or ask doctors for certain medication. Patients have certain **ideas** about their disease, because they read something about it or talked about it with other people. Doctors mention they sometimes perform technical investigations for **medico-legal reasons**. Finally, professionals have little knowledge about sport's clubs or active training programs in the patient's neighborhood where they could participate in.

3.5 Identified facilitators in the seven domains of the framework for all professionals

Because this study mostly focused on finding barriers, only the most prominent facilitators were enlightened. An overview of these facilitators can be found in table 6 (appendix 3).

All groups of professionals considered the **use of evidence-based medicine** important. This was a reason to not use certain kinds of medication, avoiding arthroscopy purely for knee OA and avoiding high-risk technical investigations. For physiotherapists, the **accommodation** plays an important role in the treatment of knee OA. In a group practice, there is often more space available and more supervision for active exercising.

"Organizational I think, you can pass on to each other. Or multiple patients can exercise together." (PT, on group practices)

Different ways of providing patients with general, evidence-based **information** about knee osteoarthritis and it's treatment, was considered to be very useful for both professionals and patients. Information sessions by orthopedic surgeons or flyers in the professionals' waiting room seem to facilitate the assessment of knee OA remarkably.

4. DISCUSSION

This study is one of the first to explore barriers and facilitators in the management of knee OA from the perspective of health care professionals with different disciplines. Many professionals are involved in the management of this chronic disease. Starting from a primary health care point of view, we choose to include three groups of professionals, namely the general practitioner, the orthopedic surgeon and the

physiotherapist. All exposed barriers for guideline adherence were categorized within seven domains of an evidence-based framework, including characteristics of the guideline, the individual healthcare professional, the patient, professional interactions, incentives and resources, the organization, and social, political and legal factors. In total, 123 barriers were identified. Most barriers were registered in the group of orthopedic surgeons.

For every group, most barriers were found within the domain of the healthcare professional, which seems to be quite logical. The second most important domain differs in every group. For physiotherapists this is the domain of the patient. The same goes for general practice, however equally as much barriers were found on the organizational level. Orthopedic surgeons on the other hand, seem to experience more barriers on the level of professional interactions. This can be explained by the fact that GP's and PT's usually see the patient on a more regular basis, which makes them spend more time with their patients. The general practitioner is not only a doctor, but also a manager in primary healthcare. They ought to be responsible for referral, follow-up of treatment and coordination of care. This may be a possible explanation for more struggles on an organizational level. Interactions between orthopedic surgeons among themselves were enlightened to be a barrier, as all participants expressed the fear of losing patients to a colleague. Also, feedback from and to primary care is an important factor on their behalf.

Multiple (inter)national guidelines on knee osteoarthritis care are available. Yet, all professionals admitted to have limited knowledge of their existence. Most of them do not go looking for guidelines in an active way. Lack of time and lack of motivation to read them is an attitude we found in every group. However, it is notable that general practitioners seem to put more value in guideline use than the other professionals. They declare to try to adhere to guidelines, if they are accessible and applicable to their individual patient. It must be said, that because of interviewing this group through focus groups, it is possible that their answers are slightly biased by peer pressure. Orthopedic surgeons trust on their own experience and alternative sources of information rather than guidelines, but they tend to use them as a global guidance. Physiotherapists on the other hand do not really take guidelines into consideration. Only when they believe in the advice their selves, they might try out certain aspects written in guidelines. They say to trust on their education and are more likely to keep a rigorous training program for one specific diagnosis. Some physiotherapists did not participate in further education anymore after they graduated, which possibly contributes to this fixed idea of treatment. It must be noted that in Belgium doctors are obligated to get a certain amount of additional schooling on a yearly basis, whereas physiotherapists are not. Symposia and seminars for doctors are frequently offered and most of the time they do not need to be payed for. For physiotherapists on the other hand, the extra schooling is not for free which can be an important reason to not participate. This discrepancy between different professionals concerning guideline use and education is a remarkable outcome in this study.

This study clearly shows that both general practitioners and orthopedic surgeons have doubts about the effectiveness of non-surgical treatment options in knee OA. This is an important reason for guideline non-adherence. As the first part of this master's thesis also confirms, referral to a physiotherapist is very scarce. This lack of referral was also exposed in a recent comparable study in the Netherlands (16). Some general practitioners were even surprised when physical therapy was suggested as a treatment option. Orthopedic surgeons do not believe that this treatment will be sufficient. Professionals also believe that it is too difficult for their patients to alter their lifestyles. Giving lifestyle advice is considered a very time-consuming and heavy task. Most professionals are simply not motivated enough to put in this extra time. On the other hand, it seems that there still are a lot of wrong ideas about knee osteoarthritis. Patients as well as some professionals, still think of OA as part of a normal ageing process and they believe not much can be done about it. These findings are in accordance with other studies (27, 28).

Many barriers were formulated in the domain of the patient. Patients are convinced that further medical imaging is necessary to confirm diagnosis. They also believe that surgery will solve their problem. Insistent patients with wrong ideas about their disease pathology can cause professionals to perform unnecessary technical investigations. Sometimes, patients even fear physical therapy will worsen their condition and some physiotherapists seem to share this fear, which is a reason to not motivate their patient for active exercise treatment. Better communication between the professional and their patient is an undeniable factor for improving guideline adherence and for optimizing patient-centered care. Patients need to have better knowledge about the disease process in order to better understand the importance of self-management options such as weight loss and physical exercise. In order to reach this, health care professionals should make sure they do not provide patients with contradictory information. This study clearly exposed lack of communication and feedback between different professionals as a barrier. Professionals assess knee OA in a different way, based on their personal experience and beliefs. Not every orthopedic surgeon uses the same criteria to proceed to surgical intervention. Also, there seem to be certain expectations towards one another. For example, general practitioners are expected to give lifestyle advices and orthopedic surgeons are expected to perform imaging. Due to the lack of clear referral criteria, there is no transparency. Multiple professional health care takers are involved in knee OA assessment. Better collaboration starts with understanding which role every individual professional has to play. Considering knee OA is a chronic disease, it would be interesting also treating it like one. Whereas other chronic diseases such as chronic kidney disease or diabetes have clear-cut regional paths of care, knee OA does not. Clear referral criteria and agreement about the organization of care would possibly facilitate knee OA care. Another advantage of improving this organization of care could be the possibility to adapt reimbursement criteria on treatment options such as physical therapy. Increasing accessibility to physical therapy can counter the disappointing perseverance that PT's experience.

The strength of this study is that possible barriers for knee OA management were analyzed from the perspective of three different kinds of professionals, all involved in knee OA care. In addition, the framework suggested by Flottdorp has proven to be a very useful tool in identifying the barriers. This approach made it possible to compare the view of different professionals in a structured manner. Furthermore, dividing all barriers over the seven pre-existing domains makes it possible to clearly differentiate more universal barriers that are not limited to a Belgian setting. This study also has its limitations. Due to participant recruitment and the use of semi-structured interviews, selection and response bias may have occurred. Eligible participants that were chosen in advance were later asked to participate by the respective researchers. Response bias may have occurred because professionals with specific interest in knee OA may be more motivated and willing to participate. However, interviews were conducted until data saturation was reached. The use of a half-open coding technique, focused on finding barriers elevates the risk of overlooking possible facilitators and other details. We tried to reduce interpretation bias by analyzing all transcripts by two independent researchers. Finally, because this is a qualitative study no statistical weight can be given to the results that were found.

In conclusion, this study shows that all healthcare professionals involved in knee osteoarthritis care experience a variety of barriers. Professionals should be aware of their own, as well as other professional's barriers in order to take them into account during daily practice. Improving patient's knowledge, better communication and feedback between different healthcare professionals and the development of a structured organization of care with clear referral criteria could all be helpful to improve guideline adherence. The next step in working towards the development of an implementation strategy is to prioritize the barriers that were found in all three groups. This way, implementation efforts can focus on those recommendations where the greatest benefit can be expected.

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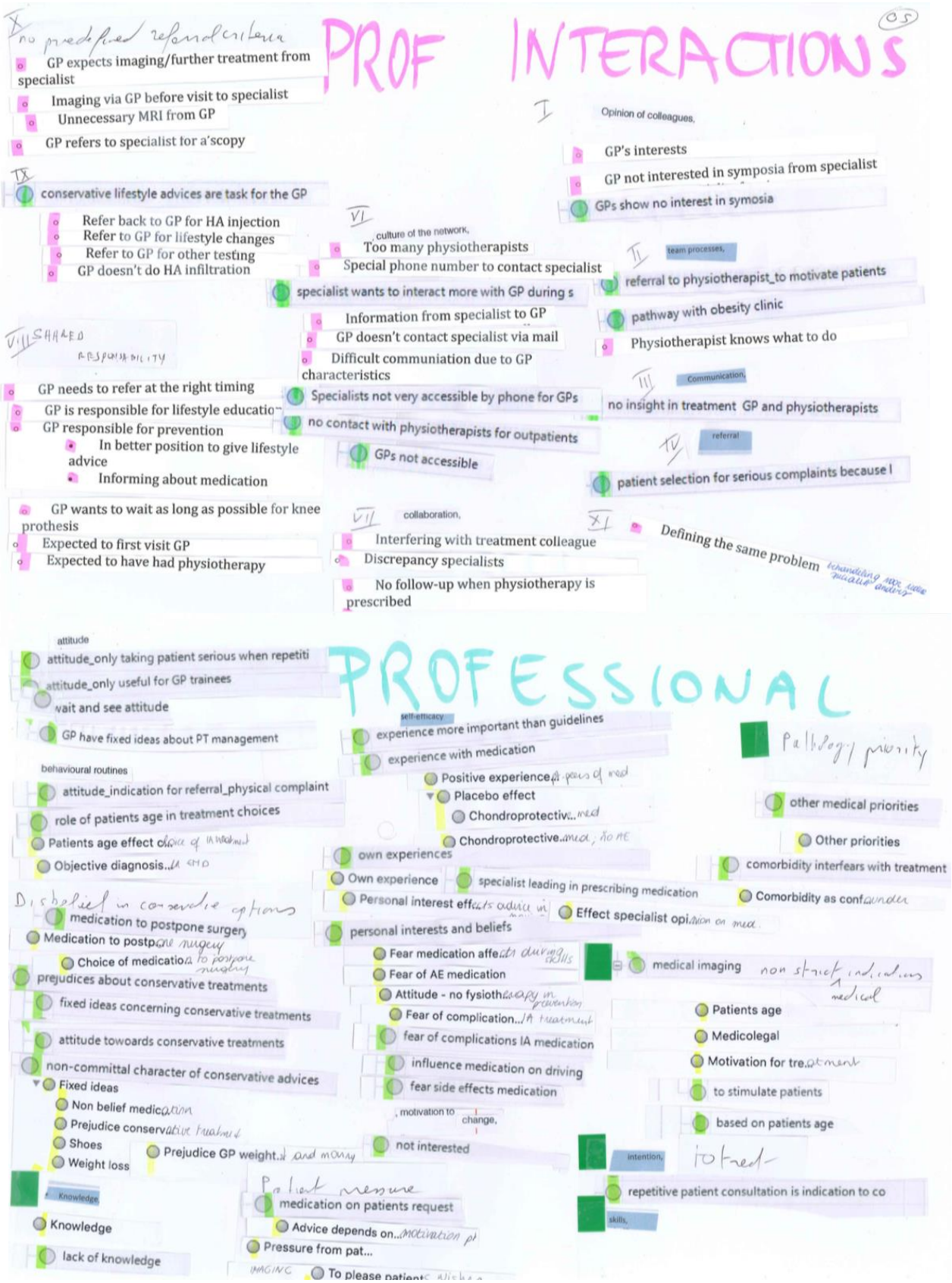
Appendices

1. SET OF QUALITY INDICATORS BY GRYPDONCK ET AL.

Recommendation
Diagnosis
1. If a patient is clinically diagnosed with knee OA and suffering from pain resistant to conservative treatment with acetaminophen and/or NSAID, then a radiography (weight-bearing, semiflexed PA, plus lateral and skyline view) of the symptomatic knee should be taken for the morphological assessment and grading of knee OA (especially to detect unicompartmental OA, for which treatment modalities may differ). CT and MRI scan should not be used.
2. If a patient with knee OA has a recurrent clinically evident effusion, then he/she should be further assessed (with aspiration and analysis of synovial fluid) in order to differentiate from inflammation caused by other arthritis.
Lifestyle/education/devices
3. If a patient has knee OA, he/she should be given information access and education about the objectives of treatment and the importance of changes in lifestyle, exercise, pacing of activities, weight reduction, and other measures to unload the damaged joints.
4. If a patient with knee OA is overweight, then he/she should be encouraged to lose weight and maintain his/her weight at a lower level.
5. If a patient with knee OA is following exercise therapy, then the exercise therapy should be combined with education/self-management interventions to improve patients' mental and physical performance and to alleviate pain.
6. If a patient has knee OA, then a brace should not be prescribed (except in unicompartmental knee OA with axial deviation).
Therapy
7. If a patient has knee OA, then exercise therapy should be prescribed, including at least muscle strengthening, aerobic exercises and functional exercises, and combined with range of motion exercises in case of range of motion restrictions.
8. If a patient has symptomatic knee OA, then he/she has to be referred to a physical therapist for instruction of the patient in appropriate exercises, for motivation of the patient to implement exercise and adhere to exercise, and to evaluate performance.
9. If a patient with knee OA is following exercise therapy, then the content and intensity of the exercise program should be tailored to the patient's individual goals in terms of limitations of activity and restrictions of participation.
10. If a patient with knee OA is following exercise therapy, then the treatment sessions should be spread over longer periods with lower frequencies in the later stages of the exercise program to facilitate the transition from exercise therapy to independent exercising and maintaining sufficient level of physical activity.
11. If a patient with knee OA is following exercise therapy, then he/she should be referred to regular community exercise and sports activities after a period of supervised exercise.
12. If a patient has knee OA, then acetaminophen up to 3 g/day should be used as the initial oral analgesic.
13. If a patient has knee OA and there is no adequate response on acetaminophen, or there is severe pain and/or inflammation, then oral NSAID should be used.
14. If a patient has knee OA, then chondroitin and glucosamine-chondroitin combination products should not be used.
15. If NSAID are used in a patient with knee OA, then they should be used intermittently (max 3 weeks sustained use) and at the lowest effective dose.
16. If a patient with knee OA and a history of bleeding gastric ulcers has a need for NSAID, then either a COX-2 selective agent or a non-selective NSAID with coprescription of a proton pump inhibitor/misoprostol should be used instead of a non-selective NSAID.
17. If a patient with knee OA has heart failure grade 2–4, ischemic heart disease, or renal insufficiency with a GFR < 40 ml/min, then NSAID should not be used. In case of other cardiovascular risk factors (e.g., hypertension, …), NSAID should be used with caution.
18. If a patient has knee OA, then strong opioids (oxymorphone, oxycodone, fentanyl, morphine sulfate) should not be used.
19. If a patient has knee OA, then arthroscopic interventions are not recommended. Coexisting meniscal lesions should not be treated. Only in case of locking of the knee from a large meniscal fragment or a loose body or an extension loss from an anterior anvil osteophyte is arthroscopic treatment indicated.
20a. If a patient with knee OA is not obtaining adequate pain relief and functional improvement, then he/she should be considered for joint replacement.
b. If a patient has unicompartmental knee OA, then a unicompartmental knee replacement should be considered.
Followup
21. If a patient with knee OA is following exercise therapy, then regular evaluations by the physiotherapist are necessary. To make the switchover from a supervised to an autonomous program, an evaluation session should be performed every 3 months in the first year, every 6 months in the second year, and once per year afterward.

OA: osteoarthritis; NSAID: nonsteroidal antiinflammatory drug; PA: posteroanterior; CT: computerized tomography; COX-2: cyclooxygenase-2; GFR: glomerular filtration rate; MRI: magnetic resonance imaging.

2. QUALITATIVE RESEARCH PROJECT: VISUALIZATION OF DATA COLLECTION



3. QUALITATIVE RESEARCH PROJECT: SUMMARIZATION OF RESULTS (TABLE 3-6)

TABLE 3. *Barriers related to guideline adherence for knee osteoarthritis according to general practitioners*

BARRIERS GP

Guideline	Professional	Patient	Professional interaction	Organisational	Incentives	Social/legal
• **Accessibility & attractiveness** ○ Accessibility ▪ On the spot ▪ Login difficulties/user-friendly ▪ Familiar use (age of the GP) ○ Availability ▪ No knowledge of existance ○ Insufficient practical guidance • **Credibility of the source** ○ Alternative resources more important: peers/specialists/ information sessions from specialists ○ Government sponsored websites • **Feasibility** ○ Time pressure • **Quality of evidence** ○ Not applicable for the individual patient ○ Too general • **Disadvantages in practice** ○ Guidelines only	• **Attitude** ○ Wait and see ○ Fixed ideas about PT management ○ Not interested in guidelines after studies ○ Only taking patients serious when repetitive complaints • **Behavioural routines** ○ Patient's age important in treatment choice ○ Important factor for referral: physical complaints ○ Underreporting: lack of proper diagnostic labeling in EHR • **Disbelief in conservative options** ○ Medication to postpone surgery ○ Prejudices about conservative options ○ Non-committal character of conservative advices ○ Fixed ideas: ▪ No belief in medication ▪ No belief in weight loss	• **Motivation** ○ Seeks quick solutions ○ Not demanding for R/ ○ Expects fast results ○ Lack of motivation • **Knowlegde** ○ Fixed ideas about disease process ○ Limited disease insight/limited insight in medication use ○ Prejudice uselessness R/ because of degenerative progress • **Patient's needs** ○ Does not see relation with QoL • **Compliance** ○ Non compliance when asymptomatic ○ Non compliance for conservative R/ options • **Attitude** ○ Watchfull waiting ○ Only consults when problems arise • **Demanding** ○ Forcing and compelling ○ Demanding technical investigations/medic ation	• **Communication** ○ No referral note ○ No contact with PT ○ No report about received treatment • **Referral** ○ Referral to specific specialists ○ Only referral to orthopedic discipline • **Shared responsibility** ○ Unclear which professional discipline is responsible ○ Unclear referral criteria • **Knowledge** ○ No insight in PT management and follow-up	• **Lack of follow-up/feedback protocol** ○ Not systematic ○ No follow-up of conservative R/ ○ Expecting patient to return when having problems ○ No insight in self medication • **Rules** ○ Prescription by box and not by DDD • **Beliefs** • **Structures** ○ Type of EHR ○ Access to evidence linker software • **Organization of care processes** ○ No regional care program ○ OTC medication ○ Imaging for insurance reasons ○ Accessibility for medical imaging is hospital dependent • **Capacities** ○ Lack of time ○ Time pressure during	• **Regulations** ○ No nomenclature for IA injections ○ No reimbursement for technical inevstigations ○ Referral to GP is cheaper than specialists put IA infiltration • **Information** ○ Adverse effect of commercial advertising • **Expensive medication and devices**	• **Culture of the network** ○ Lack of knowledge sport's club availability • **Commercial influencing of the patient** ○ Marketing through farmacy • **Opinion of colleagues** ○ Influencial persons

BARRIERS GP

- useful for treatment options
  - Only for more background information
  - Guidelines only for diagnostic options
  - possibility
    - No belief in effect conservative R/
- **Knowledge**
  - Lack of disease pathology
- **Self-efficacy**
  - Own experience more important than guidelines
  - Experience with medication
  - Personal interests affect given advice
  - Personal interests and beliefs
    - Fear medication affects driving skills
    - Fear AE medication
    - Disbelief in physiotherapy
    - Fear complications IA medication
- **Motivation to change**
  - Not interested
- **Patient pressure**
  - Doctor wants to please patient's wishes/medication on patient's
- **Patient's history**
  - Comorbidity
  - Prior knee surgery is lower threshold for new surgery
  - Knee OA is not a priority
  - consultation
  - Long waiting list 2th/3th line
- **Resources**
  - Overload new guidelines, not discipline specific

BARRIERS GP

request
  - Advice given depends on motivation of the patient
  - Patient pressure for imaging
- **Pathology priority**
  - Other medical priorities
  - Comorbidity interferes with treatment
  - Comorbidity as a confounder
- **Medical imaging for non-medical reasons**
  - Patient's age
  - Medico legal
  - Motivation for treatment
  - To stimulate patients
- **Intention to treat**
  - Only acting after repetitive consultations
- **Skills**

TABLE 4: *Barriers related to guideline adherence for knee osteoarthritis according to orthopedic surgeons*

BARRIERS ORTHOPEDIC SPECIALISTS

Guideline	Professional	Patient	Professional interaction	Organisation	Incentives	Social/legal

• **Accessibility**
  ○ No knowledge of existence
  ○ No access
• **Alternative resources for medical information**
  ○ Congress/peers/ seminars/medical journals/ supervisor
• **Disadvantages in practice**
  ○ Different guidelines for GPs and OS
• **Attractiveness**
  ○ Guidelines not made or supported by national professional OS association
• **Credibility of the source**
  ○ Reliability
  ○ Not updated
• **Quality of evidence**
  ○ Not applicable for individual patient
  ○ Too general
  ○ Lack of flexibility
	• **Behavioral routines**
	  ○ No additional value of guidelines after long study period
	  ○ Daily routine and habits are leading in treatment choices
	• **Awareness**
	  ○ Focus on imaging rather than clinical examination
	• **Disbelief in conservative options**
	  ○ Lifestyle cannot solve the problem
	  ○ Negative experience with patient's compliance
	  ○ Disbelief in PT
	• **Patient pressure**
	  ○ Influence on diagnostic and treatment approach
	• **Overuse of medical imaging**
	  ○ Easier than clinical examination
	  ○ Standard for surgery
	  ○ Arthroscopy to win time, easier than provide extra
		• **Demanding**
		  ○ For medication/surgical interventions
		  ○ Time to get well informed
		  ○ Imaging
		  ○ Athletes all highly demanding
		  ○ Shorter waiting times for specialist
		  ○ Fast treatment results
		• **Patient needs**
		  ○ High QoL is expected
		  ○ Activity level elderly is higher
		• **Attitude**
		  ○ Easily offended
		  ○ Seeking quick solutions
		• **Knowledge**
		  ○ No knowledge of treatment options
		  ○ Cannot deal with much information during consultation
		• **Compliance**
		  ○ R/ needs to be comfortable
		  ○ Ugly braces
		  ○ Not motivated for conservative advice
		• **Beliefs**
		  ○ Fixed ideas about conservative R/
			• **Opinion of colleagues**
			  ○ GPs show no interest in organized symposia
			• **Team processes**
			  ○ No contact with out clinic PTs
			  ○ No pathway with obesity clinic
			  ○ Patient's motivation is task for PT
			• **Communicati on**
			  ○ No insight in processes GPs and PTs
			• **Referral**
			  ○ Equal to higher risk of serious disease
			• **Fear of competition**
			  ○ Fear that passive attitude towards surgery will lead to losing patients
				• **Lack of feedback**
				  ○ Late referral by GPs can give worse surgery outcome
				• **Structures**
				  ○ Doctor shopping
				  ○ No referral obligation for patients
				  ○ Too accessible healthcare system
				• **Capacities**
				  ○ Time pressure during consultation
				  ○ Long waiting time for MRI
				  ○ No time for technical investigations during consultation like punction
				  ○ Gain consultation time by performing technical investigations in expense of clinical examination
					• **Financing**
					  ○ No reimbursed expensive medication
					  ○ IA HA reimbursed if done post surgery
					• **Incentive for the professional**
					  ○ Educational value CT in university hospital
					• **Medication prescriptions**
					  ○ Expensive IA medication
					  ○ Expensive imaging
					  ○ Expensive supplements for KOA management
					• **Materials**
					  ○ Braces expensive for patients
						• **Marketing IA supplements**
						• **Influential persons**
						  ○ Popularity of arthroscopy
						• **Medico legal aspects**
						  ○ Fear of claims=more technical investigations
						• **Self reliance**
						  ○ Idea that prosthetic surgery necessary for elderly to stay independent
						• **Legislation**
						  ○ No effect government campaigns for less imaging
						• **Healthcare budget**
						  ○ Braces expensive for society

BARRIERS ORTHOPEDIC SPECIALISTS

- information to patients, less invasive than surgery, before planning a TKP, for the demanding patient
- Fear to miss severe pathology
- Imaging as a tool to well inform patients
- Fear to miss important diagnosis

- **Self-efficacy**
  - Patient's age has leading role in surgical options
  - Use of second choice medication because low chance for AE
  - Own experience leading in choice for medication
- **Misuse of conservative R options**
  - Arthroscopy to postpone surgical interventions
  - Use of chondroprotective medication for wrong reasons: no AE, placebo effect, easy to perform, less invasive
  - Fixed old habits
  - Unrealistic expectations
  - Lack of appreciation unnecessary examination
  - Fixed ideas about outcome surgery
  - Fixed ideas about disease pathology
- **Motivation**
  - Does not tolerate negative feedback on lifestyle
- **Culture of network**
  - Communication problems by phone/ mail
  - GPs not accessible
  - To many out clinic PTs
- **Collaboration**
  - Discrepancy R/ with colleagues
  - Interfering with treatment colleagues
  - No follow-up of prescribed PT
- **Shared responsibility**
  - GPs refer to late in disease stage
  - GP is responsible for lifestyle education
  - GP is responsible for prevention
  - GP waits too long to refer for surgical interventions
  - Expect that
- **Priorities**
  - Idea that referred patients always have more severe persisting problems
- **Organization of care processes**
  - Lack of follow-up pathway after surgery
  - Follow-up only when complaints arise
  - Referral letter to GP only operative result no info on follow-up

BARRIERS ORTHOPEDIC SPECIALISTS

• **Motivation to change intention**
  ○ Fear of losing patients to colleague
  ○ Wants to earn patients trust
• **Attitude**
  ○ No interest in guidelines
  ○ Fear to address patients on personal lifestyle
  ○ Fear to offend patients
  ○ Biased: vision that patient does not want to change
  ○ Skeptic for patient's compliance
• **Skills**
• **Lack of patient empowerment**
  ○ Disbelief lifestyle and PT gives better outcome
  ○ Lifestyle measurements are not mandatory before surgery
  ○ patients already had PT/GP visits
• **Conservative lifestyle advice task of GP**
  ○ Refer back to GP for lifestyle advice
• **No predefined referral criteria**
  ○ GP referral for specific investigations like arthroscopy
  ○ GP expects further imaging from specialist
  ○ Already unnecessary imaging by GP
• **Defining the same problem**
  ○ Every OS has own ideas about R/

TABLE 5: *Barriers related to guideline adherence for knee osteoarthritis according to physiotherapists*

BARRIERS PHYSIOTHERAPISTS						
Guideline	**Professional**	**Patient**	**Professional interaction**	**Organisational**	**Incentives**	**Social/legal**

• **Accessibility**
  ○ No knowledge of existence
  ○ No access
  ○ Not available
• **Alternative sources**
  ○ Courses, internet, hospital OS, professional associations, specific journals
• **Quality of evidence**
  ○ Too general
  ○ Not practical for individual patient
• **Advantages for practice are lacking**
  ○ Not practical
  ○ Not hands on like examples with movies
	• **Knowledge**
	  ○ Guidelines
	  ▪ Habits and routine more important
	  ▪ No time to read
	  ▪ No knowledge of existence
	  ▪ No courses after graduation
	  ▪ Education is for younger PTs
	  ○ Disease pathology
	  ▪ Wrong ideas about effect conservative treatments
	  ▪ Fear to physically harm patients
	  ○ Personal beliefs more important
	• **Prejudiced**
	  ○ Disbelief in motivation of patients for exercise, weight loss and self management
	  ○ Avoiding confrontation
	  ○ Fear to offend patients
	• **Skills**
	  ○ Choosing R/ linked to personality PTs
	• **Motivation to change**
	  ○ Lack of motivation
		• **Knowledge**
		  ○ Limited knowledge about disease pathology
		  ○ Idea that KOA is irreversible
		• **Preferences**
		  ○ Choosing PTs for specific treatment
		  ○ PT treatment is limited by patient factors: age, comorbidities, activity level of the patient, pain of the patient
		  ○ Passive exercises to avoid pain
		• **Not motivated for treatment**
		  ○ Fear of pain
		  ○ Not interested in active training
		  ○ Attitude: comes for massage not for exercise
		  ○ Practical excuses
		  ○ Lack of ambition
		  ○ Expects PT will resolve problem
		  ○ Does not take responsibility in treatment
		  ○ Lack of time for exercise, FU and sports
		  ○ Desire limits treatment options
		• **Non-compliance in follow-up**
		  ○ Long time interval between sessions
			• **Rigid prescription follow-up**
			• **Lack of feedback**
			  ○ Prescription is only contact point
			  ○ No communication with in clinic OS
			• **Easy referral for lifestyle advice**
			  ○ No active referral for dietician
			  ○ Lifestyle is task of GP or OS, bandagist or ergotherapist
				• **Structures**
				  ○ Lack of equipment/ room for exercise
				• **Acute pathology priority**
				  ○ Agenda management
				  ○ KOA = no priority
				• **House visits too time consuming**
				• **Capacities**
				  ○ In PT group practices more capacity for exercise R
				  ○ More sessions after surgery reimbursed
				  ○ More PTs in practice = more hands off R/
				• **Time management**
				  ○ Not adapted to chronic diseases
				  ○ Lack of time for exercise R, FU, lifestyle advice, education
				  ○ Active exercise is too time
					• **Commercial effect of equipment**
					• **Profit gain with non EBM equipment**
					  ○ To gain time
					  ○ To treat more patients at same time
					• **Limited number of reimbursed sessions**
					  ○ Prescription required
					  ○ Limited sessions on prescription
					• **Equipment to induce psychological or placebo effect**
						• **General ideas on disease pathology**
						• **Limited referral active training programs**
						• **High influence of stage of life on treatment options (e.g. working class, retired patients)**

BARRIERS PHYSIOTHERAPISTS		
to educate ○ Disbelief in unsupervised training at home ○ Fear education will lead to patients loss ○ Not interested to educate patients • **Behavioral routines** ○ Limited time=fixed training program ○ Lack of creativity, no individual adapted training programs ○ Negative previous experiences give disbelief in patients/ home exercise • **Self-efficacy** ○ Credit for outcome • **Awareness** ○ Motivation needs to come from patient ○ PT is the primary responsible in the treatment process • **Uncertainty about professional position** ○ Lack of superiority professional feeling to motivate patients ○ Idea that educating patients will have negative impact on relationship • **Fixed ideas/rigidity** ○ Strict follow-up of the prescription protocol	• **Beliefs** ○ Unrealistic expectations ○ Demanding • **Compliance** ○ Physical progression demotivates patients	consuming

BARRIERS PHYSIOTHERAPISTS
○ Passive treatments to reward patients e.g. massage ○ Experience more important than guidelines ○ Disappointment in patients perseverance e.g. not my responsibility, not flexible to inform patients, stop when exercise has no fast effect

TABLE 6: *Facilitators related to guideline adherence for knee osteoarthritis according to all groups of professionals*

FACILITATORS		
General Practitioners	**Orthopedic Specialists**	**Physiotherapists**

• No use of medication with low level of evidence
• Professional interaction with physiotherapist to motivate patients
• Software can make access to guidelines easy e.g. apps
	• Information sessions for patients
	  ○ To provide general information about knee osteoarthritis
	  ○ Joint care programs
	• Evidence based management
	  ○ Disuse of non EBM supplements
	  ○ Avoiding arthroscopy for knee osteoarthritis without complications
	• Follow-up to detect problems prosthetics in early stage
	• Avoiding high risk technical investigations
	  ○ Risk of knee punction
	  ○ For imaging if it does not alter treatment
	• Look at the patient, not at the joint
	• Professional interactions
	  ○ Easy for in clinic PTs
	• Reluctance for imaging because of radioprotection
	• Postponing surgical interventions with medication/braces
		• Accommodation
		• Follow-up sessions
		• More contact points with patient = more opportunity for educational time
		• Gradually diminishing supervised exercises
		• Group training to motivate patients
		• Flyers in waiting room
		• Non EBM equipment is waste of time
		• PTs like to work with athletes

4. APPROVAL ETHICS COMMITTEE

DEFINITIVE FAVOURABLE ADVICE

Dear Patrik Vankrunkelsven
Dear Hanne Vanonckelen

The Research Ethics Committee UZ/KU Leuven hereby grants favourable advice to the proposed study, as it was described in the protocol. The Commission is of the opinion that from an ethical standpoint there are no objections to the proposed study. The study was approved on 02-07-2018

De Commissie keurt de aanvraag goed en heeft geen verdere opmerkingen.

Given that the study takes the form of a Master's thesis within the Group Biomedical Science, the application to the Research Ethics Committee UZ/KU Leuven was submitted to the Educational-Support Committee.

The Committee has no objection to the project on the basis of confidential treatment of the data and compliance with the Belgian legislation concerning privacy. The Research Ethics Committee UZ/KU Leuven wishes for the head researcher / promoter of the study to be aware of their responsibilities with regard to the privacy of personal / patient details, when in contact with living persons, patients, and / or contained within electronic medical records, including the correct implementation by employees and students.

This favorable advice concerns the submission of 20-06-2018 and is given for the duration of the Master's thesis of the student(s) concerned. Any amendment to the protocol will invalidate this favorable advice. In that case, you must submit an amendment for advice to the committee that previously approved your file.

The Committee confirms that they work in accordance with the ICH-GCP principles (International Conference on Harmonisation Guidelines on Good Clinical Practice), with the most recent verison of the Helsinki Declaration, and with applicable laws and regulations.

The Committee confirms that in case of a conflict of interest, the members concerned have not participated in decision regarding the study.

Kind regards,

Prof. dr. Minne Casteels
President / Chairperson
Research Ethics Committee UZ/KU Leuven

Prof. dr. Pascal Borry
President / Chairperson
Education-Support Committee for Medical Ethics KU Leuven

Our reference: MP005788
Your reference: Master's thesis study: Knieartrose: plan van aanpak in eerste lijn.
Leuven, 02-07-2018

Addendum: this master's thesis is part of an ongoing PhD qualitative research project at the KU Leuven. This project was approved by the Research Ethics Committee UZ/KU Leuven with stuydnumber S54497 (Belgian reference number: B322201214707).