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Many decisions are made in health care. For example when a patient is diagnosed with a certain disease the patient and health care provider are facing multiple decisions. One of these decisions for some musculoskeletal non-acute conditions is to choose between non-surgical and surgical treatments. Surgery is then often not the first choice of treatment. Initial treatment includes non-surgical treatments and surgery is only considered if the patient does not respond sufficiently to non-surgical treatment. Hip and knee osteoarthritis (OA) and sciatica are both non-acute conditions in which the decision of non-surgical versus surgical treatment is complex.

This thesis aims to contribute to the optimal use of non-surgical treatment and timing of surgery among hip and knee OA and sciatica patients. Guidelines are important in this respect because these are based on the best available evidence, it is known from the literature that health care providers do not always follow guidelines. If the evidence regarding use of non-surgical treatment and when to perform surgery is already specific and included in the guideline, efforts can be undertaken to facilitate implementation of these guidelines. To that end, it is important to gain insight into reasons why guidelines are not always followed (i.e. barriers and facilitators). This is the focus of part 1 of this thesis.

However, care delivery cannot always be optimized by implementing existing guidelines. The hip and knee OA guidelines are for example not specific about when to perform a total hip or knee arthroplasty (THA or TKA), partly because evidence is lacking about what the optimal timing of surgery is. If evidence is lacking, more knowledge needs to be generated to develop evidence based recommendations in guidelines and thereby optimize care. Specific issues about this topic that are addressed in part 2 of this thesis are: what are the evidence based indications to perform surgery and what are criteria and determinants to achieve the best possible patient outcomes after surgery? And does the type of prosthesis influence these outcomes?

**Part 1 Implementation of evidence based guidelines**

The first part of this thesis focuses on implementation strategies to improve guideline uptake regarding the use of non-surgical and surgical interventions in hip and knee OA and sciatica care. National and international evidence-based guidelines for hip and knee OA recommend to start with (a combination of) non-surgical treatments, followed by surgical intervention if a patient does not respond sufficiently to non-surgical treatment options. In chapter 2, 3 and 4 the development of an implementation strategy to improve the use of non-surgical treatments in hip and knee OA is described. Chapter 2 describes the two steps that need to be taken to develop such a strategy. First, current use of preoperative non-surgical treatments in patients with hip and knee OA was explored using internet-based surveys, one among 174 patients who had undergone TKA or THA no longer than 12 months ago or being on the waiting list for surgery with a
confirmed date within 3 months and one among 172 orthopaedic surgeons. In Chapter 3 the results of this first step are described. The results showed that most recommended non-surgical treatments (education about OA/treatment options, lifestyle advice, dietary therapy, physical therapy, acetaminophen, NSAIDs, and glucocorticoid injections) were used frequently as single therapy. However, the combination of all these treatments is used in only a small percentage (6%) of hip and knee OA patients. Dietary therapy in overweighted patients was used least frequently.

The second step was to identify barriers and facilitators for the use of non-surgical treatments in orthopaedic practice. In Chapter 4 the results of this second step are described. To identify potential barriers and facilitators, semi-structured interviews were performed among 10 orthopaedic surgeons and 5 patients who received a TKA or THA no longer than 12 months ago. All barriers and facilitators mentioned in the interviews were used to develop two internet-based surveys to examine which barriers and facilitators were associated with the use and prescription of non-surgical treatments. The surveys were completed by 172 orthopaedic surgeons and 174 patients. Most barriers and facilitators among patients were associated with the use of physical therapy, lifestyle advice and dietary therapy. Among orthopaedic surgeons, most were associated with prescription of acetaminophen, dietary therapy and physical therapy. Examples of barriers and facilitators among patients included “People in my environment had positive experiences with a surgery”, and “Advise of people in my environment to keep on moving”. For orthopaedic surgeons examples were “Lack of knowledge about the guideline”, “Agreements/ deliberations with primary care” and “Short communication lines with a dietician”. Also the belief in the efficacy of these treatments was associated with increased prescription.

In sciatica care, guidelines recommend that the team of professionals involved in sciatica care and patients jointly decide about treatment options, so-called interprofessional shared decision making (SDM). This is based on evidence that patients with persisting leg pain after six to eight weeks have similar clinical outcomes after prolonged non-surgical treatment or surgery at one year follow-up. However, there are strong indications that SDM for sciatica patients is not integrated in daily practice. Chapter 5 describes the steps that need to be taken to develop a strategy to embed SDM in daily practice based on a barrier and facilitator assessment. Chapter 6 describes the exploration of barriers and facilitators using 40 semi-structured interviews among professionals of each (para) medical discipline involved in sciatica care (general practitioners (GP’s), physical therapists, neurologists, neurosurgeons, and orthopaedic surgeons). In addition, three focus groups were conducted among patients. The results show that professionals and patients mentioned more barriers than facilitators for SDM in sciatica care. Professionals perceived most barriers at the level of the organizational context, and facilitators at the level of the individual professional. Patients reported most barriers and facilitators at
the level of the individual professional. Several barriers and facilitators correspond with barriers and facilitators found in the literature (e.g., lack of time, motivation) but also new barriers and facilitators were identified. Many of these new barriers mentioned by both professionals and patients were related to the multidisciplinary setting, such as lack of visibility, lack of trust in expertise of other disciplines, and lack of communication between disciplines.

Next, the identified barriers and facilitators were ranked in Chapter 7 using Maximum Difference Scaling, to assess which barriers and facilitators found in the qualitative interviews were the most important for the use of shared decision making according to GPs, physical therapists, neurologists, neurosurgeons, orthopaedic surgeons, and patients. Professionals assigned the highest importance to: quality of professional-patient relationship, importance of quick recovery of patient, and knowledge about treatment options. Patients assigned the highest importance to: correct diagnosis by professionals, information provision about treatment options and potential harm and benefits, and explanation of the professional about the care trajectory, which were reported both as barrier and facilitator. Therefore, knowledge, information provision and a good relationship seemed to be the most important conditions for SDM perceived by both patients and professionals.

**Part 2 The optimization of surgical care in hip and knee osteoarthritis**

In OA care, it is unclear what the optimal timing is to perform a THA or TKA. If evidence is lacking, more knowledge needs to be generated to develop evidence based recommendations in guidelines and thereby optimize care. Part 2 of this thesis therefore focused on studying criteria and determinants to reach the best possible outcomes after surgical care. In Chapter 8 the availability of evidence-based indication criteria for primary THA and TKA in OA was assessed in 6 guidelines and 18 papers. The quality of the guidelines differed. Across guidelines and included studies, four studies stated that no evidence-based indication criteria are available. In the other studies, 12 THA, 10 TKA and 2 THA/TKA indication sets were found. Indication criteria concerning THA/TKA consisted of the following domains: pain (in respectively 10 and 11 sets), function (7 and 12 sets), radiological changes (9 and 10 sets), failed non-surgical therapy (4 and 8 sets) and other indications (7 and 6 sets). Specific cut-off values or ranges were often not stated and the level of evidence was low.

In Chapter 9 the literature was reviewed on which factors predict outcomes after THA to guide decisions on when surgery is most effective. Databases and trial registries were searched for prospective studies including hip OA patients who underwent primary THA. Studies with preoperative measurements on predictors, with at least one year follow-up were included. Thirty-five studies were included (138,039 patients). Overall, there was low quality of evidence. Studies were heterogeneous in the predictors tested.
and in the observed directions of the associations. Preoperative function (13 studies) and radiological OA (6 studies) were predictors with the most consistent findings. Worse preoperative functioning and more severe radiological OA were associated with larger postoperative improvement. However, these patients never reached the level of postoperative functioning as patients with better preoperative functioning or less severe radiological OA. For age, gender and pain the results of studies were conflicting. For BMI, some studies (n=5) found worse outcomes for patients with higher BMI. However, substantial improvement was still achieved regardless of their BMI.

Thus regardless of the amount of existing studies, when all included studies are of low quality, more original research of high quality is needed. Therefore, individual patient data from 19 prospective cohorts in the Netherlands with 1783 knee OA patients and 2400 hip OA patients was pooled to determine preoperative variables for outcomes after a THA and TKA in Chapter 10. The results showed that patients with a higher preoperative quality of life or functioning have a higher postoperative quality of life or functioning and patients with less preoperative pain have less postoperative pain. Furthermore, women and patients with a higher BMI had more postoperative pain and less improvement after both THA and TKA. Higher age and higher BMI were associated with lower postoperative QoL and functioning and more pain after a THA.

Another factor that may predict outcomes after a TKA is the type of prosthesis. Chapter 11 compares two types of knee prostheses in a meta-analysis: mobile and fixed bearing. Randomized controlled trials comparing mobile bearing with fixed bearing prostheses in cruciate retaining TKA among patients with OA or rheumatoid arthritis were selected, using functional or clinical outcome measures and follow-up of at least six months. Moderate-to low-quality evidence suggests that mobile bearing prostheses may have similar effects on postoperative knee pain, clinical and functional scores, health-related quality of life, revision surgery, mortality, reoperation rate and other serious adverse events compared with fixed bearing prostheses in posterior cruciate retaining TKA.

**General discussion**

The aim of the present thesis was to extend the knowledge in the field of implementation science by examining how care delivery for patients with hip and knee OA or sciatica can be optimized. In the first part strategies to improve guideline uptake in hip and knee OA and sciatica care were searched for. Looking across the different studies described in the first part of this thesis, there seem to be general domains relevant for implementation of evidence based guideline recommendations in a multidisciplinary setting. These domains are knowledge, attitude of health care providers and organization of care. Future implementation studies can start focusing on these topics if it is not feasible to perform a barrier assessment. However, also different barriers and facilitators were found for each specific condition. This shows that implementation problems of each specific condition
ideally needs a barrier assessment to be able to gear an implementation strategy at all existing barriers and facilitators. This will most likely result in improved implementation of evidence based guidelines.

In the second part of this thesis, a search for new evidence related to the question of optimal timing of THA/TKA in hip and knee OA patients was done. Regarding the issue of optimal timing, information in the literature is lacking. Pooling multiple cohort studies in the Netherlands showed that preoperative status is the most important variable for outcome after both THA and TKA, i.e. patients with better preoperative quality of life, functioning and less pain had better postoperative outcomes. This does not necessarily mean that patients who received a joint replacement earlier in their clinical course have a better outcome. Given the results that patients with a better preoperative status have better postoperative results, it is important to examine whether functioning or pain in hip or knee OA patients become worse over time, so if a worsening of functioning or pain in hip or knee OA patients is followed by further worsening or whether this fluctuates randomly over time. To determine whether patients deteriorate over time, more knowledge is needed about the progression of OA in different subgroups. In addition, it is important to assess the same outcomes can be reached with non-surgical treatment as with THA and TKA. Focusing on these questions in future research is likely to improve quality of care delivered to these patients.