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DOI

[10.1007/978-3-030-24067-7_19](https://doi.org/10.1007/978-3-030-24067-7_19)

Publication date

2019

Document Version

Final published version

Published in

Health and Social Care Systems of the Future

Citation (APA)

Albayrak, A., Olah, P., Vehmeijer, S., Stolk, N., & Melles, M. (2019). Patient selection process for 1-day total hip arthroplasty. In T. P. Cotrim, F. Serranheira, P. Sousa, S. Hignett, S. Albolino, & R. Tartaglia (Eds.), *Health and Social Care Systems of the Future: Demographic Changes, Digital Age and Human Factors - Proceedings of the Healthcare Ergonomics and Patient Safety, HEPS 2019* (pp. 163-170). (Advances in Intelligent Systems and Computing; Vol. 1012). Springer. https://doi.org/10.1007/978-3-030-24067-7_19

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Patient Selection Process for 1-Day Total Hip Arthroplasty

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Abstract. Osteoarthritis (OA) is a degenerative joint disease and OA of hips and knees tends to cause the greatest burden to the population. In the case of hip joint failure, a Total Hip Arthroplasty (THA), a surgical replacement of the hip joint with an artificial prosthesis, is required to relieve patients from pain and regain mobility.

In order to deal with the growing number of THA surgeries, optimize the cost effectiveness, reduce the length of hospital stay and minimize the risk, rapid recovery protocols have been introduced worldwide for elective primary THA. The next challenge for the orthopedic care was outpatient THA, aiming to send the patient to home the same day of surgery. To improve patient safety and managing expectation of the patients and medical professionals the current outpatient THA care pathway was analyzed and redesign suggestions were made. Pre-assessment where clinical patient data is integrated with patient characteristics (mental and physical condition, life circumstances, etc.) seems very important to support the orthopedic surgeon with sufficient data to make an informed decision whether a patient is suitable for outpatient THA.

According to the results, current patient selection process is mainly guided by clinical patient data and should be extended with patient characteristics. The relevant data provided by one of the medical professionals should be transparently available for the other medical professionals to support shared decision-making. The patients should be involved more actively in their healthcare process and advice they receive should be tailored and personalized according to their life circumstances.

Keywords: Total hip arthroplasty · Patient journey mapping · Patient empowerment

1 Introduction

1.1 Total Hip Arthroplasty

Osteoarthritis (OA) is a degenerative joint disease and OA of the hips and knees tends to cause the greatest burden to the population. The progression of the disease is slow but can eventually lead to joint failure with pain and physical disability [1]. In the case of hip joint failure, a Total Hip Arthroplasty (THA) which is a surgical replacement of the hip joint with an artificial prosthesis is required to relieve patients from pain and to regain mobility. According to the Dutch Arthroplasty Register, in 2017 in total 29.937 primary THA surgeries were performed in the Dutch hospitals [2]. This number is expected to increase by 40% till 2030, because of aging society and changes in life style [3].

In order to deal with the growing number of THA surgeries, optimize the cost effectiveness, reduce the length of hospital stay and minimize the risk, rapid recovery protocols have been introduced worldwide for elective primary THA. Reinier de Graaf Hospital (RdGG) is a large teaching hospital in the Netherlands and a pioneer in adopting the rapid recovery protocol in the THA surgery. After a successful implementation of the rapid recovery protocol the mean length of hospital stay of patients were decreased from 4.6 to 2.9 nights [4].

The next challenge in the orthopedic care pathway was to introduce the outpatient THA to reduce the length of hospital stay even more. An outpatient department of the hospital is specially designed for the treatment of outpatients that do not need to be admitted for overnight care. In order to increase patient safety in these type of surgeries, patient selection and pre-assessment are important considerations [5]. Mapping patient characteristics provides information regarding which patients are suitable for both rapid recovery and outpatient programs [6].

According to the results of a prospective cohort study performed in 2014 in RdGG in the Netherlands, patient selection and discharge criteria for outpatient THA should include both clinical and personal (mental & physical condition, life circumstances, etc.) measures to avoid unnecessary adverse health outcomes and admission [7]. Therefore, it is important to examine which combination of criteria could provide the orthopedist the sufficient data to make an informed decision whether a patient is suitable for outpatient THA.

Within the Highly Individualized Patients Projects (HiPP) program which is a research consortium between Zimmer-Biomet (multinational in prosthesis), RdGG department of orthopedics and Faculty of Industrial Design Engineering (IDE) at TU Delft a project was initiated to analyze the current 1-day outpatient THA and improve the process of patient selection. The research question was, how can the current patient selection process be improved and how can the orthopedist be supported by means of relevant data to take informed decision whether a patient is suitable for outpatient THA. The master graduation project of the student Petra Olah which was supervised by all the authors is the underlying case for this study [8]. The aim of this study is to improve the patient selection process and support the orthopedist to make informed decisions.

2 Materials and Methods

The orthopedic care pathway of outpatient THA is very complex and different from the rapid recovery program. In order to deal with this complexity and understand the whole care pathway different methods like, literature study, field research, observations and interviews, stakeholder analysis, and patient journey mapping are used.

2.1 Literature Study

The aim of the literature study was to get insight into the different topics. Included search terms were THA surgery, outcome measures (patient characteristics, mental aspects, physical factors), diagnostic, national and international guidelines and protocols, shared decision making, technology in diagnoses and improving diagnoses in healthcare. Elsevier, Science Direct, Medline Clinical Key were the used search engines.

2.2 Field Research, Observations and Interviews with Medical Professionals and Patients

An extended field research complemented with observations and interviews was conducted to analyze the current outpatient THA care pathway and to identify;

- the characteristics of the current patient selection process, what are the relevant criteria and how they are measured
- the main decision points in the selection process
- the involved medical specialists and their responsibilities
- the communication and information management systems currently used in the hospital
- how relevant information is gathered and presented to the medical professionals and the patients?

2.3 Patient Journey Mapping

All the insights gathered from field research, observations and interviews with medical professionals and patients were mapped in a Patient Journey. The stages of the THA care pathway were defined and used as a timeline. The interactions between the patient and different medical professionals per stage were described in the so-called “touch-points” (see Fig. 3).

3 Results

3.1 Medical Professionals and Current Outpatient THA Care Pathway

Next medical professionals are involved in the current outpatient THA care pathway (see Fig. 1).



Fig. 1. Medical professionals involved in the current outpatient THA care pathway.

The current pre-operative phase of outpatient THA includes multiple stages involving several medical professionals and the patient & informal caregiver. Each medical professional has his/her own role and responsibilities and need different type of information/clinical data to decide.

In the pre-operative phase, the goal is to set up a diagnosis, collect clinical data of the patient and choose the type of surgery. At each stage the medical professional gathers mostly, clinical data from the patient and evaluate them for a diagnosis or a treatment plan.

In total six pre-operative stages were identified. The involved medical professionals, the duration of the stages and the interaction were mapped in Fig. 2.

	Stage 1	Stage 2	Stage 3		Stage 4	Stage 5	Stage 6
	Consultation with Orthopaedic Surgeon	Group Education	POS / 1 Consult with Anaesthesiologist Assistant	POS2 Consult with Anaesthesiologist	Consult with Orthopaedic consult	Consult with Orthopaedic resident	Consult with Physiotherapist
Time	15 minutes	1 hour	15 mins.	10-30 mins.	45 mins	10	30
Content of the stage	Diagnosis, asking questions, explain the necessary steps and operation procedure, inform the patient about the possible complications	Information session about the operation procedure	Ask questions Do measurements on the patient Partially fill in Patient form.	Measure health status of the patient based on anamnesis, Check patient suitability for surgery and decide on the type of anaesthesia	Explanation about the process of surgery and hospitalisation, Mapping patient's home situation	Final check on patient data	Showing excercises, Practice walking with aid tools
Decision points	Decide on surgery, decide on RR THA or 1-day RR THA programme			Decide whether surgery is possible and decide on the type of anaesthesia	Check patient's home situation, if not suitable, the patient cannot do 1-day THA	Final review of the completed patient file, if not suitable, the patient cannot do 1-day THA	

Fig. 2. Overview of the stages, involved medical professionals and interactions. Decision moments are highlighted with warning signs.

Pre-operative stages of the current 1-day THA

Stage 1: Consultation with orthopedic surgeon. The aim of this consultation is to decide which type of surgery is suitable for the patient and is planned months to a year before surgery. The consultation takes 15 min wherein the orthopedic surgeon fills in the digital patient form and communicate with the patient. During the consultation mostly clinical patient data like, X-ray, physical examination, clinical history, self-reported medical condition is available. The communication and information provided by the orthopedic surgeon is quite standard and not personalized. Prior to the

consultation some patients are already searched for information and tend to ask more. The orthopedic surgeon explains the risks in detail but the content is general. The patient receives a booklet which provides information about the surgery but not specific about outpatient THA. Even if it is decided to do an outpatient THA the final decision will be made after the pre-operative screening results which will be available in the later stages of the care pathway. Administrative work takes a lot of time. The orthopedic surgeon uses pre-written expressions and template forms to speed up the process.

The administrative work takes place during the consultation but sometimes it is finished at the end of the day.

Stage 2: Group education. The aim of the group education is to inform the patient about the entire procedure via a presentation by the orthopedic consult and physiotherapist. It is planned months before the surgery and it can take place either before or after the pre-operative screening. A nose swab is taken from the patient to check the presence of infectious bacteria. The session lasts from one hour till 90 min. The provided information is detailed but general. Since it is a group setting the patients do not get personal advice. Some patients ask questions during the session and some of them waits until the presentation ends and ask their questions personally.

Stage 3: Pre-operative screening with anesthesiologist assistant and anesthesiologist. The aim of this stage to decide whether the patient can go through a surgery, and if yes, what should be the anesthesia protocol including type of the anesthesia and pain medication. It is planned 6 weeks before the surgery. It takes around 15 min and the patient is informed on the anesthetic procedure. The pre-operative screening consists of two stages. First the anesthesiologist assistant provides information and after him/her the anesthesiologist. Their tasks are different but both of them using the same digital patient file. There is no indication in this file about who should fill in what. The anesthesiologist assistant supports the anesthesiologist by taking over some tasks. The anesthesiologist decides on anesthesia and pain medication based on the available data which is filled by the orthopedic surgeon, anesthesiologist assistant and other medical specialist if involved. The patient file can only be closed if the obligated information is filled in. If some important information is missing the anesthesiologist should search for it and add to the file.

Stage 4: Consult with the orthopedic consult. The aim of this stage is to investigate patient's living condition, giving life style advice after surgery and to discuss the remaining questions. Also, organ donation procedure is discussed during this meeting. It takes 45 min and planned 1 month before surgery.

Stage 5: Consult with the orthopedic resident. The aim of this stage is to do a final check on the patient file and update it if needed, fill out a questionnaire and provide the necessary medical prescriptions. It takes 10 min and is planned few weeks before the surgery.

Stage 6: Consult with the physiotherapist. The aim of this final stage before surgery is to prepare the patient for the recovery process. The expectations regarding recovery are discussed and the patient practice walking with crutches. This event takes place day before the surgery. It takes 30 min and is planned a day before the surgery.

first complaints and ending with the recovery process). The six pre-operative stages were included as touchpoints.

In total there were five decision moments in the journey which were highlighted with a warning sign. The first decision in the journey was made by the general practitioner by referring the patient to the hospital. The second and one of the most important decisions was made by the orthopedist whether the patient was suitable for 1-day outpatient THA. The third and fourth decision was made by the anesthesiologist to decide whether the patient can go through a surgery, and if yes, what should be the anesthesia protocol including type of the anesthesia and pain medication. The last decision is on date and time of the surgery and it is made by the administration staff in consultation with the patient. The decisions made by the different medical professionals are mostly communicated via reports or notes using the information management system of the hospital.

The information management system of the hospital has predesigned layouts which support medical professionals in registering patient data. At each stage of the pre-operative phase this layout was different. The interviewed staff was facing some usability issues; administration via the system was time-consuming, important information was not easily accessible, the structure of the patient file was complex and not transparent enough. Retrieving patient data for evaluation was a difficult process.

The patient has to fill in couple of questionnaires. This so-called patient reported outcomes are used by the medical professionals in their decision-making process.

The information that the patient got was mainly verbal and provided during the consultations. Information booklets/flyers and mobile application were also available. The provided information was very general. The content of the information was only related to the standard Rapid Recovery program and did not include specific information about 1-day outpatient THA. Some of the information materials were only available in Dutch.

4 Discussion

The outpatient THA is the new challenge in orthopedic care and to ensure a safe and effective implementation, the current pathway was analyzed to improve the patient selection process.

Two most important decision regarding the selection process was made by the orthopedist and anesthesiologist. The orthopedist has to decide the type of surgery while the post-operative screening results was not available yet. The post-operative screening wherein the anesthesiologist decides whether the patient is applicable for surgery has consequences for the decision of the orthopedist. To manage the expectations of the patients it is desirable to have this information available before the consult.

Since the information management system of the hospital is used as a main communication tool between the medical professionals, the system should be user-friendly, able to create an overview and highlight important and relevant information to support and improve the patient selection process. The system can be improved by means of transparency to support the shared decision making between medical specialist.

Next to the current patient reported outcomes it is desirable to have an insight on the mental state of the patient. Anxiety and stress for surgery can influence the outcome of the surgery or recovery phase. More tailored information and consultations could help these patients to prepare for the surgery. Currently, the patient selection criteria are mostly based on clinical patient data. These measures can be extended with patient characteristics including physical and mental health of the patient to support the orthopedist to make informed decisions.

The new developments regarding patient selection have to address more personalized care to minimize uncertainty by involving the patients more in the pre-operative stage. Also a continues learning loop where patient selection criteria and the whole process is evaluated and adjusted according to the new insights is essential for a sustainable process.

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