REVIEW ARTICLE

# THE SURVEY ON METHODS USED FOR THE ASSESSMENT OF PATIENT'S SATISFACTION AFTER TOTAL HIP ARTHROPLASTY

## PRZEGLĄD METOD STOSOWANYCH DO OCENY SATYSFAKCJI PACJENTA Z CAŁKOWITEJ ARTROPLASTYKI STAWU BIODROWEGO

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ABSTRACT
**Introduction**
Total hip arthroplasty (THA) is a surgical procedure that improves the lives of patients with end-stage osteoarthritis by decreasing pain, improving motor function and mobility. Despite implants and operative techniques being highly advanced, studies report that 7% of patients remain dissatisfied after the procedure. Initial preoperative health status, postoperative function and fulfilment of the patient's expectations contribute to overall patient's satisfaction.

**Material and methods**
The aim of our descriptive review was to identify and compare six measurement tools analysing them by focusing on their adequacy and usefulness in measurement of satisfaction after THA: Press Ganey Survey (PG), Visual Analog Scale (VAS), The Patient Satisfaction Questionnaire Short Form (PSQ-18), The Hospital for Special Surgery Hip or Knee Replacement Expectations Survey (HSS-THRES), Self-Administered Patient Satisfaction Scale (SAPS) and Hip and Knee Arthroplasty Satisfaction Scale (HKASS), which can serve as a practical guide for researchers in developing area of managing patient satisfaction as a non-specific means of improving effectiveness of the surgery. A literature review was performed by searching the PubMed, Science Direct, and Google Scholar databases.

**Results**
We review the contents of the questionnaire, its properties such as time to complete, recall period and versions available. We also discuss the impact of various factors on patient satisfaction after total hip arthroplasty such as patient expectations, age, sex, pain management, comorbidities and the length of stay. Analysis of available data shows opportunities for further improvement, as greater understanding of factors that affect patients' satisfaction may allow healthcare providers to better adjust to expectations and challenges that people undergoing arthroplasty may face before, during and after the treatment. Due to large variety of available scales, physicians and medical personnel have possibility to adjust these tools to own liking and specificly to the patient.

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**Conclusions**

This is the first review that provides useful information for clinical research and every-day routine evaluation of patient's satisfaction after THA. Each of the measurement methods assesses the satisfaction after THA from a different perspective.

**Keywords:** arthroplasty, replacement, hip, patient satisfaction, surveys and questionnaires

STRESZCZENIE

**Wstęp**

Całkowita endoprotezoplastyka stawu biodrowego (THA) to zabieg chirurgiczny, który poprawia jakość życia pacjentów ze schyłkową chorobą zwyrodnieniową stawów, poprzez zmniejszenie bólu, poprawę funkcji motorycznych i mobilności. Mimo że implanty i techniki operacyjne są coraz doskonalsze, badania wykazują, iż odsetek Pacjentów niezadowolonych sięga 7%. Początkowy stan zdrowia przedoperacyjnego, sprawność pooperacyjna oraz spełnienie oczekiwań Pacjenta mają wpływ na ogólną satysfakcję Chorego.

**Materiał i metody**

Celem naszego przeglądu była identyfikacja i porównanie sześciu narzędzi pomiarowych: Press Ganey Survey (PG), Visual Analog Scale (VAS), The Patient Satisfaction Questionnaire Short Form (PSQ18), The Hospital for Special Surgery Hip and Knee Expectations Survey (HSS-THRES), Self-Administered Patient Satisfaction Scale (SAPS) oraz Skala Satysfakcji z Artroplastyki Stawu Biodrowego i Stawu Kolanowego (HKASS), które mogą służyć jako praktyczny przewodnik dla badaczy. Przegląd literatury przeprowadzono, przeszukując bazy danych PubMed, Science Direct i Google Scholar.

**Wyniki**

Przeanalizowano zawartość kwestionariuszy, ich właściwości, takie jak czas od wypełnienia, okres prezentowania objawów i dostępne wersje. Omówiony został również wpływ czynników na satysfakcję pacjenta po całkowitej alloplastyce stawu biodrowego, takich jak: oczekiwania Pacjenta, wiek, płeć, skuteczność leczenia bólu, choroby współistniejące oraz długość pobytu w szpitalu. Analiza dostępnych danych wskazuje na możliwości dalszej poprawy wyników endoprotezoplastyki, ponieważ lepsze zrozumienie czynników wpływających na satysfakcję Chorych może pozwolić świadczeniodawcom lepiej dostosować się do oczekiwań Pacjentów oczekujących na zabieg. Dzięki dużej różnorodności dostępnych kwestionariuszy lekarze i personel medyczny mają możliwość dostosowania ich do własnych preferencji oraz indywidualnie do każdego Pacjenta.

**Wnioski**

Jest to pierwszy przegląd, który dostarcza przydatnych informacji do badań klinicznych i rutynowej oceny zadowolenia pacjenta po THA. Każda z metod pomiaru ocenia satysfakcję po THA z innej perspektywy.

**Słowa kluczowe:** endoprotezoplastyka, endoproteza stawu biodrowego, satysfakcja pacjenta, ankiety i kwestionariusz

**Introduction**

Total hip arthroplasty (THA) is a common surgical procedure that improves the lives of patients with severe arthritis by decreasing pain and improving mobility and function of the hip. According to research conducted on the University of Pennsylvania (Sloan *et al.,* 2018), 370.000 THAs are performed in the United States every year. The most common indication for THA are: severe hip osteoarthritis, developmental hip disorders ex. hip dysplasia, inflammatory arthritic conditions (Varacallo *et al.,* 2017). Most of the patients undergo total hip arthroplasty (THA), which is a cost-effective surgical procedure performed to relieve pain and restore function to the arthritic hip joint (Pivec *et al.,* 2012). The number of THA performed is estimated to grow by 174% following the increased demand and the number of revision surgeries is estimated to increase by 137% between 2005 and 2030 (Kurtz *et al.,* 2007). The primary goals of THA are pain relief and restoration of hip function. The success of total joint replacement is measured through implant survival, and the 10-year success rate of THA has been reported to be as high as 95% (Pivec *et al.,* 2012). Although this method of treatment has improved, studies have shown that at least 7% of patients remain dissatisfied (Anakwe *et al.,* 2011). There is still no consensus on the optimal method of assessment of patients' satisfaction. The uncertainty in the outlook on patients' satisfaction makes the standardization of assessment methods crucial to their applicability. Patients' satisfaction is a combination of subjective perception as well as socio-cultural, cognitive, behavioural and psychological factors. The assessment of satisfaction appears as challenging since no golden standard exists for such multifactorial item. A few major factors can impact patients' satisfaction, which can be divided into two groups. The first group includes technical factors such as type of approach (anterior, lateral or posterior), fixation (cemented or uncemented) or leg length discrepancy. The second group covers patient-specific aspects such as: patient's expectation, age, sex, pain management, patient's comorbidities (medical or psychiatric, present prior to surgery) and length of stay (LOS) (Ray *et al.,* 2020, Łęgosz *et al.,* 2020). This review aims to identify imethods used for the assessment of patients' satisfaction after THA. The authors of this article paid particular attention to factors that have significant impact on the patient related outcome after the procedure. The results should be helpful for medical professionals in the selection and use of appropriate tools for measuring patients' satisfaction.

**Methods and materials**

This manuscript is a descriptive review. The literature review was performed by searching the PubMed, Science Direct, and Google Scholar databases, limited to English language and filtered by terms: 'total hip arthroplasty', 'satisfaction', 'patient-reported outcome'. References from obtained papers not identified in the search were evaluated as an addition to the database.

**Results**

The following tools were selected for the analysis: Press Ganey (PG) Survey, Visual Analog Scale (VAS), The Patient Satisfaction Questionnaire Short Form (PSQ-18), The Hospital for Special Surgery Hip or Knee Replacement Expectations Survey (HSS-THRES), Self-Administered Patient Satisfaction Scale (SAPS) and Hip and Knee Arthroplasty Satisfaction Scale (HKASS). All of the questionnaires were compared regarding the background, the recall period, the time to complete, the available versions and the scoring variants, the languages, availability the copy and the licensing psychometric properties. The results of our review were summarized presented in the article.

**1. *Press Ganey (PG) Survey***

**1.1 Background & contents:** The Press Ganey (PG) is used by more than 50% of all US hospitals in order to measure patient satisfaction during in-hospital stays (Cleveland Clinic

Orthopaedic Arthroplasty, 2019). PG scores directly contribute to the quality measures according to the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS). The HCAHPS is the standard in measuring patient satisfaction, and it is used to estimate hospital compensations (Delanois *et al.,* 2017). The survey consists of 6 question domains containing: Access (4 items), Moving Through the Visit (2 items), Nurse Assistant (2 items), Care Provider (10 items), Personal Issues (4 items) and Overall Assessment (2 items) (Presson *et al.,* 2017).

**1.2 Recall period & time to complete:** Unspecified.

**1.3 Available versions:** The survey can be administered by the telephone, e-mail, e-mail with telephone follow-up or using an active interactive voice recognition method (Cleveland Clinic Orthopaedic Arthroplasty, 2019).

**1.4 Available scoring variants:** The answers are put into five Likert type boxes (Rane *et al.,* 2019). Each item is ranged as: very poor (score = 0), poor (score = 25), fair (score = 50), good (score = 75) and very good (score = 100). Responses are converted to a 0–100-point scale. The mean overall score for all of the answered questions within an individual subdomain is calculated. Afterwards, the six individual subdomain scores are used to calculate the mean overall care satisfaction score (Presson *et al.,* 2017).

**1.5 Languages:** All variants of the survey are available in the English and Spanish versions. Paper version is available in multiple foreign languages, but the email version of e-survey only in limited languages.

**1.6 How to obtain and licensing:** The survey is available online after logging in to the user account at www.pressganey.com. The information about licensing and scoring instructions are available at www.pressganey.com/terms-of-service (Presson *et al.,* 2017).

**1.7 Psychometrics:** The PG is the only survey approved by the National Quality Forum (NQF) (Delanois *et al.,* 2017). Cronbach's alpha is used to evaluate the internal consistency reliability of this scale ranges from 0.79 to 0.96. Deficiency for the total score was: 0.01%. The PG demonstrated suitable psychometric properties for most metrics; although the scale features a relatively high ceiling rate (29.3% for the total score) (Presson *et al.,* 2017).

**1.8 Variants of the original questionnaire:** Different variants of the Press Ganey survey exist, used to evaluate the home health care (HHCAHPS), the physician practices/medical groups (CGCAHPS), and the ambulatory surgery (Graham *et al.,* 2015). The most widely used variant consists of 7 question domains: overall rating of the hospital, communication with nurses, response time of hospital staff, communication with doctors, hospital environment, pain management and information about treatment. Domains contain from 1 to 3 questions and are rated on a scale from 1–4 (except for overall rating of hospital rated from 1 to 10) (Chughtai *et al.,* 2017).

**2. *Visual analog scale (VAS)***

**2.1 Background & contents:** The Visual Analogue Scale (VAS) is a simple, accurate and reliable method used to evaluate pain, quality of life and patient satisfaction (Brokelman *et al.,* 2012). VAS is widely used in the majority of the health care institutions and is filled out by patient (Hawker *et al.,* 2011). Due to simplicity of this questionnaire, the patient is more liable to focus attention and judgment solely on the subjective assessment of THA (de Nies and Fidler, 1997). This survey is a single-item continuous scale and consists of horizontal (HVAS) or vertical (VVAS) line, usually 10 centimetres long, with two verbal descriptors on both sides (Hawker *et al.,* 2011).

**2.2 Recall Period & time to complete:** The patients complete the survey considering the last 24 hours (Hawker *et al.,* 2011) or week (Jamison *et al.,* 2006). The VAS takes only a few seconds to complete (Berghmans *et al.,* 2017).

**2.3 Available versions:** The scale is administered on paper. Since it is basing on visual presentation, it cannot be applied verbally or by the telephone (Hawker *et al.,* 2011). The questionnaire containing a 10 centimetres

horizontal or vertical line is available in the paper-based virtual form and can be filled out on computer and mobile phone-based platforms (Klimek *et al.,* 2017).

**2.4 Available Scoring Variants:** The VAS is filled out by the patient. The patient is obligated to draw a line perpendicular to the original scale line at the point which presents theirs symptom intensity (Hawker *et al.,* 2011). A single sign is placed by a patient at one point on a 10 centimetres line (between the minimum value of assessment at the left and maximum value of the assessment at the right, e.g. the statements 'totally unsatisfied' and 'completely satisfied') (de Nies and Fidler, 1997). The length of the lines from zero to the marks in millimetres is converted to the same number of points ranging from 0 to 100 points (Brokelman *et al.,* 2012).

**2.5 Languages:** VAS is available in German, French, English, Spanish, and Japanese (Klimek *et al.,* 2017).

**2.6 How to obtain and licensing:** The survey is publicly available online and does not require any license.

**2.7 Psychometrics:** The VAS is recommended when the aim is to detect small significant changes in satisfaction (Voutilainen *et al.,* 2016). The satisfaction VAS had a high correlation between the pain VAS and Oxford hip score. However, this survey has a high ceiling effect (42%) (Brokelman *et al.,* 2012). VAS is less susceptible to bias from confounding factors, specifically patient age, than Likert-scaled items (Voutilainen *et al.,* 2016).

**2.8 Variants of the original questionnaire:** Different methods of applying VAS exist: VAS vertical (with or without endpoints); VAS horizontal (with or without endpoints). Twenty-four different adjectives are used to characterize both endings of VAS lines (Kjeldsen *et al.,* 2016). Other variants of the VAS scale are the Verbal Rating Scale (VRS) and NRS scale. The VRS is a scale using adjectives to determine the value of patient's assessment. The scale starts with the patients verbally describing their sensations. Between these terms, there are intermediate adjectives.

The Numerical Rating Scale (NRS) is the scale on which patient is asked to give a numerical representation of the sensation, on a scale ranging from 1 to 10–100 (Haefeli and Elfering, 2006).

**3. *The Patient Satisfaction Questionnaire Short Form (PSQ-18)***

**3.1 Background & contents:** The Patient Satisfaction Questionnaire Short-Form (PSQ-18) was developed from PSQ-III in 1994 by G. Marshall and R. Hays. It is widely used abbreviated satisfaction measure and precludes using full-length PSQ-III. It is adapted for primary care and outpatient department use (Thayaparan and Mahdi, 2013). The 18 items examine seven dimensions of satisfaction: general satisfaction, technical quality, interpersonal manner, communication, financial aspects, time spent with doctor and accessibility and convenience.

**3.2 Recall Period & time to complete:** Unspecified.

**3.3 Available versions:** The paper and electronic version and the telephone survey.

**3.4 Available scoring variants:** The standard Likert scale, from 1 to 5 points. The score has a maximum of 90 points (best possible outcome) with 10 points for the general satisfaction, 20 points for the technical quality, 10 points for the interpersonal manner, 10 points for the communication, 10 points for the financial aspects, 10 points for the time spent with doctor and 20 points for the accessibility and convenience. It is recommended that items left blank by responders (missing data) be ignored when calculating scale scores.

**3.5 Languages:** PSQ-18 was initially developed in English. Recently, there was a validation study in Hindi, but the outcome was unsatisfactory.

**3.6 How to obtain and licensing:** The questionnaire is available to obtain on www.rand.org/health-care/surveys_tools/psq.html. No license is required.

**3.7 Psychometrics:** The Cronbach's alpha for PSQ-18 is 0.96 (Kavalniene *et al.,* 2018) The Patient Satisfaction Questionnaire is

a valid and reliable tool for assessing patient satisfaction (Thayaparan and Mahdi, 2013).

**3.8 Variants of the original questionnaire:** The PSQ-18 is a short form of original PSQ-III which consists of 50 items.

## 4. *The Hospital for Special Surgery Hip Replacement Expectations Survey*

**4.1 Background & contents:** The Hospital for Special Surgery Hip Replacement Expectations Survey (HSS-THRES) consists of 18-items that assess patient expectations versus satisfaction after the THA this survey contains questions concerning overall functioning and the ability to engage in daily activities divided into 5 different categories: pain, walking, psychological state, essential and non-essential activities (Neuprez *et al.,* 2015).

**4.2 Recall Period & time to complete:** Patients are asked about their expectations regarding the outcomes within 20 days before surgery. Postoperative follow-up questions ask patients about overall satisfaction.

**4.3 Available versions:** The paper version is available.

**4.4 Available scoring variants***:* A 5-point Likert scale for the expectations and a 4-point Likert scale for the satisfaction. The total score ranges from 0 to 72 for hip and it can be modified into a 100-point scale with a higher score representing higher expectations. The 4-point Likert scale is used for the satisfaction. The total score is calculated using the same methodology, ranging from 0 to 54 and translated into a 100-point scale (the higher score represents higher satisfaction) (Neuprez *et al.,* 2015).

**4.5 Languages:** The questionnaire is originally written in English (Neuprez *et al.,* 2015). It was translated into Russian, Chinese, and French (Neuprez *et al.,* 2015, Wang *et al.,* 2018).

**4.6 How to obtain and licensing:** The survey is available on www.hss.edu and no license is required.

**4.7 Psychometrics:** This instrument is considered valid and reliable.

**4.8 Variants of the original questionnaire:** There is an available variant for assessment of pateints' satisfaction after the Total Knee Arthroplasty (HHS-TKRES).

## 5. *Hip and Knee Arthroplasty Satisfaction Scale* (*HKASS*)

**5.1 Background & contents:** The Hip and Knee Arthroplasty Satisfaction Scale is a self-administered tool used to assess satisfaction after hip or knee arthroplasty (van Bergayk and Garbuz, 2002). Authors also suggest using the HKASS in other orthopedic surgeries, f.e. osteotomy of the hip (van Bergayk and Garbuz, 2002). It consists of 4 questions evaluating: the relief from pain, the improvement in the ability to work, the improvement in recreational ability and the overall satisfaction (van Bergayk and Garbuz, 2002).

**5.2 Recall Period & time to complete:** The recall period is unspecified. The form contains only four items, average time for completion is shorter than 2 minutes (van Bergayk and Garbuz, 2002).

**5.3 Available versions:** The paper version is available. It may also be filled over the telephone.

**5.4 Available scoring variants:** This is a one-choice questionnaire. The answers are pointed from 0 (very dissatisfied) to 3 (very satisfied). Afterwards the scores are multiplied by the factor 8.33 to give a total outcome between 0 to 100 (van Bergayk and Garbuz, 2002).

**5.5 Languages:** The HKASS was initially developed in English.

**5.6 How to obtain and licensing:** No license required. The form can be found in a modified version in an open-source article in The Bone & Joint Journal https://online.boneandjoint.org.uk/doi/pdf/10.1302/0301-620X.84B3.0840339.

**5.7 Psychometrics:** The HKASS is considered a valid tool, but it is crucial that it was validated on the population of the older patients undergoing THA. The ceiling effects may be the potential limitation of this survey.

**5.8 Variants of the original questionnaire:** There is a modified variant of HKASS available to use after the hip osteotomy (van Bergayk and Garbuz, 2002).

## 6. *Self-Administered Patient Satisfaction Scale* (*SAPS*)

**6.1 Background & contents:** The SAPS was designed for use in conjunction with other

clinical measures and functional health status instruments to evaluate the total hip or knee arthroplasty results. The SAPS contains four items including the patient's overall satisfaction with the surgery, the extent of pain relief, the ability to perform home or yard work and the ability to perform recreational activities (Mahomed *et al.,* 2011).

**6.2 Recall Period & time to complete:** The recall period is unspecified. The survey should take approximately 2 minutes to complete [30].

**6.3 Available versions:** The paper version and the "over the telephone" version are available.

**6.4 Available scoring variants:** The answers are divided into four Likert boxes. The items are scored on a 4-point Likert scale with the response categories consisting of: very satisfied (100 points), somewhat satisfied (75 points), somewhat dissatisfied (50 points), and very dissatisfied (25 points). The scale score is the unweighted mean of the scores from the individual items, ranging from 25 to 100 per item (with 100 being most satisfied) (Mahomed *et al.,* 2011).

**6.5 Languages:** The SAPS was initially developed in English.

**6.6 How to obtain and licensing:** No license is required. The survey can be obtained from the article on www.hindawi.com/journals/arthritis/2011/591253/(Mahomed *et al.,* 2011).

**6.7 Psychometrics:** The Cronbach's alpha for SAPS varies from 0.86 to 0.92, depending on intervention. The SAPS is a reliable and valid tool for evaluating patient's satisfaction [30].

**6.8 Variants of the original questionnaire:** No other variants available.

## Discussion

The scales and questionnaires are useful tools to assess patient's satisfaction after THA. In general patients had high expectations, but only 55% had their expectations fulfilled. Despite this, 86% claimed the operation to be successful, though when questioned more closely, patients reported a certain amount of displeasure about the outcome (Schaal *et al.,* 2016). Therefore, better assessment of patients' expectations may improve the process of care and outcomes of total joint arthroplasty (Lau *et al.,* 2012). Large variety of clinical scales allows physician to assess patient's satisfaction after THA and verifies patients' ability to communicate with medical team effectively (PG). Clical scales may also prove useful in determining the type of arthroplastic intervention (PSQ). The results of measurements illustrate pain severity (VAS). It also allows physician to assess the patient's ability to return to past activities (SAPS).

More than 1 million arthroplasties are performed every year worldwide. This number is projected to double up within the next two decades (Brokelman *et al.,* 2012). The presented scales may help assess patient related outcome, which can lead to conclusions and improvement of treatment. There is a slight difference between satisfaction related to the outcome of care and the process of care. These concepts do not exclude each other. Patients who report negative outcome of treatment might still experience satisfaction with the process of care. Nevertheless, both aspects must be assessed to form a complete picture of patient satisfaction (Pulik *et al.,* 2020b). Subsequently, patients' satisfaction remains a complex issue, insufficiently defined in the orthopedic surgery. Numerous factors may have an impact on such complex outcome as patients' satisfaction. This paper aims to cover most important elements that affect the fulfilment of patient's expectations and needs. These factors should be included in tools used for the assessment of the patient's satisfaction.

## Patient expectations

Analogically to satisfaction, the patients' expectations are a dynamic quality that is difficult to define, assess and analyze (Zywiel *et al.,* 2013). They may be described as an anticipantion of certain events that are presumably to happen as a result of medical help (Uhlmann *et al.,* 1984). When considering THA, expectations depend on the patient's assessment of their disability and pain (Palazzo *et al.,* 2014). Among most

important patient expectations appeared improvements in physical function and pain relief (Palazzo *et al.,* 2014, Zywiel *et al.,* 2013). Patients can also present with a broad range of expectations that are not strictly related to pain. Numerous methods were used to evaluate patient expectations in orthopedic surgery, including direct questioning, short questionnaires, and validated surveys (Padilla *et al.,* 2019). In the past expectations relatively influenced patient satisfaction with THA outcomes (Padilla *et al.,* 2019, Mannion *et al.,* 2009). Decreasing the divergence between the patients' expectations and the outcome of surgery was a crucial element of patients' satisfaction (Palazzo *et al.,* 2014). Unsuitably high expectations can correlate with lower satisfaction (Cross *et al.,* 2009). In consequence, it is very important for physician to create rational expectations and goals with their patients. Finally, a study using validated expecatation measuring tools should be carried out to examine this relationship.

### Age
In some of the studies, satisfaction was similar in all age groups. However, other studies reported less satisfaction in younger group [1, 4, 18–22]. It may be explained by higher expectations in younger patients. Most of them lead an active lifestyle and are more likely to be negatively influenced by debilitating hip disease [4]. On the other hand, older patients may be more resilient to pain after living with the joint disease for many years [20]. Still, Swedish Hip Arthroplasty Registry classified older age as a negative predictor for all outcomes of THA [4], including patient satisfaction.

### Sex
Similarly to age, there is no consensus about the influence of gender on satisfaction. Some studies claimed no difference between sexes. Nevertheless, other studies associated male sex with greater satisfaction (Rolfson *et al.,* 2011), despite less improvement in pain. In many studies, gender is often a component

of secondary analysis that does not correlate with overall patient satisfaction with THA (Schaal *et al.,* 2016, Specht *et al.,* 2015, Hamilton *et al.,* 2013, Lau *et al.,* 2012, Hawker *et al.,* 2000, Katz *et al.,* 1994). Gender differences were noticed in the postoperative period and between sexes with perioperative factors that greatly affected patient satisfaction with the general hospital stay. Pain management influenced a hospital rating for men and staff responsiveness influenced hospital ratings for women (Delanois *et al.,* 2018). These data may indicate that a gender-based approach to satisfaction may be valuable for surgeons interested in improving patient satisfaction.

### Pain management
Pain is major indication for THA (Mahomed *et al.,* 2002, Flood *et al.,* 1993). Many patients may experience intensification of pain in the early postoperative period, which is caused by trauma induced through surgery. Studies that analyzed pain management as predictor of satisfaction (Delanois *et al.,* 2018, Anakwe *et al.,* 2011) suggest that pain is one of the most important factors influencing patient's view on the outcome of the surgery (Delanois *et al.,* 2018, Brokelman *et al.,* 2012). Other studies also mention pain relief as a crucial factor in maximizing satisfaction after THA (Mannion *et al.,* 2009, Mancuso *et al.,* 1997, Halawi *et al.,* 2019, Anakwe *et al.,* 2011). Pain management in pre-operative period with nonsteroidal anti-inflammatory drugs (NSAIDs) was correlated with improved recovery (McHugh *et al.,* 2013, Maher *et al.,* 2016). Prolonged use of benzodiazepines correlated with lower patient satisfaction. Studies have shown that significant opioid intake may cause adverse reaction (Maher *et al.,* 2016).

### Comorbidities
Comorbidity can be described as condition or disorder correlated with the development or the cause of the direct disease of interest. In general patients with no comorbidities are more satisfied than patients with one or more Charlson Comorbidity Index (CCI)

or Elixhauser Comorbidity Index (ECI) are widely used tool to assess comorbidity (Austin *et al.,* 2015, Roffman *et al.,* 2016, Pulik *et al.,* 2020a). The CCI covers 17 conditions, with two subcategories that focus on diabetes and liver disease (Roffman *et al.,* 2016). The ECI is a more modern model covering 31 conditions, including comorbidities that the CCI overlooks (hypertension, obesity, and psychiatric disorders) (Elixhauser *et al.,* 1998, Austin *et al.,* 2015). Relationship between CCI and patient satisfaction in THA patients were not noticed. If comorbidity worsens post-THA complications, patient related outcome of the surgery may be affected due to difficulties in post-operative recovery. Evidence suggests that relationship between comorbidities and patient satisfaction depends on the number and severity of comorbidities. Specific type of comorbidity should also be considered due to varying effect on the outctome. Depressed patients declared smaller reduction of pain improvement and were less satisfied with surgical treatment (Anakwe *et al.,* 2011). The good mental health is considered as a preoperative predictor of satisfaction (Palazzo *et al.,* 2014).

**Length of stay**
Some studies declare no association between LOS and THA (Delanois *et al.,* 2017), whereas shorter LOS appears to be an important factor in patient satisfaction. LOS after THA was reduced from 8 days to 1–2 days, after implementation of fast track surgery. A study assessing a program for THA established that LOS of 24 h did not negatively influence the quality of treatment or patient satisfaction (Sikora-Klak *et al.,* 2017). The absence of reliable information may lead to unrealistic expectations about time spent in the hospital during postoperative period. Education about factors influencing LOS in the hospital after THA may also contribute to increase of the postoperative satisfaction (Pacault-Legendre and Courpied, 1999).

**Conclusion**
Multiple factors are associated with patient satisfaction following THA, including expectations, pain management, age, sex, comorbidities, and length of hospital stay. Understanding and proper management of said factors has potential to improve patient's satisfaction after THA. Variety of mentioned scales prevents from clear selection of the most appropriate tool, leaving physician with subjective choice of the most adequate questionnaire. Every scale contains distinctive element focusing on satisfaction from different perspective. This article aims to compare questionnaires and facilitate choice of the most adequate tool for medical professionals. Postoperative satisfaction remains difficult to assess. Further research is reuired to improve existing and to create new tools covering mentioned factors in order to better understand patients' satisfaction after THA.

**Declaration of the interest statement and acknowledgements**

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