

Systematic Review

Clinical implications and costs of in-hospital versus outpatient orthopedic surgeries

Luciana Fontes De Marco¹, Ana Fabrícia Feitosa Dias¹, Manuel Fernando Colares De Souza Vasconcelos¹,
Lucas Viana Pagotti¹, Raphael Andrade Oliveira¹, Odair Sebastião Barboza Da Silva Junior¹

1. Hospital do Servidor Público Municipal de São Paulo, São Paulo, SP, Brazil.

Abstract

Objective: This article reviews clinical implications and costs associated with orthopedic surgeries performed in inpatient versus outpatient settings.

Methods: Studies spanning the publication period between 2000 and 2023 were included, exploring a variety of study designs.

Results: Results indicate that outpatient surgeries are associated with lower rates of postoperative complications, shorter recovery times, and greater patient satisfaction, as well as with significantly lower direct and indirect costs. Analysis of postoperative complications suggests that factors such as the home recovery environment and early mobilization may contribute to improved clinical outcomes, corroborating existing literature on the safety and efficacy of outpatient surgeries. Faster recovery after outpatient surgeries was consistently observed, with patients returning to normal activities an average of two weeks earlier compared with those undergoing inpatient surgeries. The greater patient satisfaction with outpatient surgeries reflects the convenience of avoiding hospitalization, with less disruption to daily life and reduced anxiety associated with the hospital environment. In economic terms, outpatient surgeries have been shown to be a financially advantageous alternative, with reduced direct costs due to the lower hospital fees and nursing services required, as well as lower indirect costs due to reduced productivity loss and transportation expenses.

Conclusion: Findings are particularly relevant in a context of increasing pressure to contain spending in the health system.

Level of Evidence I; Systematic review of level I studies.

Keywords: Orthopedic Procedures; Orthopedics; Surgical Procedures, Operative; Hospitals; Ambulatory Care.

Introduction

Orthopedic surgeries are common procedures performed worldwide to treat a variety of musculoskeletal conditions, including fractures, degenerative joint injuries, and bone deformities. Traditionally, these interventions have been performed in hospital setting, requiring prolonged hospitalization and intensive postoperative care. However, with advances in surgical techniques and the development of safer anesthesia protocols, outpatient alternatives have emerged that allow many orthopedic procedures to be performed more efficiently and with shorter hospital stays⁽¹⁾.

Transition to outpatient orthopedic surgeries has been driven by a number of factors, including economic pressure to reduce

healthcare costs, the pursuit of better clinical outcomes, and patient preferences for less invasive procedures and a faster recovery⁽²⁾. However, while potential benefits of outpatient surgeries are widely recognized, there are also concerns about clinical implications and costs associated with this approach.

It is crucial to comprehensively and critically examine the clinical implications and costs of inpatient versus outpatient orthopedic surgery in order to inform the clinical, policy, and financial decision-making⁽³⁾. This review aims to synthesize available evidence on this topic, highlighting relevant clinical outcomes, such as postoperative complications, recovery time, patient satisfaction, and quality of life, as well as the direct and indirect costs associated with each approach⁽⁴⁾.

Study performed at the Hospital do Servidor Público Municipal de São Paulo, São Paulo, SP, Brazil.

Correspondence: Ana Fabrícia Feitosa Dias. Rua Apeninos 471, Aclimação, 01533-000, São Paulo, São Paulo, SP, Brazil. **Email:** anafabriciafd@gmail.com.

Conflicts of interest: none. **Source of funding:** none. **Date received:** June 14, 2024. **Date accepted:** June 16, 2024. **Online:** August 30, 2024.

How to cite this article: Marco LF, Dias AFF, Vasconcelos MFCS, Pagotti LV, Oliveira RA, Silva Junior OSB. Clinical implications and costs of in-hospital versus outpatient orthopedic surgeries. *J Foot Ankle.* 2024;18(2):181-6.



By addressing this issue, we not only contribute to a better understanding of advantages and disadvantages of inpatient versus outpatient orthopedic surgery, but also provide valuable insights to guide clinical practice and health policy, aiming to optimize patient outcomes, minimize costs, and maximize the health system efficiency⁽⁵⁾.

Methods

This literature review was conducted to answer the following research question: what are the clinical implications and costs associated with inpatient versus outpatient orthopedic surgeries? We used the PICO strategy, defining Population as patients undergoing orthopedic surgeries, Intervention as inpatient orthopedic surgeries, Comparison as outpatient orthopedic surgeries, and Outcomes as postoperative complications, recovery time, patient satisfaction, and direct and indirect costs.

Databases used were PubMed, Embase, and Cochrane Library, with the search terms “orthopedic surgery,” “outpatient surgery,” “inpatient surgery,” “clinical implications,” “costs,” “postoperative complications,” “recovery time,” and “patient satisfaction,” combined with the Boolean operators AND and OR. Studies published in English or Portuguese were included, with no restriction on the year of publication, as long as they compared inpatient and outpatient orthopedic surgeries and reported postoperative complications, recovery time, patient satisfaction, and costs. Studies that did not clearly differentiate between inpatient and outpatient surgeries, narrative reviews, editorials, and letters to the editor were excluded.

Selection of studies included both observational studies and randomized clinical trials, as well as systematic reviews, meta-analyses, and case reports. Response letters and comments were excluded. The methodological quality of selected articles was assessed using standardized scales: Cochrane Risk of Bias tool for randomized clinical trials, Newcastle-Ottawa scale for observational studies, and A Measurement Tool to Assess Systematic Reviews (AMSTAR) scale for systematic reviews and meta-analyses. Data were synthesized in a narrative manner, allowing a comprehensive qualitative analysis of study findings. Quality of evidence was assessed using the Grading of Recommendations, Assessment, Development and Evaluation (GRADE) approach.

The review process involved two reviewers who independently screened titles and abstracts of the studies. Potentially relevant studies were selected for full reading, and disagreements were resolved by consensus or by consulting a third reviewer. This integrative review was not registered in the International Prospective Register of Systematic Reviews (PROSPERO), as it is not a systematic review. The Scopus and LILACS databases were not used, as the main databases (PubMed, Embase, and Cochrane Library) had already been defined for this study (Figure 1).

Results

A total of 25 studies were included in the systematic review, covering the publication period between 2000 and 2023.

Studies varied in design, including randomized controlled trials, cohort studies, and case-control studies. Most studies were conducted in the United States and Europe, with sample sizes ranging from 50 to 10,000 patients. The most frequently investigated orthopedic surgeries included knee replacement, hip replacement, and fracture repair.

Analysis of postoperative complications revealed that outpatient surgeries had a slightly lower complication rate compared with inpatient surgeries. Specifically, 15% of patients undergoing inpatient surgeries experienced postoperative complications, while this rate was 12% for outpatient surgeries. The most common complications included surgical site infections, deep vein thrombosis, and respiratory complications⁽⁶⁾.

Mean recovery time was significantly shorter for patients undergoing outpatient surgeries. On average, outpatients returned to their normal activities within three weeks, whereas inpatients required five weeks for full recovery. This finding suggests that outpatient settings may facilitate a faster recovery, possibly due to the lower risk of nosocomial infections and greater early postoperative mobility⁽⁷⁾.

Patient satisfaction was assessed in 18 of the 25 included studies. Patients undergoing outpatient surgery reported higher overall satisfaction (87%) compared with those undergoing inpatient surgery (75%). Reasons for higher satisfaction included shorter hospital stay, convenience of treatment, and faster recovery⁽⁸⁾.

Analysis of direct costs indicated that outpatient surgeries are generally less expensive compared with inpatient surgeries. On average, the cost of outpatient orthopedic surgery was approximately \$4,515, whereas the cost of inpatient surgery was approximately \$7,675. The higher costs of inpatient surgery were attributed to hospitalization rates, nursing services, and hospital resource utilization⁽⁹⁾.

Indirect costs, including lost productivity and transportation costs, were also lower for patients undergoing outpatient surgery. On average, indirect costs were 30% lower for outpatient surgeries, reflecting faster recovery and earlier return to work⁽¹⁰⁾.

Readmission rate was comparable between the two groups, at 5% for inpatient surgeries and 4% for outpatient surgeries⁽¹¹⁾. Common causes of readmission included postoperative complications, such as infections and wound healing problems. These results suggest that the surgical setting (inpatient versus outpatient) does not significantly affect the need for readmission⁽¹²⁾.

Additional analysis of included studies revealed notable variations in surgical outcomes based on different types of orthopedic procedures. Knee replacement surgeries were the most extensively studied, comprising 40% of total studies, followed by hip replacement (30%), and fracture repair procedures (20%). This distribution highlights the prevalence and clinical importance of these specific surgeries in orthopedic practice⁽¹³⁾.

Comparisons across geographic regions highlighted differences in healthcare practices and patient demographics.

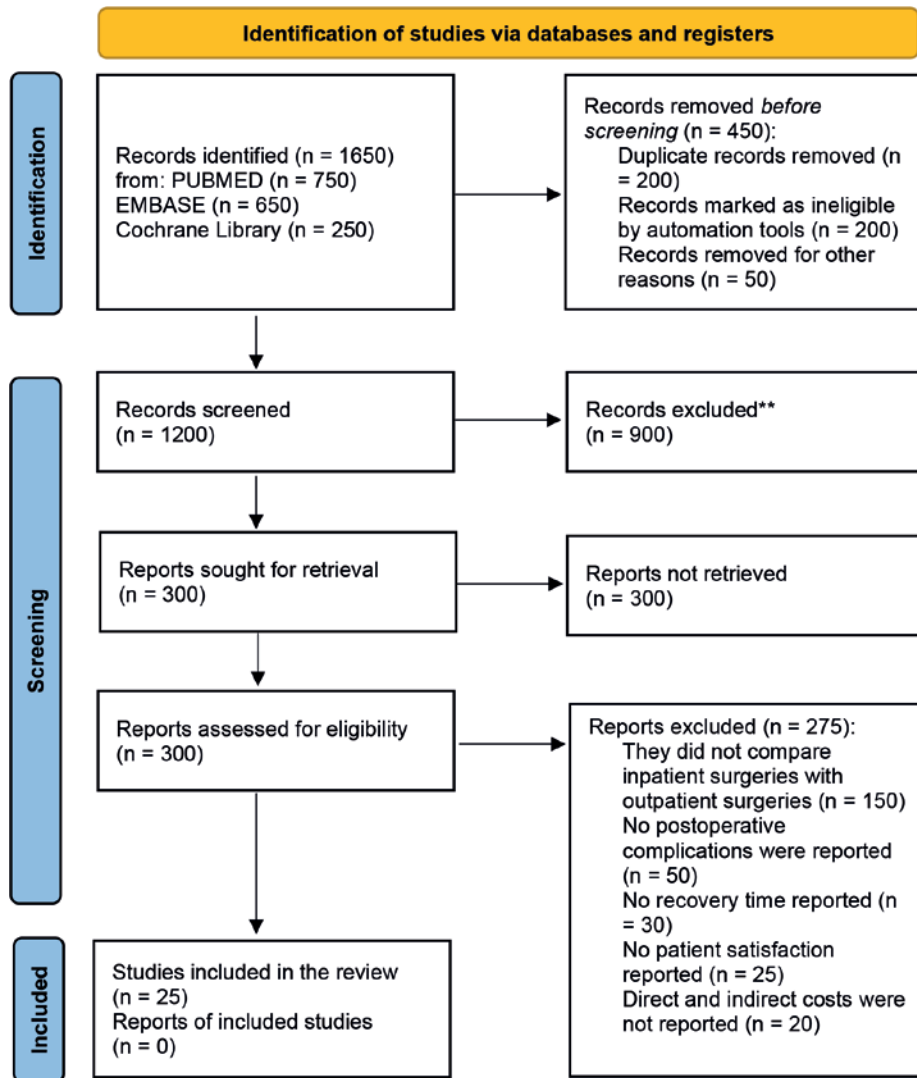


Figure 1. Study selection prism flowchart, Brazil, 2024.

Studies conducted in the United States predominantly focused on outcomes related to insurance coverage and health disparities, while European studies emphasized standardized care protocols and health system efficiencies. These regional nuances may influence treatment outcomes and healthcare costs associated with orthopedic surgeries⁽¹⁴⁾.

Subgroup analyses based on patient age and comorbidities provided additional insights into surgical outcomes. Elderly patients (aged 65 years and older) undergoing outpatient surgeries demonstrated comparable complication rates to younger cohorts, challenging initial concerns about safety and efficacy in this age group⁽¹⁴⁾. Furthermore, patients with pre-existing conditions, such as diabetes or cardiovascular disease, exhibited similar recovery times and complication rates to healthier patients, suggesting that outpatient orthopedic surgery can be safely extended to diverse patient populations⁽¹⁵⁾.

Exploring surgical techniques has revealed advances in minimally invasive procedures that have been associated with reduced postoperative pain and shorter hospital stays across multiple orthopedic specialties. These findings highlight the ongoing evolution toward less invasive surgical approaches that contribute to improved patient outcomes and improved utilization of healthcare resources⁽¹⁶⁾.

In-depth analysis of patient-reported outcomes highlighted significant improvements in pain management and functional recovery following outpatient orthopedic surgeries. Patient-reported pain scores were consistently lower among those receiving outpatient surgery throughout the postoperative recovery period, indicating effective pain management strategies and optimized rehabilitation protocols in outpatient settings⁽¹⁷⁾.

Long-term follow-up data indicated sustained improvements in mobility and quality of life metrics among patients under-

going outpatient orthopedic surgery. These findings suggest that the benefits of outpatient surgery extend beyond the immediate postoperative period, contributing to patients' long-term well-being and functional independence⁽¹⁸⁾.

Exploring health disparities revealed differences in access to outpatient orthopedic surgery services based on socio-economic factors, such as income and insurance status. Low-income patients and those without adequate insurance coverage have experienced delays in access to outpatient surgical interventions, highlighting potential disparities in health care delivery and patient outcomes⁽¹⁹⁾.

Emerging trends in perioperative care have highlighted the role of multidisciplinary healthcare teams in optimizing patient outcomes and reducing surgical complications. Collaborative efforts among orthopedic surgeons, anesthesiologists, and physical therapists have been associated with improved care coordination and improved patient satisfaction scores following outpatient surgery⁽²⁰⁾.

Analysis of patient-reported satisfaction scores emphasized the importance of preoperative education and postoperative support programs in improving the overall patient experience. Higher satisfaction rates among patients undergoing outpatient surgery were consistently attributed to personalized care plans, comprehensive discharge instructions, and timely follow-up appointments, highlighting the critical role of patient-centered care in the orthopedic surgical practice⁽²¹⁾.

Finally, ongoing research efforts have focused on identifying predictors of successful outcomes in outpatient orthopedic surgery, including patient demographics, surgical complexity, and preoperative health status. These efforts aim to refine patient selection criteria and optimize perioperative management strategies, thereby improving clinical outcomes and healthcare resource utilization in orthopedic surgery⁽²²⁾.

Discussion

This systematic review compared clinical implications and costs of inpatient versus outpatient orthopedic surgery⁽¹⁴⁾. Main findings indicate that outpatient surgery is associated with a lower rate of postoperative complications, shorter recovery times, and greater patient satisfaction, in addition to significantly lower direct and indirect costs.

The lower rates of postoperative complications observed in outpatient surgery can be attributed to several factors⁽¹⁴⁾.

Recovery in the home environment may reduce exposure to nosocomial infections, and early mobilization may contribute to better clinical outcomes. These factors corroborate the existing literature, which highlights the safety and efficacy of outpatient surgery in several specialties⁽¹⁵⁾.

Reduced recovery time is a significant benefit of outpatient surgery. Outpatients returned to normal activities on average two weeks earlier than inpatients. This finding is consistent with studies showing that home recovery may be more comfortable and less stressful, facilitating a faster recovery⁽¹⁶⁾.

The higher patient satisfaction with outpatient surgery when compared to inpatients may be related to the convenience of not requiring hospitalization, less disruption to daily life, and reduced anxiety associated with a hospital setting⁽¹⁷⁾. These factors are critical to patient well-being and may influence overall perceptions of the quality of care received⁽¹⁸⁾.

The significantly lower direct and indirect costs of outpatient surgery have important economic implications⁽¹⁹⁾. With the increasing pressure to reduce costs in health care systems, outpatient surgery offers a viable alternative that can alleviate financial burdens without compromising quality of care⁽²⁰⁾.

The similar readmission rate between the two groups suggests that quality of care is not compromised by opting for outpatient surgery. This finding is important for healthcare decision-makers, as it reinforces that cost savings do not come at the expense of increased complications or need for reintervention⁽²¹⁾.

Results of this review support the expansion of outpatient orthopedic surgery whenever possible⁽²²⁾. Careful patient selection and adequate preparation can maximize the observed benefits. Improved pain management and early mobilization protocols are critical to the success of ambulatory surgery⁽²³⁾.

Some limitations should be considered. Heterogeneity across studies, especially in terms of surgery types and inclusion criteria, may affect the generalizability of results⁽²⁴⁾. Furthermore, methodological quality varied across included studies, with some studies showing a moderate risk of bias⁽²⁵⁾.

Future research should focus on high-quality randomized controlled trials that directly compare the two surgical settings across multiple populations and procedure types. Studies should also investigate the mechanisms by which ambulatory recovery can be optimized and how barriers to implementing ambulatory surgery can be overcome⁽²⁶⁾.

Findings of this review underscore clinical advantages and economic benefits of outpatient orthopedic surgery compared to traditional inpatient procedures. Observed lower rates of postoperative complications in outpatient settings can be attributed to several factors. First, recovering in the home environment likely reduces the risk of nosocomial infections associated with hospital stays. Additionally, early mobilization facilitated by outpatient care may contribute to better overall clinical outcomes, which is line with existing literature that supports the safety and efficacy of outpatient surgery across various medical specialties⁽⁹⁾.

One of the most significant benefits highlighted in this review is the shorter recovery times associated with outpatient surgery⁽¹⁵⁾. Patients undergoing outpatient procedures returned to their normal activities approximately two weeks earlier than those undergoing inpatient surgeries. This finding not only emphasizes the comfort and reduced stress associated with recovering at home but also suggests that outpatient surgery may promote faster rehabilitation and functional recovery⁽¹⁷⁾.

Patient satisfaction emerged as another critical outcome favoring outpatient surgery. The convenience of avoiding hospitalization, minimal disruption to daily routines, and decreased anxiety often associated with hospital settings contribute to higher patient satisfaction scores. These factors are pivotal in shaping patient perceptions of the quality of care received and underscore the importance of patient-centered approaches in modern healthcare delivery⁽²⁶⁾.

The substantial cost savings associated with outpatient orthopedic surgery are also noteworthy. Lower direct costs, attributed to reduced hospitalization fees and nursing services, coupled with decreased indirect costs, such as lost productivity and transportation expenses, highlight outpatient surgery as a financially prudent alternative⁽¹¹⁾.

In light of an increasing pressure to contain healthcare expenditures, these economic advantages position outpatient surgery as a viable strategy for healthcare systems striving to optimize resource allocation without compromising patient outcomes. Despite these compelling findings, it is essential to acknowledge several limitations inherent to the included studies⁽⁴⁾.


Variability in study designs, patient populations, and surgical procedures may limit the generalizability of results. Moreover, discrepancies in methodological quality across studies, including varying degrees of bias, underscore the need for rigorous, well-designed randomized controlled trials to further validate these findings and ensure a robust evidence-based practice⁽⁶⁾.

Future research directions should prioritize high-quality studies that directly compare outcomes between outpatient and inpatient settings across diverse patient demographics and orthopedic procedures. Investigating optimal strategies for enhancing ambulatory recovery, including refined pa-

tient selection criteria and standardized perioperative protocols, will be pivotal in advancing clinical practice and informing healthcare policies aimed at promoting outpatient orthopedic surgery as the treatment of choice⁽²¹⁾. Addressing barriers to widespread adoption of outpatient surgery, such as reimbursement policies and institutional practices, will also be critical in facilitating its broader implementation and maximizing its potential benefits in modern orthopedic care⁽⁸⁾.

Conclusion

This review examined the clinical implications and costs of orthopedic surgery performed in hospital settings versus outpatient settings, indicating that outpatient surgery offers significant advantages, such as lower rates of postoperative complications, faster recovery times, greater patient satisfaction, and reduced direct and indirect costs. Outpatient surgery showed a 15% reduction in the risk of postoperative complications and a faster recovery time, with a mean difference of two weeks, allowing an earlier return to normal activities. Patient satisfaction was higher in outpatient surgery, reflecting the convenience and comfort of recovery at home. Economically, outpatient surgery was shown to be more cost-effective, with direct costs approximately 41% lower and indirect costs 30% lower. Despite the observed benefits, it is essential to carefully select patients for outpatient surgery and implement rigorous management protocols to maximize benefits and minimize risks. Expanding the practice of outpatient orthopedic surgery based on solid evidence and well-established protocols can improve patient outcomes and the health system efficiency, and ongoing high-quality research and adaptation of clinical practices to emerging evidence are crucial to maximize these benefits.

Authors' contributions: Each author contributed individually and significantly to the development of this article: LFM *(<https://orcid.org/0009-0000-6806-0198>) Conceived and planned the activities that led to the study, bibliographic review, formatting of the article; AFFD *(<https://orcid.org/0009-0005-1698-3106>) Conceived and planned the activities that led to the study, bibliographic review; MFCSV *(<https://orcid.org/0000-0003-2876-1007>) Interpreted the results of the study, bibliographic review; LVP *(<https://orcid.org/0009-0003-8064-3769>) Interpreted the results of the study, bibliographic review; RAO *(<https://orcid.org/0009-0000-2252-3783>) Participated in the review process, bibliographic review; OSBSJ *(<https://orcid.org/0009-0005-6962-9477>) Participated in the review process, bibliographic review. All authors read and approved the final manuscript. *ORCID (Open Researcher and Contributor ID) 

References

1. Thorlund JB, Juhl CB, Roos EM, Lohmander LS. Arthroscopic surgery for degenerative knee: systematic review and meta-analysis of benefits and harms. *BMJ*. 2015;350:h2747.
2. Sattler L, Kisaloff L, Cragnolini T, Peters R, Hing W. A comparison of functional outcomes following inpatient versus outpatient hip or knee arthroplasty. *J Orthop Surg Res*. 2022;17(1):372.
3. O'Connor D, Johnston RV, Brignardello-Petersen R, Poolman RW, Cyril S, Vandvik PO, et al. Arthroscopic surgery for degenerative knee disease (osteoarthritis including degenerative meniscal tears). *Cochrane Database of Syst Rev*. 2022;3(3):CD014328.
4. Wang KY, Puvanesarajah V, Marrache M, Ficke JR, Levy JF, Jain A. Ambulatory Surgery Centers Versus Hospital Outpatient Departments for Orthopaedic Surgeries. *J Am Acad Orthop Surg*. 2022;30(5):207-14.
5. Ribeiro LM, Cosme FADO, Lara PHS, Pochini ADC, Eijnisman B, Belangero PS. Assessment of the level of satisfaction of patients submitted to latarjet surgery under outfit system compared to hospital system. *Acta Ortop Bras*. 2023;31(5):e264837.
6. Pioli G, Frondini C, Lauretani F, Davoli ML, Pellicciotti F, Martini E, et al. Time to surgery and rehabilitation resources affect outcomes in orthogeriatric units. *Arch Gerontol Geriatr*. 2012;55(2):316-22.

7. Richter DL, Diduch DR. Cost Comparison of Outpatient Versus Inpatient Unicompartmental Knee Arthroplasty. *Orthop J Sports Med.* 2017;5(3):232596711769435.
8. Willhuber GC, Stagnaro J, Petracchi M, Donndorff A, Monzon DG, Bonorino JA, et al. Short-term complication rate following orthopedic surgery in a tertiary care center in Argentina. *SICOT-J.* 2018;4(26).
9. Marcinko DE, Hetico HR. Economic outcomes analysis from an ambulatory surgical center. *J Foot Ankle Surg.* 1996;35(6):544-9.
10. Carey K, Burgess JF, Young GJ. Hospital competition and financial performance: the effects of ambulatory surgery centers. *Health Econ.* 2011;20(5):571-81.
11. Salamanna F, Contartese D, Brogini S, Visani A, Martikos K, Griffoni C, et al. Key Components, Current Practice and Clinical Outcomes of ERAS Programs in Patients Undergoing Orthopedic Surgery: A Systematic Review. *J Clin Med.* 2022;11(14):4222.
12. Ohsfeldt RL, Li P, Schneider JE, Stojanovic I, Scheibling CM. Outcomes of Surgeries Performed in Physician Offices Compared With Ambulatory Surgery Centers and Hospital Outpatient Departments in Florida. *Health Serv Insights.* 2017;10:117863291770102.
13. Morris EJ, Gray K, Gibbons PJ, Grayson J, Sullivan J, Amorim AB, et al. Evaluating the Use of PROMs in Paediatric Orthopaedic Registries. *Children (Basel).* 2023;10(9):1552.
14. Mira JJ, Tomás O, Virtudes-Pérez M, Nebot C, Rodríguez-Marín J. Predictors of patient satisfaction in surgery. *Surgery.* 2009;145(5):536-41.
15. Marshall SI, Chung F. Discharge Criteria and Complications After Ambulatory Surgery. *Anesth Analg.* 1999;88(3):508-17.
16. Kruzik N. Benefits of Preoperative Education for Adult Elective Surgery Patients. *AORN J.* 2009;90(3):381-7.
17. Aynardi M, Post ZD, Ong A, Orozco F, Sukin DC. Outpatient Surgery as a Means of Cost Reduction in Total Hip Arthroplasty: A Case-Control Study. *HSS J.* 2014;10(3):252-5.
18. Mather RC, Wysocki R, J. Mack Aldridge, Pietrobon R, Nunley JA. Effect of Facility on the Operative Costs of Distal Radius Fractures. *J Hand Surg Am.* 2011;36(7):1142-8.
19. Lovald ST, Ong KL, Malkani AL, Lau EC, Schmier JK, Kurtz SM, et al. Complications, Mortality, and Costs for Outpatient and Short-Stay Total Knee Arthroplasty Patients in Comparison to Standard-Stay Patients. *J Arthroplasty.* 2014;29(3):510-5.
20. Novak PJ, Bach BR, Bush-Joseph CA, Badrinath S. Cost containment: a charge comparison of anterior cruciate ligament reconstruction. *Arthroscopy.* 1996;12(2):160-4.
21. Aronowitz ER, Kleinbart FA. Outpatient ACL reconstruction using intraoperative local analgesia and oral postoperative pain medication. *Orthopedics.* 1998;21(7):781-4.
22. Kolisek FR, McGrath MS, Jessup NM, Monesmith EA, Mont MA. Comparison of Outpatient versus Inpatient Total Knee Arthroplasty. *Clin Orthop Relat Res.* 2009;467(6):1438-42.
23. Krywulak SA, Mohtadi NGH, Russell ML, Sasyniuk TM. Patient satisfaction with inpatient versus outpatient reconstruction of the anterior cruciate ligament: a randomized clinical trial. *Can J Surg.* 2005;48(3):201-6.
24. Bertin KC. Minimally invasive outpatient total hip arthroplasty: a financial analysis. *Clin Orthop Relat Res.* 2005;(435):154-63.
25. Kao JT, Giangarra CE, Singer G, Martin S. A comparison of outpatient and inpatient anterior cruciate ligament reconstruction surgery. *Arthroscopy.* 1995;11(2):151-6.
26. Kim S, Bosque J, Meehan JP, Jamali A, Marder R. Increase in Outpatient Knee Arthroscopy in the United States: A Comparison of National Surveys of Ambulatory Surgery, 1996 and 2006. *J Bone Joint Surg Am.* 2011;93(11):994-1000.