

Rapid Decision Support

A product of the Contextualized Health Research Synthesis Program
Newfoundland & Labrador Centre for Applied Health Research



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Rapid Decision Support for Outpatient Joint Arthroplasty: Patient Selection Criteria

Search focus: For this *Rapid Decision Support* report, CHRSP researchers searched for and identified research evidence that examined patient selection criteria for outpatient joint arthroplasty. We included articles with a focus on total hip and knee arthroplasty, total hip or total knee arthroplasty, and total joint arthroplasty overall.

What we found: Research evidence presented below includes evidence from four systematic reviews/meta-analyses, and 17 reviews on patient selection criteria for outpatient arthroplasty, and four articles focusing on risk assessment tools, all published between 2017-2023. References are listed alphabetically, by article type. For each reference, we highlight key quotes and/or topics that address outpatient arthroplasty patient selection criteria and factors relevant to those criteria.

Content summary: The reader should note that there are several caveats to be aware of while reviewing this research. Most of the research studies used younger and healthier patients in their examinations of outpatient arthroplasty. The definition of “outpatient” varies within this literature from 4-8 hours, up to 24-hour stays requiring overnighting. Settings vary from ambulatory centres to tertiary-care hospitals. There is a lack of evidence from randomized controlled trials, with retrospective studies more commonly used.

The following were the common *exclusion criteria* identified across the included articles:

- Age >75 (sometimes as low as 65, sometimes as high as 80)

- American Society of Anesthesiologists (ASA) physical status classification ASA Class ≥ 3
- Bleeding disorders
- BMI (kg/m²) >35-40 (sometimes BMI >30)
- Cardio/vascular/pulmonary diseases
- Chronic opioid use/addictions
- Cirrhosis
- Comorbidities (>3) in general
- Diabetes
- Functional neurological impairments
- Lack of social supports
- Renal disease
- Sleep apnea

On pages 14-15, we have included articles that focus specifically on the predictive ability of risk assessment tools to select patients as safe for same-day discharge.

Articles Focusing on Patient Selection Criteria

Systematic Reviews/Meta Analyses

Jaibaji et al. **Is Outpatient Arthroplasty Safe? A Systematic Review.** J Arthroplasty. Epub 2020 Feb 17. ([LINK](#))

- **Selection Criteria Summary** (16/ 19 studies reported their selection criteria for outpatient arthroplasty):
 - **Exclusion criteria**
 - 5 studies used age as independent exclusion criterion
 - 2 studies used 75 years of age as cutoff, and 2 studies used 80 years.
 - “With regards to comorbidities there was a large degree of similarity among the studies with cardiovascular disease, renal failure, cirrhosis, and chronic obstructive pulmonary disease being exclusion criteria, if these conditions could not be optimized during the preoperative pathway. **Obstructive sleep apnea was an exclusion criterion for 5 studies**, though Berend et al and Sershon et al did specify that it had to be “untreated.”
 - **Inclusion criteria**
 - 3 studies specified ASA grade <3 as an inclusion criterion. In all studies however, outpatients did tend to be younger and have lower ASA grade.
 - Other important criteria to note were the requirement for the presence of support at home (either family or carer) for at least 24 hours postoperatively.
 - BMI as an inclusion criterion was used in 10 studies, with 4 setting 40 kg/m² as the cutoff. Gillis et al used 45 kg/m² and the rest used 35 kg/m².
 - 2 studies specified a degree of functional independence as inclusion criteria
- **Conclusions:** “The patients recruited for outpatient joint arthroplasty were younger, more active, and had suffered from fewer medical comorbidities than the more typical lower limb

arthroplasty patients. There are significant differences in the reported complications between the studies reviewed. More research is needed to establish if an outpatient program can produce similar outcomes to a fast-track program. Further research is also needed to establish the optimal perioperative protocols.”

Khetarpal et al. **Outpatient Joint Arthroplasty-Working and Rising through the Pitfalls and Challenges.** Br J Pharm Med Res. March - April 2021. ([LINK](#))

- Review (93 articles) of outpatient knee and hip arthroplasty that includes a section on patient selection.
- **Patient Selection Criteria**
 - Various inclusion and exclusion criteria are enlisted in Table 1 and table 2 respectively.
 - **Inclusion criteria (table 1):** 1. ASA Grade I or II; 2. Age <70 years; 3. Haemoglobin >10g/dl; 4. Care giver/Assistant present at home; 5. Primary unilateral Total knee or Hip arthroplasty; 6. Absence of fracture; 7. Independent ambulation of patient preoperatively without any support
 - **List of 23 Exclusion criterion (page 3) including #18 = Obstructive Sleep Apnea**
 - OARA score assesses presence, severity and extent of optimization of medical conditions in 9 comorbidity areas. (Table 2)

Kort et al. **Patient selection criteria for outpatient joint arthroplasty.** Knee Surgery, Sports Traumatology, Arthroscopy. 2017 Sep;25:2668-75. ([LINK](#))

- Focuses on knee and hip: “This review highlights patient selection criteria for OJA based on the current literature and expert opinion.”
- **Patient selection criteria from results section:** “Patients who are able and willing to participate, with a low ASA classification (<III), undergoing primary arthroplasty, age <75 and with support at home during the first postoperative days are eligible candidates for outpatient joint arthroplasty. Patients with a high ASA classification (>II), bleeding disorders, poorly controlled and/or severe cardiac (e.g. heart failure, arrhythmia) or pulmonary (e.g. embolism, respiratory failure) comorbidities, uncontrolled DM (type I or II), a high BMI (>30 m2/kg), chronic opioid consumption, functional neurological impairments, dependent functional status, chronic/end-stage renal disease and/or reduced preoperative cognitive capacity should be excluded from outpatient joint arthroplasty.”
- See Table 2 for Expert opinion and literature-based patient selection criteria for OJA
- “The most important finding of the present study was that an extensive and well-conducted patient selection procedure is needed to perform safe and effective OJA with acceptable clinical outcome. Despite OJA being increasingly applied in daily orthopaedic practice, general consensus on patient selection criteria is lacking”

Xu et al. **Comparison of outpatient versus inpatient total hip and knee arthroplasty: A systematic review and meta-analysis of complications.** J Orthop. 2019 Aug 13. ([LINK](#))

- Systematic review and meta-analysis on the effectiveness of outpatient TKA and THA
- **Discussion section addressing patient inclusion criteria:**
 - “In our study the outpatient group tended to be younger than the inpatient group and thus likely to be healthier pre-operatively. **From our included studies some common inclusion criteria included living within 1 h from the hospital and BMI less than**

40 kg/m. A plethora of co-morbidities such as diabetes, cardiovascular disease, smoking and corticosteroid use may make patients ineligible for TJA as there is an increased risk of post-operative complications.”

Reviews

Baratta et al. **Total joint replacement in ambulatory surgery.** Best Practice & Research Clinical Anaesthesiology. Article in press 2023 ([LINK](#))

- Review (mainly knee and hip) of total joint replacement in ambulatory surgery.
- **Section on Patient selection and preoperative optimization:**
 - **Selection criteria fall into several broad categories:** 1) patient age and characteristics; 2) patient medical comorbidities; and 3) the patient's home environment and social support. Some studies have found that patients over the age of 75 have a greater risk of complications after ambulatory TJA than those under 75 years [6]. Others have reported that male patients were more likely to achieve early discharge [7]. The reasons for this difference are not yet clear.
 - Several comorbid conditions have been associated with influencing postoperative outcomes after ambulatory surgery, including higher ASA physical status, advanced age, obesity, diabetes mellitus, cerebrovascular disease, chronic obstructive pulmonary disease, **obstructive sleep apnea**, cardiac disease, end-stage renal disease, and chronic opioid use or opioid use disorder [8]. Some of these conditions, especially when combined, may render a patient a poor candidate for ambulatory TJA.
 - Approaches to patient selection - Outpatient Arthroplasty Risk Assessment (OARA) tool, use of machine learning algorithms, consideration of social factors
 - **Table 1, Table 2 summarize data from several studies highlighting pertinent patient selection criteria for ambulatory TJA.**

Barra et al. **Same-Day Outpatient Lower-Extremity Joint Replacement: A Critical Analysis Review.** JBJS Rev. 2022 Jun 21. ([LINK](#))

- JBJS Reviews, A Critical Analysis Review for lower-extremity joint replacement
- **Section on patient selection:**
 - “To date, the most widely recognized and utilized tool is the Outpatient Arthroplasty Risk Assessment (OARA) score”
 - See TABLE II Patient Selection in Outpatient TJA*: Risk factors for adverse events/extended stay/readmission
 - Older age, Female sex, Active smoker, Bleeding diathesis, ASA class of ≥ 3 , BMI in kg/m² of > 35 , COPD, CHF, CAD, Cirrhosis, Non-White race, >3 medical comorbidities, Hypertension, and Weak social support system

Bodrogi et al. **Management of patients undergoing same-day discharge primary total hip and knee arthroplasty.** January 13, 2020. Canadian Medical Association Journal ([LINK](#))

- Review “of observational and interventional research on the effectiveness of same-day discharge total hip and total knee arthroplasty.”
- Have a section on which patients are **candidates for outpatient total hip and total knee arthroplasty:**

- **Selection Criteria:** *Absolute: Medical:* Preoperative bleeding disorder, Liver cirrhosis, Renal disease > stage 2. *Social:* Inability to participate in preoperative counselling (i.e., lack of mental capacity, lack of means of transportation). *Relative: Medical:* Age > 80 years, American Society of Anesthesiologists classification > 2, **Severe obstructive sleep apnea**, Current, or history of, significant cardiac disease, Diabetes mellitus, Body mass index > 35. *Physical function:* Timed Up and Go Test > 10 seconds. *Social:* Lack of social support system

Gondusky et al. **A Literature-Based Resource for the Development of Outpatient Arthroplasty Patient Selection Criteria.** JISRF Reconstructive Review (An open access Journal). 2021. ([LINK](#))

- Review of the available literature on **patient selection criteria for outpatient TJA** + synthesis of data to provide a reference to care teams attempting to create selection criteria appropriate for their unique facility + review of modifiable risk factors that affect TJA outcome, and patient optimization opportunities.
- Characterising the evidence:
 - Some studies select patient inclusion and exclusion criteria, and then determine the results of patient outcomes based on this selection. Others attempt to define appropriate criteria based on a retrospective review of successful day of surgery discharge after TJA.
- Table 1 reveals variable exclusion ranges noted by some authors (out of 18 studies listed)
 - 4 studies excluded patients >65-75 years of age
 - 4 studies excluded patients with ASA Class ≥3
 - 6 studies excluded patients with BMI (kg/m²) >35-40
 - 5 studies excluded patients with Preoperative Hemoglobin (g/dL), Hematocrit<10-12, and 1 other study specified <30%
 - 3 studies excluded patients with Glucose on Day of Surgery (mg/dL)>180-200
 - 2 studies excluded patients with Hemoglobin A1C (%)>7.5
 - 1 study excluded patients with Timed Up and Go Test (s)>10
 - 1 study excluded patients with Creatinine (mg/dL)>2
 - 1 study excluded patients with Sodium (mEq/L)<126
 - 1 study excluded patients with Potassium (mmol/L)<3
 - 1 study excluded patients with **STOP-BANG score for Obstructive Sleep Apnea (OSA)>5**
- Table 2: A list of general exclusion criteria noted by some authors.
 - Revision Surgery (2 studies)
 - Bilateral Arthroplasty (2 studies)
 - Inability to Ambulate Without a Walker (2 studies)
 - Significant Cardiopulmonary History (7 studies) (see article text for definition)
 - History of Thromboembolic Event (4 studies)
 - Chronic Anticoagulation (2 studies)
 - **Presence of Obstructive Sleep Apnea (4 studies see refs 3,9,10,15)**
 - Chronic Liver Disease (Childs class B or worse) (1 study)
 - Cerebral Vascular Disease (1 study)
 - Chronic pre-operative opioid use/addiction (2 studies)

- Inadequate assistance at home after discharge¹/lack of support (3 studies) Cognitive Deficiencies
- **Discussion patient selection:**
 - “Patient mix, available resources, proximity to higher levels of care, and many other facets differ between outpatient facilities. Each of these patient selection criteria variables need to be considered in light of one’s circumstances. **Because of this, a one-size fits all criteria will never be appropriate. Initial patient selection criteria should be formalized based on thoughtful consideration of variables in light of the facility circumstances and should always be reviewed and modified as needed.**”
 - See Table 3: Variables to be considered for optimization during development of patient selection criteria

Hall et al. **Day-case total hip arthroplasty: a safe and sustainable approach to improve satisfaction and productivity, and meet the needs of the orthopaedic population.** Orthopaedics and Trauma. February 2022. ([LINK](#))

- Narrative review on the experiences of successful units offering same day discharge of lower limb arthroplasty.
- Section on common features of the patients identified as having the potential for same day discharge across many of the reported strategies:
 - younger age (usually <75 years old)
 - fewer co-morbidities (either ASA 1 or 2, or a maximum of one major co-morbidity provided it can be optimized satisfactorily in the preoperative setting)
 - body mass index <35 kg/m²
 - low preoperative analgesia demand.
- “Appropriate patient selection is reported in every case series to be vital to the successful delivery of day case THA. More work is needed to investigate how patient factors such as demographics, ethnicity, domestic circumstances, and other cultural factors might affect patients’ perceptions and expectations of a day case service.”

Krause et al. **Outpatient Total Knee Arthroplasty: Are We There Yet? (Part 1).** Orthop Clin North Am. Epub 2017 Oct 27. ([LINK](#))

- Review of total knee and unicompartmental knee arthroplasty with section on patient criteria
- **Key Points on Patient Selection Criteria**
 - Patients who qualify for outpatient knee arthroplasty are generally younger than 65 year old, with a range of 45 to 80 years. Patients older than 75 years have been found to have a higher risk of postoperative falls, knee stiffness, pain, and urinary retention, and an increased readmission risk within 1 year of surgery.
 - **There is currently a lack of randomized controlled studies assessing patients’ fitness for OJA. All patients should be primary arthroplasty patients without a history of knee surgery.**
 - **Suggested exclusions from the literature they reviewed**
 - “Simultaneous bilateral TKA, surgery performed for fracture, and orthopedic complexity (eg, bone loss or retained hardware)”
 - “patients with uncontrolled (hemoglobin A1C >7.0%) diabetes mellitus (type I or II), a body mass index (BMI) greater than 30 kg/m², bleeding disorders,

American Society of Anesthesiologist (ASA) scores greater than II, poorly controlled cardiac (eg, heart failure, arrhythmia) or pulmonary (eg, embolism, respiratory failure) comorbidities, chronic opioid consumptions, functional neurologic impairments, chronic or end-stage renal disease, and/or reduced preoperative cognitive capacity”

- ‘severe mobility disorders, voiding difficulties or preoperative use of urologic medications, and practical issues”
- “patients who had a BMI greater than 40 kg/m² or with at least 3 significant medical conditions”
- ‘Patients within 1 year of a myocardial infarction or pulmonary embolism, or on anticoagulation”
- “If a surgeon determines that a diabetic patient is fit for outpatient knee arthroplasty, he or she should attempt to operate on diabetics earlier in the day in order to better control their glucose levels and minimize the risk of postoperative complications”
- “patients if they had any history of diabetes, myocardial infarction, stroke, congestive heart failure, venous thromboembolism, cardiac arrhythmia, respiratory failure, or chronic pain requiring regular opioid medications”
- “Patients who receive bare-metal coronary stents should wait 4 to 6 weeks to have an elective total joint surgery. Moreover, patients should wait 4 weeks after balloon angioplasty and 12 months after placement of a drug-eluting stent.
- Acute exacerbation of chronic obstructive pulmonary disease (COPD) should delay elective TJA.”
- “Preoperative spirometry should be tested on all COPD patients, and arterial blood gas analysis should be performed for patients with moderate-to-severe COPD. If patients have a predicted postoperative (ppo) forced expiratory volume in 1 second (FEV1) less than 40% or a carbon dioxide diffusing capacity of the lung less than 40%, aerobic capacity testing can be done to determine operative fitness.”
- “Patients who cannot climb 3 flights (54 steps) due to breathing difficulties are not recommended for surgery. Maximum oxygen consumption (Vo₂max) can be used for patients who cannot be tested using stairs for other reasons. Vo₂max less than 15 mL/kg/min or ppo Vo₂max <10 mL/kg/min should not be considered for surgery.”
- **Section on medical optimization states:**
 - **“Obstructive sleep apnea is associated with higher rates of complications and longer LOS, but screening and management can reduce these rates.”**

Lazic et al. **Day-case surgery for total hip and knee replacement: How safe and effective is it?** EFORT Open Rev. 2018 Apr 27. ([LINK](#))

- Instructional review on the safety and effectiveness of total hip and knee replacement.
- **Section on patient suitability criteria:**
 - American Society of Anaesthesiologists class 2 or below
 - No mobility aids
 - Good social support

- Haemoglobin of >13 g/dL
- No previous VTE
- No cardiopulmonary disease or diabetes
- No long-term steroid usage
- BMI < 40
- No cognitive impairment

Li J et al. **Essential elements of an outpatient total joint replacement programme.** Curr Opin Anaesthesiol. 2019 Oct. ([LINK](#))

- Review (with special focus on TKA) summarizing elements of outpatient total joint replacement.
- **Section on patient selection and preparation:**
 - Tools
 - Mention the ‘Outpatient Arthroplasty Risk Assessment Score’ (OARA) which “contains evaluation in general medicine, hematology, cardiology, endocrinology, gastroenterology, neurology, psychology, urology, pulmonary, and infectious disease.”
 - Mention “data are lacking on patient satisfaction and quality of recovery as well as the burden placed upon caregivers” and “At the moment, few assessment tools for these specific outcomes exist, and Press Ganey scores have low, if any, correlation with patient satisfaction in TJA [24]. Therefore, once potential patients are identified and selected for outpatient TJA based on physical status assessment tools as discussed above, their social and emotional readiness must also be assessed and optimized.”
 - Table 1. Commonly listed **inclusion criteria** for outpatient total joint arthroplasty
 - 1. Unilateral elective TJA
 - 2. Younger than 65 years old
 - 3. ASA I and II
 - 4. Hemoglobin > 12 gm/dl
 - 5. Adequate family support
 - Table 2. Commonly listed **exclusion criteria** for outpatient total joint arthroplasty
 - 1. Older than 65 years old
 - 2. BMI above 40
 - 3. **Obstructive sleep apnea or other severe pulmonary disease**
 - 4. Uncontrolled diabetes mellitus
 - 5. Active cardiac diseases, such as heart failure and severe arrhythmia
 - 6. Coagulopathy
 - 7. Severe renal insufficiency
 - 8. Severe hepatic insufficiency
 - 9. ASA III and IV with any other
- “In summary, the readiness of a patient for outpatient TJA involves having not only medical risk assessment and physical fitness, but also ensuring emotional adaptability and adequate social support. For TKA and THA, with proper patient selection and education, over 90% of those who met the criteria can be discharged the same day at high volume experienced centers.”

Marioenzi et al. **Outpatient Total Joint Arthroplasty: A Review of the Current Stance and Future Direction.** R I Med J (2013). 2020 Apr 1. ([LINK](#))

- Review of **total hip and knee arthroplasty**
- **Section on patient selection**
 - “Though **no consensus statement exists regarding a standardized protocol for patient selection**, appropriate patient selection is a critical element of ensuring a safe and successful outpatient TJA experience.”
 - Studies evaluating **characteristics that make patients optimal candidates for outpatient TJA** show
 - “patients discharged within 24 hours of TJA were more likely to be younger (<50 years), male, ASA class 1 or 2, and less likely to be morbidly obese (BMI <40) or taking steroids for a chronic condition (p < 0.05 for all comparisons).”
 - Studies investigating the highest risk for complications and readmission show
 - “Notable risk factors include chronic obstructive pulmonary disease (COPD), congestive heart failure (CHF), hypertension, obesity, hypoalbuminemia, cirrhosis, chronic kidney disease and age greater than 65. (12,13,14) Indices have been proposed to estimate patient risk such a Charlson Comorbidity Index (CCI) or the American Society of Anesthesiologists Score (ASA). Higher overall disease burden as graded by these scoring systems has been shown to be directly associated with increased complications after TJA. These scoring systems are not specific to TJA patient populations and have not been found to be highly sensitive or specific.”
 - Unique scoring system developed =
 - “The Outpatient Arthroplasty Risk Assessment (OARA) score consists of nine distinct medical categories that are summed and stratified in a binary fashion to predict safe vs. unsafe early discharge.”
 - Non-medical factors likely associated with improved rates of safe discharge
 - “...Include strong social support, home living situation such as bed and shower on a single floor, preoperative mobility status and the patient’s motivation for same day discharge.”
 - “As the demand for outpatient total joint arthroplasty increases, further research is needed to identify the ideal prediction tool that will incorporate medical co-morbidities, patient-specific factors, and social influences to best identify which patients can undergo safe outpatient TJA.”
- **Outcomes and Complications**
 - “One critique of the available literature is that outpatient TJA is currently being performed on younger, healthier patients. It is not surprising that outpatient TJA patients have lower complication and readmission rates at this time.”
 - “In addition to providing a safe surgical process, maintaining or improving levels of patient satisfaction is important in establishing a successful outpatient TJA program.”

Meneghini et al. **The American Association of Hip and Knee Surgeons, Hip Society, Knee Society, and American Academy of Orthopaedic Surgeons Position Statement on Outpatient Joint Replacement.** J Arthroplasty. 2018 Dec. ([LINK](#))

- Position statement (based on review): “This position statement was developed systematically in a true collaboration with key stakeholders with interest in the safety and well-being of patients who undergo outpatient hip and knee arthroplasty and the surgeons who perform them.”
- The essential elements identified that require optimization are as follows:
 - Patient selection (on medical grounds)
 - “Special attention should be paid to proper patient selection when considering outpatient same-day discharge for total hip and knee arthroplasty. Medical comorbidities should be minimal, and patients should generally be relatively healthy, active, and at low risk for medical or surgical complications. Although there is no definitive medical risk–stratification system, there are some factors that have proven useful to guide the medical team and practitioners in assessing the number of medical comorbidities and the extent to which they are adequately controlled.”
 - Social support and environmental factors (family or professional outpatient support)

Rajan et al. **Patient Selection for Adult Ambulatory Surgery: A Narrative Review.** *Anesth Analg.* December 1, 2021. PMID: 34784328. ([LINK](#))

- A narrative review “to present current best evidence that would provide guidance to the ambulatory anesthesiologist in making an informed decision regarding patient selection for surgical procedures in freestanding ambulatory facilities.”
- “Several comorbid conditions have been shown to influence postoperative outcomes after outpatient surgery and therefore play a major role in patient selection. Independent factors identified by most studies include ASA physical status (ASA-PS) classification, advanced age, obesity (body mass index [BMI]), **obstructive sleep apnea (OSA)**, cardiac disease, chronic obstructive pulmonary disease (COPD), diabetes mellitus (DM), end-stage renal disease (ESRD), transient ischemic attack (TIA)/stroke, chronic opioid use or opioid use disorder, and malignant hyperthermia (MH).”
- **See Table 2 for summary of recommendations for screening criteria for different comorbidities**
- **Obstructive Sleep Apnea section:** “Because undiagnosed OSA is common, and failure to recognize OSA preoperatively is one of the major causes of perioperative complications, the **Society for Ambulatory Anesthesia (SAMBA) and the Society of Anesthesia and Sleep Medicine (SASM) recommend screening patients for OSA. Of the variety of screening tools available, the Snoring, Tiredness, Observed apnea, blood Pressure, Body mass index, Age, Neck circumference and Gender questionnaire is the most validated and studied in the surgical populations and recommended by both SAMBA and SASM.** A score of 5 or higher indicates a presumptive diagnosis of OSA.”
- **Conclusions:** “In the future, as more patients and surgical procedures are moved from inpatient to outpatient facilities, **it is advisable to develop procedure-specific exclusion criteria for patients that are not candidates for ambulatory surgery.** A pragmatic question to ask is: Will postoperative hospitalization influence patient care or perioperative outcome? If no improvement would be achieved, then the patient should undergo the procedure on an ambulatory basis.”

Register et al. **Establishing a Successful Outpatient Joint Arthroplasty Program.** *AORN J.* 2018 Jul. ([LINK](#))

- **Section on outpatient selection criteria:**
 - “Although the tools for selecting suitable candidates are still being refined, several tools are currently used. The American Society of Anesthesiologists’ classification, the Charlson comorbidity index (CCI), and the Outpatient Arthroplasty Risk Assessment all have merit. The American Society of Anesthesiologists’ rating scale measures fitness for surgery. Similar to the CCI, it has been shown to correlate well as an indicator for comorbidities.”
 - **“The optimal candidate for OJA is not fully defined, and there are no universally accepted selection criteria.** However, the lack of comorbidities and being functionally independent are factors that increase the success of an OJA. Several factors have been shown to preclude a patient from undergoing OJA. These include
 - increased age,
 - body mass index greater than 40,
 - cardiac conditions (ie, previous myocardial infarction, valve disease, coronary artery disease, congestive heart failure),
 - cirrhosis,
 - chronic obstructive pulmonary disease,
 - hematology issues (eg, hemoglobin less than 13 g/dL),
 - genitourinary issues (eg, a history of urinary retention, symptomatic benign prostatic hyperplasia, prostate cancer),
 - neurology issues (eg, history of dementia or postoperative delirium),
 - previous cardiovascular accident, and
 - diabetes mellitus.”

Rodríguez-Merchán EC. **Outpatient total knee arthroplasty: is it worth considering?** EFORT Open Rev. 2020 Mar 2. ([LINK](#))

- Review, total knee replacement
- **Patient selection:**
 - “The selection criteria for patients who seek to undergo outpatient TKA remain controversial.”
 - “Other important factors inherent to the patient are body mass index (BMI), physical and cognitive function and the presence of social support at home.”
 - “In 2018, Gogineni et al reported three main groups of factors (inclusion criteria) for outpatient TKA: 6 (1) surgical factors (primary TKA and first/second case of the day); (2) medical factors (age < 75 years; BMI < 35; no anaemia; no chronic obstructive pulmonary disease; no congestive heart failure; no cirrhosis; no venous thromboembolism; no spinal stenosis; no benign prostate hyperplasia; no chronic narcotics; and surgeon discretion); (3) social factors (risk assessment and prediction tool > 10; proximity to hospital; and private insurance)”
 - “Currently, the ideal risk assessment tool for choosing the right patients is unknown. It has been reported that the AAAR based on nine comorbidity areas is a better indicator to predict readmission than the ASA classification and the CCI.”
 - **“Currently, obstructive sleep apnea, poor patient balance, cognitive deficiencies and lack of social support are considered contraindications”**

- “One study has demonstrated a higher risk of perioperative surgical and medical outcomes in outpatient TKA than inpatient TKA, including component failure, surgical site infection, knee stiffness and deep vein thrombosis.”
- “There remains a lack of universal criteria for patient selection. Outpatient TKA has thus far been performed in relatively young patients with few comorbidities. It is not yet clear whether outpatient TKA is worth considering, except in very exceptional cases (young patients without associated comorbidities). **Outpatient TKA should not be generally recommended at the present time.**”

Rozell et al. **Outpatient Total Joint Arthroplasty: The New Reality.** J Arthroplasty. Epub 2021 Feb 12. ([LINK](#))

- “This article will review the data supporting outpatient arthroplasty, the business and legal aspects involved, if surgeons can align with their hospital to offer these services, and how tightly knit and highly organized teams are key to the success of safely offering hip and knee arthroplasty on an outpatient basis.”
- **Patient Selection and Data Supporting Outpatient Arthroplasty**
 - “In general, the patient should be healthy, with minimal medical comorbidities which would require close monitoring in the early postoperative period. Some of the specific things which may raise concerns for fast-track arthroplasty include patient age over 80 year old, diabetes, a history of urinary retention, patients who require chronic anticoagulation, preoperative opioid use, prior problems with anesthesia, and multiple allergies. While none of these are strict contraindications to having an outpatient procedure, they can portend challenges if not closely monitored postoperatively and ideally optimized preoperatively.
 - ...more challenging cases could be associated with higher blood loss and longer operative times and thus may be best managed in an inpatient setting.
 - Patients chosen for outpatient procedure should have a good support network to assist them in the early postoperative period.”

Sayed et al. **Total Hip Arthroplasty in the Outpatient Setting: What You Need to Know (Part 1).** Orthop Clin North Am. Epub 2017 Oct 26. ([LINK](#))

- “Reviews information regarding **patient selection criteria**, preoperative education, and preoperative medical optimization”
- **“The Anesthesiologists Physical Status Classification System and the Charlson Comorbidity Index have often been used as surrogates for arthroplasty selection and risk assessment.”**
- “Most studies excluded patients with cardiac (history of myocardial infarction, arrhythmia, and heart failure) and **pulmonary (respiratory failure) comorbidities**. One study excluded patients with diabetes mellitus (DM) type 1 and 2. Additionally, body mass index (BMI) has been associated studied as a risk factor in outpatient arthroplasty.”
- “Literature is lacking with regard to arthroplasty-specific guidelines for outpatient THA selection; however, some evidence associates pre-existing conditions with adverse events (AEs) after outpatient arthroplasty.”
- “...there is no gold standard for preoperative optimization of outpatient THA patients, evidence-based approaches will likely minimize AEs and improve care nationally”

Thompson et al. **The introduction of day-case total knee arthroplasty in a national healthcare system: A review of the literature and development of a hospital pathway.** Surgeon. Epub 2021 Mar 23. ([LINK](#))

- Review of the literature and development of hospital pathway for day-case total knee arthroplasty
- Refer to University College London Hospitals (UCLH) **Elective Day Surgery Arthroplasty Pathway (EDSAP)** aka a evidence-based multidisciplinary perioperative care pathway (see figure 1 and Tables 1-4)
 - Table 2. Inclusion & Exclusion criteria for Elective Day Surgery Arthroplasty.
 - **One of the Exclusion criteria = Requires Continuous Positive Airway Pressure (CPAP)**
- Has section on preoperative measures including patient education and patient selection that specifies:
 - “The **ASA scoring system** has also been used as an eligibility tool for day-case TKA in a number of studies. Similarly, **BMI** is commonly used as an exclusion criterion with variance in cut offs values; <45 kg/m² (11,20), <40 kg/m² or <35 kg/m². As previously mentioned, large database/registry studies reporting ‘outpatient TKA’ with higher complication and readmission rates demonstrate high ASA grades and substantially **higher mean age of patients.**”
 - “Whilst our inclusion criteria are absolute, it is important to note not all exclusion criterion are contraindicative of day-case TKA. It is imperative a collaborative clinical decision is made in agreement between the surgeon, anaesthetist and arthroplasty clinical nurse specialist for a patient to proceed with day-case TKA. “

Thompson et al. **Day-case total hip arthroplasty: a literature review and development of a hospital pathway.** Bone Jt Open. 2021 Feb. ([LINK](#))

- Review of the literature and development of hospital pathway for total hip arthroplasty.
- Section on preoperative measures includes **patient selection** (Table II. Inclusion and exclusion criteria for elective day surgery arthroplasty.)
 - Inclusion
 - Willing to participate
 - Clinically safe to be treated at home
 - Proficient with walking aids
 - Living within the local borough
 - Supported at home by relatives
 - Exclusion
 - ASA ≥ 3
 - Any cardiac history
 - Significant prostate history
 - Haemoglobin < 120 g/l
 - Insulin dependent diabetes
 - **Requires continuous positive airway pressure (CPAP)**
 - History of chronic pain
 - Cognitive issues that preclude the ability to understand instructions

- Significant psycho/social issues that would prevent the patient from managing at home safely
- Take home messages
 - “Careful patient selection and education, adequate perioperative considerations, and appropriate postoperative pathways are essential for successful day-case THA.”

Articles focusing on Risk Assessment Tools for Patient Selection

Anderson et al. **The Predictive Accuracy of the CareMOSAIC Risk Assessment for Discharge Disposition in Medicare Bundle Patients After Total Joint Arthroplasty.** *Arthroplast Today.* 2022 Jan. ([LINK](#))

- “This article evaluates the predictive accuracy of the CareMOSAIC Risk Assessment for discharge disposition in Medicare patients undergoing total joint arthroplasty.”
- **Conclusions** The CareMOSAIC Risk Assessment effectively predicts the discharge disposition for Medicare patients undergoing total hip or total knee arthroplasty.
- Patient selection for the study:
 - **Inclusion criteria:** elective THA or TKA, age greater than 65 years, Medicare insurance, and patients who had preoperative CareMOSAIC Risk Assessment scores.
 - **Exclusion criteria:** patients who underwent conversion TJA, who underwent revision THA or TKA, who underwent unicompartmental knee arthroplasty, who underwent hip hemiarthroplasty, who are older than 65 years but did not use Medicare as their primary insurance, with incomplete CareMOSAIC Risk Assessment scores, and patients with femoral neck fracture were excluded as they lacked the CareMOSAIC Risk Assessment scores.

House et al. **Relative Contribution of Outpatient Arthroplasty Risk Assessment Score Medical Comorbidities to Same-Day Discharge After Primary Total Joint Arthroplasty.** *The Journal of Arthroplasty.* March 2022. ([LINK](#))

- “This study quantified the relative contribution and weight of 52 medical comorbidities comprising the Outpatient Arthroplasty Risk Assessment (OARA) score as predictors of safe same-day discharge (SDD).”
- **Results:** “Among testable OARA comorbidities, 53% significantly decreased the likelihood of SDD by 2.3 (body mass index [BMI] ≥ 40 kg/m²) to 12 (history of post-operative confusion and pacemaker dependence) times. BMI between 30 and 39 kg/m² did not affect the likelihood of SDD (P = .960), and BMI ≥ 40 kg/m² had the smallest odds ratio in our study (2.28, 95% confidence interval 1.11-4.67, P = .025).”
- **Conclusion:** “Study findings contribute to the refinement of the OARA score as a successful predictor of safe SDD following primary TJA while maintaining low 90-day readmission rates.”
 - “Comorbidities that did not statistically differentiate between SDD and non-SDD included BMI 30-39 kg/m², non-obstructive stable coronary artery disease, controlled diabetes with A1C < 7.0, uncontrolled diabetes with A1C ≥ 8.0 , severe benign prostatic hyperplasia, controlled asthma, **untreated obstructive sleep apnea**, snoring or excessive daytime sleepiness, and mild URI (P = .082). Comorbidities that did statistically differentiate between SDD and non-SDD included BMI ≥ 40 kg/m², direct thrombin and factor Xa inhibitors, chronic stable evaluated anemia with Hb 11.0 to normal, chronic

stable-evaluated anemia with Hb > 11.0, left ventricular (LV) systolic dysfunction without history of pulmonary edema, diastolic dysfunction stage 1-2, pacemaker dependence, uncontrolled diabetes with A1C 7.0-7.9, history of post-operative confusion, and stage 3 kidney disease (P.025).”

Howie et al. **Readmission, Complication, and Disposition Calculators in Total Joint Arthroplasty: A Systemic Review.** J Arthroplasty. Epub 2020 Nov 3. ([LINK](#))

- Systematic review of the literature “to determine the existing post-TJA readmission calculators and compare the specific elements that comprise their formula. Second, we intend to evaluate the pros and cons of each calculator.”
- “Conclusion: The extensive variation among TJA risk calculators underscores the need for tools with more individualized stratification capabilities and verification. The transition to outpatient and same-day discharge TJA may preclude or change the need for many of these calculators.”

Meneghini et al. **Safe Selection of Outpatient Joint Arthroplasty Patients With Medical Risk Stratification: the "Outpatient Arthroplasty Risk Assessment Score".** J Arthroplasty. Epub 2017 Mar 14. ([LINK](#))

- Retrospective review that “assessed the predictive ability of a medically based risk assessment score in selecting patients for outpatient and short stay surgery.”
- “Early results suggest that the OARA score can successfully facilitate appropriate patient selection for outpatient TJA, although consideration of clinical program maturity before adoption of the score is advised.