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REVIEW

COST-EFFECTIVE OUTPATIENT ARTHROPLASTY WORLDWIDE IN 2025

Outpatient total joint arthroplasty: international evidence, rationale for implementation, and practical steps to get started

Andrew WICKLINE [1], Giuseppe PETRALIA [2] *, Marta PAMBUKHCHYAN [3], Jeenah GWAK [3], Pier F. INDELLI [3]

[1]Genesee Orthopedics and Plastic Surgery Associates, Utica, NY, USA; [2]Unit of Mininvasive Orthopedic Surgery, Department of Life, Health and Environmental Sciences, University of L'Aquila, L'Aquila, Italy; [3]The Breyer Center for Overseas Studies in Florence, Stanford University, Florence, Italy

*Corresponding author: Giuseppe Petralia, Unit of Mininvasive Orthopedic Surgery, Department of Life, Health and Environmental Sciences, University of L'Aquila, 67100 L'Aquila, Italy. E-mail: giuseppepetraliamd@gmail.com

ABSTRACT

Outpatient total hip and knee arthroplasty with same day discharge is increasingly adopted as health systems seek to reduce length of stay, costs and perioperative complications while maintaining excellent patient experience. Yet implementation remains heterogeneous and many centers still lack a clear, practical roadmap. This narrative review synthesizes contemporary international evidence and translates it into a practical, stepwise protocol and decision algorithm for outpatient joint replacement. We summarize data from registries, randomized trials and large observational series on safety, costs and functional outcomes, and integrate this with real world experience from high volume programs. In carefully selected patients, outpatient total joint arthroplasty can provide complication, readmission and revision rates comparable to or lower than conventional inpatient care, with meaningful reductions in resource use. Successful pathways share common elements: multidisciplinary leadership, transparent selection and risk stratification, structured preoperative education and optimization, motor sparing anesthesia and multimodal analgesia, early mobilization on the day of surgery, tailored venous thromboembolism prophylaxis and a clear plan for home based rehabilitation supported by remote follow-up where available. We propose a pragmatic, algorithm based approach that helps teams start with low risk patients, monitor outcomes systematically and safely expand indications as experience, infrastructure and patient support grow.

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KEY WORDS: Outpatients; Arthroplasty; Patient discharge; Arthroplasty, replacement, hip; Knee.

Outpatient total joint arthroplasty (OTJA), which involves same-day discharge after primary total hip (THA) or knee arthroplasty (TKA), has expanded rapidly but unevenly across different health systems. In the United States, national registry data indicated a significant reduction in length of stay (LOS) for primary THA and TKA, now averaging approximately 1.1-1.3 days (2022-2023), effectively turning many procedures into "0-1 night" pathways.[1]

Regulatory changes further sped up this trend: after removing TKA (2018) and THA (2020) from Medicare's Inpatient-Only List, more than half of Medicare TKA cases were coded as outpatient within three years.[2] At the same time, an increasing number of low-risk patients are now

treated in Ambulatory Surgery Centers (ASCs), where comparative data showed safety outcomes comparable to inpatient settings for appropriately selected patients.[3]

Across Europe, the situation varies more widely. In England, analyses from the Hospital Episode Statistics database showed an average length of stay of about four days, with historically low day-case rates.[4] Denmark, a leader in fast-track procedures, has achieved a national average length of stay of around one day and, through a multicenter public initiative, proved the feasibility of same-day discharge in approximately 21% of selected THA and TKA patients.[5] Other countries, such as Germany, continue to report longer inpatient stays and routine post-acute inpatient rehabilitation, which slow down the broader adoption of OTJA.[6]

In Italy, national registries do not yet report LOS indicators following arthroplasty, and true same-day discharge remains rare nationwide. Implementation efforts have instead focused on fast-track and ERAS pathways, which have progressively shortened hospital stays and reduced direct medical costs while maintaining clinical safety.[7-9]

Within fast-track OTJA pathways, effective postoperative swelling management is a key safety component and should be explicitly included in standard operating procedures.[10]

The following sections examine the scientific rationale and safety considerations underlying OTJA, followed by the practical steps required for its clinical implementation.

Scientific rationale and safety considerations

Advances in surgical techniques and enhanced recovery protocols have made same-day discharge for total hip and knee arthroplasty (THA, TKA) increasingly achievable. The reason is partly economic, since Medicare spent over $6.5 billion on inpatient joint replacements in 2013,[11] and partly driven by patient preferences. Over the last twenty years, fast-track perioperative programs have gradually reduced hospital stays, to the point that many patients now meet discharge criteria on the day of surgery.[12]

Evidence supports the safety of this approach. A multicenter randomized trial demonstrated that outpatient THA can be performed as safely as inpatient surgery,[13] and a systematic review confirmed comparable outcomes for same-day arthroplasty.[14] Broader analyses consistently indicated that complication and readmission rates are not higher for outpatient cases, while patient satisfaction is very high.[15]

Importantly, infection rates are also comparable between outpatient and inpatient procedures.[16]

Policy changes in the United States have further accelerated this transition. In 2018 CMS removed TKA from the Inpatient-Only List, followed by THA in 2020, enabling outpatient reimbursement.[17, 18] Shortly after, TKA was also added to the ASC Covered Procedures List.[19]

National data confirm rapid growth: outpatient TKA increased from 0.4% of cases in 2012 to 14% in 2020,[20] and outpatient coding for THA surpassed one-third of cases by 2021.[21] Forecasts suggest that by 2026 more than half of primary joint replacements will be performed without inpatient admission.[22]

Economic analyses supported this trend. Time-driven activity-based costing showed about 30% savings for outpatient THA and TKA, mainly because of eliminating hospital stays.[23] On a national level, this would mean avoiding hundreds of thousands of inpatient bed-nights and saving billions of dollars annually.[21, 23]

Practical steps

Patient selection

Initially, careful patient selection was key to safety in same-day total hip and knee replacements. Ideal candidates were generally healthy, motivated adults with strong home support and a dependable caregiver, capable of mobilizing with aids and actively participating in rehabilitation. Chronological age was not a strict cut-off; instead, decisions relied on physiological reserve, cognition, and support rather than age alone. Most programs preferred patients with few, well-managed comorbidities (ASA I-II) and A Body Mass Index (BMI) of $\leq$40 kg/m^2 – often $\leq$35 kg/m^2 when obstructive sleep apnea or

poorly controlled diabetes are present. Structured tools, such as the Outpatient Arthroplasty Risk Assessment (OARA) score, introduced in 2017 and updated in 2019, have been validated for identifying low-risk candidates.[24, 25] While the literature generally cites a conservative cut-off around ≤79, some recommend an even more cautious operational threshold of OARA<60 to enhance safety in routine practice.

Growing evidence supports cautious expansion to optimized ASA III patients. In a large institutional series of 7258 arthroplasties conducted under standardized pathways, ASA III status did not increase emergency-department visits or complications at 24 hours and 90 days.[26] At the population level, a Danish registry of 51,042 procedures showed no difference in 30- or 90-day readmissions between true day-case discharge and a single overnight stay.[27] Meta-analyses likewise reported high same-day discharge rates with no excess complications or readmissions and favorable economics.[28-30]

Conversely, patients with clinical frailty (*e.g.*, Clinical Frailty Scale ≥5), BMI≥45 kg/m^2, unstable cardiac or pulmonary conditions, end-stage renal disease, poorly controlled diabetes, or ASA≥IV are typically better managed with at least an overnight admission.[31] In all cases, safe outpatient care depends on thorough screening, clear discharge criteria, and reliable post-discharge support.

Preoperative assessment

Preoperative preparation for same-day total hip or knee arthroplasty rests on four coordinated pillars that make home recovery safe and predictable: patient-and-caregiver education, focused medical optimization, nutrition-focused prehabilitation, and edema/lymphatic management. Education is multimodal (class, printed/app materials, video) and clarifies the surgical pathway, early mobilization, use of assistive devices, at-home pain control, and indicators of concern with a 24/7 contact and comprehension checklists; it is also useful to include a simple pathway to prevent urinary retention (hydration, early void trial, prompt catheterization if needed).[32-35]

Medical optimization is focused on the cardiovascular side, including a targeted evaluation, functional capacity ≥4 METs, stable blood pressure on the day of surgery, and no recent cardiovascular events or hemodynamic instability; antiplatelet/anticoagulant management and venous thromboembolism prophylaxis for 10-35 days are tailored to risk.[36]

On the respiratory side, smoking cessation, optimal management of asthma/COPD, and OSA screening and treatment are recommended, with proven CPAP adherence (≥4 hours/night) when indicated; when OSA is properly managed, it does not prevent ambulatory discharge.[37, 38] Modifiable factors are addressed early: hemoglobin levels of ≥12 g/dL in women and ≥13 g/dL in men (with IV ferric carboxymaltose 2-4 weeks before surgery if needed), albumin levels of ≥3.5 g/dL with nutrition support if lower, and cautious BMI management, recognizing increased risk already above approximately 31 kg/m^2, higher risk above 40-45 kg/m^2 when comorbidities are present, and significantly increased risk in "super-obesity" (≥50 kg/m^2), where at least one overnight stay is often safer.[39-43] Nutrition-focused prehabilitation supports a Mediterranean-style pattern with reduced sodium, a protein intake of 1.2-1.6 g/kg/day, and, during the last two weeks, 10-15 g/day of leucine-rich essential amino acids as a recommended intervention; vitamin D levels are corrected when 25-OH-D falls below 20 ng/mL, and hemoglobin levels are maintained. Preoperative carbohydrate loading is optional and varies based on local protocols: many centers remain NPO from midnight; where clear liquids are allowed up to 2 hours before anesthesia, a carbohydrate drink may be considered only in accordance with anesthesia and fasting guidelines.[44-47]

Finally, for edema and lymphatic care, wearing graduated compression stockings during the day (with the degree tailored to edema or venous status), elevating the limb at rest, performing simple muscle-pump exercises, and staying adequately hydrated are recommended; in limbs with significant baseline edema, mechanical aids such as intermittent pneumatic compression or other adjunct techniques can be considered as part of an individualized multimodal plan.[48-50] Overall, these interventions, planned and confirmed

TABLE I.—*Preoperative readiness checklist for same-day total joint arthroplasty.*

Domain	Key criteria/actions
Cardiovascular	No active cardiac instability; optimized status; safe for anesthesia.
VTE/antiplatelet	Prophylaxis and timing coordinated with anesthesia plan.
Pulmonary/OSA	Respiratory disease optimized; OSA treated and CPAP ready if applicable.
Hematologic	Anemia corrected before surgery.
Nutrition/albumin	Nutritional status optimized; adequate protein and vitamin D.
BMI/metabolic	Acceptable weight range; obesity plan if needed.
Urologic/POUR	Identify risk; early voiding strategy in place.
Education/support	Patient and caregiver trained; equipment and contacts ready.
Edema/lymphatic	Compression, elevation, and early follow-up planned.

before the operation, enhance safety, minimize early setbacks, and help patients meet same-day discharge criteria consistently (Table I).

Intraoperative assessment

In outpatient joint replacement, intraoperative care is deliberately optimized to maximize motor-sparing analgesia, hemostasis, and immediate mobilization while minimizing nausea, sedation, and barriers to same-day discharge.[51] When feasible, neuraxial anesthesia remains preferred within ERAS pathways for its analgesic quality and favorable systemic profile; however, effective same-day recovery can also be achieved with general anesthesia, particularly when propofol-based TIVA is used to reduce postoperative nausea and vomiting and support rapid discharge.[52-54]

Regional analgesia should emphasize motor-sparing techniques: an adductor canal block (alone or combined with periarticular infiltration) maintains quadriceps strength and aids ambulation compared to femoral nerve block, with similar analgesia.[55, 56] Preoperative cryocompression has emerging randomized evidence supporting its role in reducing early inflammation and speeding up initial rehabilitation milestones after TKA, and can be integrated into perioperative temperature-management protocols.[57] Surgical techniques focus on tissue-sparing methods; for total hip arthroplasty, the direct anterior approach is linked to faster early recovery compared to the posterior approach, with similar long-term results.[58] For the knee, quadriceps-sparing variants (subvastus/midvastus) demonstrated improved early range of motion and less pain in network meta-analyses compared with the medial parapatellar approach.[59] Nonetheless, same-day discharge is also frequently achieved using the posterior approach for the hip and the medial parapatellar approach for the knee.

Routine tourniquet use remains controversial: although it can reduce intraoperative blood loss, randomized trials and meta-analyses showed limited overall benefit along with increased early pain and swelling and potential thrombotic risk, leading many fast-track programs to limit or avoid it in favor of meticulous surgical hemostasis and pharmacologic strategies.[60-63] Tranexamic acid plays a key role in blood management; intravenous and/or topical administration, alone or combined, consistently decreases transfusion rates without raising complications.[64] A single intraoperative dose of corticosteroids (*e.g.*, dexamethasone or methylprednisolone) enhances pain control, reduces nausea, and promotes early functional recovery without increasing infection risk when used carefully.[65, 66] Most perioperative protocols describe the use of a single intravenous dexamethasone dose in the range of approximately 8-16 mg. Higher-dose strategies have been evaluated in selected patient populations and have shown improved analgesic efficacy in patients with high postoperative pain sensitivity, while no additional benefit was observed in low-pain responders.[67] Even within fixed-dose strategies, outcomes with higher doses (16-24 mg) remain heterogeneous across studies.[68]

Closure should be secure and layered (capsule and subcuticular) using a barbed suture to reduce closure time with complication rates comparable to conventional sutures;[69, 70] for TKA, performing capsular closure and immediate testing with the knee at 90° flexion has been associated with improved early ROM and lower early pain without added complications, while long-term outcomes

appear similar.[71] When infection risk mitigation is prioritized, silver-impregnated dressings may be considered, as randomized and observational arthroplasty data suggest fewer superficial wound problems and lower early SSI/PJI rates *versus* standard dressings.[72-74] Consistent with ERAS day-0 mobilization goals, many programs avoid routine drains and indwelling urinary catheters unless clearly indicated, and conclude the intraoperative phase by targeting functional discharge criteria, protected standing, safe ambulation with aids, and when feasible, stair negotiation on the day of surgery.[51, 75] Keeping the knee in flexion postoperatively can reduce total and hidden blood loss and improve early postoperative range of motion, without increasing rates of complications, according to a meta-analysis of randomized trials.[76]

Postoperative assessment

In the outpatient setting, postoperative care emphasizes multimodal analgesia with acetaminophen and NSAIDs/COX-2 inhibitors (with gastroprotection when needed), using opioids only when necessary for breakthrough pain, in accordance with PROSPECT/ERAS pathways.[51, 77] Post-discharge nausea and vomiting are managed with a multimodal approach that includes 5-HT3 antagonists as first-line rescue and risk-stratified prophylaxis when appropriate.[54] Venous thromboembolism prophylaxis is risk-stratified: aspirin is increasingly recognized as an effective and safe option for low- and selected moderate-risk patients, with pragmatic data showing non-inferior protection against VTE compared with DOACs and lower bleeding rates in some cohorts.[78, 79] Low Molecular Weight Heparin (LMWH) or direct oral anticoagulants (DOACs) are typically reserved for higher-risk profiles. Importantly, observational data suggest an increased risk of periprosthetic joint infection associated with DOAC use.[80] Mechanical measures such as graduated stockings or intermittent pneumatic compression may be used selectively, acknowledging mixed evidence for universal benefit.[81]

Sleep disturbances are common after arthroplasty and are linked to poorer early recovery; prioritize sleep hygiene and avoid routine benzodiazepines or sedative-hypnotics due to fall risk.[82, 83] Early oral nutrition and adequate hydration should be quickly resumed at home to support gastrointestinal recovery and overall convalescence within ERAS frameworks.[51] Perioperative protein and essential amino acid supplementation reduces early muscle atrophy and enhances early functional recovery after arthroplasty.[84] Edema and pain management rely on scheduled cryotherapy during the first 24-72 hours with limb elevation; when available, cryocompression devices can provide additional benefits in reducing swelling and improving early range of motion, although meta-analyses report variable superiority over conventional ice.[10, 85] Early mobilization begins on the day of surgery with weight-bearing as tolerated and frequent short walks, supported by simple home exercise programs (*e.g.*, quadriceps sets, straight-leg raises, heel slides for TKA; gluteal and abduction strengthening for THA depending on approach); home-based or tele-rehabilitation is generally non-inferior to conventional physiotherapy for pain, function and satisfaction.[86] Activity monitoring with step counters or smartphone apps supports a gradual progression; randomized and cohort studies show step-feedback increases daily steps with substantial gains over the first six weeks.[87]

Preventing falls and orthostatic intolerance, a common obstacle to same-day goals, involves gradual positional changes, hydration, and reviewing sedating medications.[88, 89] A proactive bowel regimen (hydration, fiber, osmotic agents with or without stimulants as needed) helps prevent constipation, particularly in patients on short-term opioid courses.[90] Wound-care continuity should include clear home instructions and thresholds for re-contact, *e.g.*, persistent drainage approaching or beyond 5-7 days, increasing erythema, fever, or escalating pain, given the association of prolonged drainage with complication risk.[91, 92] Structured follow-up (phone/telemedicine at 24-48 hours and early clinic review at 10-14 days) consolidates education, reviews medications, checks wound status/activity milestones, and ensures timely response to red flags, aligning with ERAS goals for safe same-day mobilization and recovery.[51, 75]

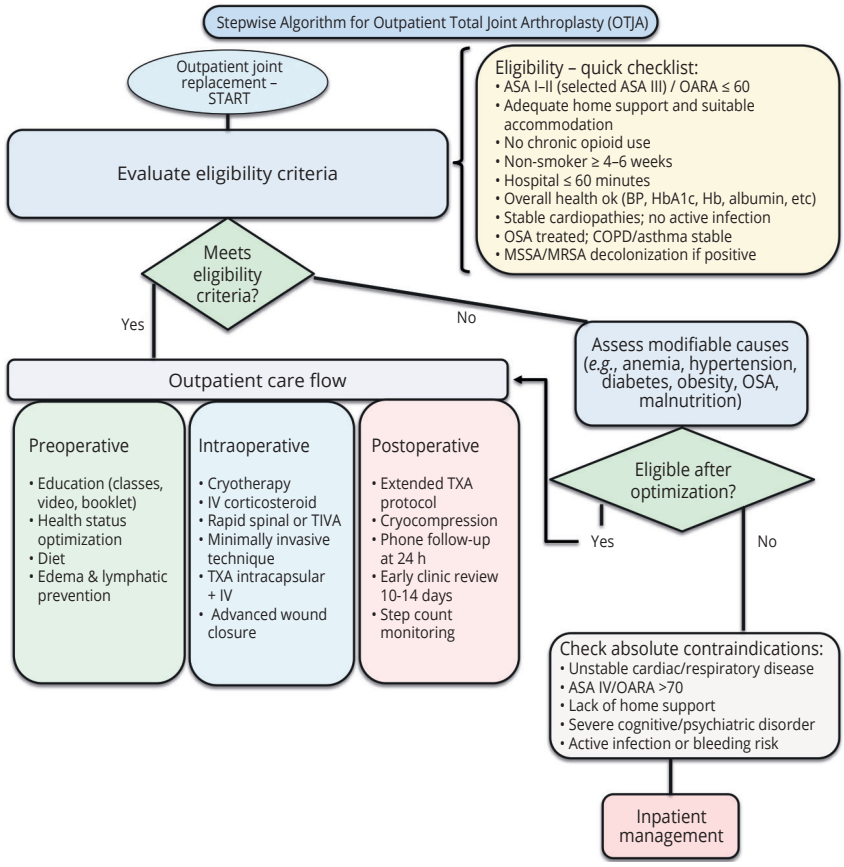

Figure 1.—Stepwise algorithm for patient selection and perioperative management in outpatient total hip and knee arthroplasty.

Stepwise algorithm

Based on the evidence summarized above, we created a practical step-by-step algorithm to assist with case selection and perioperative management for outpatient THA/TKA (Figure 1).

Conclusions

Same-day total hip and knee arthroplasty is feasible and safe when implemented within structured pathways, but it is not a one-size-fits-all solution. Programs should focus on appropriate discharge timing rather than rushing patients, combining careful patient selection, clear day-0 functional criteria, and reliable home support.

The pathway we outlined, which includes screening and optimization before surgery, motor-sparing anesthesia, early mobilization during the immediate postoperative phase, and a straightforward, structured plan at home, aims to reduce variability without adding complexity. The decision algorithm provided standardizes key points (such as eligibility, checklist completion, discharge criteria, and timing for planning an overnight stay), while still allowing for clinical judgment in borderline cases and considering local resource constraints.

Implementation should be gradual, with transparent thresholds and routine monitoring of basic outcomes (same-day discharge rate, unplanned contacts, readmissions, wound issues). This enables rapid course-correction and helps ensure that efficiency gains do not come at the expense of safety or patient experience.

Evidence continues to evolve; the selection of complex ASA III patients, VTE prophylaxis tailoring, edema management, and rehabilitation delivery remain areas for refinement. With disciplined processes, team training, and continuous audit, outpatient arthroplasty can become the default for many appropriately selected patients,

improving access and stewardship of resources while maintaining outcomes.

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Conflicts of interest
The authors certify that there is no conflict of interest with any financial organization regarding the material discussed in the manuscript.

Authors' contributions
Andrew Wickline, Giuseppe Petralia and Pier F. Indelli conceived the scope and structure of the review; Giuseppe Petralia and Andrew Wickline performed the literature review and drafted the initial manuscript; Marta Pambukhchyan and Jeenah Gwak contributed to critical revision of the manuscript and verification of sources and references for accuracy. All authors read and approved the final version of the manuscript.

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