Saudi Journal of Medicine and Public Health

https://saudijmph.com/index.php/pub

https://doi.org/10.64483/202412461

Navigating the Pathway: An Interdisciplinary Narrative Review of the Peri-Procedural Journey in Complex Joint Arthroplasty

Yahya Mudiesh Mudiesh Bajawi [(1)] , Ahmed Mutlab Al-Enezi [(2)] , Yahya Mudiesh Mudiesh Bajawi [(1)] , Ibrahim Yahya Ali Almutabi [(3)] , Mater Abdullah Al Mutiri [(4)] , Mohammed Shaya Alshammari [(5)] , Ali Saad Mubarak Aldosari [(6)] , Elham Ali Alshumrani [(7)] , Waleed Majed Almutiri [(8)] , Ghalib Mohammed Abdu Arar [(9)] , Abeer Ali Bitali [(10)] , Bshayer Saleh Alrushud [(11)]

(1) Alhurath Hospital, Ministry of Health, Saudi Arabia,
(2) Al-Muhammadiyah Health Center, Hafr Al-Batin, Ministry of Health, Saudi Arabia,
(3) King Fahd Central Hospital, Jazan, Ministry of Health, Saudi Arabia,
(4) Al Faisalih Primary Health, Ministry of Health, Saudi Arabia,
(5) King Salman Specialist Hospital, Hail,Ministry of Health, Saudi Arabia,
(6) Ministry Of Health, Saudi Arabia,
(7) Ibn Sina Health Center, Jubail (Comprehensive Examination),Ministry of Health, Saudi Arabia,
(8) Sa'ira General Hospital,Ministry of Health, Saudi Arabia,
(9) Al Darb General Hospital, Ministry of Health, Saudi Arabia,
(10) Imam Abd Arahman Alfesal, Ministry of Health, Saudi Arabia,
(11) Al Kharj King Khalid Hospital,Ministry of Health, Saudi Arabia

Abstract

Background: Total joint arthroplasty (TJA), a high-volume and high-value procedure, has evolved into a complex clinical pathway whose success hinges on flawless interdisciplinary coordination. The transition from a decision for surgery to full recovery is no longer a linear, siloed process but a meticulously choreographed journey involving multiple clinical and administrative disciplines. **Aim:** This narrative review aims to synthesize current evidence on the peri-procedural pathway for complex joint replacement, using total knee arthroplasty (TKA) as a paradigm. **Methods:** A systematic literature search (2010-2024) was conducted across PubMed, CINAHL, Scopus, and Embase. Pertinent literature was analyzed and synthesized into a narrative structured around the five core fields. **Results:** The review identifies that a seamless pathway is predicated on standardized protocols, proactive patient optimization, and deliberate information transfer. Key findings underscore the critical importance of multimodal analgesia, structured pre-operative education, precise surgical planning via advanced imaging, administrative orchestration of logistics, and immediate post-operative mobilization. Gaps persist in digital interoperability and the consistent application of Enhanced Recovery After Surgery (ERAS) principles. **Conclusion:** Optimizing the TJA pathway requires a system-level reconceptualization of care as a continuous, patient-centered continuum. Success is achieved through the rigorous integration of clinical protocols, empowered patient participation, and robust communication frameworks that bridge disciplinary divides, ultimately enhancing efficiency, safety, and functional recovery.

Keywords: arthroplasty, replacement, knee; perioperative care; patient care team; continuity of patient care; patient education

Introduction

Total knee arthroplasty (TKA) stands as one of the most successful and frequently performed orthopedic procedures worldwide, renowned for its ability to alleviate pain and restore function in patients with end-stage osteoarthritis (Price et al., 2018). Historically viewed through a narrowly technical lens—the surgeon's skill and the implant's design—contemporary understanding recognizes TKA as a complex biomedical intervention situated within an intricate clinical pathway (Debono et al., 2021). This pathway, spanning from the initial surgical consultation to long-term functional recovery, is a multi-stage journey fraught with potential discontinuities (Thompson et al., 2022). Each stage involves distinct yet interdependent disciplines, and the handoffs between them—whether of information, responsibility, or clinical care—represent critical vulnerabilities where errors can propagate, leading to delays, complications, patient dissatisfaction, and increased costs (Bradywood et al., 2017).

The evolution toward value-based care and the widespread adoption of Enhanced Recovery After Surgery (ERAS) protocols have catalyzed a paradigm shift. The focus is no longer solely on the operative hour but on the entire peri-procedural continuum

*Corresponding author e-mail: Xyd505@hotmail.com (Ahmed Nasser Alqahtani).
Receive Date: 18 December 2024, Revise Date: 30 December 2024, Accept Date: 31 December 2024

(Ljungqvist et al., 2021). This holistic model demands seamless integration and communication across a team that extends far beyond the operating room (Oodit et al., 2022). This narrative review deconstructs the modern TKA pathway through the essential, interdependent lenses of five core domains: Pharmacy, Nursing, Radiology, Medical Secretarial Services, and Physical Therapy. By synthesizing literature from 2010-2024, it aims to illuminate the strategies, evidence, and collaborative frameworks necessary to engineer a pathway that maximizes patient safety, accelerates recovery, optimizes resource utilization, and fulfills the promise of restored mobility.

The Interdisciplinary Framework of the Peri-Procedural Pathway

Orchestrating Pharmacological Optimization and Stewardship

The pharmacist's role in TKA is pivotal and spans the entire pathway, transitioning from a reactive dispenser to a proactive manager of pharmacological therapy. The journey begins with pre-operative medication reconciliation, a critical safety step to identify and manage medications that increase surgical risk. This includes counseling on the cessation of anticoagulants (e.g., warfarin, direct oral anticoagulants) and antiplatelet agents according to evidence-based bridging protocols, and discontinuing NSAIDs that may impair bone healing and increase bleeding risk (Shah et al., 2021; Kane & Berry, 2023). Concurrently, clinical pharmacists collaborate with the surgical team to implement multimodal analgesic protocols. These regimens, central to ERAS, combine acetaminophen, NSAIDs (if not contraindicated), gabapentinoids, and regional anesthesia to minimize reliance on opioids, thereby reducing associated side effects like sedation, nausea, constipation, and the risk of long-term dependence (Soffin & Wu, 2019).

Antibiotic prophylaxis, administered within 60 minutes of incision with appropriate re-dosing for prolonged procedures, is a non-negotiable standard for preventing periprosthetic joint infection (PJI), a devastating complication (Sandra et al., 2017). Finally, pharmacy ensures a smooth transition to discharge by reconciling medications again, providing clear instructions for new prescriptions (e.g., thromboprophylaxis), and often conducting post-discharge follow-up calls to ensure understanding and adherence (Fernandes et al., 2020).

The Continuous Thread of Education, Advocacy, and Acute Care

Nursing serves as the constant, coordinating thread throughout the patient's journey, embodying the roles of educator, clinician, and advocate. The pathway is significantly strengthened by pre-operative education, often delivered in a structured "joint school" format (Sutton et al., 2023). These sessions, led by nurse educators and physical therapists, set realistic expectations, teach pre-habilitation exercises, and review post-operative protocols for pain management, mobility, and wound care, effectively reducing pre-operative anxiety and improving post-operative compliance (Anderson et al., 2021). Intra-operatively, the perioperative nurse acts as the patient's advocate and a key member of the surgical safety team, ensuring sterility and facilitating communication (Widmer et al., 2022).

The most intensive nursing role emerges in the post-operative acute care phase. Here, nurses are responsible for vigilant monitoring of vital signs and neurovascular status, managing surgical drains, implementing stringent wound care protocols to prevent infection, and, crucially, initiating early mobilization—often on the day of surgery—as dictated by ERAS principles (Petersen et al., 2018). This requires close collaboration with physical therapy. Furthermore, nurses conduct ongoing inpatient education, reinforcing instructions and preparing patients and their families for the self-management required after discharge, ensuring they are competent in recognizing signs of complications, such as deep vein thrombosis or infection.

The Foundation of Precision from Planning to Verification

Radiology provides the anatomical roadmap and verifies technical success, integrating both diagnostic and interventional roles across the pathway. Pre-operative imaging assessment is foundational (Leung et al., 2020). Standard weight-bearing radiographs are used for diagnosis and surgical planning, assessing alignment, bone quality, and joint space. For complex primary or revision cases, advanced imaging like MRI or CT may be employed to evaluate bone stock, plan for augments or stems, and navigate around critical anatomical structures (Klug et al., 2021). Intra-operative imaging, most commonly utilizing fluoroscopic C-arm technology, has become integral to achieving precise mechanical alignment. Its use in confirming femoral and tibial resection angles, checking ligament balance, and verifying trial component placement is a key factor in improving implant longevity and functional outcomes (Mills et al., 2023). Finally, a standardized post-operative X-ray (typically an anteroposterior and lateral view) is essential to document final prosthesis position, cement mantle integrity, and alignment, serving as a critical baseline for future comparison should any issues arise (Khalifa et al., 2021).

The Architect of Logistics, Communication, and Continuity

The medical secretary, or clinical coordinator, is the unsung architect who ensures the logistical engine of the pathway runs smoothly (Farey et al., 2021). This role is central to orchestrating the complex schedule, which involves booking the surgery in coordination with the OR, scheduling mandatory pre-admission testing (lab work, medical clearance), and securing all necessary post-operative follow-up appointments with the surgeon and therapy services (Hood et al., 2019). A critical and often

burdensome task is managing insurance authorizations, navigating payer requirements to secure approval for the procedure, implant, and post-acute care. Furthermore, secretaries are responsible for managing the flow of critical information: processing and filing surgeon dictations, ensuring pre-operative imaging and consults are available in the medical record, and communicating results and schedule changes to patients and the care team. This central coordination role is vital for preventing delays, reducing patient anxiety from poor communication, and ensuring all pre-operative milestones are met (Smith et al., 2021).

Mobilizing Recovery from Pre-Habilitation to Functional Independence

Physical therapy (PT) is the discipline that translates the technical success of surgery into the functional reality of improved mobility and quality of life. Intervention begins pre-operatively with pre-habilitation education and exercise. Strengthening the quadriceps, hamstrings, and core muscles before surgery has been shown to improve post-operative strength, accelerate achievement of mobility milestones, and may shorten length of stay (Wang et al., 2021). Immediate post-operative mobilization, beginning on the day of or the day after surgery, is a cornerstone of modern TKA care.

PT guides patients in bed exercises, progresses to sitting at the edge of the bed, standing, and initial gait training with an assistive device, all while managing pain and edema (Lei et al., 2021). During the inpatient stay, PT continues daily, focusing on safe ambulation, stair training, and patient education on a home exercise program (Yi-Ting et al., 2021). Finally, therapists are responsible for planning the continuum of rehabilitation, making recommendations for the appropriate post-acute setting—whether home health, outpatient therapy, or a skilled nursing facility—based on the patient's progress, home environment, and social support, and establishing clear functional goals for the outpatient phase (Table 1 & Figure 1).

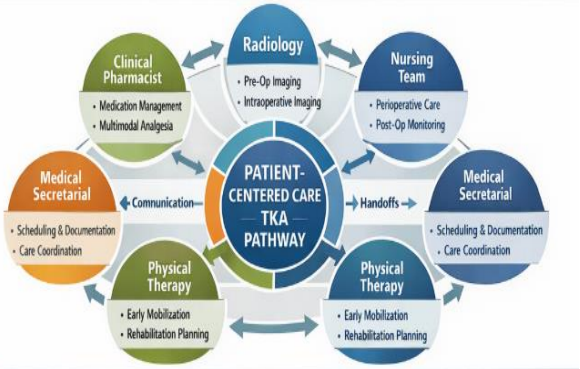

Figure 1. Interdisciplinary Roles and Interactions Across the TKA Care Continuum

Table 1: The Interdisciplinary Timeline of a Total Knee Arthroplasty Pathway

Phase	Pharmacy	Nursing	Radiology	Medical Secretary	Physical Therapy
Pre-Operative (Weeks prior)	Medication reconciliation; Counseling on anticoagulant/NSAID management.	Conducts "joint school" education; Completes pre-op nursing assessment.	Obtains and reports pre-op planning X-rays; May perform advanced imaging (MRI/CT).	Schedules surgery, pre-admission testing, and medical consults; Manages insurance authorization.	Conducts pre-habilitation assessment and prescribes strengthening exercises.
Day of Surgery	Administers pre-operative antibiotics & multimodal analgesia components.	Pre-op holding: final assessment & patient reassurance; Intra-op: patient advocacy & safety.	Provides intra-operative fluoroscopy for alignment verification (if used).	Confirms patient arrival; Manages OR schedule communication.	N/A
Acute Post-Op (Inpatient)	Manages IV & oral pain regimen; Initiates thromboprophylaxis; Discharge med reconciliation.	Manages acute pain, wounds, drains; Initiates early mobilization; Provides continuous education.	Performs post-operative X-ray to verify implant placement.	Schedules follow-up appointments; Coordinates discharge paperwork.	Initiates mobilization (Day 0/1); Conducts daily gait & functional training.

Discharge & Follow-up	Provides clear discharge medication instructions; May conduct medication follow-up call.	Finalizes discharge education; Ensures patient competency in wound care and warning signs.	Provides imaging for follow-up visits as needed.	Conducts post-discharge check-in call; Manages communication for any concerns.	Establishes home exercise program; Plans for outpatient rehab referral.

Synthesis, Challenges, and Integrated Solutions

The TKA pathway is a quintessential example of a complex clinical microsystem. Its performance is not merely the sum of its parts but a product of their dynamic interaction (Table 2). A perfectly placed implant (a triumph of Surgery and Radiology) can be undermined by poorly managed pain (a Pharmacy and Nursing challenge), leading to delayed mobilization (a PT failure) and a protracted recovery. Conversely, a well-educated patient (Nursing and PT), on a robust analgesic regimen (Pharmacy), can mobilize effectively despite surgical pain, accelerating discharge and improving outcomes.

Persistent challenges highlight the friction points in this system. Communication breakdowns during handoffs—for example, between the pre-op clinic nurse and the inpatient floor nurse, or between the discharging physician and the outpatient therapist—remain a leading cause of errors and patient distress (Stenquist et al., 2022). Digital fragmentation is another major hurdle; electronic health records (EHRs) often fail to seamlessly integrate data from pre-op imaging, intra-op fluoroscopy snapshots, PT progress notes, and pharmacy discharge lists, forcing clinicians to piece together information from multiple portals (Adler-Milstein et al., 2021). Furthermore, variability in protocol adherence, especially with comprehensive ERAS bundles, can lead to inconsistent patient experiences and outcomes across different providers within the same institution (Wainwright et al., 2020).

Table 2: Common Pathway Challenges and Interdisciplinary Mitigation Strategies

Challenge	Potential Consequence	Proposed Interdisciplinary Mitigation Strategy
Poor Pre-Operative Patient Optimization	Increased risk of complications (e.g., DVT, SSI); Cancelled surgeries.	**Nursing/Medical Secretary:** Implement a mandatory, nurse-led pre-op clinic weeks in advance. **Pharmacy:** Integrate pharmacist for medication review. **PT:** Initiate pre-hab referral.
Ineffective Post-Operative Pain Control	Delayed mobilization, prolonged LOS, increased opioid use.	**Pharmacy/Surgery:** Adopt a mandatory, order-set-driven multimodal analgesia protocol. **Nursing:** Empower nurses with non-opioid PRN options and pain reassessment schedules.
Discharge Planning Failures	Readmission; Patient anxiety; Delay in continuum of care.	**Medical Secretary/Nursing:** Standardize discharge process with checklist initiated 48 hours prior. **PT/ Nursing:** Jointly assess discharge needs (home vs. facility) early.
Lack of Standardized Handoff Tools	Missed information; Medication errors; Therapy delays.	**All Disciplines:** Implement and train on standardized handoff frameworks (e.g., SBAR – Situation, Background, Assessment, Recommendation) for all care transitions.
Fragmented Post-Discharge Follow-up	Unaddressed complications; Poor adherence to rehab.	**Medical Secretary:** Systematize a post-discharge phone call (24-72 hrs). **Surgery/PT:** Establish clear pathways for patients to report concerns directly to the care team.

Future directions point toward greater integration, personalization, and digital enablement. The full implementation of ERAS protocols, which bundle the evidence-based interventions from each discipline into a single coordinated pathway, represents the current gold standard (Umari et al., 2018). Digital health tools, including mobile applications for patient education, remote monitoring of pain and mobility, and telehealth for follow-up PT sessions, promise to enhance engagement and extend care beyond the hospital walls (Correia et al., 2019). Ultimately, the sustainability of high-quality TKA pathways will be tied to value-based reimbursement models that financially reward coordinated care, excellent patient-reported outcomes, and the avoidance of costly complications like readmissions and revisions (Navathe et al., 2020).

Conclusion

The peri-procedural pathway for total knee arthroplasty is a sophisticated, patient-centered

continuum that demands a reconceptualization of care delivery. Success is not an artifact of isolated expertise in surgery or implant technology but is engineered through the deliberate and collaborative integration of pharmacy, nursing, radiology, administrative coordination, and physical therapy. This narrative review underscores that optimizing this pathway requires a systemic commitment to standardized protocols, proactive patient education, seamless information flow, and rigorous attention to the handoffs that connect each phase of the journey. By fostering a true culture of interdisciplinary teamwork and leveraging technology to bridge communication gaps, healthcare systems can ensure that every patient navigates this pathway safely, efficiently, and effectively, achieving not just a successful operation but a successful recovery and a restored quality of life.

References

1. Adler-Milstein, J., Raphael, K., O'Malley, T. A., & Cross, D. A. (2021). Information sharing practices between US hospitals and skilled nursing facilities to support care transitions. *JAMA network open*, *4*(1), e2033980-e2033980. doi:10.1001/jamanetworkopen.2020.33980
2. Anderson, A. M., Comer, C., Smith, T. O., Drew, B. T., Pandit, H., Antcliff, D., ... & McHugh, G. A. (2021). Consensus on pre-operative total knee replacement education and prehabilitation recommendations: a UK-based modified Delphi study. *BMC Musculoskeletal Disorders*, *22*(1), 352. https://doi.org/10.1186/s12891-021-04160-5
3. Bradywood, A., Farrokhi, F., Williams, B., Kowalczyk, M., & Blackmore, C. C. (2017). Reduction of inpatient hospital length of stay in lumbar fusion patients with implementation of an evidence-based clinical care pathway. *Spine*, *42*(3), 169-176. *DOI:* 10.1097/BRS.0000000000001703
4. Correia, F. D., Nogueira, A., Magalhães, I., Guimarães, J., Moreira, M., Barradas, I., ... & Bento, V. (2019). Medium-term outcomes of digital versus conventional home-based rehabilitation after total knee arthroplasty: prospective, parallel-group feasibility study. *JMIR rehabilitation and assistive technologies*, *6*(1), e13111. https://doi.org/10.2196/13111
5. Debono, B., Sabatier, P., Boniface, G., Bousquet, P., Lescure, J. P., Garnaud, V., ... & Lonjon, G. (2021). Implementation of enhanced recovery after surgery (ERAS) protocol for anterior cervical discectomy and fusion: a propensity score-matched analysis. *European Spine Journal*, *30*(2), 560-567. https://doi.org/10.1007/s00586-020-06445-0
6. Farey, J. E., An, V. V., Sidhu, V., Karunaratne, S., & Harris, I. A. (2021). Aspirin versus enoxaparin for the initial prevention of venous thromboembolism following elective arthroplasty of the hip or knee: A systematic review and meta-analysis. *Orthopaedics & Traumatology: Surgery & Research*, *107*(1), 102606. https://doi.org/10.1016/j.otsr.2020.04.002
7. Fernandes, B. D., Almeida, P. H. R. F., Foppa, A. A., Sousa, C. T., Ayres, L. R., & Chemello, C. (2020). Pharmacist-led medication reconciliation at patient discharge: a scoping review. *Research in Social and administrative Pharmacy*, *16*(5), 605-613. https://doi.org/10.1016/j.sapharm.2019.08.001
8. Hood, B. R., Cowen, M. E., Zheng, H. T., Hughes, R. E., Singal, B., & Hallstrom, B. R. (2019). Association of aspirin with prevention of venous thromboembolism in patients after total knee arthroplasty compared with other anticoagulants: a noninferiority analysis. *JAMA surgery*, *154*(1), 65-72. doi:10.1001/jamasurg.2018.3858
9. Kane, W. J., & Berry, P. S. (2023). Perioperative Assessment and Optimization in Major Colorectal Surgery: Medication Management. *Clinics in Colon and Rectal Surgery*, *36*(03), 210-217. DOI: 10.1055/s-0043-1761156
10. Khalifa, A. A., Mullaji, A. B., Mostafa, A. M., & Farouk, O. A. (2021). A protocol to systematic radiographic assessment of primary total knee arthroplasty. *Orthopedic Research and Reviews*, 95-106. https://doi.org/10.2147/ORR.S320372
11. Klug, A., Gramlich, Y., Rudert, M., Drees, P., Hoffmann, R., Weißenberger, M., & Kutzner, K. P. (2021). The projected volume of primary and revision total knee arthroplasty will place an immense burden on future health care systems over the next 30 years. *Knee Surgery, Sports Traumatology, Arthroscopy*, *29*(10), 3287-3298. https://doi.org/10.1007/s00167-020-06154-7
12. Lei, Y. T., Xie, J. W., Huang, Q., Huang, W., & Pei, F. X. (2021). Benefits of early ambulation within 24 h after total knee arthroplasty: a multicenter retrospective cohort study in China. *Military Medical Research*, *8*(1), 17. https://doi.org/10.1186/s40779-021-00310-x
13. Leung, K., Zhang, B., Tan, J., Shen, Y., Geras, K. J., Babb, J. S., ... & Deniz, C. M. (2020). Prediction of total knee replacement and diagnosis of osteoarthritis by using deep learning on knee radiographs: data from the osteoarthritis initiative. *Radiology*, *296*(3), 584-593. https://doi.org/10.1148/radiol.2020192091
14. Ljungqvist, O., de Boer, H. D., Balfour, A., Fawcett, W. J., Lobo, D. N., Nelson, G., ... & Demartines, N. (2021). Opportunities and challenges for the next phase of enhanced recovery after surgery: a review. *JAMA surgery*, *156*(8), 775-784. doi:10.1001/jamasurg.2021.0586
15. Mills, K., Wymenga, A. B., Bénard, M. R., Kaptein, B. L., Defoort, K. C., van Hellemondt, G. G., & Heesterbeek, P. J. (2023). Fluoroscopic and radiostereometric analysis of a bicruciate-retaining versus a posterior cruciate-retaining total knee arthroplasty: a randomized controlled trial. *The bone & joint journal*, *105*(1), 35-46.

https://doi.org/10.1302/0301-620X.105B1.BJJ-2022-0465.R2

16. Navathe, A. S., Emanuel, E. J., Venkataramani, A. S., Huang, Q., Gupta, A., Dinh, C. T., ... & Liao, J. M. (2020). Spending And Quality After Three Years Of Medicare's Voluntary Bundled Payment For Joint Replacement Surgery: The spending and quality effects of Medicare's Bundled Payments for Care Improvement initiative among patients undergoing lower extremity joint-replacement. *Health Affairs*, *39*(1), 58-66. https://doi.org/10.1377/hlthaff.2019.00466
17. Oodit, R., Biccard, B. M., Panieri, E., Alvarez, A. O., Sioson, M. R., Maswime, S., ... & Ljungqvist, O. (2022). Guidelines for perioperative care in elective abdominal and pelvic surgery at primary and secondary hospitals in low–middle-income countries (LMIC's): Enhanced Recovery After Surgery (ERAS) society recommendation. *World journal of surgery*, *46*(8), 1826-1843. https://doi.org/10.1007/s00268-022-06587-w
18. Petersen, P. B., Kehlet, H., Jørgensen, C. C., & Lundbeck Foundation Centre for Fast-track Hip and Knee Replacement Collaborative Group. (2018). Safety of in-hospital only thromboprophylaxis after fast-track total hip and knee arthroplasty: a prospective follow-up study in 17,582 procedures. *Thrombosis and haemostasis*, *118*(12), 2152-2161. DOI: 10.1055/s-0038-1675641
19. Price, A. J., Alvand, A., Troelsen, A., Katz, J. N., Hooper, G., Gray, A., ... & Beard, D. (2018). Knee replacement. *The Lancet*, *392*(10158), 1672-1682. https://doi.org/10.1016/S0140-6736(18)32344-4
20. Shah, R., Sheikh, N., Mangwani, J., Morgan, N., & Khairandish, H. (2021). Direct oral anticoagulants (DOACs) and neck of femur fractures: standardising the perioperative management and time to surgery. *Journal of Clinical Orthopaedics and Trauma*, *12*(1), 138-147. https://doi.org/10.1016/j.jcot.2020.08.005
21. Sandra, I., Craig, A., & Dale, W. (2017). Centers for disease control and prevention guideline for the prevention of surgical site infection. *Jama Surg*, *152*(8), 784-791.
22. Smith, M. A., Smith, W. T., Atchley, D., & Atchley, L. (2021). Total knee arthroplasty in the ambulatory surgery center setting: Best practices for cost containment and clinical care delivery. *Orthopaedic Nursing*, *40*(1), 7-13. *DOI:* 10.1097/NOR.0000000000000725
23. Soffin, E. M., & Wu, C. L. (2019). Regional and multimodal analgesia to reduce opioid use after total joint arthroplasty: a narrative review. *HSS Journal®*, *15*(1), 57-65. https://doi.org/10.1007/s11420-018-9652-2
24. Stenquist, D. S., Yeung, C. M., Szapary, H. J., Rossi, L., Chen, A. F., & Harris, M. B. (2022). Sustained improvement in quality of patient handoffs after orthopaedic surgery I-PASS intervention. *JAAOS Global Research & Reviews*, *6*(9), e22. *DOI:* 10.5435/JAAOSGlobal-D-22-00079
25. Sutton, E. L., Rahman, U., Karasouli, E., MacKinnon, H. J., Radhakrishnan, A., Renna, M. S., & Metcalfe, A. (2023). Do pre-operative therapeutic interventions affect outcome in people undergoing hip and knee joint replacement? A systematic analysis of systematic reviews. *Physical Therapy Reviews*, *28*(3), 175-187. https://doi.org/10.1080/10833196.2023.2243581
26. Thompson, J. W., Wignadasan, W., Ibrahim, M., Plastow, R., Beasley, L., & Haddad, F. S. (2022). The introduction of day-case total knee arthroplasty in a national healthcare system: A review of the literature and development of a hospital pathway. *The Surgeon*, *20*(2), 103-114. https://doi.org/10.1016/j.surge.2021.01.017
27. Umari, M., Falini, S., Segat, M., Zuliani, M., Crisman, M., Comuzzi, L., ... & Lucangelo, U. (2018). Anesthesia and fast-track in video-assisted thoracic surgery (VATS): from evidence to practice. *Journal of thoracic disease*, *10*(Suppl 4), S542. https://doi.org/10.21037/jtd.2017.12.83
28. Wainwright, T. W., Gill, M., McDonald, D. A., Middleton, R. G., Reed, M., Sahota, O., ... & Ljungqvist, O. (2020). Consensus statement for perioperative care in total hip replacement and total knee replacement surgery: Enhanced Recovery After Surgery (ERAS®) Society recommendations. *Acta orthopaedica*, *91*(1), 3-19. https://doi.org/10.1080/17453674.2019.1683790
29. Wang, D., Wu, T., Li, Y., Jia, L., Ren, J., & Yang, L. (2021). A systematic review and meta-analysis of the effect of preoperative exercise intervention on rehabilitation after total knee arthroplasty. *Annals of palliative medicine*, *10*(10), 109860996-109810996. doi: 10.21037/apm-21-2670
30. Widmer, P., Oesch, P., & Bachmann, S. (2022). Effect of prehabilitation in form of exercise and/or education in patients undergoing total hip arthroplasty on postoperative outcomes—a systematic review. *Medicina*, *58*(6), 742. https://doi.org/10.3390/medicina58060742
31. Yi-Ting, L., Jin-Wei, X., Huang, Q., Huang, W., & Pei, F. X. (2021). Benefits of early ambulation within 24 h after total knee arthroplasty: a multicenter retrospective cohort study in China. *Military Medical Research*, *8*, 1. https://doi.org/10.1186/s40779-021-00310-x.