DOI: 10.1002/ksa.70316

EDITORIAL

Knee Surgery, Sports Traumatology, Arthroscopy WILEY

The silver tsunami and the elective arthroplasty crisis: How geriatric trauma overruns public surgical capacity

Abstract

Across Europe, orthopaedic departments face a growing disequilibrium: the sharply rising volume of geriatric trauma requiring urgent intervention versus the continued necessity for high-value elective total joint arthroplasty to restore mobility, independence and quality-adjusted life years (QALYs). In most public systems, the escalation in proximal femoral fractures—driven by demographic shifts —absorbs operative capacity previously allocated to elective arthroplasty. Although trauma surgery should, by definition, be prioritised, the resulting displacement of elective total joint arthroplasty (TJA) increasingly undermines the principles of value-based care. This editorial discusses the drivers of this development, highlights the clinical and health-economic consequences and outlines practical strategies that European health systems should consider to maintain timely trauma care without sacrificing access to elective arthroplasty.

KEYWORDS

elective arthroplasty, geriatric trauma, total knee arthroplasty, trauma care

INTRODUCTION

Orthopaedic and traumatology services in Europe have reached a critical crossroad. While the demographic shift towards an older population has been widely anticipated, its consequences on day-to-day surgical capacities are only now becoming fully visible. Specifically, the management of proximal femur fractures—where surgery within 24–48 h is an established quality criterion—has become the dominant factor shaping surgical scheduling in public hospitals [1, 35, 38, 44].

At the same time, thousands of patients await elective hip or knee arthroplasty. While their conditions are not acutely life-threatening, the impact on their mobility, independence and socioeconomic participation is profound. Waiting lists of 6–12 months are no longer unusual [9, 22, 39]. The result is a growing structural conflict: acute trauma is prioritised, while elective arthroplasty is indefinitely postponed. Current literature reveals clear year-on-year increases in geriatric trauma cases that outpace non-geriatric trauma and steadily compress the resources available for elective surgery [6, 23].

Demographic pressure and the rise of geriatric trauma

In many European trauma centers, elderly are accounting for increasing trauma presentations [3, 14, 26]. This represents a fundamental shift compared to two decades ago. The combination of frailty, multimorbidity and the severe medical consequences of delayed treatment renders geriatric trauma highly resource-intensive [5, 28, 42]. Furthermore, there is a growing clinical and cultural shift towards earlier and more aggressive surgical management of fragility fractures (such as those of the sacrum and pelvic ring), which were traditionally treated conservatively. This change is driven by advances in implant technology and increasing evidence showing that surgical intervention reduces pain, shortens hospital stays, and enables faster and more effective patient mobilisation and autonomy [37, 40]. These cases occupy operating theatres, intermediate-care beds and multidisciplinary teams - often unpredictably and irrespective of previously planned elective lists. The epidemiological trend is unmistakable: geriatric trauma will continue to rise. Its impact on elective services is not a temporary anomaly but a structural reality [6, 23].

Elective arthroplasty: High-value care in a disadvantaged position

Elective hip and knee arthroplasties are among the most successful and cost-effective procedures in modern medicine [8, 43]. They restore autonomy and

Abbreviations: QUALY, quality-adjusted life years; TJA, total joint arthroplasty.

functional capacity, substantially improve QALYs, reduce long-term healthcare utilisation and frequently enable return to work in younger individuals [2, 34].

Nevertheless, elective arthroplasty lacks the immediate urgency that defines trauma care. In a resource-limited environment, this perceived flexibility becomes a systemic disadvantage. When trauma volumes surge, elective TJA patients are the first to be rescheduled - even though delays contribute to physical deterioration, increased pain, potential opioid dependency, secondary musculoskeletal damage, increased revision and postoperative complication rates [20]. This practice is inconsistent with value-based healthcare, where high-impact elective interventions should be protected rather than treated as a reservoir for overflow capacity [11, 13, 15, 45].

The financial symbiosis of elective and trauma care

The relationship between elective arthroplasty and emergency trauma services is often viewed purely through a clinical lens, yet the economic interdependence is equally critical. In many healthcare systems, high-volume elective arthroplasty is profitable and effectively subsidises the high-cost, unpredictable nature of geriatric trauma. Reduced elective capacity leads to lost patient care and destabilises the hospital's financial model, creating a "death spiral" of resources [12, 25].

Furthermore, this operational displacement severs the department's financial lifeline. Elective arthroplasty acts as a reliable revenue engine, generating the surplus needed to underwrite the unpredictable, resource-heavy costs of geriatric trauma. By cancelling these elective lists to absorb emergency overflow, hospitals trade high-margin efficiency for high-cost chaos, effectively dismantling the very mechanism that keeps the trauma service financially viable [4, 8, 12, 17, 43].

Consequently, the loss of this ring-fenced elective stream creates a deficit that pure trauma funding cannot fill. Without the regular injection of elective revenue, the department might lack the capital to invest in the staffing and infrastructure improvements required to handle the trauma burden efficiently. This creates a cycle of decline: the service becomes less efficient, costs rise further and pressure to reduce elective capacity increases, ultimately compromising care across both pathways.

Evidence from large-scale trauma analyses

Recent studies provide empirical weight to these observations. The findings reveal that annual geriatric trauma volumes have increased significantly, with a slope far steeper than that of younger populations. Crucially, acute service demand is now consistently exceeding planned capacities [6, 23].

These data provide a quantitative explanation for the everyday clinical experience in European orthopaedics: elective arthroplasty is increasingly under pressure by trauma obligations [32].

The systemic consequences for the patient that are being postponed even further are severe, including:

- Progressive loss of mobility and function.
- Increased risk of long-term disability and falls.
- Work incapacity and broader socioeconomic fallout.
- Psychological burden resulting from prolonged suffering.
- Inefficiencies caused by repeated preoperative assessments [21, 41].

For the health system, the impact includes:

- Higher long-term costs due to delayed care.
- Increased need for rehabilitation and chronic pain management.
- Reduced surgical productivity due to frequent cancellations.
- Staff burnout caused by unpredictable trauma surges [16, 20, 31].

A frequently overlooked irony is that many geriatric trauma patients are individuals whose elective arthroplasty had been postponed - only to later present with a fracture resulting from declining mobility [18]. It has been shown that the prevalence of falls in geriatric populations awaiting surgery drops significantly after the procedure [7, 10]. Conversely, prolonged waiting times before joint replacement in patients with severe hip or knee osteoarthritis increase the risk of preoperative falls, which in turn is a predictor of postoperative fall risk [29]. In other words, keeping patients waiting too long for joint replacement surgery can potentially increase the incidence of traumatic events in the elderly population, both before and after the joint replacement surgery.

Reframing the debate

This challenge is not about choosing between trauma and arthroplasty as both are essential components of orthopaedic care. The core issue is that most public systems attempt to manage both streams within the same rigid operating room structure, without protected capacity lines. A modern surgical system must differentiate clearly between protected acute trauma capacity, protected elective arthroplasty capacity and flexible buffers to handle seasonal fluctuations.

Several European countries have already test run elective orthopaedic centers, regional trauma hubs, 'ring-fenced' arthroplasty days that cannot be cancelled for trauma, activity-based reimbursement models that protect high-value procedures and predictive analytics for trauma seasonality. These models demonstrate that structural redesign is both feasible and effective [24, 30].

Crucially, structural separation alone is insufficient; the orthopaedic community must also address the root cause. It is becoming increasingly clear that we cannot simply operate our way out of the 'silver tsunami'. Surgeons must take active ownership of secondary prevention, particularly aggressive osteoporosis screening and management. Treating the fracture without treating the underlying bone fragility merely postpones the next admission, guaranteeing a recurring wave of trauma that further compounds the capacity crisis [19, 27, 33, 36].

CONCLUSION

The rise in geriatric trauma is not a temporary fluctuation but a long-term demographic reality. If public systems continue to treat elective arthroplasty as a 'flexible add-on' to acute trauma care, waiting lists will lengthen, outcomes will worsen and overall costs will rise. To maintain equitable and high-value care, trauma services must remain fast and uncompromised. Simultaneously, elective arthroplasty requires protected operative capacity that is insulated from acute fluctuations. Without such reforms, the 'silver tsunami' will continue to overwhelm surgical capacity and patients will ultimately pay the price in lost mobility, independence and quality of life.

ACKNOWLEDGMENTS
This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

CONFLICT OF INTEREST STATEMENT
MT Hirschmann: Consulting fees from Depuy Synthes and Symbios; Honoraria for Lectures and Support attending Meetings from Depuy Synthes, Symbios, and S&N; Participation on Advisory Board for Depuy Synthes; Leadership positions in KSSTA Journal, ESSKA, German Knee Society, and Personalised Arthroplasty Society. P. Sadoghi: Industry grants from DePuy Synthes, Johnson & Johnson, alphamed, and Medacta; Editorial Board Member for JOA, KSSTA, and Arthroscopy.

ETHICS STATEMENT
Not applicable.

Patrick Sadoghi[1]
Maximilian Budin[1]
Elmar Herbst[2]
Giuseppe Milano[3,4]
Volker Musahl[5]
Michael T. Hirschmann[6,7]

[1]*Department of Orthopaedics and Trauma, Medical University of Graz, Graz, Austria*
[2]*Department of Trauma, Hand and Reconstructive Surgery, University Hospital Münster, Münster, Germany*
[3]*Department of Medical and Surgical Specialties, Radiological Sciences, and Public Health, University of Brescia, Brescia, Italy*
[4]*Department of Bone and Joint Surgery, ASST Spedali Civili, Brescia, Italy*
[5]*Department of Orthopaedic Surgery, University of Pittsburgh, Pittsburgh, Pennsylvania, USA*
[6]*University Department of Orthopedic Surgery and Traumatology, Kantonsspital Baselland, Bruderholz, Binningen, Switzerland*
[7]*Department of Clinical Research, Research Group Michael T. Hirschmann, Regenerative Medicine & Biomechanics, University of Basel, Basel, Switzerland*

Correspondence
Patrick Sadoghi, Medical University of Graz, Auenbruggerplatz 5, A-8036 Graz, Austria.
Email: patricksadoghi@gmx.at

ORCID
Patrick Sadoghi https://orcid.org/0000-0003-1767-555X
Maximilian Budin https://orcid.org/0000-0001-9107-8388

REFERENCES
1. Almqvist F, Vansintjan P, Verdonk P, Verdonk R. Traumatic meniscal lesions in a stable knee: masterly neglect, meniscectomy, repair. In: Beaufils PVR ed. The Meniscus. Heidelberg: Springer; 2009.
2. Askari A, Mohammadpour M, Jabalameli M, Naeimipoor N, Goodarzy B, Jafari B, et al. Predictors of health-related quality of life after total knee arthroplasty: a case-control study. Sci Rep. 2024;14:14176.
3. Atinga A, Shekkeris A, Fertleman M, Batrick N, Kashef E, Dick E. Trauma in the elderly patient. Br J Radiol. 2018;91: 20170739.
4. Aucar JA, Hicks LL. Economic modeling comparing trauma and general surgery reimbursement. Am J Surg. 2005;190:951–60.
5. Bennett KM, Scarborough JE, Vaslef S. Outcomes and health care resource utilization in super-elderly trauma patients. J Surg Res. 2010;163:127–31.
6. Bindrich S, Mittlmeier T, Falk SSI. In the last 10 years, have our polytrauma patients become geriatric? The emergency trauma bay in the context of demographic change. Eur J Trauma Emerg Surg. 2025;51:61.

7. Blasco JM, Pérez-Maletzki J, Díaz-Díaz B, Silvestre-Muñoz A, Martínez-Garrido I, Roig-Casasús S. Fall classification, incidence and circumstances in patients undergoing total knee replacement. Sci Rep. 2022;12:19839.
8. Daigle ME, Weinstein AM, Katz JN, Losina E. The cost-effectiveness of total joint arthroplasty: a systematic review of published literature. Best Pract Res Clin Rheumatol. 2012;26:649–58.
9. Dawson E, Neufeld ME, Schemitsch E, John-Baptiste A. The impact of wait time on patient outcomes in knee and hip replacement surgery: a scoping review protocol. Syst Rev. 2022;11:38.
10. di Laura Frattura G, Filardo G, Giunchi D, Fusco A, Zaffagnini S, Candrian C. Risk of falls in patients with knee osteoarthritis undergoing total knee arthroplasty: a systematic review and best evidence synthesis. J Orthop. 2018;15:903–8.
11. El-Othmani MM, Crespi Z, Pallekonda V, Sayeed Z, Saleh KJ. The implementation of lean six sigma principles to improve the value of care delivery for total joint arthroplasty patients: the perioperative institute of surgical excellence experience. J Am Acad Orthop Surg. 2021;29:e1087–96.
12. Fang CJ, Shaker JM, Hart PA, Cassidy C, Mattingly DA, Jawa A, et al. Variation in the profit margin for different types of total joint arthroplasty. J Bone Jt Surg. 2022;104:459–64.
13. Fernández-Salido M, Alhambra-Borrás T, Casanova G, Garcés-Ferrer J. Value-based healthcare delivery: a scoping review. Int J Environ Res Public Health. 2024;21:134.
14. Fisher JM, Bates C, Banerjee J. The growing challenge of major trauma in older people: a role for comprehensive geriatric assessment? Age Ageing. 2017;46:709–12.
15. Gayed B, Black S, Daggy J, Munshi IA. Redesigning a joint replacement program using Lean Six Sigma in a Veterans Affairs hospital. JAMA Surg. 2013;148:1050–6.
16. George J, Gautam D, Devasenapathy N, Malhotra R. Is it worth delaying total knee replacement as late as possible? A cost-effectiveness analysis using a markov model in the indian setting. Value Health Reg Issues. 2021;24:173–80.
17. Gnanou S, Guertin JR, Tardif PA, Conombo B, Bérubé M, Yanchar N, et al. Cost-effectiveness of specialized trauma care: a systematic review. J Health Serv Res Policy. 2026;31:56–67.
18. Hill KD, Wee E, Margelis S, Menz HB, Bartlett J, Bergman NR, et al. Falls in people prior to undergoing total hip or total knee replacement surgery: Frequency and associated factors. J Clin Gerontol Geriatr. 2016;7:146–52.
19. Hoffmann I, Kohl M, von Stengel S, Jakob F, Kerschan-Schindl K, Lange U, et al. Exercise and the prevention of major osteoporotic fractures in adults: a systematic review and meta-analysis with special emphasis on intensity progression and study duration. Osteoporos Int. 2023;34:15–28.
20. Holzapfel DE, Meyer M, Thieme M, Pagano S, von Kunow F, Weber M. Delay of total joint replacement is associated with a higher 90-day revision rate and increased postoperative complications. Arch Orthop Trauma Surg. 2023;143:3957–64.
21. Hsu H, Siwiec RM. Knee Osteoarthritis. StatPearls. Treasure Island (FL): StatPearls Publishing; 2025.
22. Jabbal M, Burt J, Clarke J, Moran M, Walmsley P, Jenkins P. Trends in incidence and average waiting time for arthroplasty from 1998-2021: an observational study of 282,367 patients from the Scottish arthroplasty project. Ann R Coll Surg Engl. 2024;106:249–55.
23. Jiang L, Zheng Z, Zhang M. The incidence of geriatric trauma is increasing and comparison of different scoring tools for the prediction of in-hospital mortality in geriatric trauma patients. World J Emerg Surg. 2020;15:59.
24. Joseph V, Boktor JGE, Roy K, Lewis PM. Dedicated orthopaedic elective unit: our experience from a district general hospital. Irish J Med Sci. 2023;192:1727–30.
25. Kleweno CP, O'Toole RV, Ballreich J, Pollak AN. Does fracture care make money for the hospital? An analysis of hospital revenues and costs for treatment of common fractures. J Orthop Trauma. 2015;29:e219–24.
26. Lau L, Ajzenberg H, Haas B, Wong CL. Trauma in the aging population. Emerg Med Clin North Am. 2023;41:183–203.
27. LeBoff MS, Greenspan SL, Insogna KL, Lewiecki EM, Saag KG, Singer AJ, et al. The clinician's guide to prevention and treatment of osteoporosis. Osteoporos Int. 2022;33:2049–102.
28. Legros V, Picard B, Pasqueron J, Kanagaratnam L, Garrigue D, Rozenberg E, et al. Prognosis of major trauma in patients older than 85 years admitted to the ICU, a registry-based study. Eur J Trauma Emerg Surg. 2024;50:3199–208.
29. Levinger P, Wee E, Margelis S, Menz HB, Bartlett JR, Bergman NR, et al. Pre-operative predictors of post-operative falls in people undergoing total hip and knee replacement surgery: a prospective study. Arch Orthop Trauma Surg. 2017;137:1025–33.
30. Lex JR, Abbas A, Oitment C, Wolfstadt J, Wong P, Abouali J, et al. A dedicated orthopaedic trauma room improves efficiency while remaining financially net positive. J Orthop Trauma. 2023;37:32–7.
31. Lizaur-Utrilla A, Martinez-Mendez D, Miralles-Muñoz FA, Marco-Gomez L, Lopez-Prats FA. Negative impact of waiting time for primary total knee arthroplasty on satisfaction and patient-reported outcome. Int Orthop. 2016;40:2303–7.
32. Memarzadeh A, Taki H, Tissingh E, Hull P. The decline of elective operating at major trauma centres. Ann R Coll Surg Engl. 2017;99:166–8.
33. Morin SN, Feldman S, Funnell L, Giangregorio L, Kim S, McDonald-Blumer H, et al. Clinical practice guideline for management of osteoporosis and fracture prevention in Canada: 2023 update. Can Med Assoc J. 2023;195:E1333–48.
34. Neuprez A, Neuprez AH, Kaux JF, Kurth W, Daniel C, Thirion T, et al. Total joint replacement improves pain, functional quality of life, and health utilities in patients with late-stage knee and hip osteoarthritis for up to 5 years. Clin Rheumatol. 2020;39:861–71.
35. Reinhard J, Schindler M, Straub J, Baertl S, Szymski D, Walter N, et al. Timing in orthopaedic surgery - rethinking traditional myths with a critical perspective. Injury. 2025;56:112165.
36. Rizzoli R, Chevalley T. Nutrition and osteoporosis prevention. Curr Osteoporos Rep. 2024;22:515–22.
37. Rommens PM, Hopf JC, Arand C, Handrich K, Boudissa M, Wagner D. Prospective assessment of key factors influencing treatment strategy and outcome of fragility fractures of the pelvis (FFP). Eur J Trauma Emerg Surg. 2022;48:3243–56.
38. Samuel AM, Russo GS, Lukasiewicz AM, Webb ML, Bohl DD, Basques BA, et al. Surgical treatment of femoral neck fractures after 24 hours in patients between the ages of 18 and 49 is associated with poor inpatient outcomes: an analysis of 1361 patients in the National Trauma Data Bank. J Orthop Trauma. 2016;30:89–94.
39. Scott CEH, MacDonald DJ, Howie CR. Worse than death' and waiting for a joint arthroplasty. Bone Joint J. 2019;101–B:941–50.
40. Shannon SF, Black JD, Yoon RS, Michels R, Hadeed M, Soles G, et al. Randomized trial of surgery vs. non-surgical management for pelvic fragility fractures. Injury. 2025;56:112462.
41. Sonobe T, Otani K, Sekiguchi M, Otoshi K, Nikaido T, Konno S, et al. Influence of knee osteoarthritis severity, knee pain, and depression on physical function: a cross-sectional study. Clin Interv Aging. 2024;19:1653–62.
42. Thurston M, Robinson T, Pandhiri T, McGhee K, Bryant C, Drahos A, et al. Geriatric trauma intensive care unit admission guideline is associated with reduction in unplanned intensive care unit admissions. J Surg Res. 2024;302:790–7.

43. Waimann CA, Fernandez-Mazarambroz RJ, Cantor SB, Lopez-Olivo MA, Zhang H, Landon GC, et al. Cost-effectiveness of total knee replacement: a prospective cohort study. Arthritis Care Res. 2014;66:592–9.
44. Welford P, Jones CS, Davies G, Kunutsor SK, Costa ML, Sayers A, et al. The association between surgical fixation of hip fractures within 24 hours and mortality: a systematic review and meta-analysis. Bone Joint J. 2021;103–B:1176–86.
45. Yoon RS, Nellans KW, Geller JA, Kim AD, Jacobs MR, Macaulay W (2010) Patient education before hip or knee arthroplasty lowers length of stay. J Arthroplasty 25:547–51.

How to cite this article: Sadoghi P, Budin M, Herbst E, Milano G, Musahl V, Hirschmann MT. The silver tsunami and the elective arthroplasty crisis: how geriatric trauma overruns public surgical capacity. Knee Surg Sports Traumatol Arthrosc. 2026;1–5. https://doi.org/10.1002/ksa.70316