An overnight sensation: the effect of an acute introduction of a short-stay pathway on a previously compromised arthroplasty service

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Aims

In this study, we report the impact of implementing a new short-stay hip and knee arthroplasty pathway in an NHS hospital. This was enacted due to existing concerns around long length of stay (LOS) and reduced elective operating capacity each winter due to bed pressures. The overnight introduction of this pathway was aimed to reduce LOS, alleviate bed pressures, minimize readmission rates, and generate financial savings, all combining to facilitate full elective activity during the winter.

Methods

We conducted a prospective study at a regional tertiary arthroplasty centre. The new pathway was introduced across the service overnight. It included rigorous preoperative optimization, specific anaesthetic protocols, and uniform changes in surgical practice to allow a focus on early mobilization and discharge on the day of surgery where possible. Data collection spanned 17 months, encompassing the initial six months post-implementation of the short-stay pathway. LOS data were collected for the full period and data were compared pre- and post-implementation of the new pathway. Patient satisfaction and 30-day readmission data were also collected.

Results

There was a significant decrease in median LOS from four days pre-implementation to one day post-implementation. Patient satisfaction was high and the 30-day readmission rate was unchanged (5.95%, n = 43), with no readmissions directly related to decreased inpatient stay. Financial analyses revealed substantial cost savings due to reduced LOS and the elimination of routine postoperative blood tests. Elective activity over winter was significantly higher (203 more arthroplasties, 79% increase) than in the same time period in the previous year.

Conclusion

An acute introduction of a carefully planned and coordinated short-stay hip and knee pathway is safe, cost-effective, and popular with patients, but also contributes to increased efficiency in the delivery of elective healthcare in the context of increasing demand and financial constraints in the NHS.

Take home message

- A short-stay total joint replacement pathway can be introduced safely into an acute hospital setting, with immediate impacts on length of stay, efficiency, and financial savings.

Introduction

Since their introduction, total joint replacement (TJR) procedures have witnessed a consistent increase in volume and are among the most successful surgical procedures performed today.[1] With an ageing population, it is anticipated that the number of TJRs performed will

undergo ongoing and exponential growth in the foreseeable future.[2-4] With increasing demand, annual winter pressures, and delays related to the COVID-19 pandemic, the NHS has experienced lengthy waiting lists for TJR.[5–10] This has resulted in reports showing that some patients in the NHS are waiting over three years for their surgery.[11,12] Patients with prolonged waits for TJR report a marked deterioration in function and health-related quality of life.[7,13,14]

TJR constitutes a substantial financial burden on the healthcare economy and providers. As well as the costs of highly skilled and multidisciplinary surgical teams, theatre infrastructure, implants, and the inpatient facility and care must be considered alongside postoperative therapy and follow-up. TJR surgery has witnessed a paradigm shift in recent years, with the adoption of enhanced recovery after surgery (ERAS) and day-case protocols.[15] This has created transformational improvement, with consistent patient outcomes, cost reductions, and enhanced operational efficiency.[16]

This study reports the clinical and organizational effect of the acute introduction of a new short-stay arthroplasty pathway into an NHS hospital with chronic pre-existing bed availability and winter pressure concerns.

Methods

Institutional review board approval as a quality improvement (QI) project from Nottingham University Hospitals was obtained for this study. This prospective analysis of service improvement was conducted at a regional tertiary arthroplasty centre (Nottingham Elective Orthopaedic Service (NEOS), Nottingham University Hospitals NHS Trust, UK). A short-stay TJR pathway, based on other similar processes, was conceptualized and then introduced for all patients overnight on 1 August 2023. The development of the pathway was a multidisciplinary process, led by the senior author (BVB), with a working group that included senior surgeons, anaesthetists, nurses, physiotherapists, occupational therapists, and management personnel. The ultimate goal was to streamline surgical care and acute postoperative inpatient care. Regular staff education sessions and briefings were held prior to the implantation of the new pathway.

The pathway implementation date was set for 1 August 2023, after which all patients undergoing elective primary TJR were enrolled in the short-stay pathway, which was based on previous work from the South West Ambulatory Orthopaedic Centre (SWAOC).[17] Preoperative assessment was undertaken by a team of specialist preoperative assessment nurses and nurse practitioners, with anaesthetics involvement when required. Patients were informed and educated about the newly established pathway, and social factors were optimized where necessary. No patients were excluded from this pathway.

As per the SWAOC protocol, all patients received standard pre-medications prior to surgery consisting of paracetamol, ibuprofen, lansoprazole, and ondansetron. All patients received regional anaesthesia to minimize postoperative pain and encourage early mobilization. Spinal anaesthesia consisting of 3 to 4 ml hyperbaric 2% prilocaine was used for routine primary TJR lasting less than 90 minutes, with sedation if required. The previous regime of 0.5% bupivacaine spinal anaesthesia was used for surgeons whose routine TJR was greater than 90 minutes. No intrathecal opioid was administered. For total knee arthroplasty, ultrasound-guided adductor canal blocks and iPACK (infiltration between the popliteal artery and capsule of the knee) blocks were performed, and additional local anaesthesia infiltration in the form of 2% ropivacaine was administered by the surgeon intraoperatively. Prophylactic antibiotics consisted of one dose of teicoplanin and gentamicin; no additional antibiotics were administered post-surgery. Furthermore, 1 g of tranexamic acid (TXA) was administered intravenously for all patients to aid in haemostasis, with 1 g intravenously at the end for total hip arthoplasty (THA) and 2 g intra-articular for total knee arthoplasty (TKA).

Drain and tourniquet use was left to the discretion of the operating surgeon. Drains (if used) were removed three to four hours post-surgery. TKAs were performed using a medial parapatellar approach. THAs were performed using a posterior, anterolateral, or direct anterior approach depending on surgeon preference. A standardized pain management approach was used for all patients, including paracetamol, celecoxib, lansoprazole, oxycodone (both modified release (MR) and immediate release (IR)), ondansetron, and prophylactic senna and sodium docusate.

Following surgery, patients were transferred to the postoperative recovery suite, where a HemoCue (HemoCue, Sweden) test was performed. If the test result was above 100 g/l, no further blood tests were performed. Postoperative radiographs were obtained on the way from recovery to the ward. Subsequently, patients were taken to the short-stay ward, which was created using three bays of the original inpatient ward, where they received extensive physiotherapy to facilitate full mobility without restrictions and underwent assessments before discharge. To be considered safe for discharge, all patients needed to demonstrate the ability to walk with two crutches or a frame, ascend and descend stairs, and independently move from bed to the bathroom. On the day following discharge, all patients who were discharged on the day of surgery received a follow-up call from a specialist nurse to address any concerns or issues they may have had, using a standardized postoperative questionnaire.

Data collection

Data collection spanned a period of 17 months, commencing in September 2022 and concluding in January 2024. This data collection encompassed the initial six months of the short-stay TJR pathway's implementation. Length of stay (LOS) data were collected for the full period and data were compared pre- and post-implementation of the new pathway. Patient satisfaction and 30-day readmission data were also collected.

Statistical analysis

Independent-samples *t*-test or Fisher's exact test were used to compare and determine significance. A p-value < 0.05 was taken to represent a statistically significant difference. Cost savings of the short-stay pathway were calculated as a result of not routinely performing postoperative blood tests (full blood count and urea & electrolytes) and reduced LOS.

Results

Length of stay

LOS data are summarized in Table I. Prior to the implementation of the short-stay pathway, 1.02% (11/1078) of patients

Table I. Number of total joint replacements and length of stay by month.

Month	Total no. of joints	Mean length of stay, days (SD) (median; IQR)	Day 0 discharge, n (%)	Day 1 discharge, n (%)	Day 2 discharge, n (%)	Day 3+ discharge, n (%)
Sept 22	124	4.97 (7.237) (4.00; 2 to 5)	1 (0.81)	7 (5.65)	29 (23.39)	87 (70.16)
Oct 22	88	5.82 (5.781) (3.5; 3 to 6)	0	3 (3.41)	16 (18.18)	69 (78.41)
Nov 22	118	5.01 (5.848) (3; 2 to 5)	0	10 (8.47)	31 (26.27)	77 (65.25)
Dec 22	50	5.54 (6.132) (4; 2 to 6)	0	2 (4)	12 (24)	36 (72)
Jan 23	27	6.63 (6.001) (4; 2 to 11)	1 (3.7)	5 (18.52)	3 (11.11)	18 (66.67)
Feb 23	93	5.05 (5.551) (3; 2 to 6)	0	9 (9.68)	23 (24.73)	62 (66.67)
March 23	125	4.95 (7.075) (3; 2 to 5)	0	9 (7.2)	27 (21.6)	89 (71.2)
April 23	81	4.29 (4.919) (3; 2 to 5)	1 (1.23)	8 (9.88)	27 (33.33)	45 (55.56)
May 23	135	4.62 (5.542) (3; 2 to 5)	1 (0.74)	11 (8.15)	33 (24.44)	90 (66.67)
June 23	148	3.88 (4.559) (3; 2 to 4)	7 (4.73)	20 (13.51)	35 (23.65)	86 (58.11)
July 23	89	3.84 (3.633) (3; 2 to 5)	0	8 (8.99)	34 (38.20)	47 (52.81)
August 23	129	2.02 (2.362) (1; 1 to 2.5)	22 (17.05)	52 (40.31)	23 (17.83)	32 (24.81)
Sept 23	134	1.95 (1.853) (1; 1 to 3)	18 (13.43)	59 (44.03)	21 (15.67)	36 (26.87)
Oct 23	112	2.74 (3.299) (1; 1 to 4)	11 (9.82)	49 (43.75)	17 (15.18)	35 (31.25)
Nov 23	127	2.37 (3.430) (1; 1 to 2)	20 (15.75)	56 (44.09)	21 (16.54)	29 (22.83)
Dec 23	100	2.24 (2.408) (1; 1 to 3)	14 (14)	45 (45)	12 (12)	29 (29)
Jan 24	123	2.49 (3.253) (1; 1 to 3)	21 (17.07)	49 (39.84)	16 (13.01)	37 (30.08)

were discharged on the same day (day 0), while 9.55% (103/1078) were discharged by the following day (day 1). Consequently, this translated to a median LOS of four days (IQR 3 to 6; mean 4.78 (SD 5.695)) during the pre-implementation phase.

Following the implementation of the short-stay TJR pathway, 14.62% (106/725) of patients were discharged on day 0 ($p < 0.001$), and 57.38% (416/725) were discharged by day 1 ($p < 0.001$, both Fisher's exact test). Figure 1 shows changes in the proportion discharged on each day over time. As a result of these changes, in the post-implementation phase the median LOS was one day (IQR 1 to 3, mean 2.25 (SD 3.026); $p < 0.001$, independent-samples *t*-test). This can be seen in Figure 2.

Reasons for delayed discharges

Since the implementation of the short-stay TJR pathway, there were 196 (27.01%) patients who stayed in hospital for three or more days. Reasons for these delayed discharges are summarized in Table II.

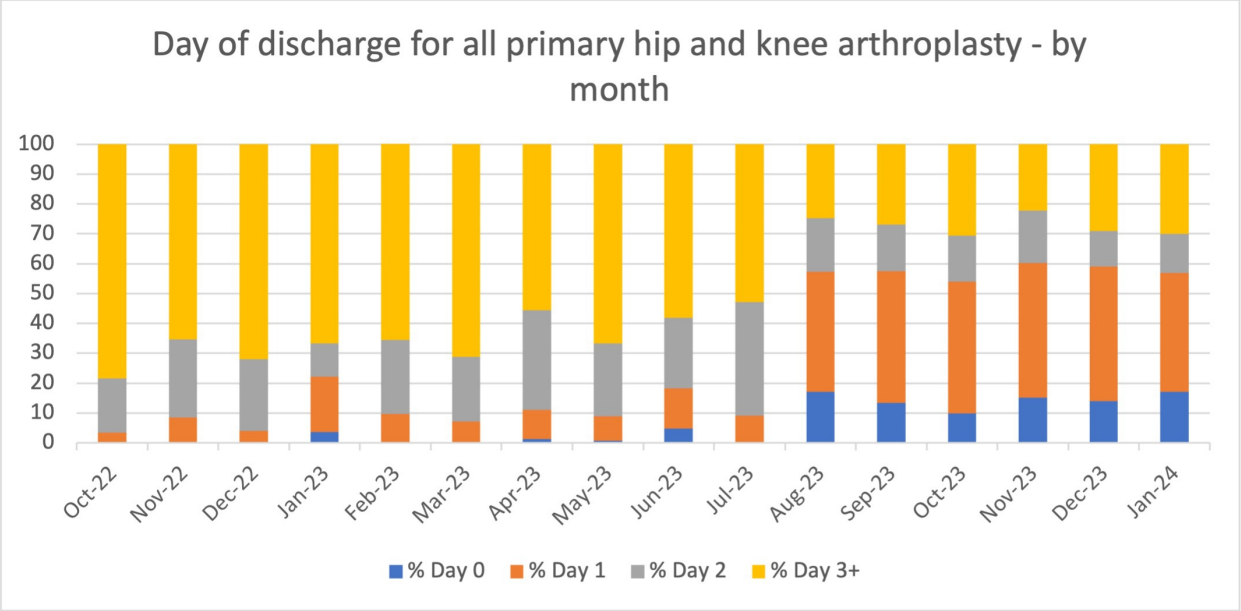

Fig. 1
Graph illustrating length of stay for joint arthroplasties by month.

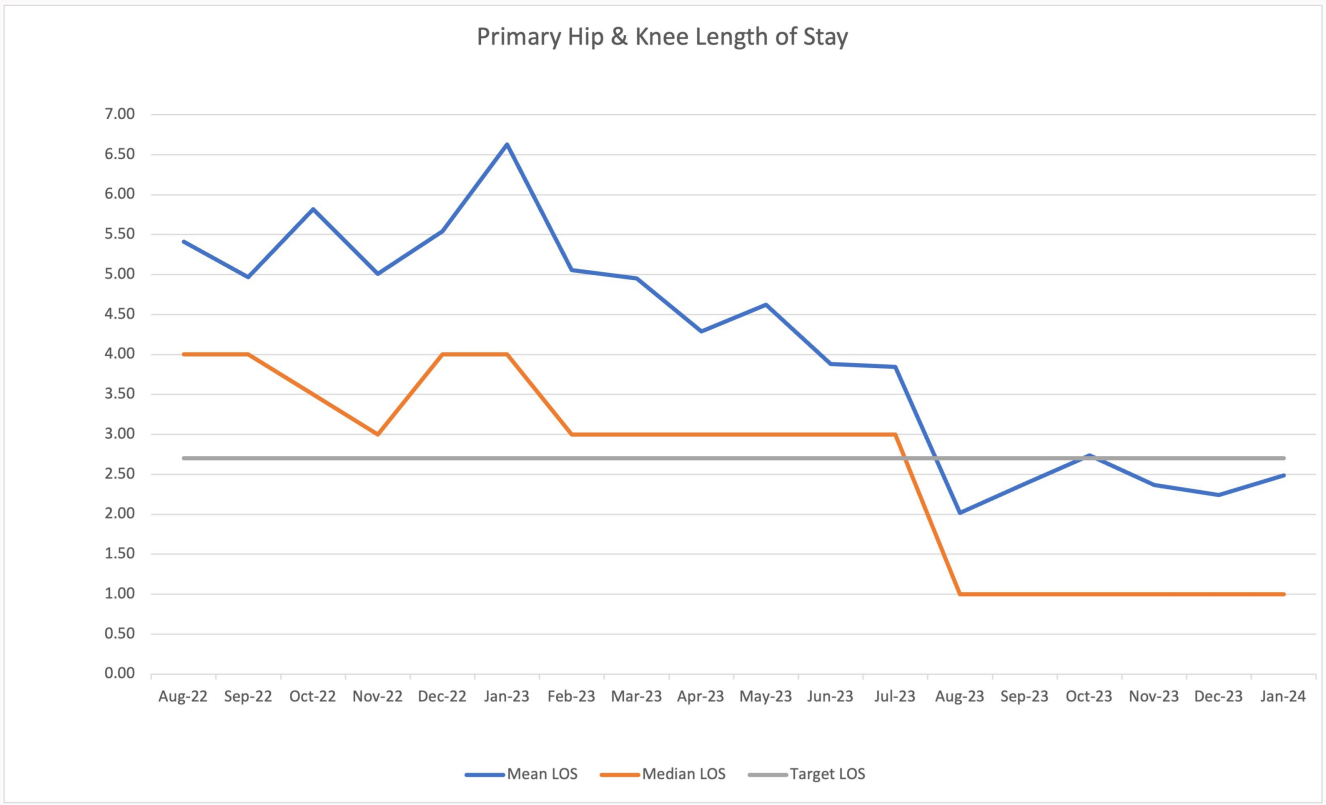

Fig. 2
Graph illustrating change in mean and median length of stay (LOS), measured in days, for joint arthroplasties.

Patient satisfaction

Results of the day 1 questionnaire are summarized in Table III.

30-day readmission rate

During the initial six months following the implementation of the short-stay TJR pathway, 43 (5.95%) patients were readmitted within 30 days (Table IV), and none were discharged on day 0. Of these, 18 (2.49%) were non-implant related. Among these readmissions, four (0.55%) patients were readmitted specifically due to wound complications, and two (0.28%) patients were readmitted due to pain-related issues.

Table II. Reasons for delayed discharges (≥ day 3).

Reason for delayed discharges (≥ day 3)	No. of patients
Social	39
Wound problems	15
Medical conditions affecting mobility	
Cognitive decline	5
Learning difficulties	1
Multiple sclerosis	1
Alcoholism	1
Parkinson's disease	1
Stroke	1
Complex pain issues	1
Slow progression with physiotherapy	
Postoperative pain	44
Postoperative nausea/dizziness	12
Low baseline mobility	21
Required HDU postoperative	20
High BMI	6
Complex primary TJR	14
Postoperative complications	
Postoperative THA dislocation	2
Postoperative acetabular fracture	1
Intraoperative periprosthetic femur fracture	1
Postoperative TIA	1
Postoperative cardiac issue	4
Postoperative LRTI	2
Postoperative PE	2
Hyponatraemia	1

HDU, high dependency unit; LRTI, lower respiratory tract infection; PE, pulmonary embolism; THA, total hip arthroplasty; TIA, transient ischaemic attack; TJR, total joint replacement.

Table III. Results from day 1 questionnaire, administered to patients discharged on the day of surgery.

Criteria	Responses, %
How are you feeling day 1 post-surgery?	
Not good	3.64
Ok	32.72
Great	63.64
How is your pain?	
Controlled	90.91
Not controlled	9.09
Did you feel your analgesia is adequate?	
Yes	92.63
No	7.27
Are you able to do your exercises?	
Yes	96.36
No	3.64
Have you had any nausea and vomiting?	
Yes	9.09
No	90.91
Have you had any dizziness?	
Yes	5.45
No	94.55
How is your wound?	
Dry	98.18
Not dry	1.82
How was your overall experience?	
Not good	3.64
Good	21.82
Excellent	74.54

Cost-effectiveness

The short-stay TJR pathway yielded significant cost savings during the initial six months, primarily in terms of inpatient stay and postoperative blood tests.

The introduction of the short-stay TJR pathway led to a significant reduction in the LOS for patients. Mean LOS pre-implementation was 4.78 days and post-implementation was 2.25 days. As a result, there was a reduction of 2.53 inpatient days per TJR. At our hospital, the estimated cost for an orthopaedic bed for 24 hours is £442.87, as calculated by our institution's finance department. Therefore prior to the short-stay pathway, the mean TJR inpatient bed cost was £2,116.92 (SD 2,522) whereas post-implementation it was £996.46 (SD 1,261). There were 723 TJRs performed in the inital six months of the short-stay pathway. The implementation of the short-stay pathway therefore resulted in a cost saving of £810,093.38 in six months. It is projected that this pathway would lead to a saving per year of £1,620,186.75.

There were 689 (95.30%) patients over the first six months of the new pathway who did not require the typical routine blood tests (full blood count (FBC) and urea & electrolytes (U&E)). This resulted in a cost saving of £1.89 per FBC and £2.96 per U&E, accumulating to a total of £3,341.65 in cost savings during the initial six months.

Furthermore, during the initial six months of the new pathway, 723 TJRs were performed in comparison to 520 performed in the same period the previous year. Based on the standard NHS tariffs for TJR, this 39% increase led to an increased income of £1,427,602.

Discussion

With ever increasing pressure to reduce TJR costs, ERAS pathways provide an opportunity to decrease LOS and reduce postoperative and rehabilitation costs, while maintaining quality of care and with excellent patient satisfaction. Day-case TJR has demonstrated its cost-effectiveness, and its popularity has increased worldwide in the last few years.[16] While

Table IV. Reasons for readmission.

Reason for readmission	No. of patients
Implant related	
Query infection	10
Bruising	4
Leaking wound	4
Cellulitis	3
Pain	2
THA dislocation	1
Periprosthetic fracture	1
Non-implant related	
Query DVT	3
Mechanical fall	2
Pulmonary embolism	2
Lower respiratory tract infection	2
Obstructed inguinal hernia	1
Cellulitis secondary to leg ulcer	1
Rectus sheath haematoma and anaemia	1
Hyponatraemia	1
Vomiting and constipation	1
Diarrhoea and vomiting	1
Low blood pressure	1
Social care issues	1
Fracture (not periprosthetic)	1

DVT, deep vein thrombosis; THA, total hip arthroplasty.

day-case TJR has so far been uncommon across the NHS, there is evidence supporting its potential to reduce healthcare provider costs and enhance patient care.[18-21] A critical aspect of launching a new short-stay TJR pathway is a collaborative approach working to encourage the full engagement of all the teams involved in the process.

The key areas to facilitate rapid recovery and day-case TJR include patient education and expectation setting, preoperative optimization, sensible list planning, and excellent surgery with meticulous attention to anaesthetic and analgesic protocols, all with a patient-based and driven focus on early postoperative mobilization.[22-24] These elements collectively contribute to the success of day-case TJR.

Patient safety is of paramount importance, and we report an acceptable 30-day readmission rate, which was unchanged compared to our pre-pathway rate. Of note, all readmissions were for reasons that would not have been prevented by a longer inpatient stay, and no day-case patient was readmitted. This low readmission rate aligns with other studies.[23,25,26] Our decision to discontinue postoperative blood tests was supported by our earlier study demonstrating the unnecessary nature of these tests.[27]

The significant reduction in hospital stay directly benefits both patients and the healthcare environment. This study, in which the changes were purposefully introduced acutely overnight, demonstrated notable success with 14.52% of patients going home on the same day and 57.74% by the following day, significantly reducing the mean LOS by 2.5 days (0 to 16). Despite all efforts, there were still a substantial number of patients who had a prolonged inpatient stay. The majority of these reasons were either social or related to complex surgical plans or perioperative pain management. Discharge delays secondary to social care challenges are common throughout the NHS.[28] With regard to patients with a longer LOS, many had had a prolonged time on the waiting list, likely with progressive deformity, deconditioning, and worsening pain, and had increased and challenging levels of postoperative pain. Any requirement for regular opioid analgesia contributed further to this management challenge.[29] Previous studies have highlighted the importance of reducing opioid use prior to surgery. More recently, we have worked to implement this into our pathway.[30-33]

Shorter hospital stays also carry substantial cost-saving implications, which become particularly crucial during periods of winter bed pressures. The short-stay TJR pathway can play a pivotal role in alleviating these pressures by reducing the number of inpatient beds required to sustain a full arthroplasty service. It has been a common practice over the past decade to reduce elective orthopaedic beds during the winter months to accommodate emergency admissions.[10,34] This practice has resulted in a detrimental impact on elective patients, with increased waiting lists.[35] This is highlighted in our data, as there has historically been a substantial decrease in TJRs performed in the winter period. However, with the introduction of the short-stay TJR pathway, the dependency on inpatient beds can be substantially decreased. During winter (November to January) 2023/24, we performed 79% more TJR procedures than we managed during the same period in 2022/23. This pathway has the potential to maintain patient access to much-needed surgical interventions and help reduce waiting lists. We suggest that the short-stay TJR pathway improves patient care, but also serves as a strategic solution to address the challenges posed by winter bed pressures.

The adoption of a short-stay joint TJR pathway holds great promise for generating substantial cost savings within healthcare systems, driven by the remarkable reduction in LOS for patients undergoing TJR. This translates into a reduced demand for inpatient resources, including the number of available beds and the allocation of nursing care, which in turn decreases overhead costs. Furthermore, the short-stay pathway optimizes resource use by employing standardized anaesthesia and postoperative care protocols, and a focus on early mobilization and discharge.

Patients often express a strong preference for day-case TJR pathways, drawn by the prospect of shorter hospital stays, a decreased risk of hospital-acquired infections, and a swifter return to the familiar comforts of their home environment.[36,37] We have demonstrated consistently high levels of patient satisfaction in those discharged on the day of surgery. The majority of patients in our study reported positive experiences with regard to pain management, swelling, and ability to perform their physiotherapy.

The current UK mean LOS post-TJR is high compared to other countries, affirming that short-stay TJR pathways play a

pivotal role in the advancement of TJR surgery.[38] We envisage that this has the potential to bring about much-needed change to TJR care in the NHS.

The limitation of this study is that although it is a prospective study, we present the first six months of the implementation of the pathway and do not yet have long-term data. The strength of this study is that it demonstrates that innovative pathways can be safely introduced into an existing busy orthopaedic department, applied to all patients without the need for risk stratification or separate facilities, and will have a significant effect on LOS.

In conclusion, the acute introduction of a new short-stay enhanced recovery pathway for TJR, based on experience from other ambulatory orthopaedic centres, has proved to be safe and effective when implemented in a traditional inpatient unit. With high patient satisfaction, the pathway has saved money and facilitated high activity levels even at a time of critical winter bed pressures in our busy tertiary referral centre. This pathway has proved beneficial to patients, healthcare professionals, and management colleagues within the entire local healthcare environment.

Social media

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References

1. **Learmonth ID**, **Young C**, **Rorabeck C**. The operation of the century: total hip replacement. *Lancet*. 2007;370(9597):1508–1519.
2. **Culliford D**, **Maskell J**, **Judge A**, **et al**. Future projections of total hip and knee arthroplasty in the UK: results from the UK Clinical Practice Research Datalink. *Osteoarthritis Cartilage*. 2015;23(4):594–600.
3. **Inacio MCS**, **Graves SE**, **Pratt NL**, **Roughead EE**, **Nemes S**. Increase in total joint arthroplasty projected from 2014 to 2046 in Australia: a conservative local model with international implications. *Clin Orthop Relat Res*. 2017;475(8):2130–2137.
4. **Sloan M**, **Premkumar A**, **Sheth NP**. Projected volume of primary total joint arthroplasty in the U.S., 2014 to 2030. *J Bone Joint Surg Am*. 2018;100-A(17):1455–1460.
5. **Oussedik S**, **MacIntyre S**, **Gray J**, **McMeekin P**, **Clement ND**, **Deehan DJ**. Elective orthopaedic cancellations due to the COVID-19 pandemic: where are we now, and where are we heading? *Bone Jt Open*. 2021;2(2):103–110.
6. **Iacobucci G**. Sharp rise in patients waiting more than 18 weeks for elective surgery. *BMJ*. 2016;354:i4518.
7. **Clement ND**, **Scott CEH**, **Murray JRD**, **Howie CR**, **Deehan DJ**, **IMPACT-Restart Collaboration**. The number of patients "worse than death" while waiting for a hip or knee arthroplasty has nearly doubled during the COVID-19 pandemic. *Bone Joint J*. 2021;103-B(4):672–680.
8. **Haddad FS**. COVID-19 and orthopaedic and trauma surgery. *Bone Joint J*. 2020;102-B(5):545–546.
9. **Oussedik S**, **Zagra L**, **Shin GY**, **D'Apolito R**, **Haddad FS**. Reinstating elective orthopaedic surgery in the age of COVID-19. *Bone Joint J*. 2020;102-B(7):807–810.
10. **Jones T**, **Penfold C**, **Redaniel MT**, **et al**. Impact of pausing elective hip and knee replacement surgery during winter 2017 on subsequent service provision at a major NHS Trust: a descriptive observational study using interrupted time series. *BMJ Open*. 2023;13(5):e066398.
11. **No authors listed**. Referral to Treatment (RTT) Waiting Times. NHS England. 2024. https://www.england.nhs.uk/statistics/statistical-work-areas/rtt-waiting-times (date last accessed 6 February 2025).
12. **Karayiannis PN**, **Warnock M**, **Cassidy R**, **Jones K**, **Scott CEH**, **Beverland D**. The painful truth of waiting for hip and knee arthroplasty in Northern Ireland. *Bone Joint J*. 2023;105-B(7):783–794.
13. **Ackerman IN**, **Bennell KL**, **Osborne RH**. Decline in health-related quality of life reported by more than half of those waiting for joint replacement surgery: a prospective cohort study. *BMC Musculoskelet Disord*. 2011;12:108.
14. **Pietrzak JRT**, **Maharaj Z**, **Erasmus M**, **Sikhauli N**, **Cakic JN**, **Mokete L**. Pain and function deteriorate in patients awaiting total joint arthroplasty that has been postponed due to the COVID-19 pandemic. *World J Orthop*. 2021;12(3):152–168.
15. **Frassanito L**, **Vergari A**, **Nestorini R**, **et al**. Enhanced recovery after surgery (ERAS) in hip and knee replacement surgery: description of a multidisciplinary program to improve management of the patients undergoing major orthopedic surgery. *Musculoskelet Surg*. 2020;104(1):87–92.
16. **Lazic S**, **Boughton O**, **Kellett CF**, **Kader DF**, **Villet L**, **Rivière C**. Day-case surgery for total hip and knee replacement: how safe and effective is it? *EFORT Open Rev*. 2018;3(4):130–135.
17. **No authors listed**. Orthopaedic elective surgery: guide to delivering perioperative ambulatory care for patients with hip and knee pain requiring joint replacement surgery. Getting It Right First Time (GIRFT). 2023. https://gettingitrightfirsttime.co.uk/wp-content/uploads/2023/07/Ambulatory-Hip-and-Knee-Replacement-Guide-March-2023-FINAL-V1-1.pdf (date last accessed 6 February 2025).
18. **Aynardi M**, **Post Z**, **Ong A**, **Orozco F**, **Sukin DC**. Outpatient surgery as a means of cost reduction in total hip arthroplasty: a case-control study. *HSS J*. 2014;10(3):252–255.
19. **Huang A**, **Ryu JJ**, **Dervin G**. Cost savings of outpatient versus standard inpatient total knee arthroplasty. *Can J Surg*. 2017;1:57–62.
20. **Dey S**, **Gadde R**, **Sobti A**, **Macdonald N**, **Jacob J**, **Unnithan A**. The safety and efficacy of day-case total joint arthroplasty. *Ann R Coll Surg Engl*. 2021;103(9):638–644.
21. **Berend ME**, **Lackey WG**, **Carter JL**. Outpatient-focused joint arthroplasty is the future: the midwest center for joint replacement experience. *J Arthroplasty*. 2018;33(6):1647–1648.
22. **Bert JM**, **Hooper J**, **Moen S**. Outpatient total joint arthroplasty. *Curr Rev Musculoskelet Med*. 2017;10(4):567–574.
23. **Hoffmann JD**, **Kusnezov NA**, **Dunn JC**, **Zarkadis NJ**, **Goodman GP**, **Berger RA**. The shift to same-day outpatient joint arthroplasty: a systematic review. *J Arthroplasty*. 2018;33(4):1265–1274.
24. **Sah AP**, **DeCook CA**, **Della Valle CJ**, **Meneghini RM**. Outpatient joint replacement: practical guidelines for your program based on evidence, success, and failures. *Instr Course Lect*. 2020;69:167–182.
25. **Springer BD**, **Odum SM**, **Vegari DN**, **Mokris JG**, **Beaver WB Jr**. Impact of inpatient versus outpatient total joint arthroplasty on 30-day hospital readmission rates and unplanned episodes of care. *Orthop Clin North Am*. 2017;48(1):15–23.
26. **Jaibaji M**, **Volpin A**, **Haddad FS**, **Konan S**. Is outpatient arthroplasty safe? A systematic review. *J Arthroplasty*. 2020;35(7):1941–1949.
27. **Naathan H**, **Ilo K**, **Berber R**, **Matar HE**, **Bloch B**. Are postoperative blood tests always required after lower limb arthroplasty? *Bone Jt Open*. 2023;4(5):357–362.
28. **Oliver D**. David Oliver: delayed discharges harm patients, staff, and health systems alike. *BMJ*. 2023;380:459.
29. **Aasvang EK**, **Lunn TH**, **Hansen TB**, **Kristensen PW**, **Solgaard S**, **Kehlet H**. Chronic pre-operative opioid use and acute pain after fast-track total knee arthroplasty. *Acta Anaesthesiol Scand*. 2016;60(4):529–536.
30. **Malahias MA**, **Loucas R**, **Loucas M**, **Denti M**, **Sculco PK**, **Greenberg A**. Preoperative opioid use is associated with higher revision rates in total joint arthroplasty: a systematic review. *J Arthroplasty*. 2021;36(11):3814–3821.
31. **Ravi B**, **Pincus D**, **Croxford R**, **et al**. Patterns of pre-operative opioid use affect the risk for complications after total joint replacement. *Sci Rep*. 2021;11(1):22124.
32. **Blevins Peratikos M**, **Weeks HL**, **Pisansky AJB**, **Yong RJ**, **Stringer EA**. Effect of preoperative opioid use on adverse outcomes, medical spending, and persistent opioid use following elective total joint arthroplasty in the United States: a large retrospective cohort study of administrative claims data. *Pain Med*. 2020;21(3):521–531.
33. **Goplen CM**, **Verbeek W**, **Kang SH**, **et al**. Preoperative opioid use is associated with worse patient outcomes after total joint arthroplasty: a

systematic review and meta-analysis. *BMC Musculoskelet Disord*. 2019; 20(1):234.
34. **O'Dowd A**. Hospitals are advised to halt elective surgery to free beds for winter. *BMJ*. 2016;355:i6766.
35. **Herrod PJJ**, **Adiamah A**, **Boyd-Carson H**, **et al**. Winter cancellations of elective surgical procedures in the UK: a questionnaire survey of patients on the economic and psychological impact. *BMJ Open*. 2019; 9(9):e028753.
36. **Kelly MP**, **Calkins TE**, **Culvern C**, **Kogan M**, **Della Valle CJ**. Inpatient versus outpatient hip and knee arthroplasty: which has higher patient satisfaction? *J Arthroplasty*. 2018;33(11):3402–3406.
37. **Patel KT**, **Lewis TL**, **Gill P**, **Chatterton M**. The patient perspective, experience and satisfaction of day case unicompartmental knee arthroplasty: a short-term mixed-methods study. *Knee*. 2021;33:378–385.
38. **Wainwright TW**. The current status of daycase hip and knee arthroplasty within the English National Health Service: a retrospective analysis of hospital episode statistics data. *Ann R Coll Surg Engl*. 2021;103(5):324–331.

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Data sharing

The datasets generated and analyzed in the current study are not publicly available due to data protection regulations. Access to data is limited to the researchers who have obtained permission for data processing. Further inquiries can be made to the corresponding author.

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Ethical review statement

This was registered as a service improvement project and ethical approval was not required.

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