

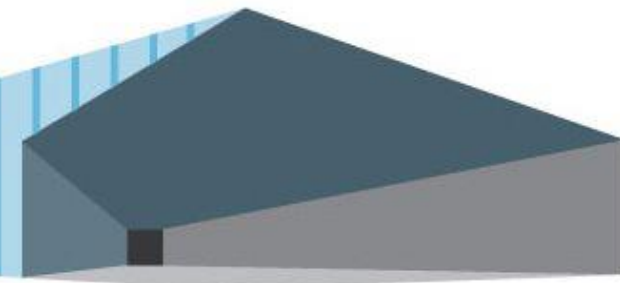


Pain management for hip and knee replacement: are we ready for outpatient surgery?

Prof. A. Gelmanas

Lithuanian University of Health Sciences

BaltAnestIC 2023



Declaration of conflict

I am not convinced yet...



I am not an irretrievable skeptic. I am not hopelessly prejudiced. I am perfectly willing to believe, and my mind is wide open; but I have, as yet, to be convinced. I am perfectly willing, but the evidence must be sane and conclusive.

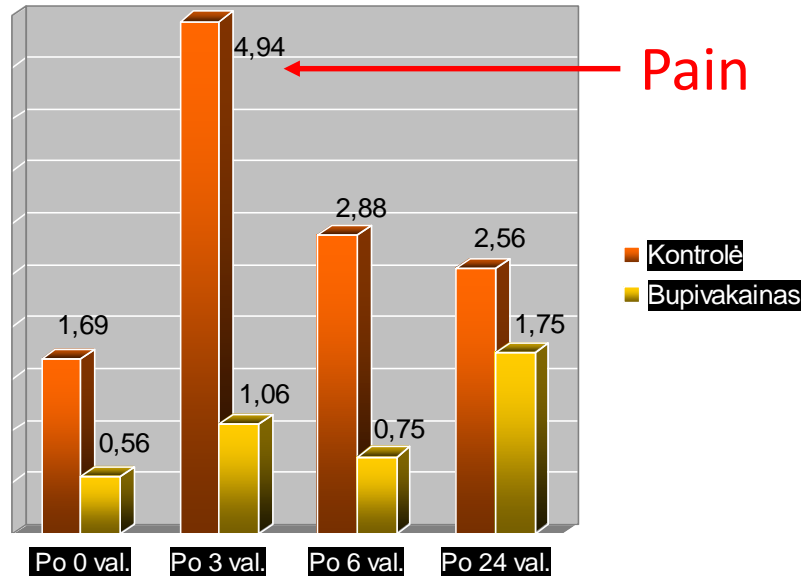
— *Harry Houdini* —

Joint replacement in XX century...

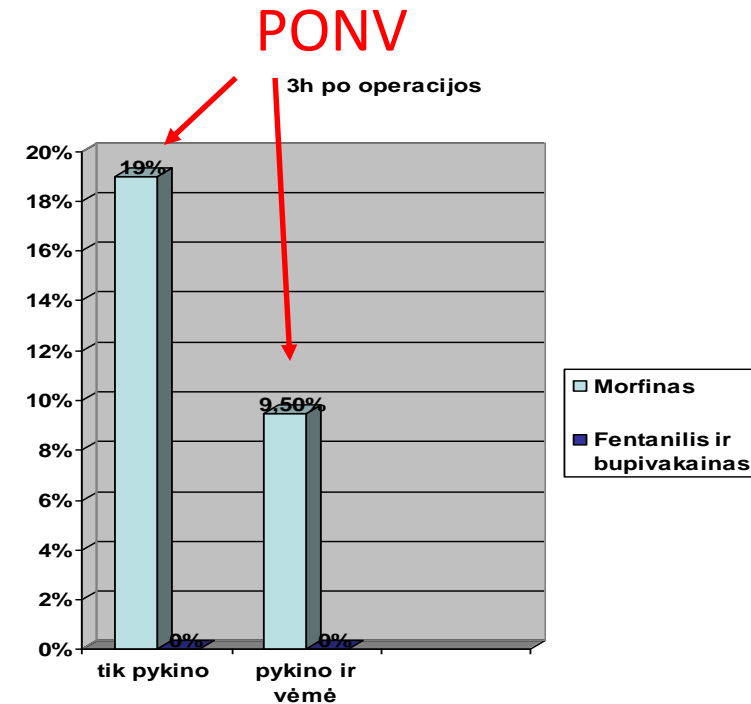
- < 80 yrs
- 10 days in hospital
- ICU
- 3000-5000 ml infusion therapy
- Blood products >2 RBC
- Epidural for 7 days
- Drains
- Urinary cath
- Fasting
- Immobilisation
- ...



A. Gelmanas, A. Karbonskienė, E. Brazdžionytė. *Effectiveness of postoperative pain relief after hip joint replacement surgery comparing epidural pain relief with a combination of epidural pain relief and intraoperative bupivacaine infiltration*, 2006



A. Gelmanas, A. Ledaitė, E. Tarasevičiūtė. *Efficacy of postoperative epidural analgesia comparing morphine and bupivacaine with fentanyl after hip replacement surgery*, 2007



Postoperative cell saving -2010



ERAS for joint replacement in LUHS Hospital

- Length of stay (days): ERAS **5,13** \pm 0,99, control 7,40 \pm 0,89
- Postoperative pain (VAS): ERAS **5,03** \pm 2,4, control 3,55 \pm 2,35
- EQ-5 quality of life:
ERAS preop **51,83** \pm 22,72, postop **74,58** \pm 15,38
Control preop 42,87 \pm 21,32, postop 68,85 \pm 14,30
- Costs: ERAS group – **80 euro** ↓



Future or present reality?

- Total joint arthroplasties are performed with a short hospital stay or even as an outpatient surgery.
- Advancements in surgical techniques, improvements in anesthesia care, the development of multimodal pain management pathways, and enhanced rehabilitation and home healthcare protocols have helped make this shift possible.
- Outpatient total joint arthroplasty has been shown to be safe and feasible, having similar or possibly decreased risk of complications when compared with standard hospitalized care.
- The move towards outpatient arthroplasty will likely continue...
- The shift from inpatient to outpatient has significant potential cost savings not only for healthcare systems, but also to government payers



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Health Policy & Economics

Patient Outcomes Following Total Joint Replacement Surgery: A Comparison of Hospitals and Ambulatory Surgery Centers

Kathleen Carey, PhD^{a,*}, Jake R. Morgan, PhD^b, Meng-Yun Lin, PhD^c,
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- >1 million patients/year total knee arthroplasty (TKA) or total hip arthroplasty (THA) in the United States, 4 million by 2030
- > ½ of primary joint replacement surgeries are predicted to take place in an outpatient setting by 2026
- TKA and THA treatment in HOPDs translated into *large cost savings* to payers

Is it safe?

Marcus C. Ford, MD*, Jordan D. Walters, MD, Ryan P. Mulligan, MD, Gregory D. Dabov, MD, William M. Mihalko, MD, PhD, Anthony M. Mascioli, MD, Thomas W. Throckmorton, MD. *Safety and Cost Effectiveness of Outpatient Unicompartamental Knee Arthroplasty in the Ambulatory Surgery Center A Matched Cohort Study*. Orthop Clin N Am 51 (2020) 1–5

	ASC	Hospital	P value
Age (y)	58.8	59.4	.55
Sex			.40
Male	15 (31.3%)	20 (41.7%)	
Female	33 (68.7%)	28 (58.3%)	
Body mass index	34.3	32.9	.29
ASA	1.94	2.08	.15
Complications	1 (2.1%)	5 (10.4%)	.20
Minor	1 (2.1%)	1 (2.1%)	1.00
Major	0 (0.0%)	4 (8.3%)	.12
Reoperation	0 (0.0%)	2 (4.2%)	.49
Readmission	0 (0.0%)	4 (8.3%)	.12
Length of stay (d)	0	2.9	



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Table 1

Inpatient and Ambulatory Surgery Centers: Comparison of Total Joint Replacement Postsurgical Events.

	Total Knee Replacement				Equality of Rates ^a <i>P</i> -Value
	Inpatient (n = 2574)		Ambulatory Surgery Center (n = 858)		
	No. of Events	Rate (%)	No. of Events	Rate (%)	
30-d readmissions	143	5.56	17	1.98	<.001
90-d readmissions	254	9.87	27	3.15	<.001
Postsurgical complications ^b	162	6.29	47	5.48	.387
Revision surgery	13	0.51	4	0.47	.221
	Total Hip Replacement				Equality of Rates ^a <i>P</i> -Value
	Inpatient (n = 1869)		Ambulatory Surgery Center (n = 623)		
	No. of Events	Rate (%)	No. of Events	Rate (%)	
30-d readmissions	60	3.21	8	1.28	.011
90-d readmissions	143	7.65	10	1.61	<.001
Postsurgical complications ^b	109	5.83	12	1.93	<.001
Revision surgery	4	0.21	1	0.16	.396 ^c



Health Policy & Economics

**Patient Outcomes Following Total Joint Replacement Surgery:
A Comparison of Hospitals and Ambulatory Surgery Centers**Kathleen Carey, PhD^{a,*}, Jake R. Morgan, PhD^b, Meng-Yun Lin, PhD^c,
Michael S. Kain, MD^d, William R. Creevy, MD^d^a Department of Health Law, Policy and Management, Boston University School of Public Health, Boston, MA^b Boston University School of Medicine, Section of Infectious Disease, Boston, MA^c Boston University School of Medicine, Section of General Internal Medicine, Boston, MA^d Boston Medical Center, Department of Orthopedic Surgery, One Boston Medical Center Place, Boston, MA**Hospital Outpatient Department and Ambulatory Surgery Centers: Comparison of Total Joint Replacement Postsurgical Events.**

	Total Knee Replacement				
	Outpatient (n = 450)		Ambulatory Surgery Center (n = 450)		Equality of Rates ^a
	No. of Events	Rate (%)	No. of Events	Rate (%)	P-Value
30-d readmissions	18	4.00	7	1.56	.026
90-d readmissions	28	6.22	13	2.89	.017
Postsurgical complications ^b	24	5.33	21	4.67	.646
Revision surgery	0	0.00	0	0.00	—
	Total Hip Replacement				
	Outpatient (n = 271)		Ambulatory Surgery Center (n = 271)		Equality of Rates
	No. of Events	Rate (%)	No. of Events	Rate (%)	P-Value
30-d readmissions	8	2.95	1	0.37	.038 ^c
90-d readmissions	16	5.90	2	0.74	.001 ^c
Postsurgical complications ^b	14	5.17	3	1.11	.011 ^c
Revision surgery	2	0.73	0	0.00	.250 ^c



Health Policy & Economics

Patient Outcomes Following Total Joint Replacement Surgery: A Comparison of Hospitals and Ambulatory Surgery Centers

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Total 90-d Episode Costs (\$): Comparison of Hospitals and ASCs.

	Total Knee Replacement				Total Hip Replacement			
	Inpatient \$ (n = 2574)	ASC \$ (n = 858)	Inpatient \$-ASC \$	Percent Difference	Inpatient \$ (n = 2574)	ASC \$ (n = 858)	Inpatient \$-ASC \$	Percent Difference
Index	32,273	27,839	4434	-13.7	33,469	28,821	4648	-13.9
Postacute	7293	6683	610	-8.4	5545	4408	1137	-20.5
Total episode	39,566	34,521	5045	-12.8	39,014	33,229	5785	-14.8

	Total Knee Replacement				Total Hip Replacement			
	Outpatient \$ (n = 450)	ASC (n = 450)	Outpatient- ASC	Percent Difference	Outpatient (n = 271)	ASC (n = 271)	Outpatient- ASC	Percent Difference
Index	25,024	27,128	-2104	+8.4	25,238	29,311	-4073	+16.1
Postacute	7078	6687	391	-5.5	7016	4601	2415	-34.4
Total episode	32,102	33,815	-1713	+5.3	32,254	33,913	-1659	+5.1

ASC, Ambulatory Surgery Center.



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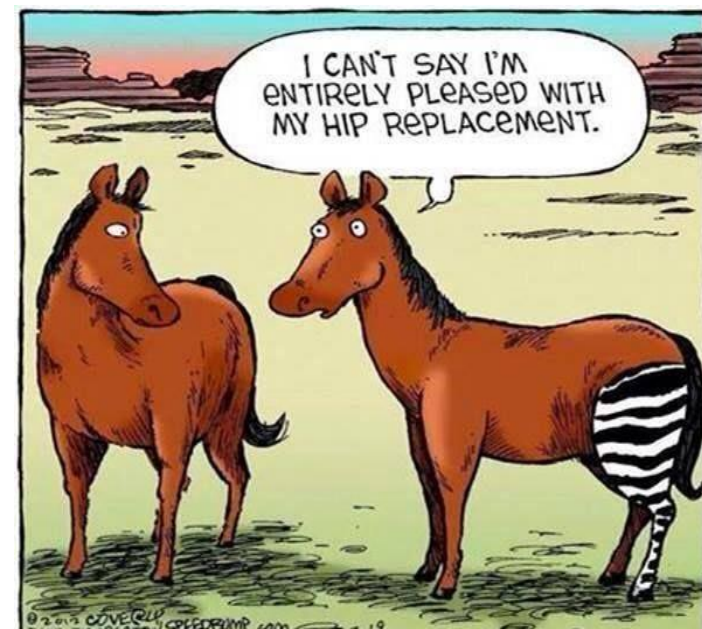
Inpatient Versus Outpatient Hip and Knee Arthroplasty: Which Has Higher Patient Satisfaction?



Mick P. Kelly, MD^{*}, Tyler E. Calkins, BS, Chris Culvern, MS, Monica Kogan, MD, Craig J. Della Valle, MD

Department of Orthopedic Surgery, Rush University School of Medicine, Chicago, IL

Although patients in both settings reported high overall satisfaction after hip and knee arthroplasty procedures, patients who had surgery at an ASC were more satisfied in the areas of nursing staff, pain management, and preparedness for discharge.



Question	HCAHPS Boxes	Inpatient	Outpatient	P-Value
How often did nurses treat you with courtesy and respect?	Top	94 (92.2%)	64 (100.0%)	.022
	Middle	8 (7.8%)	0 (0.0%)	.022
How often did nurses listen to you carefully?	Top	91 (89.2%)	61 (96.8%)	.078
	Middle	10 (9.8%)	2 (3.2%)	.111
	Bottom	1 (1.0%)	0 (0.0%)	.431
How often did nurses explain things in a way you could understand?	Top	94 (92.2%)	62 (96.9%)	.214
	Middle	6 (5.9%)	2 (3.1%)	.419
	Bottom	2 (2.0%)	0 (0.0%)	.260
How often did doctors treat you with courtesy and respect?	Top	91 (89.2%)	62 (96.9%)	.074
	Middle	9 (8.8%)	2 (3.1%)	.151
	Bottom	1 (1.0%)	0 (0.0%)	.427
How often did doctors listen to you carefully?	Top	85 (84.2%)	58 (90.6%)	.234
	Middle	14 (13.9%)	5 (7.8%)	.236
	Bottom	2 (2.0%)	1 (1.6%)	.845
How often did doctors explain things in a way you could understand?	Top	86 (86.0%)	59 (92.2%)	.227
	Middle	11 (11.0%)	4 (6.3%)	.303
	Bottom	3 (3.0%)	1 (1.6%)	.560
How often did you get help in getting to the bathroom or using a bedpan as soon as you wanted?	Top	81 (81.8%)	47 (95.9%)	.018
	Middle	15 (15.2%)	0 (0.0%)	.004
	Bottom	2 (2.0%)	2 (4.1%)	.467
After you pressed the call bell, how often did you get help as soon as you wanted?	Top	61 (61.0%)	26 (96.3%)	^a
	Middle	33 (33.0%)	0 (0.0%)	^a
	Bottom	6 (6.0%)	1 (3.7%)	^a
How often was your pain well controlled?	Top	79 (77.5%)	52 (86.7%)	.150
	Middle	19 (18.6%)	6 (10.0%)	.142
	Bottom	3 (2.9%)	2 (3.3%)	.889
How often did the facility staff do everything they could to help you with your pain?	Top	88 (88.0%)	58 (98.3%)	.022
	Middle	9 (9.0%)	1 (1.7%)	.067
	Bottom	3 (3.0%)	0 (0.0%)	.179
Before giving you any new medicine, how often did hospital staff tell you what the medicine was for?	Top	79 (77.5%)	53 (91.4%)	.026
	Middle	15 (14.7%)	5 (8.6%)	.263
	Bottom	8 (7.8%)	0 (0.0%)	.052
Before giving you any new medicine, how often did facility staff describe side effects in a way you could understand?	Top	58 (58.0%)	40 (69.0%)	.171
	Middle	23 (23.0%)	7 (12.1%)	.091
	Bottom	19 (19.0%)	11 (19.0%)	.996
How often were your room and bathroom kept clean?	Top	81 (81.0%)	41 (97.6%)	^a
	Middle	12 (12.0%)	1 (2.4%)	^a
	Bottom	7 (7.0%)	0 (0.0%)	^a
How often was the area around your room quiet at night?	Top	71 (70.3%)	25 (92.6%)	^a
	Middle	26 (25.7%)	2 (7.4%)	^a
	Bottom	4 (4.0%)	0 (0.0%)	^a
Did facility staff talk with you about whether you would have the help you needed when you left the hospital?	Top	93 (93.0%)	48 (92.3%)	.876
	Bottom	7 (7.0%)	4 (7.7%)	.876
Did you get information in writing about what symptoms or health problems to look out for after you left the facility?	Top	91 (90.1%)	57 (98.3%)	.050
	Bottom	10 (9.9%)	1 (1.7%)	.057
What number would you use to rate this facility?	Top	88 (87.1%)	57 (93.4%)	.204
	Middle	12 (11.9%)	4 (6.6%)	.271
	Bottom	1 (1.0%)	0 (0.0%)	.436

Question	HCAHPS Boxes	Inpatient	Outpatient	P-Value
FFT: How likely are you to recommend our practice to friends and family if they needed similar treatment?	Top	89 (89.0%)	61 (95.3%)	.166
	Middle	12 (11.8%)	3 (4.8%)	.166
Did you have problems with nausea?	Top	65 (63.7%)	43 (68.3%)	.552
	Middle	22 (21.6%)	13 (20.6%)	.887
	Bottom	15 (14.7%)	7 (11.1%)	.509
When you think about your recent joint replacement surgery, how did you feel about the nursing care you received? Please rate the anesthesia care you received	Top	94 (92.2%)	61 (98.4%)	.089
	Middle	8 (7.8%)	1 (1.6%)	.089
	Top	95 (94.1%)	59 (93.7%)	.915
When you think about your recent surgical procedure how would you rate the registration process (getting checked in) when you arrived at the facility? Please rate the cleanliness of the facility	Middle	2 (2.0%)	3 (4.8%)	.314
	Bottom	4 (4.0%)	1 (1.6%)	.390
	Top	94 (92.2%)	57 (90.5%)	.707
When you think about your recent surgical procedure how would you rate the registration process (getting checked in) when you arrived at the facility? Please rate the cleanliness of the facility	Middle	8 (7.8%)	5 (7.9%)	.983
	Bottom	0 (0.0%)	1 (1.6%)	.202
	Top	94 (92.2%)	60 (95.2%)	.441
When you think about your recent joint replacement surgery, did you feel that the staff prepared you well for discharge to home?	Middle	5 (4.9%)	2 (3.2%)	.593
	Bottom	2 (2.0%)	1 (1.6%)	.855
	Top	81 (79.4%)	55 (88.7%)	.125
Did you feel that you were safe to go home at the time of discharge?	Middle	11 (10.8%)	7 (11.3%)	.920
	Bottom	9 (8.9%)	0 (0.0%)	.014
	Top	95 (94.1%)	59 (93.7%)	.915
What number would you use to rate your overall experience?	Middle	3 (3.0%)	4 (6.3%)	.298
	Bottom	3 (3.0%)	0 (0.0%)	.167
	Top	91 (89.2%)	60 (95.2%)	.177
	Middle	8 (7.8%)	3 (4.8%)	.441
	Bottom	3 (2.9%)	0 (0.0%)	.170

Does anaesthesia matter?



To cite: Yap E, Wei J, Webb C, et al. *Reg Anesth Pain Med* 2022;47:294–300.

Neuraxial and general anesthesia for outpatient total joint arthroplasty result in similarly low rates of major perioperative complications: a multicentered cohort study



Edward Yap ^{1,2}, Julia Wei,³ Christopher Webb,^{1,2} Kevin Ng,⁴ Matthias Behrends²

Table 2 30-day adverse postoperative outcomes for outpatient knee and hip arthroplasty

Postoperative outcome	Anesthesia type		χ^2 p-value	Unadjusted OR		Adjusted OR from hierarchical multivariable regression*	
	Neuraxial n=10 003	General n=1520		OR (95% CI)	P value	aOR (95% CI)	P value
Major outcome†	175 (1.8)	35 (2.3)	0.13	0.75 (0.52 to 1.09)	0.13	0.85 (0.56 to 1.27)	0.39
Minor outcome‡	325 (3.3)	62 (4.1)	0.09	0.79 (0.60 to 1.04)	0.09	0.83 (0.62 to 1.14)	0.23
Readmission	233 (2.3)	45 (3.0)	0.14	0.78 (0.57 to 1.08)	0.14	0.86 (0.59 to 1.25)	0.39
Individual adverse outcomes							
Mortality	15 (0.2)	3 (0.2)	0.72§	0.76 (0.22 to 2.63)	0.66	0.86 (0.20 to 3.73)	0.83
Myocardial infarction	24 (0.2)	10 (0.7)	0.01§	0.36 (0.17 to 0.76)	0.01	0.48 (0.21 to 1.09)	0.08
Cerebrovascular accident	15 (0.2)	1 (0.1)	0.41	2.28 (0.30 to 17.27)	0.42	2.31 (0.25 to 21.37)	0.44
VTE/PE	92 (0.9)	16 (1.0)	0.61	0.87 (0.51 to 1.49)	0.62	0.87 (0.48 to 1.56)	0.61
Acute renal failure	58 (0.6)	15 (1.0)	0.06	0.59 (0.33 to 1.04)	0.07	0.76 (0.38 to 1.50)	0.40
Urinary tract infection	161 (1.6)	31 (2.0)	0.22	0.79 (0.52 to 1.16)	0.22	0.82 (0.50 to 1.34)	0.40
Surgical site infection	131 (1.3)	25 (1.6)	0.29	0.79 (0.52 to 1.22)	0.29	0.83 (0.51 to 1.33)	0.41
Pneumonia	43 (0.4)	10 (0.7)	0.22	0.65 (0.32 to 1.30)	0.22	0.76 (0.36 to 1.61)	0.45

*All hierarchical multivariable regression models adjusted for age, race/ethnicity, sex, BMI, ASA class and accounting for clustering by hospital facility.

†Major outcome composite incidence of mortality, myocardial infarction, cerebrovascular event, VTE/PE, acute renal failure.

‡Minor outcome composite incidence of urinary tract infection, surgical site infection, pneumonia.



Table 3 Secondary outcomes for outpatient total knee and hip arthroplasty^{‡§}

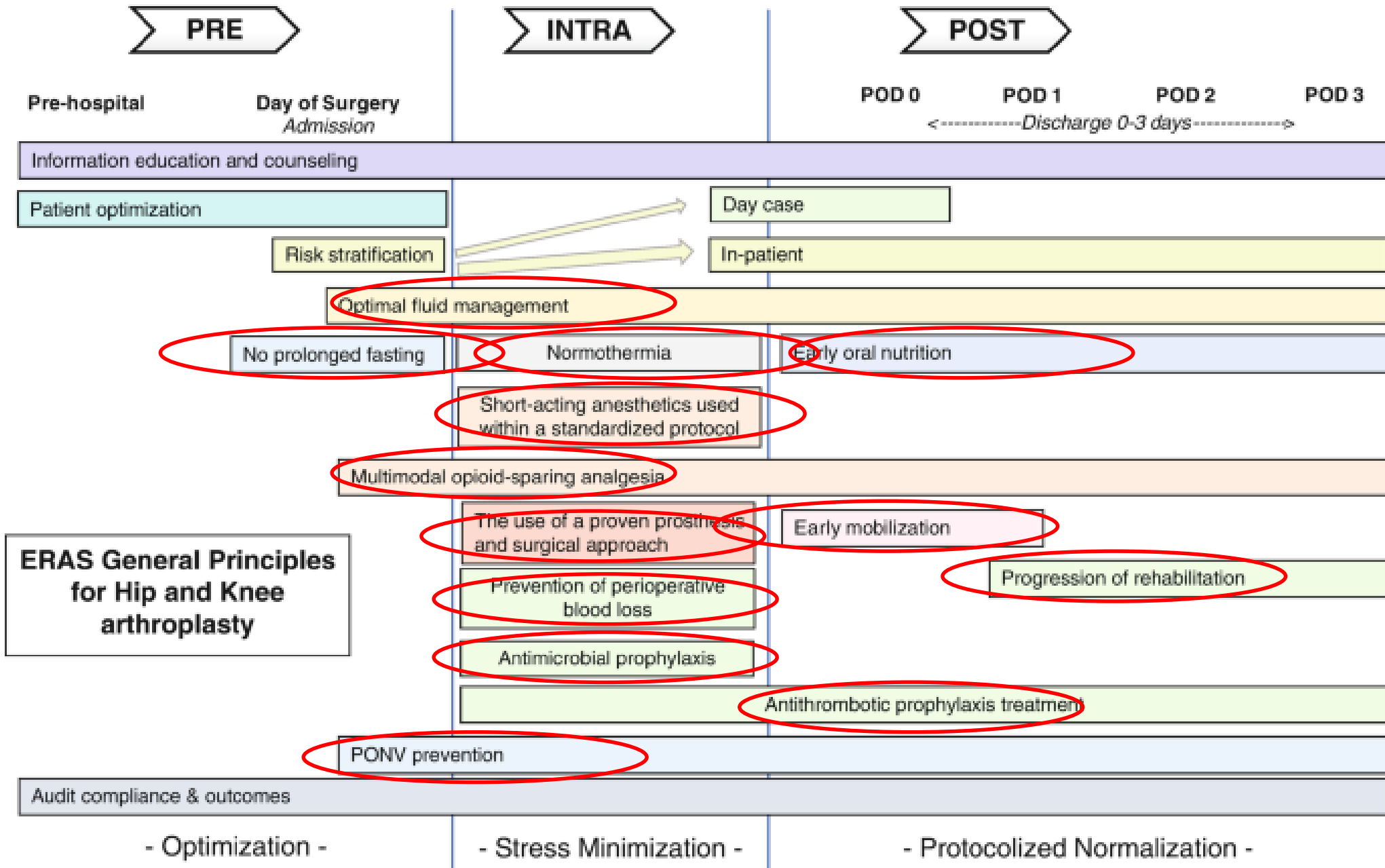
Postoperative outcome	Anesthesia type		P value
	Neuraxial n=10 003	General n=1520	
Pain and PONV outcomes			
Intraoperative opioid (MME), median (Q1–Q3)	0 (0–22.5)	40 (19–65)	<0.01
PACU opioid usage (MME), median (Q1–Q3)	15 (7.5–37.5)	36 (15–60)	<0.01
PACU average pain scores, median (Q1–Q3)	1.5 (1.1–2.3)	2.5 (1.8–3.2)	<0.01
PACU maximum pain scores, median (Q1–Q3)	5 (2–7)	7 (5–8)	<0.01
PACU PONV, n (%)	297 (3.0)	69 (4.5)	0.01*
Blood loss and transfusion outcomes			
Intraoperative blood loss (mL), median (Q1–Q3)	50 (25–100)	75 (45–100)	<0.01
Transfusion (intraoperative and postoperative), n (%)	13 (0.1)	9 (0.6)	<0.01†
Tranexamic acid administered, n (%)	9646 (96.4)	1492 (98.2)	<0.01*
Duration and admission outcomes			
Surgical duration (min), median (Q1–Q3)	76 (66–87)	86 (74–101)	<0.01
Length of PACU stay (min), Median (Q1–Q3)	188 (111–278)	136 (89–225)	<0.01
Admitted after surgery, n (%)	2336 (23.4)	502 (33.0)	<0.01*

- **First, the surgeon and institution should have appropriate insight and accompanying data regarding their current performance and their capability to perform early discharge hip and knee arthroplasty**
- **The essential elements identified that require optimization are:**
 - Patient selection (on medical grounds)
 - Patient education and expectation management (e.g. preoperative “joint school”)
 - Social support and environmental factors (family or professional outpatient support)
 - Clinical and surgical team expertise
 - Institution facility or surgery center factors (history of successful team work and an environment conducive to optimizing surgical outcomes)
 - Evidence based protocols and pathways for pain management, blood conservation, wound management, mobilization, and VTE prophylaxis.
- **It is our position that some total hip and knee replacements can be appropriately performed in the outpatient setting with safe discharge the day of surgery if the above-mentioned factors, elements, and sufficient practitioner and surgeon experience are maintained.**

Joint replacement in LUHS Hospital. Are we ready for day case?

- Buildings ↑
- Population ↓





PRE

INTRA

POST

Pre-hospital

Day of Surgery
Admission

POD 0

POD 1

POD 2

POD 3

<-----Discharge 0-3 days----->

Information education and counseling

Patient optimization

Risk stratification

Day case

In-patient

Optimal fluid management

No prolonged fasting

Normothermia

Early oral nutrition

Short-acting anesthetics used
within a standardized protocol

Multimodal opioid-sparing analgesia

The use of a proven prosthesis
and surgical approach

Early mobilization

Prevention of perioperative
blood loss

Progression of rehabilitation

Antimicrobial prophylaxis

Antithrombotic prophylaxis treatment

PONV prevention

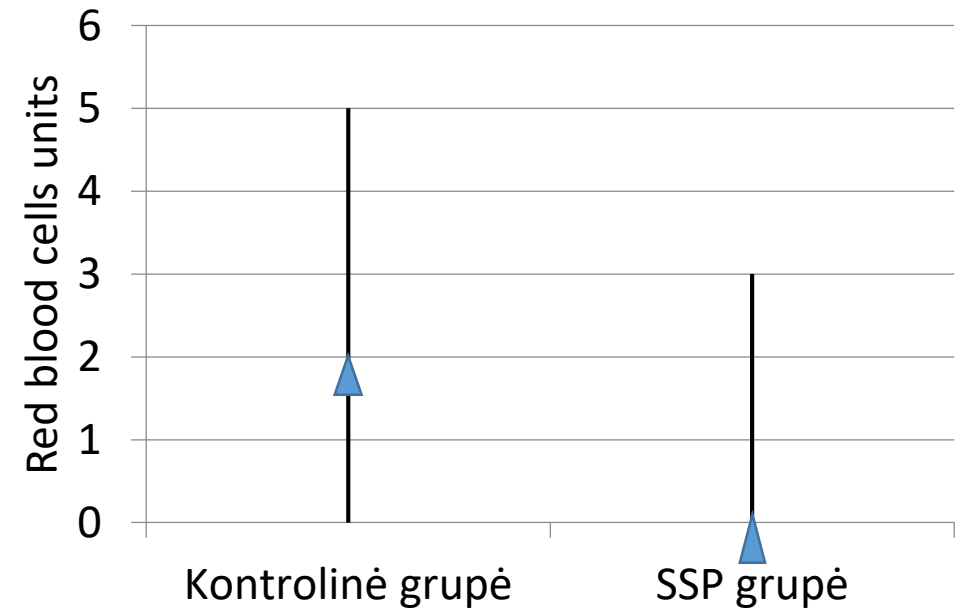
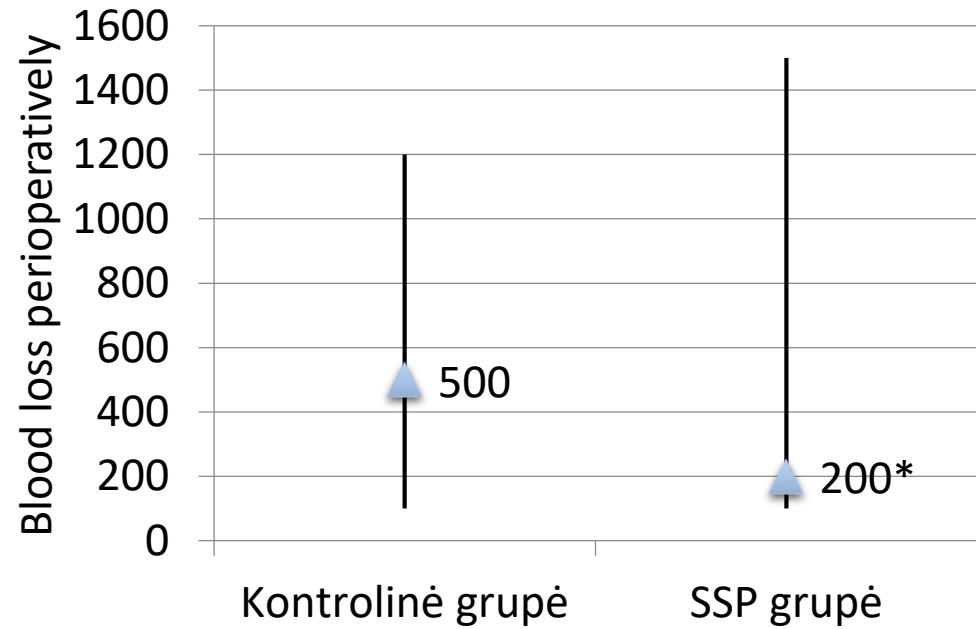
Audit compliance & outcomes

- Optimization -

- Stress Minimization -

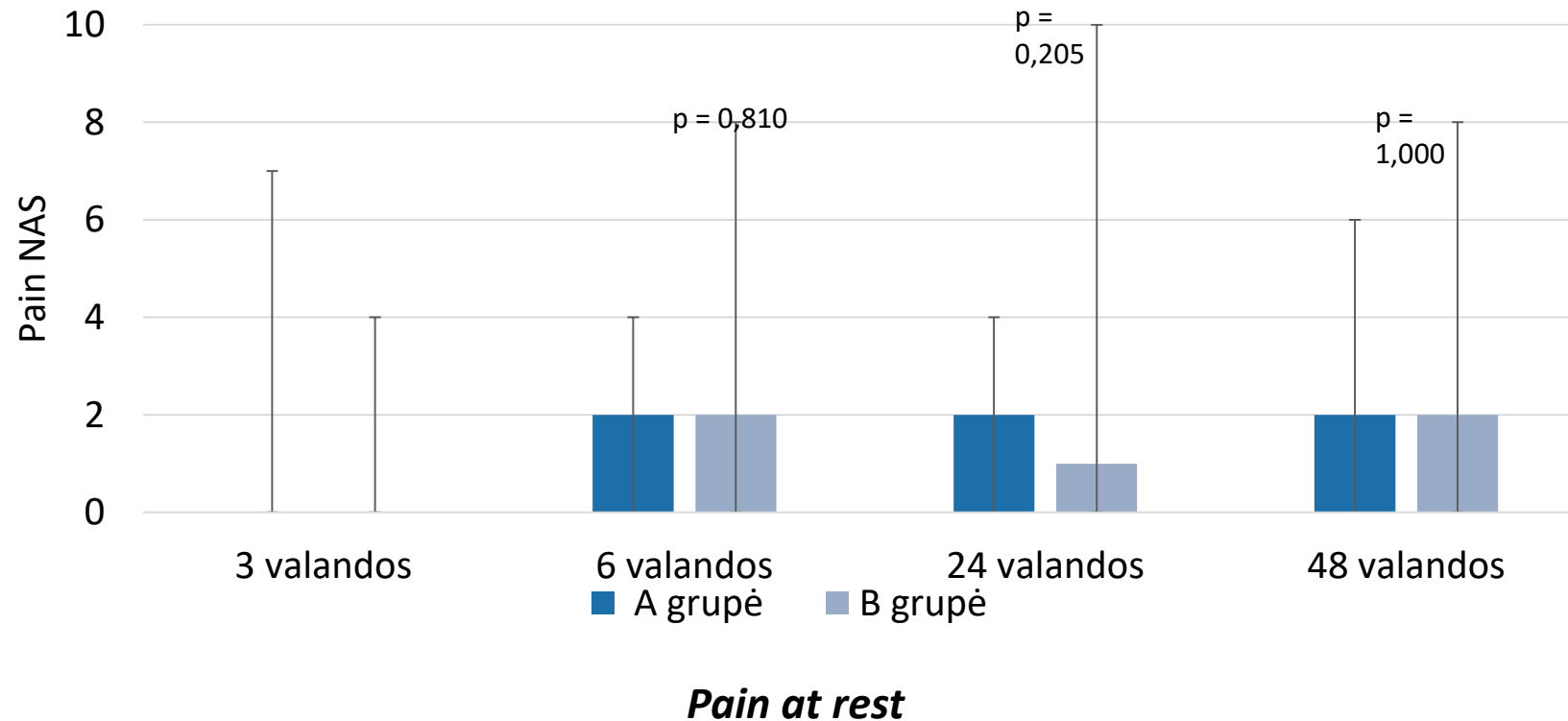
- Protocolized Normalization -

A. Gelmanas, J. Stankūnaitė. ERAS protocol implementation and perioperative blood loss in primary hip and knee arthroplasty in LUHS hospital, 2017

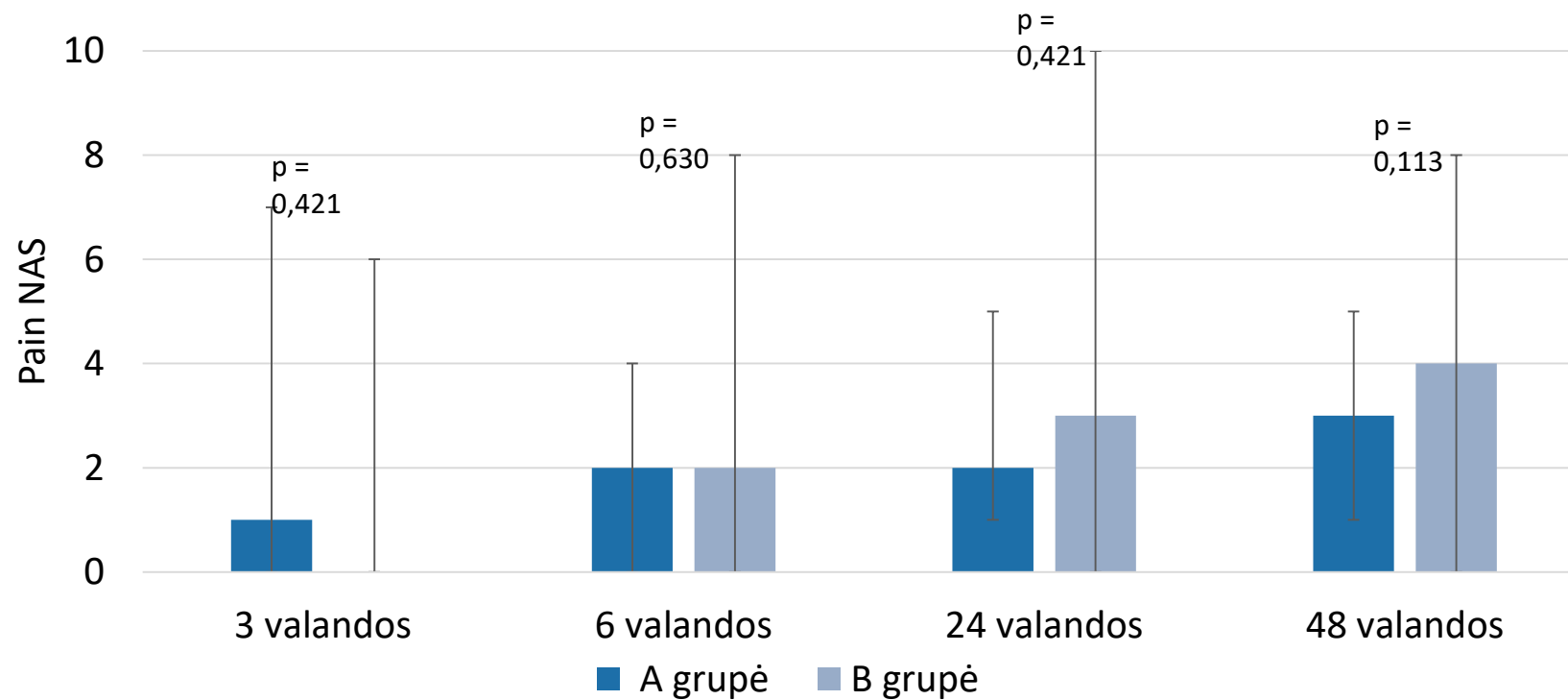


G. Aldauskaite, A. Gelmanas. *Two peripheral nerve blocks for total knee arthroplasty: postoperative pain management and functional recovery. 2022*

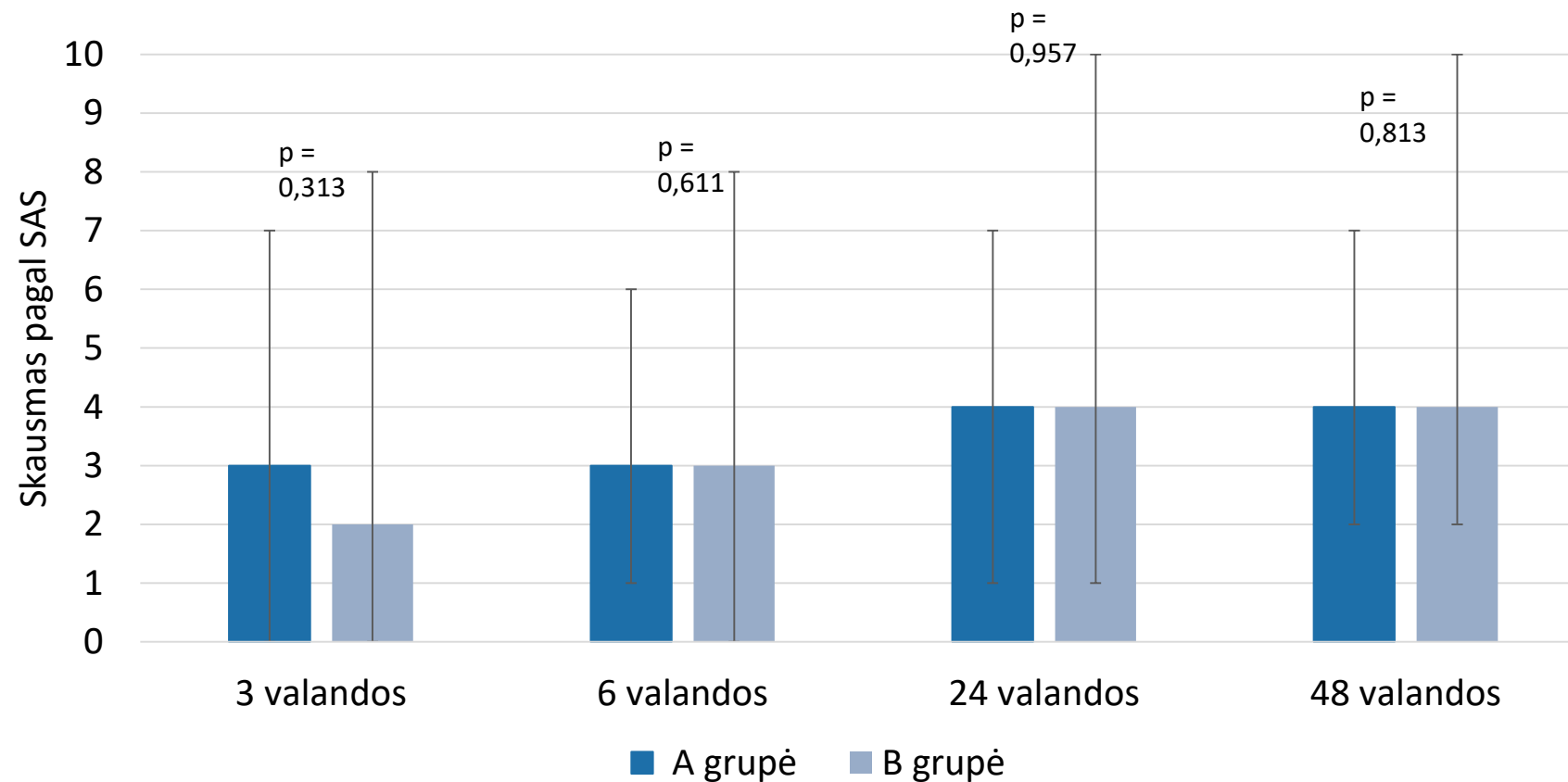
All patients: regional, systemic analgesia, LIA



Intensity of knee pain passively bending the leg at an angle of 45°



Intensity of knee pain according to VAS after surgery when actively bending the leg at an angle of 45°





Time after surgery	A, sec	B, sec	P value
24 hrs	34,32 [26,74-69,46]	38,10 [16,38-97,07]	0,575
48 hrs	31,36 [23,28-63,62]	36,65 [16,91-86,01]	0,232

Time Up and Go test

ERAS in LUHS hospital. Are we ready for day case?

Preoperative period	Intraoperative period	Postoperative period
Health status evaluation and optimisation	Antiagregants/anticoagulants, thromboembolic prophylaxis	Early mobilisation;
Nutrition status	Same day hospitalisation	Effective postoperative analgesia/ no opioids
Physical activity and prehabilitation	No sedative premedication	Aggressive treatment of PONV
Comorbidities	Clear fluids until 2 hours before induction of anesthesia and a 6-hour fast for solid food.	Early oral nutrition (in 12 hrs)
Informed consent and education (4-6 weeks before operation)	Antibiotics single dose, 1 hour before skin incision and further doses for procedures lasting more than 3 hours.	Discharge criteria, information
Discharge planning	No bowel preparation	Contact in 24 hrs after discharge
Anaemia diagnostic and treatment	Carbohydrate enriched drinks preoperatively;	Special requirements
	Selective use of drains/Urinary drainage	Systematic audit
	Fluid restriction, avoiding hypovolemia, sodium and fluid overload Goal-directed fluid therapy in high-risk cases	
	Standard anesthetic protocol: low dose spinal with regional/local anesthetics, pain management	
	Maintenance of normothermia	

Are we ready for day case? No...

Why?

1. Preoperative consultations and prehabilitation
2. Postoperative nursery
3. Postoperative online consultations and physiotherapy...
4. Postoperative medications

But we have 18-21 days of rehabilitation for all after 3 days in hospital



CC25220

But I'm not convinced we ought to...

Safety and outcomes of outpatient compared to inpatient total knee arthroplasty: a national retrospective cohort study

To cite: Mai HT, Mukhdomi T, Croxford D, et al. *Reg Anesth Pain Med* 2021;46:13–17.

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Table 2 Matched comparisons and relative risk of adverse event rates that occurred any time after surgery in outpatient versus inpatient total knee arthroplasty

	Outpatient, n	Inpatient, n	Risk difference (95% CI)	P value
Death	0	2	-0.18 (-0.43 to 0.07)	0.30
Sepsis/septic shock	1	0	0.09 (-0.09 to 0.27)	0.44
Unplanned intubation	2	1	0.09 (-0.22 to 0.40)	0.69
On ventilator >48 hours	1	1	0.00 (-0.25 to 0.25)	1.00
Stroke/cerebrovascular accident	2	0	0.18 (-0.07 to 0.43)	0.30
Cardiac arrest	0	1	-0.09 (-0.27 to 0.09)	0.44
Myocardial infarction	2	0	0.18 (-0.07 to 0.43)	0.30
Renal failure	0	0	-	-
Thromboembolic event	12	6	0.55 (-0.21 to 1.30)	0.30
Wound-related infection	7	5	0.18 (-0.43 to 0.80)	0.69
Return to the operating room	14	6	0.73 (-0.07 to 1.52)	0.30
Renal insufficiency	2	3	-0.09 (-0.49 to 0.31)	0.76
Urinary tract infection	4	4	0.00 (-0.50 to 0.50)	1.00
Wound dehiscence	5	0	0.45 (0.06 to 0.85)	0.17
Pneumonia	6	2	0.36 (-0.14 to 0.87)	0.30
Blood transfusion	14	21	-0.64 (-1.68 to 0.41)	0.36
Readmission	31	22	0.82 (-0.46 to 2.10)	0.36
SAE	35	15	1.82 (0.58 to 3.06)	0.005
MAE	30	29	0.09 (-1.26 to 1.44)	0.98
Any AE	57	41	1.46 (-0.27 to 3.18)	0.30
MAE (without transfusion)	17	9	0.73 (-0.18 to 1.63)	0.30
Any AE (without transfusion)	47	22	2.27 (0.82 to 3.73)	0.047

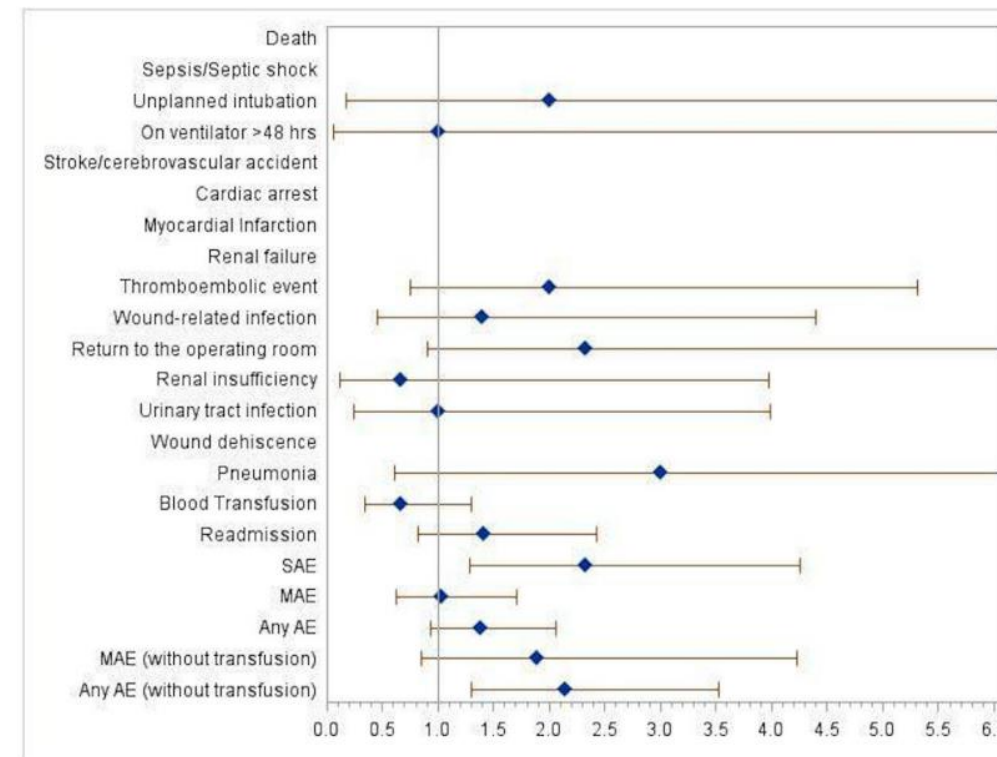



Figure 2 Forest plots comparing the relative risk of postoperative complications between outpatient total knee arthroplasty and inpatient total knee arthroplasty. Diamonds represent the point estimate for relative risk; line represents 95% CIs. AE, adverse event; MAE, minor adverse event; SAE, serious adverse event.

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- In summary, patients undergoing outpatient total knee replacement have a **greater composite risk of SAEs** when compared with patients undergoing total knee replacement in the inpatient setting.
- It is the responsibility of the surgical and anesthesia teams to protect patient safety during the current movement towards outpatient TKA. Future studies that incorporate up-to-date clinical practices are warranted to determine the safety of outpatient TKA.
- Meanwhile, anesthesiologists and surgeons should inform their patients of the potential risks of having TKA in the outpatient setting

Thank you 😊

