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ABSTRACTS OF THE JOINT ANNUAL CONGRESS 2026

INTERLAKEN, NOVEMBER 5–7, 2026

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ORAL PRESENTATIONS

OP 1

Current practice of neuromuscular block management in paediatric anaesthesia and intensive care: an international survey

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Background: Neuromuscular blocking agents (NMBA) are used to facilitate tracheal intubation in both adults and children. However, the paediatric population is highly heterogeneous with regard to age, resulting in relevant differences in physiological and pharmacological responses. Consequently, NMBA use, monitoring, and reversal may vary considerably in clinical practice. Although recent guidelines by the European Society of Anaesthesiology and Intensive Care (ESAIC) and the European Society of Paediatric Anaesthesia (ESPA) provide recommendations, real-world practice remains insufficiently characterised. We aimed to identify and characterize self-reported NMBA practice patterns across different European and non-European countries prior to publication of the ESAIC-ESPA guidelines.

Methods: We performed an international, anonymous, cross-sectional, web-based survey conducted between 12 November and 12 December 2025 consisting of 36 questions regarding the practice of NMBA.

Results: The survey was accessed by 904 persons from 43 countries, and 874 responses were included in the analysis. Most participants were from Europe (83.5%) and worked in mixed paediatric anaesthesia and intensive care settings (71.2%). Rocuronium was the most used NMBA for routine tracheal intubation (68%, 95%CI 65-71) and for rapid sequence intubation (67%, 95%CI 64-70). NMBA were used “always” or “mostly” before routine intubation in 47% of neonates (≤ 30 days) and 50% of infants (<1 year), whereas “rarely” or “never” use was reported in 30% and 24%, respectively. Most respondents (56%) assessed adequate NMB using a fixed time interval after NMBA administration. NMBA reversal was administered “always” before extubation by 27% of respondents, while 9.3% and 2.9% reported “rarely” or “never”. Only half of the participants used quantitative neuromuscular monitoring to guide reversal. Sugammadex was used by 47%.

Conclusion: Self-reported NMBA practice in paediatric anaesthesia and intensive care shows substantial variability, particularly in neonates and infants. A considerable proportion of patients are intubated without NMBA and extubated without consistent reversal. Furthermore, quantitative neuromuscular monitoring remains underused. These findings underline the importance of implementation on a local level with the aim to improve paediatric care.

OP 2

Association of Disturbed Cerebral Autoregulation during Major Noncardiac Surgery with the Biomarker of Neurological Injury Neurofilament Light

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Background: Disturbed cerebral autoregulation (cAR) is associated with neurological injury including perioperative stroke, cognitive decline, delirium and neuron-specific biomarker rise in cardiac surgery. Neurofilament light chain (NfL), a highly neuron-specific biomarker of axonal injury, rises postoperatively and correlates with delirium and stroke. Evidence in noncardiac surgery is scarce. This study aimed to investigate the association of i) disturbed cAR and ii) of mean arterial pressure <65 mmHg with postoperative NfL rise as a surrogate for neurological injury.

Methods: This substudy of AUTOREGULATE-NONCARDIAC, a prospective multicentre cohort study on the clinical implications of cAR monitoring, included 309 patients aged ≥65 years at cardiovascular risk. Cerebral autoregulatory function was assessed using the cerebral oximetry index (COx) derived from cerebral near infrared-spectroscopy. Serum NfL was measured using a chemiluminescent enzyme immunoassay preoperatively and on postoperative day 2. In separate multivariable linear regression models the associations of burden of disturbed cAR (area under threshold [AUT] with MAP under the lower limit of cAR [AUTLLA], area above threshold [AAT] with MAP above the upper limit of cAR [AATULA], AAT with abnormal COx of ≥ 0.3 [AATCOx], deviation from optimal MAP [MAPOPT]) and burden of MAP <65 mmHg (AUT65) with the perioperative NfL rise were investigated. All models were adjusted for age, revised cardiac risk index, anaesthetic duration and type, ICU admission, and CRP trajectory. In sensitivity analyses models were adjusted for eGFR.

Results (Preliminary Analysis) Median baseline NfL of 26.6 (IQR 18.4-39.4) pg/ml rose significantly with a median of 11.4 pg/ml (P<0.001). No measures of disturbed cAR were associated with postoperative NfL rise in primary models (AUTLLA P = 0.8, AATULA P = 0.6, AATCOx P = 0.1, MAPOPT P = 0.7). In the exploratory analysis and all sensitivity analyses, AUT65 was associated with perioperative NfL rise (P = 0.002). Anaesthetic duration was associated with NfL rise in all models (P = 0.001-P = 0.02).

Conclusion: In preliminary analyses, intraoperative hypotension (MAP <65 mmHg) and anaesthetic duration were independently associated with postoperative NfL rise. In contrast, disturbed cAR was not. Impaired cAR may not be a driver of NfL-based perioperative neuronal injury in noncardiac surgery. Further research on the mechanisms underlying perioperative neurological injury is needed.

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OP 3

Lower Preoperative Thyroxine (T4) is Associated with Higher 30?Day and 1?Year Mortality After Elective Adult Cardiac Surgery with Cardiopulmonary Bypass

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Background: Thyroid hormones are key regulators of cardiovascular and metabolic homeostasis, and thyroid dysfunction is common during critical illness and major surgical stress. While low-T3 syndrome has been linked to adverse outcomes after cardiac surgery, the prognostic relevance of thyroid hormones in largely euthyroid, elective surgery patients remains poorly characterized. We investigated the association between preoperative thyroid hormone levels and short- and long-term mortality after elective adult cardiac surgery with cardiopulmonary bypass.

Methods: This retrospective analysis of the prospective Bern Perioperative Biobank cohort included 519 patients undergoing elective cardiac surgery with cardiopulmonary bypass at Bern University Hospital in 2019. Preoperative free T3, free T4, and thyroid-stimulating hormone (TSH) were measured before induction of anesthesia. Associations between thyroid hormone levels and 30-day and 1-year all-cause mortality, myocardial infarction, and stroke were assessed using multivariable logistic regression, adjusted for age, sex and Body Mass Index.

Results: Median patient age was 67.0 years (IQR 59.5–73.0), and 21.6% were female. Higher preoperative T4 was associated with lower odds of 30-day mortality (OR 0.63, 95% CI 0.42–0.89; p = 0.016) and 1-year mortality (OR 0.76, 95% CI 0.61–0.92; p = 0.009). Neither T3 nor TSH showed significant associations with mortality at either time point.

Conclusion: Among elective cardiac surgery patients, lower preoperative T4 – but not T3 or TSH – was associated with increased 30-day and 1-year mortality. These findings suggest that preoperative T4 may reflect physiological reserve and vulnerability to perioperative stress in elective cardiac surgery patients, warranting further mechanistic and validation studies.

OP 5

Clonidine to prevent postictal delirium after ElectroConvulsive Therapy: a randomised, placebo-controlled, triple-blind, single-centre trial (ECaTa)

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Background: Electroconvulsive therapy (ECT) is an effective treatment for psychiatric disorders, but may lead to post-procedure delirium in up to 65% of patients. Severe agitation may be dangerous for patients or staff. Clonidine, a central-acting alpha2-receptor agonist is an approved antihypertensive with known sedative side effects.

Aim: We hypothesise that pre-treatment with clonidine will significantly reduce the incidence of post-procedure delirium.

Study Design: Prospective, randomised, placebo-controlled, triple blind, single-centre, two-arm parallel groups superiority trial.

Patients & Setting: Patients scheduled for an elective series of ECT (12 sessions, 3 sessions per week) at Bern University Hospital.

Intervention: Block-randomisation to clonidine 2 mcg/kg or placebo prior to ECT. All other procedures were unchanged.

Primary Endpoint: Incidence of post-procedure delirium over all sessions, assessed by Confusion Assessment Method for the ICU (CAM-ICU).

Results: From 2021–2026, 130 patients with comparable baseline characteristics were included: (clonidine / placebo): age 59y / 56y, female sex 61% / 64%, ASA 1&2 63% / 60%, major depression 84% / 74%, Hamilton Depression Rating Scale 28p / 28p. Incidence of delirium over all sessions was lower in the clonidine group (72% vs. 81%, p <0.001). The relative risk reduction was -8.9% (95%-CI -17.5% – –0.2%). Incidence of mild agitation (RASS +1) was lower in the clonidine group (41.3% vs 64.4%, p = 0.014), incidence of severe agitation (RASS >1) was not different (25.4% vs 41.5%, p = 0.081). Use of rescue medication for delirium was comparable. There were more episodes of hypotension in the clonidine group (57.1% vs 30.8%, p = 0.005). Other safety outcomes such as the use of cardiovascular drugs, incidence of bradycardia, quality of seizure or length of stay were comparable.

Discussion: This is the first randomised controlled trial assessing the effect of clonidine on post-procedure delirium after ECT. Premedication with clonidine 2 mcg/kg significantly reduced incidence of post-procedure delirium, although it did not reduce incidence of severe agitation. Despite more recordings of hypotensive events, the use of cardiovascular drugs and other safety outcomes were comparable. Clonidine appears as a safe and cost-effective way to prevent post-procedure delirium after ECT. This potentially makes this highly efficient treatment safer and more accessible for patients with otherwise refractory psychiatric illness.

OP 6

Observed treatment effects in anaesthesia and pain trials: A Bayesian reanalysis of the Cochrane Database of Systematic Reviews

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Background: Clinical trials in anaesthesia and pain medicine show, compared to other disciplines, a high rate of statistically significant results, pronounced small-study effects and modest sample sizes. Given the increased risk of false positive findings and inflated effect estimates in underpowered trials, an assessment of the likely treatment effects is crucial to realistically size clinical trials. We therefore performed a Bayesian reanalysis of the trials reported in the Cochrane Database of Systematic Reviews (CDSR) to characterise the probabilistic distribution of treatment effects in this field.

Methods: We screened all Systematic Reviews in the CDSR under the topic "Pain & anaesthesia" from inception until the end of 2025. We considered only binary outcomes and performed a reanalysis of each available meta-analysis and reported trial by means of a Bayesian random-effects model. The primary endpoint was the posterior distribution of the absolute risk difference (ARD) for all outcomes and stratified according to outcomes related to mortality, infarction, hypotension and pain. The replication power was computed for trials with statistically significant outcomes.

Results: We analysed 291 systematic reviews, including 5472 meta-analyses, with a total of 5,034,217 outcomes. Pooled across meta-analyses, the median absolute risk difference was 4% (95%-CrI: 0%-41%) with risk differences for outcomes related to mortality (3%, 95%-CrI: 0%-23%), infarction (0.8%, 95%-CrI: 0%-10%), hypotension (2%, 95%-CrI: 0%-28%) and pain (15%, 95%-CrI: 0%-53%). In total, 5788/25726 (22%) of

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reported study outcomes were statistically significant (p <0.05) with a median replication power of 54% (95%-CrI: 3%-100%). To reproduce the observed statistically significant treatment effects, individual randomised trials would require a median sample size about twice the actual size (N = 219 versus N = 100).

Discussion: This large-scale Bayesian reanalysis provides probabilistic treatment effect estimates that can help clinicians realistically size clinical trials with binary outcomes. Overall, there was only a 50% probability of a treatment effect above 4%. Even in pain medicine, where larger treatment effects were observed, this probability reached only 50% for effects above 15%. The findings support the case for larger, adequately powered trials in anaesthesia and pain medicine in order to provide robust evidence that ultimately shapes systematic reviews and clinical guidelines the field relies on.

OP 7

Decisional Regret at 6 and 12 Months in Patients and Close Relatives Following Major Abdominal Surgery for cancer: A Prospective Cohort Study

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Importance: Decisional regret, distress following a healthcare decision, remains rarely discussed preoperatively in major cancer surgery. Its prevalence, evolution, and risk factors are largely unknown.

Objective: To quantify decisional regret among patients and close relatives at 6 and 12 months after major abdominal cancer surgery, describe its evolution, and identify associated factors.

Design, Setting, and Participants: Substudy of a prospective cohort study (ChangeQoL) conducted at the University Hospitals of Geneva (September 2020–June 2025). Adults scheduled for elective gastrectomy, esophagectomy, pancreatic resection, or hepatectomy, and their designated close relatives, were enrolled. Patients with severe cognitive impairment or psychotic disorders were excluded.

Main Outcomes Decisional regret was assessed using the validated Decision Regret Scale (DRS, 0–100), categorized as no regret (DRS = 0), mild (1–25), or moderate-to-severe (>25). Patient–close relative agreement was assessed by intraclass correlation coefficient (ICC) and Bland-Altman analysis. Associations with health-related quality of life (HRQoL) trajectory and Clinical Frailty Scale (CFS) were examined.

Results: Of 295 enrolled patients (mean age 65.2 years; 63.7% male; 51.2% ASA III), 284 (96%) designated a close relative. At 6 months, 58.2% of patients reported regret, including 25.1% with moderate-to-severe regret. Among close relatives, 49.6% reported regret, with 22.1% moderate-to-severe. At 12 months, patient regret declined significantly to 42.9% (p = 0.001), while close relative regret remained stable (43.6%; p = 0.25). ICC was 0.67 at 6 months and 0.72 at 12 months, with greater discordance at higher regret levels. Postoperative HRQoL deterioration was associated with moderate-to-severe regret in both groups (p <0.05). Frailty was strongly associated with regret at 12 months (40% in fit patients [CFS 1–4] vs. 88% in frail patients [CFS 5–6]; p = 0.02).

Conclusions: Decisional regret is common after major abdominal cancer surgery, affecting more than half of patients and nearly half of close relatives at 6 months. It declined among patients by 12 months but persisted in a substantial proportion and remained stable among close relatives. HRQoL deterioration and frailty were independently associated with regret. These findings support integrating discussion of postoperative regret into preoperative shared decision-making with both patients and their close relatives.

OP 8

The PRECISION study: Impact of cerebral autoregulation on neurological outcomes in patients undergoing cardiac surgery – preliminary results from an international, multicentre, prospective cohort study

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Introduction: Neurological complications are a major risk after cardiac surgery, and optimal blood pressure (BP) targets remain uncertain. Personalised cerebral autoregulatory (CA)-guided haemodynamic management may help identify patient-specific mean arterial pressure (MAP) targets, potentially reducing brain injury. This study was designed to assess CA and its association with neurological outcomes.

Methods: PRECISION is an international, multicentre, prospective cohort study including patients ≥65 years undergoing elective cardiac surgery with cardiopulmonary bypass (CPB). CA was derived from near-infrared spectroscopy (NIRS)-based cerebral oximetry (COx) and haemoglobin volume (HVx) indices. Thresholds of 0.35 (COx) and 0.30 (HVx) defined the lower (LLA) and upper (ULA) limits of CA. The MAP at the nadir of the CA curve defined optimal MAP. Postoperative delirium (PD) was assessed daily up to day 7 using 3D-CAM/CAM-ICU. Final analyses of associations between the product of magnitude and duration (mmHg·h) from individual CA limits and PD (primary endpoint), stroke, and major morbidity/mortality are ongoing.

Results: A total of 510 patients were recruited between 03/2023–04/2026. These preliminary findings include the first 200 consecutively enrolled patients and are restricted to CA feasibility and descriptive characteristics. Median age was 74 years (IQR 69–78), EuroSCORE II 1.8 (IQR 1.3–2.9); 73% were male. Median surgical and CPB durations were 228 (IQR 195–288) and 112 min (IQR 91–148), respectively. PD occurred in 48.7%. Pre-CPB, the LLA and ULA were identified in 71% and 66%, with median values of 62 (IQR 57–68) and 90 mmHg (IQR 84–99), respectively; optimal MAP was identified in 81%, with a median of 76 mmHg (IQR 68–84). Regarding deviation from the CA limits, the median exposure pre-CPB below the LLA was 1.1 (IQR 0.3–3.7), above the ULA 0.5 (IQR 0.1–1.1), and total 2.4 mmHg·h (IQR 0.9–4.6). During CPB, total exposure largely increased to 7.7 mmHg·h (IQR 2.3–18.7) due to an increase in the exposure below LLA (7.6, IQR 2.2–18.5).

Discussion: The PRECISION study demonstrates the feasibility of high-quality CA monitoring in cardiac surgery. CA metrics were successfully obtained in most patients, supporting real-time clinical applicability. CA limits showed marked variability,

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whereas exposure outside CA limits was high and predominantly occurred during CPB, highlighting a substantial burden of potential cerebral hypoperfusion relative to individual CA thresholds.

OP 9

Impact of Multimodal versus Opioid-Based Anaesthesia on Short-Term Quality of Recovery after Major Surgery: a Single-Centre Randomised Controlled Trial (the MOPAC Trial)

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Background and Goal of Study: Opioid-related adverse effects have renewed interest in opioid-sparing strategies such as multimodal adjunct regimens. We evaluated whether protocolized multimodal anaesthesia MMA improves patient-centred outcomes measured by the 15-item Quality of Recovery score (QoR-15).

Materials and Methods: In this randomised, double-blind single-centre trial adult patients undergoing general anaesthesia for major elective surgery in four subspecialities were enrolled June to September 2025. 245 patients were allocated 1:1 to a protocolised multimodal bundle (dexmedetomidine, ketamine, magnesium and lidocaine intraoperatively) added to usual care or to opioid-based anaesthesia. The primary outcome was the QoR-15 on the first postoperative day (POD 1). Secondary outcomes included intraoperative and cumulative morphine milligram equivalents (MME) and pre-specified adverse events.

Results and Discussion: 232 participants were included in the modified intention-to-treat analysis. The baseline characteristics were balanced. QoR-15 on POD 1 did not differ (median 110 [IQR 91–125] vs 110 [91–126]; median difference −1 point, 95% CI −7 to 6; one-sided P = 0.381), the upper bound excluding a clinically meaningful benefit. Intraoperative MME was 43% lower (120 vs 211; P<0.001), and cumulative MME remained lower through POD 2 (153 vs 231; P<0.001). On POD 2, more MMA patients received opioids (36.0% vs 22.0%; P = 0.028). Sedation on PACU arrival was slightly deeper in the intervention group, normalising by discharge. Pain, postoperative nausea and vomiting, and prespecified adverse events did not differ.

Conclusions: Adding an intraoperative multimodal bundle to established care in accordance to enhanced recovery after surgery ERAS reduces substantially perioperative opioid exposure. However, this does not translate into improved patient-centered recovery, pain, or postoperative nausea and vomiting.

OP 10

Current evidence of multimodal anaesthesia on postoperative outcomes: A Systematic Review and Meta-Analysis

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Background: Multimodal anaesthesia MMA is a broadly adopted anaesthetic regimen with the aim to reduce opioid exposure and improvement of postoperative recovery. Despite its widespread use systematically synthesized evidence for bundled intraoperative multimodal interventions is lacking with regard to patient-centred outcomes.

Materials and Methods: In this systematic review and meta-analysis of randomized controlled trials we compared MMA (defined as use of opioids plus ≥2 adjuncts; including regional techniques and/or systemic agents such as dexmedetomidine, ketamine, intravenous lidocaine, clonidine, or magnesium) with opioid-based general anaesthesia in adults undergoing elective surgery. Primary outcomes were postoperative pain scores, incidence of postoperative nausea and vomiting PONV, quality of recovery, and pulmonary complications. Secondary outcomes included opioid consumption in Morphine Milligram Equivalent MME and length of stay in the postoperative anaesthesia care unit PACU. Risk of bias was assessed with the RoB 2 tool and certainty with the GRADE approach.

Results and Discussion: After screening 29’317 records, 21 RCTs (participants n = 1,828) were included. At the timepoint 24 hours postoperatively, no clear effect of MMA on pain intensity was observed (10 trials, n = 785; MD −0.6, 95% CI −1.5 to 0.2; very low certainty); however, it reduced the incidence of PONV (4 trials, n = 352; RR 0.59, 95% CI 0.44 to 0.77; low certainty). With regard to secondary outcomes, MMA reduced opioid consumption in the first 24 hours (10 trials, n = 915; MD −7.0 mg MME, 95% CI −12.8 to −1.3; moderate certainty), with the opioid-sparing effect persisting at 48 hours (MD −14.0 mg MME) and study end (MD −16.0 mg). Data for quality of recovery, PACU stay, and pulmonary complications were insufficient for pooling.

Conclusions: MMA shows no clear effect on postoperative pain at 24 hours but reduces PONV incidence and opioid consumption. Evidence certainty ranges from moderate to very low. Larger, standardized trials are needed to define optimal MMA regimens and patient selection.

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POSTERS

P 1

IPACK versus selective tibial nerve block for analgesia after anterior cruciate ligament reconstruction: a randomised controlled triple-blinded trial

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Introduction: Both the iPACK (infiltration between the popliteal artery and the capsule of the knee) and the selective tibial nerve block (STNB) provide analgesia on the posterior aspect of the knee after anterior cruciate ligament (ACL) reconstruction. This randomised controlled triple-blinded trial tested the hypothesis that iPACK provides superior analgesia to STNB after ACL reconstruction, with additional focus on early and late functional outcomes.

Methods: Eighty ACL reconstruction patients under general anaesthesia with a femoral triangle block were randomly allocated to 2 groups: iPACK with ropivacaine 0.2%, 20mL or STNB with ropivacaine 0.75%, 5mL. Postoperative pain treatment followed a pre-defined protocol with intravenous PCA of morphine, paracetamol, and ibuprofen. The primary outcome was cumulative intravenous morphine consumption at 24h postoperatively. Secondary pain-related outcomes included pain scores at rest and on movement (visual analogue scale out of 10) measured at 2, 24 and 48h. Early functional-related outcomes evaluated were range of motion, quadriceps strength, and walking distance measured at 24 and 48h. Late functional-related outcomes included concentric quadriceps strength, single-hop test, and Y balance test, measured at 4 and 8 months.

Results: Mean (standard deviation) cumulative intravenous morphine consumption at 24h postoperatively was similar between groups (iPACK group: 15 [13] mg; STNB group: 22 [17] mg; p = 0.06). No significant differences between groups were seen in the secondary pain- or early, late functional-related outcomes.

Discussion: IPACK and STNB provide comparable postoperative analgesia after ACL reconstruction under general anaesthesia with a femoral triangle block, with similar impact on early, and late functional outcomes.

P 2

IPACK versus selective tibial nerve block for analgesia after total knee arthroplasty: a randomised controlled triple-blinded trial.

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Introduction: Both the iPACK (infiltration between the popliteal artery and the capsule of the knee) and the selective tibial nerve block (STNB) provide analgesia on the posterior aspect of the knee after total knee arthroplasty (TKA). This randomised controlled triple-blinded trial tested the hypothesis that iPACK provides superior analgesia to STNB after TKA, with additional focus on early functional outcomes.

Methods: This trial was approved by the Ethics Committee of the Lausanne University Hospital and was prospectively registered on clinicaltrials.gov. One hundred TKA patients under spinal anaesthesia with a femoral triangle block were randomly allocated to 2 groups: iPACK with ropivacaine 0.2%, 19mL or STNB with ropivacaine 0.75%, 5mL. Postoperative pain treatment followed a pre-defined protocol with intravenous PCA of morphine, paracetamol, and ibuprofen. The primary outcome was cumulative intravenous morphine consumption at 24h postoperatively. Secondary pain-related outcomes included pain scores at rest and on movement (visual analogue scale out of 10) measured at 2, 24, 48 and 72h and cumulative intravenous morphine consumption at 2, 48 and 72h postoperatively. Functional-related outcomes evaluated were quadriceps strength, walking distance and range of motion, all measured at 24, 48 and 72h postoperatively.

Results: Mean (95%CI) cumulative intravenous morphine consumption at 24h postoperatively was similar between groups (iPACK group: 6 [4, 8] mg; STNB group: 5 [3, 6] mg; p = 0.36). Similarly, no differences between groups were seen in the secondary pain- or functional-related outcomes.

Discussion: IPACK and STNB provide similar analgesia and early functional benefit after TKA under spinal anaesthesia with a femoral triangle block. Hence, either technique can be adopted by clinicians depending on the preferences and routines of their centres.

P 3

The PARTUM study (Personalized Anticoagulation and Right Timing for invasive procedures during Unscheduled labor Management)

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Therapeutic anticoagulation during pregnancy poses significant challenges for peripartum management. Current guidelines recommend a 24-hour delay between the last dose of low-molecular-weight heparin (LMWH) and neuraxial anesthesia, without accounting for the pregnancy-induced procoagulant state. Earlier access to neuraxial analgesia, the gold standard for labor, could reduce maternal and fetal risks associated with general anesthesia or labor induction, while limiting immobilization during periods of increased thromboembolic risk. Although anti-Xa activity reflects LMWH pharmacodynamics, it does not capture the overall coagulation balance, which may be better assessed using global coagulation assays.

This observational study included 26 full-term pregnant patients receiving therapeutic LMWH, compared with 27 non-anticoagulated full-term pregnant patients and matched non-pregnant controls. Blood samples were collected every 4 hours up to 24 hours after the last LMWH dose in the treated group, and once at admission in controls. Analyses included standard coagulation tests, anti-Xa activity, markers of in vivo thrombin generation, and ex vivo thrombin generation assays.

Baseline characteristics were comparable across groups. Anti-Xa activity peaked at 4 hours and declined progressively, remaining detectable in over half of patients at 24 hours. Markers of thrombin generation remained elevated in both pregnant

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groups. Global assays confirmed a persistent procoagulant profile regardless of anticoagulation. The anticoagulant effect of LMWH was maximal between 4 and 8 hours, while thrombin generation parameters returned to levels comparable to non-anticoagulated controls as early as 12 hours post-injection.

In conclusion, term pregnancy enhances procoagulant activity and attenuates the biological effect of LMWH. Global coagulation potential appears restored in most patients within 12 hours after the last dose. These findings challenge the uniform 24-hour delay and support a more individualized approach to neuraxial anesthesia timing.

P 4

Effect of an enhanced recovery after surgery program on total hip and knee arthroplasty in a university hospital, a two cohort study

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Background and aims: Enhanced Recovery After Surgery (ERAS®) is a coordinated, evidence-based program delivered through a multidisciplinary team, which objective is to improve outcomes, while minimizing complications. The objective of this two-cohort study is to evaluate the clinical impact of an ERAS program on elective primary hip (THA) and knee (TKA) arthroplasties with regards to hospital length of stay, during the first 12 months after implementation.

Methods: Following ethics approval we compared a retrospective pre-ERAS with a prospective ERAS cohort. Key program aspects included preoperative education, minimal fasting, standardised anaesthetic and surgical techniques, multimodal analgesia, and early mobilization. The primary outcome was hospital length of stay. Other outcomes included pain at rest, dynamic pain scores, and rates of complications.

Results: From December 1st, 2021 to November 30th, 2022, data from 267 patients (138 THA, 129 TKA) were compared with data from 258 ERAS® program patients (128 THA, 130 TKA) collected between December 1st, 2022, and November 30th, 2023, (total: 525 patients). The mean hospital length of stay for THA patients before ERAS® was 5.5 ± 2.9 days versus 4.5 ± 2.0 days after ERAS® implementation (p = 0.002). For TKA patients, it was 6.6 ± 3.1 days before vs 5.6 ± 1.9 days after ERAS® implementation (p = 0.001). Rest, dynamic pain scores, and rates of complications were similar between groups except for pneumonia in TKA patients.

Conclusions: The implementation of an ERAS® program for hip and knee arthroplasty led to a reduced hospital length of stay, below the Swiss national average, without impacting pain outcomes and rates of complications.

P 5

Comparison of three different analgesic strategies following revision hip arthroplasty, a retrospective study

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Background and aims: Evidence-based recommendations exist for postoperative analgesia following primary hip arthroplasty, but none specifically address revision procedures. Current strategies include local infiltration analgesia, peripheral nerve blocks, and spinal anesthesia with intrathecal morphine. This retrospective study compared the postoperative analgesic efficacy of these strategies in patients undergoing revision hip arthroplasty.

Methods: Following ethics approval, all consecutive patients undergoing revision hip arthroplasty between January 2019 and December 2023 were included and allocated to one of three groups: general anesthesia with local infiltration analgesia (LIA group), with femoral and sciatic nerve blocks (PNB group), or spinal anesthesia with intrathecal morphine 100µg (SA group). The primary outcome was cumulative intravenous morphine equivalents consumption at 24h postoperatively. Secondary outcomes included cumulative intravenous morphine equivalents consumption at 2 and 12h; rest pain scores at 2h, dynamic and rest pain scores at 12 and 24h.

Results: Data from 124 patients were analyzed: 45 in the LIA group, 30 in the PNB group, and 49 in the SA group. Mean cumulative intravenous morphine equivalents consumption at 24h was significantly lower in the SA group (12 mg [95%CI:10–13]) compared with the LIA group (21mg [95%CI:17–24]) and the PNB group (25mg [95%CI:21–29]; p <0.001). Most secondary outcomes were also significantly improved in the SA group.

Conclusions: Among the three analgesic strategies evaluated, spinal anesthesia with intrathecal morphine was associated with superior postoperative analgesia compared with general anesthesia combined with either local infiltration analgesia or peripheral nerve blocks after revision hip arthroplasty. These findings warrant confirmation in a prospective randomized trial.

P 6

Pain management after hallux valgus repair surgery: an updated systematic review and procedure-specific postoperative pain management (PROSPECT) recommendations

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Background: Hallux valgus repair surgery is associated with moderate-to-severe postoperative pain. The aim of this systematic review was to assess the available literature and update previous PROSPECT (PROcedure SPECific Postoperative Pain ManagemenT) recommendations for optimal pain management after hallux valgus repair surgery.

Methods: A systematic review utilising PROSPECT methodology was performed. Randomised controlled trials and systematic reviews published in the English language from January 1, 2019 to November 19, 2024 that assessed postoperative pain using analgesic, anaesthetic and surgical interventions were identified from CENTRAL, CINAHL, EMBASE, MEDLINE and Web of Science.

Results: Of the 375 articles identified, 17 RCTs and 7 systematic reviews/meta-analyses met our inclusion criteria (total: 24 publications). Interventions that improved postoperative pain relief included: paracetamol and nonsteroidal anti-inflammatory

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drugs or cyclooxygenase-2 selective inhibitors; dexamethasone; ankle block and, as an alternative, local anaesthetic wound infiltration; and minimally invasive surgery or percutaneous osteotomy. Insufficient evidence was found for the use of perineural magnesium or liposomal bupivacaine. No evidence was found for continuous popliteal sciatic nerve block or for the use of the plantar compartment nerve block.

Discussion: This review provides an update to the previous guidelines written by the PROSPECT group: there is one important change, minimally invasive surgery or percutaneous osteotomy is recommended over open osteotomy. Contemporary publications confirm the analgesic effects of ankle block as a first-choice modality with wound infiltration as an alternative. In addition, the analgesic regimen for hallux valgus repair should include, in the absence of contraindication, paracetamol and a nonsteroidal anti-inflammatory drug or cyclooxygenase-2 selective inhibitor administered preoperatively or intra-operatively and continued postoperatively, along with systemic dexamethasone, and postoperative opioids for rescue analgesia.

P 7

Pain management after total shoulder arthroplasty: a systematic review and procedure-specific postoperative pain management (PROSPECT) recommendations

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Background and aims: Total shoulder arthroplasty is associated with moderate-to-severe postoperative pain. The aim of this systematic review was to assess the available literature and update previous PROSPECT (PROcedure SPECific Postoperative Pain ManagemenT) recommendations for optimal pain management after total shoulder arthroplasty.

Methods: A systematic review utilizing PROSPECT methodology was performed. Randomized controlled trials and systematic reviews published in the English language from inception to March 17, 2025 that assessed postoperative pain using analgesic, anesthetic and surgical interventions were identified from EMBASE, MEDLINE, CENTRAL, Web of Science and Google Scholar.

Results: Of the 1475 articles identified, 27 RCTs and 7 systematic reviews/meta-analyses met our inclusion criteria (total – 24 publications). Interventions that improved postoperative pain relief included: paracetamol and non-steroidal anti-inflammatory drugs or cyclooxygenase-2 selective inhibitors; dexamethasone; interscalene brachial plexus block and, as an alternative, local infiltration analgesia. Conflicting evidence was found for continuous interscalene brachial plexus block (catheter) or liposomal bupivacaine for interscalene block or local infiltration analgesia. No evidence was found for a specific surgical technique.

Conclusions: Pain management after total shoulder arthroplasty should include, in the absence of contraindication, paracetamol and a nonsteroidal anti-inflammatory drug or cyclooxygenase-2 selective inhibitor administered pre-operatively or intra-operatively and continued postoperatively, along with systemic dexamethasone, and postoperative opioids for rescue analgesia. As a regional technique, an interscalene brachial plexus block with a single-bolus injection of long-acting local anaesthetic (bupivacaine or ropivacaine), but not of liposomal bupivacaine, should be provided. In case of contraindications or absence of expertise, a local infiltration analgesia is a reasonable alternative. Further studies are required to investigate the analgesic benefit of a continuous infusion for the interscalene brachial plexus block.

P 8

Changes of health-related quality of life after major abdominal surgery for cancer: a prospective observational study (ChangeQoL Study)

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Importance: Health-related quality of life (HRQoL) is a patient-relevant outcome after major abdominal surgery for cancer. Perioperative HRQoL changes over time are typically reported at the cohort-level, potentially obscuring heterogeneity in individual trajectories.

Objective: To describe postoperative HRQoL trajectories in patients undergoing major abdominal surgery for cancer and explore factors associated with HRQoL deterioration.

Design, Setting, and Participants: Prospective, single-center observational cohort study conducted at a tertiary academic hospital in Switzerland. Adult patients undergoing elective major abdominal surgery for cancer or precancerous lesions (gastrectomy, esophagectomy, pancreas resection, or hepatectomy) were enrolled between September 2020 and May 2024 and followed up to 12 months postoperatively.

Main Outcomes and Measures: Patients were classified into three HRQoL trajectory groups (improvement, stability, deterioration) based on changes in the EORTC QLQ-C30 Summary Score between preoperative assessment and 6 months postoperatively, using a minimal clinically important difference (MCID) of 10 points. HRQoL was reassessed at 12 months. Secondary outcomes included preoperative factors associated with 6-month deterioration.

Results: Among 295 enrolled patients (the mean age was 65.2 years; 63.7% men), ASA physical status was II (47.8%) or III (51.2%), and 17.6% had a Clinical Frailty Scale score ≥ 4. 20.3% of patients had a WHODAS 2.0 score ≥ 25%. The median EORTC QLQ-C30 Summary Score was 86 [76-93] at baseline and 83 [69-91] at 6 months. At 6 months, 33% of patients experienced clinically meaningful HRQoL deterioration, 51% remained stable, and 16% improved (primary outcome). Substantial individual transitions between HRQoL trajectory groups were observed between 6 and 12 months (secondary outcome). In multivariable analyses restricted to preoperative variables, only male sex was associated with HRQoL deterioration at 6 months; overall model discrimination remained limited.

Conclusions and Relevance: Although median HRQoL change was minimal, one-third of patients experienced clinically meaningful deterioration at 6 months while 16% improved. Applying MCID thresholds in perioperative HRQoL research reveals outcome heterogeneity masked by cohort-level estimates and may improve preoperative counseling and informed decision-making.

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P 9

Distress in the Post-Anesthesia Care Unit: impact and prevention

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Introduction: Swiss hospitals face growing economic and logistical stressors. Distress is a recognized indicator of burnout. In 2025, HFR Fribourg (320 acute somatic care beds, 24/7 emergency services) reported an average absenteeism rate of 6% (direct costs: CHF 4.56 million). Its Post-Anesthesia Care Unit (PACU) comprises 3 pediatric and 19 adult beds. Day staff includes 6.0 FTEs 5 days/week and 2.0 FTEs on weekends; night staff has 2.0 FTEs 7 days/week. The LEP1 system (nursing activity score), adapted to PACU, quantifies nursing workload. From 2023 to 2025, patients classified as LEPmedium/high and LEPpediatric inscreased by 1.3x (n = 3000) and 2.8x (n = 2800) respectively, with stable length of stay. In 2025, 100 patients required continuous care levels. This suggests rising case complexity and added stress.

Objectives: This study aimed to 1) Detect distress levels, 2) Identify triggering factors, and 3) List preventive measures.

Methodology: Prospective observational study on stress within the PACU team (December 2025). An anonymous questionnaire (created according to the Perceived Stress Scale2) was sent to staff with a 2-week response window. Data were analyzed using a standardized protocol.

Results: The response rate was 79% (n = 19); 89% were women (nW = 17, nM = 2). Participants included 15 nurses (8 general, 5 specialized, 2 experts) and 4 anesthesia assistants. 95% had ≥ 3 years of care experience. 95% of staff reported distress (26% chronic). Primary causes (56% each) were: pediatric cases, workload, and staff shortages. To cope, the team frequently relied on protocols/checklists and team dialogue (60%). 46% expressed a desire for specific training.

Conclusions: This study confirms significant distress in the PACU. Despite the small sample size, a discrepancy exists between perceived coping and actual impact, suggesting an underestimation of distress consequences. Targeted competencies, continuous training, and regular debriefings appear essential for distress prevention.

Keywords: Distress, burn-in, burn-out, preventive actions.

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P 10

Development of a Case-Specific Performance Evaluation Tool for a High-Fidelity Combat Trauma Simulation study in Switzerland: A Delphi Consensus process report

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Background: Modern armed conflicts increasingly reveal complex injury patterns that challenge both civilian and military healthcare systems. In Switzerland, exposure to such injuries is limited. For a planned multicenter, high-fidelity, in-situ simulation-based study assessing trauma care performance across military, prehospital, and clinical teams, a standardized and validated evaluation tool was required.

Objective: To develop a consensus-based performance assessment tool/framework for evaluating the management of complex combat trauma, integrating civilian and military standards of care.

Methods: A structured consensus process was conducted, combining an initial nominal group technique with a multi-round Delphi process. Fourteen experts from military medicine, emergency medicine, anesthesiology, and trauma surgery participated. Assessment items were iteratively refined until predefined consensus criteria were achieved.

Results: Consensus was reached after five Delphi rounds. The final evaluation tool includes 35 items covering key domains such as prioritization of interventions, procedural quality, adherence to trauma principles, and time to critical actions. Initial differences between civilian and military perspectives – particularly regarding cervical spine immobilization, neurological assessment, coagulation management, and fluid resuscitation – were identified and resolved through the consensus process.

Conclusion: This Delphi process resulted in a standardized, expert-derived evaluation tool for assessing combat trauma management in in-situ simulation. It provides a robust and reproducible framework for comparing performance across different levels of trauma care.

P 12

Efficacy of Deep Parasternal Intercostal Plane Block in Adult Cardiac Surgery: a randomized controlled trial

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Background: Postoperative pain after cardiac surgery via median sternotomy remains a major challenge. Deep parasternal intercostal plane (DPIP) block has been proposed as part of multimodal analgesia; however, its efficacy within fast-track pathways remains unclear.

Objective: To evaluate whether DPIP block reduces postoperative opioid consumption in adult patients undergoing cardiac surgery with planned ultra-fast-track extubation (within 2 h postoperatively).

Design: Single centre, randomised, double-blind, controlled trial.

Setting: University hospital (Lausanne, Switzerland).

Methods: Adult patients undergoing elective cardiac surgery with planned ultra-fast-track extubation were assigned to receive either bilateral ultrasound-guided DPIP block or standard care. The primary outcome was cumulative opioid consumption during the first 24 postoperative hours, expressed as intravenous morphine milligram equivalents (MME). Secondary outcomes included pain scores and opioid consumption at predefined time points. Safety outcomes included block-related complications.

Results: A total of 140 patients were randomised. Cumulative 24-hour opioid consumption did not differ significantly between groups (23 ± 13 MME vs. 26 ± 14 MME; P = 0.15). However, opioid consumption was lower in the DPIP group during the early postoperative period (3.1 MME vs 5.9 MME, P <0.001 after 2 hours; 8.1 MME vs 12.0 MME, P = 0.003 after 6 hours and 12.0 MME vs 17.0 MME, P = 0.007 after 12 hours), and pain scores were reduced (VAS 4 vs VAS 5, P <0.001 two hours after surgery). No block-related complications were observed.

Conclusion: In patients undergoing cardiac surgery with planned ultra-fast-track extubation, DPIP block did not reduce cumulative 24-hour opioid consumption. It was associated with

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modest early opioid sparing and improved early pain control without safety concerns, but its overall incremental benefit appears limited.

Trial registration: ClinicalTrials.gov (NCT05681507)

P 14

Intraoperative Septal Echogenicity and Its Association to Ventricular Function During Cardiopulmonary Bypass in Open-Heart and Coronary Artery Bypass Grafting Surgery

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Background: During cardiac surgery performed on cardiopulmonary bypass (CPB), air bubbles can enter the coronary circulation. The right coronary artery which supplies part of the septum, is particularly susceptible to air embolization, possibly increasing septal echogenicity detectable by transoesophageal echocardiography (TOE). If air embolization associated with cardiotomy is the main mechanism, patients undergoing open-heart procedures would show a greater increase in septal echogenicity than patients undergoing coronary artery bypass grafting (CABG). This study investigated intraoperative septal echogenicity changes between open heart and CABG procedures and their association with ventricular function.

Methods: In this retrospective interim analysis, TOE cines from patients undergoing cardiac surgery under CPB were analysed at three time points: before CPB, after declamping, and after decannulation. Echogenicity of septal and lateral walls was measured and the Echogenicity Index (EI) was defined as the septal-to-lateral-wall ratio of the signal intensity. Left and right ventricular peak strain were analysed at each time point.

Results: We included 259 patients (24% female, mean age 64.1±10.7 years): of whom 115 underwent open heart surgery and 113 underwent CABG. Septal echogenicity rose significantly from before CPB to after declamping (but not from after declamping to after decannulation) in both open-heart Δ+19.5 ($p = 0.035$) and CABG surgeries Δ+16.0 ($p < 0.001$). No significant group difference was observed ($p = 0.56$). Lateral wall echogenicity remained unchanged in both groups (Δ +0.00, $p = 0.79$). After decannulation (but not before CPB or after declamping), higher EI in open-heart patients correlated with impaired RV free wall strain (indicating worse RV function; Spearman's $\rho = 0.401$, $p = 0.013$) and reduced basal inferoseptal strain ($\rho = 0.241$, $p = 0.046$), whereas no such associations were observed after CABG.

Conclusion: In both CABG and open-heart surgery, septal echogenicity increased after declamping. This indicates that air embolism upon cardiotomy is not the primary mechanism. The association between septal echogenicity with septal and RV free wall strain after decannulation was limited to open-heart patients, suggesting increased septal echogenicity might be a surrogate marker for reduced contractility in the right coronary territory in these procedures.

P 16

Regional anaesthesia for moon exploration: ultrasound-guided pericapsular nerve group (PENG) block in lunar gravity by minimally trained operators

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Introduction: Reduced gravity in extended lunar missions induces osteoporosis, increasing the risk of fracture during extravehicular activities. Pericapsular nerve group (PENG) block could provide effective analgesia after femoral neck fracture and might be performed by astronauts. We aimed to determine whether minimally trained novices in regional anaesthesia would be able to perform PENG block in lunar gravity during parabolic flights when compared with experts.

Methods: Ten operators (four experts, six novices) participated in the European Space Agency's 88th parabolic flight campaign. The aircraft generated repeated 25-second periods of lunar gravity across three flight days, comprising a total of 90 parabolas. Because of the short lunar gravity window, each PENG block procedure performed on a hip phantom was divided into two consecutive parabolas: an anatomical identification phase followed by an in-plane needling phase. The protocol was repeated for novices under normogravity conditions 2 hours after landing. Primary outcome was block success rate in lunar gravity, assessed blindly by two experts after the campaign. Secondary outcomes included block success rate in normogravity; total procedure time; and the NASA Task Load Index score.

Results: Block success rates for experts and novices in lunar gravity were 84% (95%CI 51–96%) and 49% (95%CI 22–76%; $p = 0.07$), respectively. In normogravity, novices had a block success rate of 76% (95%CI 47–92%). Total procedure times and NASA Task Load Index score were significantly increased in novices in both lunar and normogravity.

Discussion: Minimally trained novices are able to perform PENG block in lunar gravity, but with lower success rates, longer procedure times and higher cognitive workload than experts. These findings suggest that a single preflight training session may be insufficient to ensure reliable performance by non-experts under lunar gravity conditions.

P 17

SonoClot FACTx during extracorporeal bypass in elective heart surgery (SonoClot correlation to Fibrinogen, ACT and antiXa activity)

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Background: Precision anticoagulation management is essential during cardiopulmonary bypass (CPB) to prevent circuit thrombosis while minimizing postoperative bleeding. While the Activated Clotting Time (ACT) is the long-standing standard of care, it is a global functional test susceptible to variability from

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hemodilution and hypothermia. The Sonoclot Analyzer offers a dynamic "signature" of hemostasis via electromagnetic microviscometry, but clinical data correlating its specific kinetic parameters – the kACT and Clot Rate (CR) – with gold-standard laboratory Anti-Factor Xa (Anti-Xa) activity in cardiac surgery remains scarce

Objectives: The primary objective of the FACTx Study is to evaluate the correlation between Sonoclot kinetic parameters and laboratory Anti-Xa activity to validate Sonoclot as a reliable bedside guide for heparin monitoring.

Methods: This monocentric, prospective observational study (Risk Category A) was conducted at Stadtspital Zürich. We analyzed data from a cohort of 64 adult patients[emaue11] undergoing elective heart surgery with CPB and without preoperative heparin Patients received a standardized heparin dose of 400 U/kg and 300 U/kg for off-pump CABG. Blood was sampled from a preexisting arterial line after heparinization to measure laboratory Anti-Xa activity and Sonoclot kinetic parameters (kACT and kCR). Statistical significance was assessed using Pearson's r correlation and Steiger's Z test via Fisher's r-to-z transformation.

Results: The results demonstrated significant linear relationships for both parameters:

- kACT vs. Anti-Xa: Showed a strong positive correlation (r = 0.593, p <0.001), reflecting the expected delay in clot initiation as heparin levels increase.
- kCR vs. Anti-Xa: Showed a moderate negative correlation (r = −0.433, p = 0.021), confirming that higher heparin levels suppress the velocity of fibrin polymerization

Conclusion: Preliminary data from the FACTx study confirms that Sonoclot kinetic parameters are biologically consistent with gold-standard laboratory heparin measurements. These findings support the utility of Sonoclot microviscometry for precise, bedside anticoagulation management in the cardiac surgical setting.

P 18

Preoperative Myocardial Abnormalities Quantified by Cardiovascular Magnetic Resonance and The Risk of Intraoperative Hypotension

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Background: In Switzerland, cardiovascular magnetic resonance (CMR) exams are increasingly performed making the diagnostic reports more frequently available to anaesthesiologists. Whether CMR findings can inform preoperative risk stratification, however, remains unknown. T1 mapping and extracellular volume (ECV) with CMR are established clinical tools for detecting and quantifying ischaemic and non-ischaemic myocardial injury. T1 mapping is contrast-free and sensitive to acute and chronic changes like oedema and scar tissue. ECV requires a contrast agent and is well established for assessing fibrosis. Intraoperative hypotension (IOH) is a common perioperative adverse event that may be anticipated, and potentially mitigated, through preoperative assessment. To date, no studies have investigated if preoperative mapping has predictive value for IOH during cardiac and non-cardiac surgery. The aim of this study was to investigate whether myocardial abnormalities assessed through CMR, are prognostic markers for intraoperative hypotension.

Methods: This retrospective interim analysis included 111 patients who underwent cardiac (n = 35) or non-cardiac surgery (n = 76) within 6 months after a clinically indicated CMR exam. CMR images were analysed and regional abnormalities were defined by the number of abnormal myocardial segments exceeding field-specific cut-off values for T1 and ECV. Blood pressure data from induction until the emergence of anaesthesia was quantified for IOH, defined as a cumulative occurrence of a systolic blood pressure <90 mmHg for at least 10 minutes that was treated with vasopressors, inotropes or fluids.

Results: Patients having cardiac surgery were more likely to experience hypotension during cardiac surgery (71%) than patients undergoing non-cardiac surgery (42%, p-value <0.01). In patients undergoing non-cardiac surgery, T1 (AUC = 0.63, p = 0.04) and ECV (AUC = 0.62, p = 0.06; non-significant trend) were associated with IOH after adjustment for age and sex. In the cardiac surgery cohort, T1 (AUC = 0.73, p = 0.19) and ECV (AUC = 0.53, p = 0.82) were not associated with IOH.

Conclusion: Parametric mapping by CMR can identify preoperative myocardial tissue abnormalities that are associated with an increased risk of IOH in patients undergoing non-cardiac surgery. These findings indicate that preoperative CMR tissue characterization may provide value for preoperative risk stratification and aid anaesthesiologists to anticipate and manage IOH.

P 20

miR-22-3p regulates the MHC-II pathway via CIITA and mediates monocytic HLA-DR downregulation in a model of sepsis-induced immunosuppression

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Reduced monocytic HLA-DR (mHLA-DR) expression is an established marker of sepsis-induced immunosuppression, associated with increased risk of secondary infections and mortality. Despite its clinical relevance, the molecular mechanisms driving sustained HLA-DR downregulation remain poorly understood. This study investigated the role of microRNAs (miRNAs) in regulating HLA-DR expression in monocytes under conditions mimicking sepsis-induced immunosuppression.

Primary monocytes were isolated from the peripheral blood of healthy volunteers by density gradient centrifugation and magnetic cell separation. An immunosuppressed phenotype was induced by prolonged lipopolysaccharide (LPS) exposure. Integrated mRNA and miRNA sequencing combined with in silico prediction tools (TargetScan, miRDB) identified candidate miRNAs targeting genes of the MHC class II (MHC-II) pathway involved in HLA-DR regulation. Functional relevance was assessed by transfecting candidate miRNA mimics into THP-1 cells and primary monocytes, followed by analysis of mHLA-DR surface expression and target gene expression. Direct miRNA–mRNA interactions were validated by dual-luciferase reporter assay, and temporal expression dynamics were analysed by RT-qPCR.

Prolonged LPS stimulation induced a reproducible immunosuppressed phenotype with marked MHC-II pathway and HLA-DR downregulation. MiR-22-3p was identified as a candidate regulator targeting CIITA, the master transcriptional activator of the MHC-II pathway. Overexpression of miR-22-3p significantly reduced CIITA and mHLA-DR expression at transcript and protein levels. In primary monocytes, LPS induced a time-dependent increase in miR-22-3p, concurrent with reduced CIITA mRNA expression. Conversely, inhibition of miR-22-3p by anti-miRNA oligonucleotide transfection prior to LPS exposure significantly attenuated the LPS-induced decline in CIITA and mHLA-DR expression compared with control-transfected cells.

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This study identifies miR-22-3p as a novel regulator of mHLA-DR expression in a model of sepsis-induced immunosuppression, providing new mechanistic insight into impaired antigen presentation during sepsis. Further studies are required to determine the clinical relevance of miR-22-3p as a potential biomarker of immune status and therapeutic target for immunomodulatory strategies.

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Implementation of an EEG-Guided Fast-Recovery Anaesthesia Pathway During High-Throughput Robotic Gynaecological Surgery: A Consecutive Case Series

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Background: Although enhanced recovery components are well established, evidence on implementation of a standardised fast-recovery anaesthesia pathway in robotic surgery remains limited. We evaluated the feasibility and early clinical performance of an EEG-guided, opioid-sparing fast-recovery anaesthesia pathway implemented within a high-throughput robotic gynaecological surgery programme.

Methods: We conducted a consecutive case series of nine patients undergoing elective robotic gynaecological surgery. The standardised anaesthesia pathway combined effect-site target-controlled anaesthesia, EEG-guided hypnotic titration, dexmedetomidine-supported multimodal opioid-sparing analgesia, bilateral transversus abdominis plane blocks and a standardised emergence protocol. The primary outcome was the time from the recorded end of surgery to tracheal extubation. Secondary outcomes included time from skin closure to tracheal extubation, completion of anaesthesia care (handover to the PACU team), operating room metrics, postoperative pain, postoperative nausea and vomiting (PONV), postoperative opioid consumption and early recovery. Results are presented descriptively as median (interquartile range [IQR]) or number (%).

Results: The standardised pathway was successfully implemented in all patients. Median time to tracheal extubation was 3 min (IQR 1–5) after the recorded end of surgery and 7 min (IQR 4–8) after skin closure. Completion of anaesthesia care occurred 14 min (IQR 13–16) after the recorded end of surgery and 18 min (IQR 18–20) after skin closure. Median intraoperative fentanyl administration was 1.37 µg/kg (IQR 1.15–1.43). Median pain scores (VAS) were 2.5 in the post-anaesthesia care unit (PACU) and 1.0 at both 6 and 24 h. No patient experienced PONV. Rescue analgesia was required in one patient (11%). Postoperative opioid consumption to day 1 was 0 mg intravenous morphine equivalents (IQR 0–0). Median PACU length of stay was 85 min (IQR 67–105), first mobilisation occurred at 221 min (IQR 154–276), and median hospital length of stay was 23 h (IQR 22–24).

Conclusions: Implementation of a standardised EEG-guided, opioid-sparing fast-recovery anaesthesia pathway was feasible within a high-throughput robotic surgery programme and was associated with rapid emergence, favourable early recovery, minimal postoperative opioid requirements and absence of PONV. These preliminary findings support evaluation in larger comparative cohorts.

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Effects of nociceptin on triggering receptors expressed on myeloid cells (TREM1 and TREM2) in human monocytes

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Background: Nociceptin, an opioid-like neuropeptide, plays a role in the perception and modulation of pain. Nociceptin and its receptor (NOP) have been described as targets for the treatment of pain and inflammatory diseases.1 The function of nociceptin is still not fully revealed to date. Triggering receptors expressed on myeloid cells 1 (TREM1) and TREM2 are key immunoglobulin superfamily glycoproteins predominantly expressed by monocytes. They play crucial roles in pain and sepsis.2,3 In this study, the effects of nociceptin on the regulation of TREM1 and TREM2 in human blood monocytes were investigated.

Methods: Approved by the local ethics committee, blood samples were obtained from Interregionale Blutspende SRK Bern. Dose-response experiments were performed to evaluate the influence of lipopolysaccharide (LPS) on TREM1 and TREM2 in human monocytic THP-1 cells. To investigate effects of nociceptin on TREMs, THP-1 cells and whole blood were pretreated with/without nociceptin for 1h, followed by LPS stimulation for up to 72h. Prepronociceptin (PNOC), NOP, TREM1 and TREM2 mRNA were quantified by RT-qPCR. Cell surface NOP, TREM1 and TREM2 levels were determined using flow cytometry. Nociceptin protein levels in culture supernatants were measured by ELISA.

Results: NOP, TREM1 and TREM2 were constitutively expressed in THP-1 cells and blood leukocytes at the mRNA and protein levels. PNOC mRNA was below the detection level in untreated THP-1 cells and blood cells. Nociceptin concentrations in culture supernatants were low. LPS significantly upregulated cell surface TREM1 and downregulated cell surface TREM2 proteins in THP-1 cells and blood monocytes compared to respective untreated controls (all $p < 0.05$). Nociceptin attenuated the LPS-mediated upregulation of TREM1 proteins in THP-1 cells and primary monocytes (both $p < 0.05$). For TREM2, nociceptin enhanced LPS's downregulating effect on TREM2 in THP-1 cells and restored LPS-induced downregulation of TREM2 in blood monocytes compared to LPS groups (both $p < 0.05$).

Conclusions: Nociceptin impaired cell surface TREM1 and TREM2 protein levels in LPS-stimulated THP-1 cells and primary blood monocytes. Future research should explore possible mechanisms underlying these regulations and assess nociceptin, TREM1 and TREM2 levels in disease-relevant patient cohorts.

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A new approach to pain assessment: Are words better than numbers?

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Background: Post-operative pain occurs in up to 80% of patients. The NRS (Numerical Rating Scale, 0–10) is widely used to assess pain intensity. However, some patients have difficulties to express their pain intensity as a number. An alternative could be the Key Word Pain Scale (KPS, Scharnagel 2018), which uses words instead of numbers: pain, pleasant-unpleasant, tolerable-intolerable. Depending on their responses, patients are assigned to groups A to D (for medical staff: D = treatment is required).

Aim of the study: Comparison of the KPS to NRS-Scores, the necessity of an intervention (desire for more pain treatment) and further patient-reported outcome measures (PROMs).

Methods: Patients participating in PAIN OUT also completed the KPS. Based on their responses, they were allocated to groups: A: no pain, B: unpleasant pain, no interference C: unpleasant pain, but tolerable, D: intolerable pain. In the preliminary study, these groups corresponded to NRS 0, 3, 5 and 8. PROMs from PAIN OUT were analysed for KPS groups and compared with measures of the previous study. Other PROMs evaluated: desire for more analgesia, physical and psychological impairment, side effects, satisfaction. Mean±SD, median (Q1/Q3), $\chi 2$, Kruskal-Wallis test.

Results: 191 patients were assigned to groups A (16%), B (44%), C (37%) and D (3%). NRS pain scores were comparable to those of the previous study: A: 1.3±1.4 vs. 0.23; B: 3.1±1.9 vs. 2.9; C: 5.6±2.1 vs. 5.4; D: 7.3±1.7 vs. 7.7. Group CD showed highest NRS composite scores for all PROMs; physical impairment: A: 2.4±1.9; B: 3.8±1.9; CD: 5.2±1.6; emotional impairment: 1.6±2.1 / 2.6±2.3 / 4.5±2.5; adverse events: 1.8±1.8 / 2.3±1.9 / 3.0±2.0 (all $p < 0.001$). Furthermore, perceived pain relief in group CD was lower (A: 85 (95% CI:78–93)%, B: 70 (50–80)%; CD: 50 (30–60)%; $p < 0.001$), and the desire for additional analgesia was more common (A:3/B:5/C:35/D:100%; $p < 0.001$). In group CD, 69% of patients were dissatisfied with their pain management (A: 13%; B: 23% dissatisfied; $p < 0.001$). More patients in group CD received opioids on the ward (26.7% / 51.2% / 77.9%) and opioid doses were higher.

Conclusion: The KPS adequately reflects postoperative pain intensity, pain-related interference and the need for analgesic treatment. The statement 'intolerable pain' corresponds to the request for more analgesics in PAIN OUT. The findings confirm the simple, intuitive use of the KPS. Analyses of a larger patient cohort with repeated assessments over time should be done.

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Sedation Success and Procedural Satisfaction with an Optimized Remimazolam Protocol

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Background: Remimazolam promises greater haemodynamic stability than conventional sedatives and may therefore be advantageous in frail, elderly patients, such as those undergoing transcatheter aortic valve implantation (TAVI). However, initial experience with its implementation at our institution prompted the development of a refined sedation protocol by combining remimazolam with remifentanil (an ultra-short acting opioid). This study evaluated whether the optimised sedation regimen further reduced sedation failure and improved satisfaction compared with dexmedetomidine and remimazolam alone.

Methods: In this prospective observational study, 144 patients undergoing TAVI (mean age 81.5 ± 7.7 years, 37.2% female) received one of three sedation protocols, each applied as the standard of care at our institution during a defined period: Dexmedetomidine (phase 1, n = 53), remimazolam (phase 2, n = 48) or remimazolam–remifentanil (phase 3, n = 43). The primary endpoint was sedation failure, defined as administration of additional anaesthetics or conversion to general anaesthesia. Secondary endpoints were satisfaction scores (1-10), reported by anaesthetists, interventionalists and patients.

Results: Sedation failure was lowest with remimazolam-remifentanil (3/43, 7%) compared with remimazolam alone (15/48, 31.2%; $p = 0.004$) and dexmedetomidine (35/53, 66%; $p < 0.001$). Interventionalist satisfaction was higher with the remimazolam-remifentanil protocol (10.0 [7.0–10.0]) than with remimazolam (8.0 [6.0–10.0]; $p = 0.007$) or dexmedetomidine (8.0 [7.0–9.8]; $p = 0.031$). Anaesthetist satisfaction was higher with the optimised protocol than with dexmedetomidine (9.0 [8.0–10.0] vs 8.0 [5.0–9.0]; $p = 0.017$), while no difference was observed compared with remimazolam alone (8.0 [7.0–9.0]; $p = 0.205$). Patient satisfaction was higher in phase 3 than in phase 1 (10.0 [10.0–10.0] vs 9.0 [8.0–10.0]; $p < 0.001$), but comparable to phase 2 (10.0 [10.0–10.0]; $p > 0.999$).

Conclusion: The combination of remimazolam and remifentanil was associated with a marked reduction in sedation failure during TAVI than dexmedetomidine and remimazolam alone. In addition, procedural satisfaction among patients, interventionalists, and anaesthetists was superior to dexmedetomidine. These findings support the use of this optimised sedation approach in routine clinical practice. Further studies are warranted to assess its impact on haemodynamic stability, cognitive recovery, and clinical outcomes.

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Implementation of a Comprehensive Digital Preoperative Assessment Pathway in a Large Non-University Regional Referral Hospital in Switzerland

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Background: Digital health technologies are increasingly transforming perioperative care, but evidence on the routine implementation of comprehensive digital preoperative pathways in non-university hospitals remains limited. We report the stepwise implementation of a comprehensive digital preoperative assessment pathway in a large non-university referral hospital in Switzerland.

Methods: This clinical implementation project evaluated the stepwise introduction of a comprehensive digital preoperative assessment pathway across surgical and interventional specialties, using a commercial platform (Medify, Amsterdam, The Netherlands) and routinely collected operational and patient-reported data. The pathway combined structured digital medical history collection, standardised anaesthesia information, and digital informed consent before anaesthesiologist review. Outcomes included supplementary teleconsultation, face-to-face consultation, and patient-reported experience measures (PREMs).

Results: Between November 2025 and June 2026, 3,995 patients were managed through the digital pathway. Of these, 282 (7.1%) underwent supplementary teleconsultation and 579

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(14.5%) required face-to-face consultation. PREMs were available from 984 of 3,995 assessments (24.6% response rate). Mean satisfaction was 8.14/10; 74.7% (735/984) of ratings were 8–10 and 52.0% (512/984) were 9 or 10. Incomplete digital contact information, particularly missing or invalid email addresses and mobile phone numbers, was identified as an organisational barrier to implementation and secure digital authentication.

Conclusions: A comprehensive digital preoperative assessment pathway integrating structured medical history, standardised patient information, and digital informed consent was feasible at substantial scale in routine care. Only 14.5% of patients required face-to-face consultation, while patient satisfaction was high. Reliable patient contact information emerged as an important prerequisite for digital perioperative care. These represent preliminary findings from an ongoing rollout; a comprehensive analysis of the implementation cohort is planned.

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Implementation of a perioperative safety intervention: a mixed-methods multicentre study assessing implementation pace and its determinants

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Background: Sustained implementation of complex perioperative safety interventions is challenging in clinical practice, and the pace of implementation remains underexamined. This study aimed to conceptualize and compare implementation pace, assessed through implementation fidelity, and its influencing factors within a multi-centre quality improvement project. The intervention combined re-implementation of the sign-out part of the WHO Surgical Safety Checklist with standardized documentation of intraoperative adverse events according to ClassIntra®. Moreover, we investigated stakeholder-rated acceptability, appropriateness, and feasibility.

Methods: Using established implementation frameworks enabled us to systematically assess implementation fidelity, to measure implementation pace and influencing factors such as intervention adaptation. This sub-study including six Swiss hospitals was embedded within a national quality improvement project. Qualitative data comprised interviews and focus groups, while intervention perception was assessed through surveys. Participants included local implementation team members and operating room healthcare professionals.

Results: Total (re-)implementation time ranged between 7 and 13 months across sites. Individual implementation steps varied in duration (range: 1-156 days), with "developing a documentation system", "planning training", and "adapting the checklist" identified as most time intensive. They progressed either in a compact or spaced manner. Intervention adaptations varied in intensity across sites and, together with contextual and organizational factors, helped explain variation in implementation progression. Highly integrated site-wide or changing IT systems emerged as decelerators of implementation pace, whereas stable and engaged implementation teams acted as accelerators. Intervention acceptability, appropriateness, and feasibility were all rated high at the end of the implementation.

Conclusions: Integration of this perioperative safety intervention was not a single time interval but a pattern of durations and progression across interdependent steps, strongly influenced by IT infrastructure, adaptation practices, and team stability. These findings can inform more realistic planning, targeted management of decelerators such as IT system changes or team turnover, and deliberate pacing where this supports fidelity, acceptability, and sustainable compliance in checklist use and adverse event documentation.

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From Educational Theory to Clinical Reality: Putting Microlearning to prevent perioperative hypothermia in everyday clinical practice to the test

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Purpose: Perioperative hypothermia is a major concern and a risk factor for complications in patients. Despite their importance, patient-related outcomes in medical education research remain underutilized. Specific faculty development and its clinical impact on prevention in this field are rarely discussed. The effect of a single self-directed digital microlearning session on clinical changes is unclear. Therefore, this study aims to evaluate its influence according to Kirkpatrick level 4 "Results", focusing on the final organizational outcomes that tie back to the training: improved efficiency in preventing perioperative hypothermia.

Design: Single-center, prospective, non-randomized observational trend study.

Methods: The study involved all anesthesiology staff at the University Hospital Zurich. The microlearning included two separate sessions, spaced four months apart. To observe changes in management behaviors, we extracted anonymized patient data from the Patient Data Management System to assess primary outcomes with a focus on body temperature measurements and the use of warming devices. All participants provided informed consent by engaging with the microlearning program.

Results: Our findings indicate that a single microlearning intervention does not lead to substantial changes in clinical behavior. While the primary outcomes confirmed the importance of prewarming and temperature monitoring for the prevention of inadvertent intraoperative hypothermia, the secondary outcome of behavioral change following the microlearning intervention remained limited.

Discussion and Conclusion: Previous research on microlearning has predominantly reported positive outcomes at Kirkpatrick Levels 1 and 2, demonstrating high learner satisfaction and effective knowledge acquisition. Our findings extend this evidence by suggesting that favorable learner perceptions do not necessarily translate into meaningful changes in workplace behavior or the application of learning in clinical practice. To promote effective learning transfer, microlearning interventions should encourage learners to critically reflect on the integration of newly acquired knowledge into their daily professional practice. Embedding microlearning within a broader educational construct with other learning formats that incorporates cognitive load theory and spaced learning may strengthen its impact on behavioral change and support the translation of learning into practice.

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Superimposed high-frequency jet ventilation versus single jet ventilation during rigid bronchoscopy: A case report

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Background: Ventilation during rigid bronchoscopy in patients with obstructive endobronchial tumor is challenging[1]. We report a case in which severe hypoxemia (SpO2<85%) during single jet ventilation (SJV) prompted an urgent change of strategy. We therefore used superimposed high-frequency jet ventilation (SHFJV). Only a few reports have compared performance of SJV versus SHFJV in patients with near-complete main bronchus obstruction.

Case report: A 57-year-old patient ASA 3 with a squamous cell carcinoma of the left upper lobe presented with a 90% obstruction of the left main bronchus. He underwent rigid bronchoscopy under general anesthesia. Anesthesia induction was uneventful and SJV was initiated [frequency 120–140 bpm, driving pressure (dp) 2.4 bar, I/E: 50%, FiO_2: 1]. After 20 minutes, despite ventilatory optimisation, repeated episodes of severe desaturation required interruption of the procedure. SJV was discontinued and the patient was emergently intubated (ETT 9.0), allowing continuation of the procedure with flexible bronchoscopy. Three months later, due to the progression of the disease, the same patient underwent a rigid bronchoscopy under identical anaesthetic conditions and same baseline parameters using SHFJV (double frequency 12/600 bpm, I/E 1:1, dp 1.2 bar; I/E 1:1.5, dp 0.8 bar) The procedure was carried out without complications, maintaining adequate oxygenation (SpO_2 >95%) all along with improved procedural safety.

Discussion: This case highlights the limitations of single jet ventilation in the presence of severe airway obstruction and illustrates the benefits of SHFJV. By combining two frequencies, SHFJV provided stable oxygenation with a PEEP effect. These mechanisms likely explain the successful course of the second intervention. Although SHFJV has been described in the context of complex airway procedures, published data on its superiority over SJV in rigid bronchoscopy for obstructive tumors remain limited, underscoring the relevance of this report.

Learning points

1. Severe airway obstruction may prove SJV insufficient for the oxygenation of patient.

2. SHFJV may offer superior oxygenation and ventilation with a PEEP effect.

3. SHFJV may enhance safety during rigid bronchoscopy in patients with near-complete bronchial obstruction.

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