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In-Hospital Postoperative Adverse Events in Patients with Diabetes Undergoing Elective General or Orthopedic Surgery: A Retrospective Cohort Study from Pakistan

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ABSTRACT

Diabetes is associated with postoperative morbidity, but the pattern of adverse events varies across surgical populations. **Objectives:** To determine the frequency and pattern of in-hospital postoperative adverse events and examine selected clinical and perioperative correlates among patients with diabetes undergoing elective general or orthopedic surgery. **Methods:** This retrospective cohort included 300 patients treated at MTI Mardan Medical Complex, Pakistan, from 1 February 2021 to 31 December 2023. Follow-up extended from surgery to discharge or in-hospital death. Welch's t-test and exact tests were used for group comparisons, with Benjamini-Hochberg correction across 23 exploratory comparisons. **Results:** Twenty-three patients experienced an adverse event (7.7%; 95% CI 5.2%-11.2%). Pre-existing diabetic complications were more frequent in the event group (47.8% vs 17.3%; q=0.016), and mean creatinine was higher (98.49 ± 29.35 vs 70.28 ± 37.46; q=0.004). Age, diabetic comorbidity, surgery category, and mean peripheral glucose did not meet the corrected significance threshold. Anesthesia distribution was similar between groups (p=0.953), and delayed extubation was the most frequent event (8/23). **Conclusions:** An aggregate endpoint-definition sensitivity check excluding six ambiguously labelled events yielded 17/300 (5.7%). In-hospital postoperative adverse events affected 7.7% of the cohort. Pre-existing diabetic complications and renal status showed the most robust between-group differences, highlighting the importance of end-organ assessment in perioperative risk evaluation.

INTRODUCTION

Diabetes mellitus is common in surgical practice and may increase perioperative vulnerability through chronic vascular disease, renal dysfunction, impaired host defense, delayed wound healing, and altered metabolic responses to surgical stress. A systematic review and meta-analysis of more than 3.2 million non-cardiac surgical patients found diabetes to be associated with higher risks of overall postoperative complications, infection, wound-healing disorders, renal insufficiency, readmission, and death [1]. However, a contemporary scoping review showed substantial inconsistency in how diabetes, glycemic control, and postoperative outcomes are defined across perioperative studies, limiting direct comparison between cohorts [2]. In a cohort specifically including patients with diabetes undergoing general and orthopedic surgery, Wang et al. reported a postoperative adverse-event frequency of 7.7%, highlighting the clinical relevance of this population [3]. Risk is unlikely to be explained by a diabetes diagnosis alone. Contemporary perioperative guidance emphasizes assessment of diabetes type, chronic glycemic control, treatment regimen, and end-organ complications, together with active perioperative

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glucose surveillance [4-7]. Procedure-specific evidence further demonstrates that postoperative glucose variability, diabetic kidney disease, and diabetes-related comorbidity are relevant in orthopedic surgery [8-10], whereas major abdominal operations have distinct physiological and postoperative risk profiles [11]. Anesthetic technique may also influence perioperative glucose responses, although evidence linking an anesthetic choice directly to postoperative complications in patients with diabetes remains procedure-dependent [12].

Although international evidence on perioperative diabetes is expanding, contemporary data from Pakistan remain sparse, particularly for patients undergoing elective general and orthopedic surgery. Local outcome profiles are clinically important because case mix, referral pathways, perioperative practice, and the burden of diabetes-related end-organ disease vary across health systems. A focused evaluation of in-hospital adverse events can identify the complications that dominate early postoperative morbidity and clarify which routinely assessed clinical domains merit closer perioperative attention. The current study therefore aimed to determine the frequency and clinical pattern of in-hospital postoperative adverse events and to compare selected demographic, diabetes-related, biochemical, surgical, and aesthetic characteristics between patients with and without events at MTI Mardan Medical Complex.

METHODS

This retrospective, single-centre, record-based cohort used hospital records from MTI Mardan Medical Complex, Mardan, Khyber Pakhtunkhwa, Pakistan, for patients undergoing elective surgery between 1 February 2021 and 31 December 2023. These dates represent the historical record-eligibility period. The study duration was from February 2024 through December 2025. Patients were eligible if type 1 or type 2 diabetes had been documented before surgery and the operation was classified in the hospital record as general or orthopedic surgery. The study was approved by the Institutional Review Board of Bacha Khan Medical College, Pakistan (reference no. 479/BKMC dated 22 January 2024). The record-eligibility period ended before ethical approval because this was a retrospective review of pre-existing clinical records rather than prospective patient enrolment. Study-specific record review, data extraction, and analysis were undertaken after IRB approval. Diabetes type was based on the documented clinical diagnosis and interpreted according to contemporary diagnostic classification [13]. If a patient had more than one qualifying operation, only the first episode was analyzed. Outpatient procedures and records without sufficient information to determine postoperative outcome were excluded. Reporting follows the STROBE recommendations for observational studies [14]. All 300 eligible records during the defined record period were included; no sampling was performed. Diabetes characterization included documented diabetes type, duration, pre-existing diabetes-related end-organ complications, and major coexisting illnesses. Pre-existing diabetic complications were defined as documented diabetes-related end-organ complications; diabetic comorbidity denoted major coexisting illness recorded in the clinical chart. HbA1c, outpatient insulin or oral antidiabetic treatment regimen, and longitudinal measures of glycemic control were not available in sufficiently complete, verifiable form in the supplied dataset. Therefore, no classification by diabetes treatment intensity, HbA1c-defined control, or diabetes severity was attempted. The presence of an end-organ complication is not a validated proxy for HbA1c or treatment category. Because every eligible patient already had a documented diabetes diagnosis, diabetes status functioned as an inclusion criterion, not as a diabetic versus nondiabetic exposure. No inference is made about the association of HbA1c, antidiabetic treatment intensity, or long-term control with events; these factors were not adequately measured. Operations were analyzed using the hospital service-line categories of general or orthopedic surgery. Procedure-level operative names and validated surgical-complexity grades were not consistently available in the archived dataset and were therefore not retrospectively reconstructed, because doing so could introduce misclassification. Surgical service line was retained only as an exploratory between-group characteristic and was not interpreted as an independent predictor. Recorded anesthesia categories were local anesthesia, general anesthesia, epidural anesthesia, nerve block, brachial plexus block, and lumbar plexus block. Perioperative variables included preoperative and postoperative fasting plasma glucose, mean peripheral blood glucose, blood pressure, renal and liver biochemical measurements, postoperative antibiotic use, and length of stay. Surgical category and anesthesia technique were evaluated as perioperative characteristics in the between-group analysis. Procedure duration, within-service operative complexity, and detailed intraoperative and postoperative management protocols could not be reliably evaluated. Recorded glucose concentrations and antibiotic use were measured characteristics, not standardized interventions; potential confounding from unmeasured insulin dosing, perioperative medication, and supportive care remains. These exploratory comparisons are not adjusted for differences in procedure-level risk, aesthetic selection, or perioperative management. Observed differences must not be read as independent effects of surgery type or

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clinical care. The primary outcome was at least one recorded principal postoperative adverse event during the index hospitalization, from completion of the qualifying operation until discharge or in-hospital death. The chart-derived mutually exclusive principal categories were delayed extubation, respiratory/circulatory abnormalities, circulatory disorders, infections at other sites, nonhealing incision, other severe postoperative complications, and death. Events were assigned by their recorded principal label, not adjudicated by an independent committee, and not attributed to an aesthetic or operative causation. The archived labels do not provide a consistent extubation-delay threshold, objective physiologic cut-offs, infection criteria, or a separable breakdown of the combined respiratory/circulatory category. Accordingly, the case definitions in Table 3 reflect documentation-level categories rather than validated complication diagnoses. Because the seven reported principal category counts sum to 23, an aggregate endpoint-definition sensitivity check can describe the frequency after excluding the two least-specific categories; this does not establish whether individual patients experienced additional secondary events. "Principal category" denotes the single chart label used for descriptive tabulation; separate labels do not establish clinically distinct or independently validated diagnoses. The two circulatory-related labels could share clinical features, so they were not combined, decomposed, or subjected to separate association tests. Without source-record adjudication, standard outcome criteria cannot be retrospectively imposed.

Continuous variables are reported as mean ± SD and categorical variables as n (%). Welch tests were used for continuous group comparisons, two-sided Fisher exact tests for binary contrasts, and the Fisher–Freeman–Halton conditional exact test for the six-category anesthesia distribution. No imputation or multivariable risk model was used because there were only 23 adverse events and the archived summary did not support patient-level model verification. The exploratory Benjamini–Hochberg (BH) false-discovery-rate family contains 23 distinct comparisons: 20 baseline clinical and biochemical tests in Table 1 (including one diabetes-type contrast) and three perioperative tests (surgical service line, global anesthesia, antibiotic use). Complementary categories were not double-counted. Length of stay is a post-event consequence, reported descriptively with an unadjusted p-value and excluded from this family. For verification, continuous p-values were reconstructed from the reported group means, standard deviations, and group sizes (n=23 and n=277), binary p-values from the reported two-by-two counts, and the global anesthesia p-value from exact conditional enumeration. All 22 printed p-values were reproduced to three decimal places. The additional diabetes-type Fisher contrast yielded p=0.274; including it once produced a 23-test Benjamini–Hochberg family, with adjusted q values reported to three decimals. Calculations were performed using Python 3.12.14 and SciPy 1.17.0. Because the reported group summaries are rounded and variable-specific, no missing counts were independently verifiable; these calculations should be interpreted as verification from aggregate statistics, not as recovery of individual patient-level estimates. A post hoc, frequency-only endpoint-definition check omitted the six ambiguously labelled principal events (23–4–2=17, or 5.7% of 300); no subgroup p-values or q-values were recalculated for that narrower endpoint. The original analyses used IBM SPSS Statistics version 29.0. Inference remains exploratory and noncausal.

RESULTS

The cohort comprised 300 patients; 23 experienced at least one in-hospital postoperative adverse event (7.7%; 95% CI 5.2%–11.2%) and 277 did not. Type 2 diabetes was recorded in 296 patients (98.7%) and type 1 diabetes in 4 (1.3%). Patients with an event were older than those without an event (68.32 ± 11.20 vs 62.99 ± 10.65 years; p=0.037), although this difference did not remain significant after multiplicity correction (q=0.153). Pre-existing diabetic complications were more frequent in the event group (47.8% vs 17.3%; p=0.001; q=0.016), whereas diabetic comorbidity showed an unadjusted difference that did not meet the corrected threshold (91.3% vs 64.6%; p=0.010; q=0.075). Mean creatinine was higher in the event group (98.49 ± 29.35 vs 70.28 ± 37.46; p<0.001; q=0.004). Other baseline findings are presented (Table 1).

Table 1: Baseline Clinical and Biochemical Characteristics According to In-Hospital Adverse-Event Status

Variables	Overall, n (%) / Mean ± SD	Adverse Event, n (%) / Mean ± SD	No Adverse Event, n (%) / Mean ± SD	p-value	FDR q
No. of Patients	300	23 (7.7%)	277 (92.3%)	–	–
Age (years)	63.40 ± 10.77	68.32 ± 11.20	62.99 ± 10.65	0.037	0.153
Male	153 (51.0%)	16 (69.6%)	137 (49.5%)	0.082	0.253
Weight, kg	70.83 ± 12.57	68.81 ± 13.86	71.00 ± 12.47	0.470	0.688
BMI, kg/m^2	25.81 ± 3.89	24.67 ± 3.76	25.91 ± 3.89	0.142	0.362
Type 1 Diabetes,	4 (1.3%)	1 (4.3%)	3 (1.1%)	–	–

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Type 2 Diabetes	296 (98.7%)	22 (95.7%)	274 (98.9%)	–	–
Diabetes Duration, years	8.70 ± 6.43	9.31 ± 6.75	8.65 ± 6.41	0.655	0.785
Pre-Existing Diabetic Complications	59 (19.7%)	11 (47.8%)	48 (17.3%)	0.001	0.016
Diabetic Comorbidity	200 (66.7%)	21 (91.3%)	179 (64.6%)	0.010	0.075
Hypoglycemia <=3.9 mmol/L	19 (6.3%)	2 (8.7%)	17 (6.1%)	0.647	0.785
Smoking	63 (21.0%)	7 (30.4%)	56 (20.2%)	0.285	0.504
Systolic BP, mmHg	137.68 ± 17.81	139.05 ± 20.07	137.57 ± 17.64	0.735	0.790
Diastolic BP, mmHg	79.39 ± 10.48	78.40 ± 12.04	79.47 ± 10.36	0.683	0.785
FPG Preoperative, mmol/L	6.88 ± 2.18	6.61 ± 1.83	6.90 ± 2.21	0.479	0.688
FPG Postoperative, mmol/L	9.19 ± 3.11	9.54 ± 3.06	9.16 ± 3.12	0.573	0.775
Mean Peripheral Glucose, mmol/L	9.44 ± 2.19	8.66 ± 1.78	9.51 ± 2.21	0.040	0.153
ALT, U/L	18.99 ± 13.78	19.90 ± 14.56	18.91 ± 13.74	0.756	0.790
AST, U/L	17.66 ± 10.83	21.06 ± 12.49	17.38 ± 10.66	0.182	0.419
GGT, U/L	31.21 ± 20.04	39.22 ± 22.74	30.54 ± 19.70	0.088	0.253
Creatinine	72.44 ± 37.62	98.49 ± 29.35	70.28 ± 37.46	<0.001	0.004
BUN, mmol/L	5.70 ± 2.29	6.79 ± 4.65	5.61 ± 1.96	0.239	0.501

Preoperative and postoperative fasting plasma glucose did not differ significantly between groups. Mean peripheral blood glucose was lower in the event group (8.66 ± 1.78 vs 9.51 ± 2.21 mmol/L; p=0.040), but the difference was not significant after false-discovery-rate correction (q=0.153). Mean peripheral glucose was therefore not associated with event status after multiplicity correction.

General surgery accounted for 17/23 procedures (73.9%) in the event group and 133/277 (48.0%) in the no-event group (Fisher exact p=0.028; q=0.153). The overall distribution of anesthesia techniques did not differ between groups (Fisher-Freeman-Halton exact p=0.953; q=0.953). General anesthesia was used in 20/23 (87.0%) event patients and 219/277 (79.1%) no-event patients. Postoperative antibiotic use was recorded in 22/23 (95.7%) and 237/277 (85.6%), respectively (p=0.337; q=0.554). Length of stay was longer among patients with an adverse event (27.82 ± 26.96 vs 13.43±8.53 days; mean difference 14.39 days, 95% CI 2.69–26.09; unadjusted descriptive p=0.018). Because length of stay is measured after the adverse event classification, this comparison is not part of the 23-test FDR family and is not interpreted as a risk factor (Table 2).

Table 2: Perioperative Characteristics According to In-Hospital Adverse-Event Status

Variables	Overall, n (%)	Adverse Event, n (%)	No Adverse Event, n (%)	p-value	FDR q
General Surgery	150 (50.0%)	17 (73.9%)	133 (48.0%)	0.028	0.153
Orthopedic Surgery	150 (50.0%)	6 (26.1%)	144 (52.0%)	–	–
Nerve Block	23 (7.7%)	2 (8.7%)	21 (7.6%)	–	–
Brachial Plexus Block	6 (2.0%)	0 (0%)	6 (2.2%)	–	–
Lumbar Plexus Block	1 (0.3%)	0 (0%)	1 (0.4%)	–	–
Postoperative Antibiotic Use	259 (86.3%)	22 (95.7%)	237 (85.6%)	0.337	0.554
Length of Stay, days	14.53 ± 11.63	27.82 ± 26.96	13.43 ± 8.53	0.018	–
Anesthesia Type, Global Exact Test					
Local Anesthesia	18 (6.0%)	1 (4.3%)	17 (6.1%)	0.953	0.953
General Anesthesia	239 (79.7%)	20 (87.0%)	219 (79.1%)		
Epidural Anesthesia	13 (4.3%)	0 (0%)	13 (4.7%)		

The principal event distribution is shown. Delayed extubating was the most frequent recorded event (8/23, 34.8%), followed by respiratory/circulatory abnormalities (4/23, 17.4%), circulatory disorders (3/23, 13.0%), infections at other sites (3/23, 13.0%), nonhealing incision (2/23, 8.7%), other severe postoperative complications (2/23, 8.7%) and death (1/23, 4.3%). The outcome analysis therefore emphasizes event frequency and corrected between-group comparisons rather than adjusted prediction estimates. In a post hoc, limited descriptive endpoint-definition sensitivity check, excluding the four combined respiratory/circulatory entries and the two nonspecific other-severe entries left 17 principal events, corresponding to 5.7% of the full cohort, compared with 7.7% under the original record-based composite. Thus, the overall reported frequency depends partly on inclusion of categories with limited clinical specificity. No new subgroup significance testing was performed (Table 3).

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Table 3: Operational Definitions and Frequency of Principal Postoperative Adverse Events

Events	Operational Definition	Among Event Patients, n (%)	Full Cohort, n (%)
Delayed Extubation	Chart-recorded delay in removal of airway support; the actual time-to-extubation threshold and clinical attribution were not consistently specified.	8 (34.8%)	8 (2.7%)
Respiratory/Circulatory Abnormalities	Combined respiratory/circulatory abnormality recorded as the principal event; components and objective criteria could not be separated.	4 (17.4%)	4 (1.3%)
Circulatory Disorders	Chart-labelled circulatory or hemodynamic disturbance; thresholds, treatment criteria and overlap with the preceding label were not verifiable.	3 (13.0%)	3 (1.0%)
Death	Clinician-labelled infection outside the incision category; microbiologic confirmation and standardized site-specific criteria were unavailable.	3 (13.0%)	3 (1.0%)
Infections at Other Sites	Chart-labelled inadequate incision healing before discharge; uniform wound-grading criteria were unavailable.	2 (8.7%)	2 (0.7%)
Nonhealing Incision	Other serious postoperative event not otherwise specified in the archived principal-event categorization.	2 (8.7%)	2 (0.7%)
Other Severe Postoperative Complications	Death recorded during the postoperative index hospitalization; attribution to surgery or anesthesia not established.	1 (4.3%)	1 (0.3%)

DISCUSSION

In this retrospective cohort, 7.7% of patients with diabetes experienced at least one clinically important adverse event before discharge or in-hospital death. This frequency is numerically identical to that reported by Wang et al. in a broader general and orthopedic surgical cohort [3]. After correction for multiple exploratory comparisons, the clearest differences involved pre-existing diabetic complications and serum creatinine. Diabetes-related end-organ disease can represent accumulated microvascular and macrovascular injury, while impaired renal function may complicate perioperative fluid balance, drug handling, electrolyte control, and glycemic management. Nationwide orthopedic analyses have shown that diabetic kidney disease is associated with substantially greater postoperative kidney injury and that diabetes is linked to worse arthroplasty outcomes [9, 15]. In the present cohort, pre-existing diabetic complications and creatinine remained the two most robust clinical differences after false-discovery-rate correction, supporting end-organ disease and renal status as priority domains for perioperative assessment and prospective validation. The glucose findings also clarify the relationship between the measured perioperative glucose variables and adverse-event status. Mean peripheral glucose was lower in patients with events, but the difference was no longer significant after multiplicity correction; preoperative and postoperative fasting glucose were also similar between groups. This result should be interpreted alongside substantial evidence linking perioperative dysglycaemia with adverse outcomes. In a non-cardiac surgical cohort, higher mean glucose and glycemic variability were associated with postoperative complications and longer stay [16]. Continuous-monitoring studies in arthroplasty have demonstrated early postoperative hyperglycemic excursions [17], and postoperative hyperglycemia has been associated with adverse outcomes in other surgical populations [18]. Structured glycemic-management programmes may improve perioperative outcomes [19], while recent systematic reviews support the growing role of continuous glucose monitoring in non-cardiac surgery [20, 21]. The contrast with the present findings suggests that summary glucose measurements may not capture the glycemic dimensions most closely related to postoperative risk; future studies should integrate HbA1c, treatment regimen, and time-resolved glucose metrics within the same analytic framework. General surgery was more frequent among event patients before multiplicity correction, but the association did not remain significant after false-discovery-rate adjustment. Procedure-specific studies in pancreatic surgery and total knee arthroplasty illustrate how postoperative risk changes with operative context and diabetes phenotype [11, 22]. Insulin dependence has also been associated with higher rates of renal, wound, infectious, and mortality outcomes after total joint arthroplasty [23], supporting inclusion of treatment intensity in future procedure-specific models.

Interpretation should consider the retrospective single-centre design, the 23-event outcome count, service-line rather than procedure-level surgical classification, and follow-up restricted to the index hospitalization. Procedure-level operative names and validated surgical-complexity grades were not consistently available in the archived records; retrospective reconstruction was

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therefore avoided to reduce the risk of misclassification. The in-hospital observation period was clearly defined from surgery to discharge or in-hospital death, but its duration necessarily varied according to length of stay. Diabetes characterization was based on documented type, duration, end-organ complications, and comorbidity rather than HbA1c-defined control or treatment intensity. These design features support an exploratory between-group comparison framework and warrant prospective external validation before development of a multivariable risk model. Missing or unverifiable patient-level HbA1c, antidiabetic treatment intensity, intraoperative management, operative complexity, and postoperative care protocols leave clinically important uncontrolled confounding. Predefined complication criteria and at least 30-day follow-up would permit separate analysis of infectious, cardiopulmonary, renal, wound, and mortality outcomes. Interpretation should consider the retrospective single-centre design, the 23-event outcome count, service-line rather than procedure-level surgical classification, and follow-up restricted to the index hospitalization.

CONCLUSIONS

In this cohort of patients with diabetes undergoing elective general or orthopedic surgery, 7.7% developed clinically important in-hospital postoperative adverse events. After correction for multiple exploratory comparisons, pre-existing diabetic complications and serum creatinine showed the biggest between-group differences. Patients with adverse events also had markedly longer hospital stays, and delayed extubation was the most frequent recorded event. These findings support careful assessment of diabetes-related end-organ involvement and renal status and provide a basis for prospective, procedure-specific studies with standardized complication definitions and fixed follow-up intervals. Under a narrower sensitivity definition excluding six ambiguously labelled principal events, the descriptive frequency was 5.7%, demonstrating that the estimated event burden depends partly on chart-based endpoint definitions. This exploratory dataset cannot support adjusted causal or predictive conclusions in the absence of detailed operative and diabetes-treatment information.

Authors' Contribution

Conceptualization: AI
Methodology: AK, AI, R
Formal analysis: AI, R
Writing and Drafting: AK, AI, R
Review and Editing: AK, AI, R

All authors approved the final manuscript and take responsibility for the integrity of the work

Conflict of Interest

All the authors declare no conflict of interest.

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REFERENCES

[1] Zhang X, Hou A, Cao J, Liu Y, Lou J, Li H *et al.* Association of Diabetes Mellitus with Postoperative Complications and Mortality After Non-Cardiac Surgery: A Meta-Analysis and Systematic Review. Frontiers in Endocrinology. 2022 May; 13: 841256. doi: 10.3389/fendo.2022.841256.

[2] Drayton DJ, Birch RJ, D'Souza-Ferrer C, Ayres M, Howell SJ, Ajjan RA. Diabetes Mellitus and Perioperative Outcomes: A Scoping Review of the Literature. British Journal of Anesthesia. 2022 May; 128(5): 817-28. doi: 10.1016/j.bja.2022.02.013.

[3] Wang J, Chen K, Li X, Jin X, An P, Fang YI *et al.* Postoperative Adverse Events in Patients with Diabetes Undergoing Orthopedic and General Surgery. Medicine. 2019 Apr; 98(14): e15089. doi: 10.1097/MD.0000000000015089.

[4] Polderman JA, Hermanides J, Hulst AH. Update on the Perioperative Management of Diabetes Mellitus. British Journal of Anesthesia Education. 2024 Aug; 24(8): 261-9. doi: 10.1016/j.bjae.2024.04.007.

[5] Sreedharan R, Khanna S, Shaw A. Perioperative Glycemic Management in Adults Presenting for Elective Cardiac and Non-Cardiac Surgery. Perioperative Medicine. 2023 Apr; 12(1): 13. doi: 10.1186/s13741-023-00302-6.

[6] Bellon F, Solà I, Gimenez-Perez G, Hernández M, Metzendorf MI. Perioperative Glycemic Control for People with Diabetes Undergoing Surgery. Cochrane Database of Systematic Reviews. 2023; 8. doi: 10.1002/14651858.CD007315.pub3.

[7] Rajan N, Duggan EW, Abdelmalak BB, Butz S, Rodriguez LV, Vann MA *et al.* Society for Ambulatory Anesthesia Updated Consensus Statement on Perioperative Blood Glucose Management in Adult Patients with Diabetes Mellitus Undergoing Ambulatory Surgery. Anesthesia and Analgesia. 2024 Sep; 139(3): 459-77. doi: 10.1213/ANE.0000000000006791.

[8] Shohat N, Foltz C, Restrepo C, Goswami K, Tan T, Parvizi JA. Increased Postoperative Glucose Variability Is Associated with Adverse Outcomes Following Orthopedic Surgery. The Bone and Joint Journal. 2018 Aug; 100(8): 1125-32. doi: 10.1302/0301-620X.100B8.BJJ-2017-1283.R1.

[9] Zhou AD, Ding J, Zhou Q, Yang QF, Cai X, Shi Y *et al.* Impact of Diabetic Kidney Disease on Post-Operative Complications After Primary Elective Total Hip Arthroplasty: A Nationwide Database Analysis. BioMed

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DOI: https://doi.org/10.54393/pbmj.v9i9.1424

Central Musculoskeletal Disorders. 2024 Jul; 25(1): 551.
[10] doi: 10.1186/s12891-024-07653-1.
Chandrupatla S, Rumalla K, Singh JA. Association Between Diabetes Mellitus and Total Hip Arthroplasty Outcomes: An Observational Study Using the US National Inpatient Sample. British Medical Journal open. 2024 Jul; 14(7): e085400. doi: 10.1136/bmjopen-2024-085400.
[11] Wijma AG, Driessens H, Nijkamp MW, Hoogwater FJ, van Dijk PR, Klaase JM. Impact of Preoperative Diabetes Mellitus on Postoperative Outcomes in Elective Pancreatic Surgery and Its Implications for Prehabilitation Practice. Pancreas. 2024 Jan; 53(3): e274. doi: 10.1097/MPA.0000000000002300.
[12] Xiong X, He Y, Zhou C, Zheng Q, Chen C, Liang P. Impact of Total Intravenous Anesthesia and Total Inhalation Anesthesia as the Anesthesia Maintenance Approaches on Blood Glucose Level and Postoperative Complications in Patients with Type 2 Diabetes Mellitus: A Double-Blind, Randomized Controlled Trial. BMC Anesthesiology. 2023 Aug; 23(1): 267. doi: 10.1186/s12871-023-02199-6.
[13] Committee AD. 2. Diagnosis and Classification of Diabetes: Standards of Care in Diabetes—2026. Diabetes Care. 2025 Dec; 49(Suppl 1): S27. doi: 10.2337/dc26-S002.
[14] Von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement: Guidelines for Reporting Observational Studies. The Lancet. 2007 Oct; 370(9596): 1453-7. doi: 10.1016/S0140-6736(07)61602-X.
[15] Riley RD, Ensor J, Snell KI, Harrell FE, Martin GP, Reitsma JB *et al.* Calculating the Sample Size Required for Developing a Clinical Prediction Model. British Medical Journal. 2020 Mar; 368. doi: 10.1136/bmj.m441.
[16] Nair BG, Neradilek MB, Newman SF, Horibe M. Association Between Acute Phase Perioperative Glucose Parameters and Postoperative Outcomes in Diabetic and Non-Diabetic Patients Undergoing Non-Cardiac Surgery. The American Journal of Surgery. 2019 Aug; 218(2): 302-10. doi: 10.1016/j.amjsurg.2018.10.024.
[17] Tateiwa T, Shikuma J, Takahashi Y, Nakamura I, Matsumura H, Suzuki R *et al.* Early Postoperative Hyperglycemia After Arthroplasty in Type 2 Diabetes: Insights from Continuous Glucose Monitoring and Identification of Predictive Glycemic Parameters. Life. 2025 Oct 13;15(10):1594. doi: 10.3390/life15101594.
[18] Lewcun JA, Kelly B, McCaughey M, Melki G, Vanderkwaak B, Nichols D *et al.* Impact of Postoperative Hyperglycemia on Adverse Outcomes in Microvascular Free Tissue Transfer for Limb Salvage. Journal of Reconstructive Microsurgery. 2026 Mar; 42(03): 197-203. doi: 10.1055/a-2616-4656.
[19] Zhou Q, Pan X, Zhang X, Huang D. A Hospital-Wide Informatized Glycemic Management Team (WH-GMT) Improves Perioperative Outcomes in Type 2 Diabetes: A Prospective Cohort Study. Endocrine. 2026 Apr; 91(1): 124. doi: 10.1007/s12020-026-04578-8.
[20] Putzu A, Grange E, Schorer R, Schiffer E, Gariani K. Continuous Peri-Operative Glucose Monitoring in Noncardiac Surgery: A Systematic Review. European Journal of Anesthesiology. 2024 Nov; 42(2): 162. doi: 10.1097/EJA.0000000000002095.
[21] Carlier L, De Ponthaud C, Jacqueminet S, Phan F, Gaujoux S, Amouyal C. Perioperative Use and Accuracy of Continuous Glucose Monitoring: A Systematic Review. Diabetes, Obesity and Metabolism. 2025 Oct; 27(10): 5393-408. doi: 10.1111/dom.16583.
[22] Berkovich Y, Nissan EC, Maman D, Hirschmann MT, Yonai Y, Steinfeld Y *et al.* Diabetes and Total Knee Arthroplasty: A Nationwide Analysis of Complications, Hospitalization Outcomes and Revision Burden. Knee Surgery, Sports Traumatology, Arthroscopy. 2025 Sep; 33(9): 3250-60. doi: 10.1002/ksa.12696.
[23] Wu LM, Si HB, Li MY, Wu YG, Zeng Y, Shen B. Insulin Dependence Increases the Risk of Complications and Death in Total Joint Arthroplasty: A Systematic Review and Meta-(Regression) Analysis. Orthopedic Surgery. 2021 May; 13(3): 719-33. doi: 10.1111/os.12944.

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