

A Prospective Study of Association between Perioperative Glycemic Levels and Post-Operative Infections in General Surgery Patients

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Abstract:

Background: Perioperative hyperglycemia is a common and modifiable risk factor that increases the incidence of postoperative complications, particularly surgical site infections (SSIs). Diabetic patients are especially susceptible due to impaired immune responses and delayed wound healing. Although strict glycemic control can improve outcomes, the optimal target range for perioperative glucose remains uncertain.

Aim: To study the association between perioperative glycemic levels and postoperative infections in diabetic patients undergoing general surgical procedures.

Methodology: This hospital-based prospective study was conducted on 50 diabetic patients undergoing elective and emergency general surgery procedures in the Department of General Surgery, Narayana Medical College and Hospital, Nellore, from June 2023 to November 2024. Patients were categorized into four quartiles based on mean perioperative blood glucose levels (120–180 mg/dl, 181–220 mg/dl, 221–260 mg/dl, 261–350 mg/dl). Parameters such as fasting blood sugar, HbA1c, and postoperative glucose levels (days 1, 3, and 7) were correlated with postoperative complications including SSIs, urinary tract infections (UTIs), delayed wound healing, and reoperations.

Results: Among 50 patients, 68% were female, and the most common age group was 51–60 years. Surgical site infection was the most frequent complication (64%), followed by delayed wound healing (28%) and UTI (20%). Patients with poor glycemic control exhibited higher rates of SSIs (78.9%) compared to those with good control (40%). Mean postoperative glucose levels were significantly higher in the SSI group on postoperative days 1, 3, and 7 ($p < 0.05$). However, HbA1c and fasting glucose did not show statistically significant associations with infection risk.

Conclusion: The study emphasizes that perioperative hyperglycemia, particularly elevated postoperative glucose levels, strongly correlates with higher rates of SSIs and delayed recovery. Optimal perioperative glucose management significantly reduces infection risk and improves surgical outcomes.

Keywords: Perioperative Hyperglycemia, Surgical Site Infection, Glycemic Control, Diabetes Mellitus.

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Introduction

Perioperative hyperglycemia in surgical patients increases the risk of postoperative SSI, a common complication. Diabetic patients are particularly susceptible to postoperative complications, compared to non-diabetic surgical patients. Notably, hyperglycemia is positively associated with SSI in diabetic surgical patients and linked to poor outcomes following surgery. In surgical patients, perioperative hyperglycemia further worsens chances of SSI. Maintaining strict glycemic control reduces the risk of infections and enhances outcomes in trauma, cardiac, and critically ill and non-diabetic surgical patients. [1]

Hyperglycemia is also linked to a prolonged reduction in polymorphonuclear leukocyte function. The hyperglycemic state has been shown to cause vari-

ous leukocyte dysfunctions, including impaired granulocyte adherence, reduced phagocytosis, delayed chemotaxis, and diminished bactericidal capacity. Phagocytic function can be impaired at glucose levels as low as 200 mg/dL. However, these leukocyte deficiencies tend to improve with strict glycemic control. Given the established role of perioperative hyperglycemia, maintaining tight glycemic control is essential for improving surgical outcomes. [2]

Recent evidence indicates that perioperative hyperglycemia is a primary risk factor for developing postoperative infection (POI). Intensive glucose control has been shown to reduce SSI in surgical patients. However, strict glycemic management, including intensive insulin therapy (IIT), carries the

risk of hypoglycemia. Furthermore, the ideal blood glucose target range for minimizing SSI remains uncertain. Our recent study demonstrated that tight perioperative glycemic control can be effectively achieved using an artificial endocrine pancreas in surgical patients, providing a safe and effective method to reduce SSI without increasing the risk of hypoglycemia. [3]

Patients with diabetes are more likely to face a higher risk of postoperative complications. However, the impact of perioperative hyperglycemia on mortality and postoperative complications in diabetic patients has not been fully established. The Leuven 1 study, a large-scale clinical trial involving surgical intensive care unit (SICU) patients, demonstrated the benefits of glucose management in reducing 1-month mortality. However, a subgroup analysis in diabetic patients did not show the same efficacy. Similarly, Frisch et al. conducted a large observational study on patients undergoing non-cardiac surgery, highlighting the benefits of glucose management in reducing hospital stay, complications, and mortality, though the subgroup analysis in diabetic patients did not yield comparable results. [4]

Perioperative hyperglycemia is associated with an increased risk of infection, stroke, myocardial infarction, and mortality in the general population. Additionally, it is believed to elevate the risk of arterial and venous thrombosis by promoting platelet aggregation and activating coagulation factors. Hyperglycemia itself also contributes to delay wound healing. In response, the American Diabetes Association recommends maintaining perioperative blood glucose (BG) levels between 80–180 mg/dL for diabetic patients. The American College of Surgeons and the Surgical Infection Society advise a BG range of 110–150 mg/dL in all patients during the immediate postoperative period to reduce the risk of surgical site infections (SSI). Similarly, the Japan Diabetes Society suggests a fasting BG range of 100–140 mg/dL and a postprandial range of 160–200 mg/dL for diabetic patients before surgery. However, there is currently no definitive evidence supporting an optimal BG range for diabetic patients undergoing surgery. [5]

Tight glycemic control (TGC) has been shown to reduce mortality and morbidity in critically ill patients, leading to its recommendation as the standard approach for perioperative intensive care unit (ICU) management worldwide. However, subsequent studies have failed to consistently confirm these benefits. Perioperative hyperglycemia occurs in approximately 20–40% of patients after general surgery and nearly 80% of those undergoing cardiac surgery. Research in both cardiac and general surgery has demonstrated a strong link between perioperative hyperglycemia and adverse clinical outcomes, including delayed wound healing, surgi-

cal site infections, and extended hospital stays. However, the ideal glucose target in the postoperative period remains a topic of debate. Studies comparing TGC and conventional glycemic control (CGC) have found no significant differences in complication rates, though one study involving cardiac surgery patients reported fewer postoperative complications in the TGC group. [6]

Hyperglycemia has been identified as a modifiable factor contributing to adverse surgical outcomes. The potential mechanisms underlying these effects include vascular, inflammatory, and hemodynamic disturbances caused by persistently elevated glucose levels, all of which can increase the risk of postoperative morbidity and mortality. Retrospective studies across various surgical specialties—including general, colorectal, cardiac, vascular, and orthopaedic surgery—have further reinforced the association between hyperglycemia and postoperative complications. In general surgery patients, the widely referenced study by Kwon et al, utilizing data from the Surgical Care and Outcomes Assessment Program in Washington State, found that postoperative hyperglycemia was significantly linked to infections, additional surgical interventions, and mortality. [7]

Surgical patients may experience elevated blood glucose levels regardless of their diabetic status. Perioperative hyperglycemia has been linked to an increased risk of surgical site infections, myocardial infarction, stroke, and mortality. Stress hyperglycemia, defined as elevated glucose levels in the absence of diagnosed diabetes, commonly occurs during surgery and critical illness, particularly in cardiac procedures. Research indicates that patients with stress hyperglycemia have worse outcomes than those with diabetes-related hyperglycemia. [8]

Some small, single-centre analyses suggest a connection between severe hyperglycemia and postoperative infections, these studies often rely on outdated data or over fitted models, making the association between intraoperative glucose levels and outcomes uncertain [9]. Although most anaesthesiologists recognize that managing high glucose levels during surgery may improve postoperative outcomes, they also face concerns. General anaesthesia can mask symptoms of hypoglycemia, creating a potential risk with aggressive glucose control. Additionally, workflow challenges, such as limited access to point-of-care glucose monitoring devices, hinder compliance with perioperative glucose management. However, studies have shown that real-time alerting systems can improve glucose monitoring and adherence to glycemic control protocols. [10] A surgical site infection (SSI) is characterised as an infection that arises within 30 days following a surgical procedure in the absence of implanted devices, or within one year if an implantable device has been introduced. The occurrence of SSIs is

generally influenced by the interplay of four key factors: the bacterial inoculum, the pathogenicity of the bacteria, the microenvironment at the surgical site, and the host's immune response. Procedures that are prolonged in duration or involve body cavities that are normally populated by bacteria tend to have a higher rate of SSIs. Additionally, surgical sites can be categorized as clean, clean-contaminated, contaminated, or dirty, which can help in assessing the likelihood of developing an SSI.¹¹ Factors such as age extremes, malnutrition, diabetes, smoking, cancer, and other comorbid conditions that weaken the immune system may also increase the risk of surgical site infections (SSIs).

Notwithstanding the progress achieved in aseptic practices, antimicrobial prophylaxis, sterilized surgical techniques, and hospital care, surgical site infections remain a significant challenge that arises after surgery. [12]

Even in hospitals equipped with the latest technology and adhering to established protocols for pre-operative preparation and antibiotic prophylaxis, surgical site infections (SSIs) contribute to increased costs, morbidity, and mortality associated with surgical interventions. Furthermore, they negatively impact the quality of life and productivity of patients undergoing surgery. [13]

Aim: To Study the association between perioperative glycemic levels and post-operative infections in General Surgery cases admitted in Narayana Medical College and Hospital, Nellore. **Objectives:** To Study about the Preoperative glycemic control and postoperative infections, To Study about the Postoperative glycemic status and postoperative

infections and To Study the range of the blood sugar to be maintained.

Materials & Methods

This was a Hospital based Prospective study done on 50 cases with diabetes mellitus undergoing general surgery procedures in the Department of General surgery in Narayana Medical College and Hospitals, Nellore from June 2023 to November 2024.

Inclusion Criteria: Patients presenting with diabetes mellitus undergoing general surgical procedures. **Exclusion Criteria:** Patients without diabetes mellitus, with major comorbid illness, presenting with postoperative infections within 36 hours of surgery.

Investigations Required: Blood sugar values, Hb A1C, Total leukocyte count, Differential white blood cell count, Wound swab culture and sensitivity, Urine Complete examination, Urine culture and sensitivity, Sputum culture and sensitivity, Chest X ray, Blood culture and sensitivity.

Methodology: Mean plasma glucose concentration in the perioperative period calculated and patients were divided into four quartiles: Quartile I (120-180 mg/dl) Quartile II(181 to 220 mg/dl) Quartile III (221 to 260 mg/dl) Quartile IV (261 to 350 mg/dl) accordingly. All patients were followed up for signs and symptoms of postoperative infections which included: Surgical site infections, Wound dehiscence, Pneumonia, Cough with expectoration, Urinary tract infections, Sepsis, Elevated leukocyte count, Positive blood culture, Hypotension, Shock.

Results:

Table 1: Age and Sex Distribution

Age	Frequency	Percent
31 - 40	11	22.0
41 - 50	10	20.0
51 - 60	13	26.0
61 - 70	8	16.0
71 - 80	8	16.0
Sex	Frequency	Percent
Female	34	68.0
Male	16	32.0

Table 2: Distribution of Sugar Control

Sugar Control	Frequency	Percent
Good Control	10	20.0
Fair Control	21	42.0
Poor Control	19	38.0
Total	50	100.0

Table 3: Distribution of Type of Surgery

Type of Surgery	Frequency	Percent
Inguinal Hernioplasty	12	24.0
Benign lesion excision	5	10.0
Jaboulays procedure	6	12.0
Lap cholecystectomy	6	12.0
Mastectomy	4	8.0
Thyroidectomy	7	14.0
Ventral Hernioplasty	10	20.0
Total	50	100.0

Table 4: Distribution of Complications

Complications	Frequency	Percent
Surgical Site Infection	32	64.0
Urinary Tract Infection	10	20.0
Delayed Wound Healing	14	28.0
Fever	4	8.0
Reoperation	5	10.0
None	27	54.0

Table 5: Comparison B/W Surgical Site Infection and Blood Sugar Levels

Surgical Site Infection									
No					Yes				
Blood sugar levels	N	Mean	SD	Std. Error Mean	N	Mean	SD	Std. Error Mean	P values
Fasting Blood Sugar (mg/dl)	18	164.56	17.202	4.055	32	175.34	19.722	3.486	0.058
HbA1c (%)	18	7.472	0.8280	.1952	32	7.994	.9675	.1710	0.060
Post-op Day 1 Sugar (mg/dl)	18	200.44	19.936	4.699	32	214.28	16.278	2.878	0.010
Post-op Day 3 Sugar (mg/dl)	18	204.44	22.272	5.249	32	217.28	17.997	3.181	0.031
Post-op Day 7 Sugar (mg/dl)	18	203.44	21.462	5.059	32	216.47	18.596	3.287	0.029
SSI	Good Control			Fair Control			Poor Control		P Value
	Count	%		Count	%		Count	%	
No	6	60.0%		8	38.1%		4	21.1%	0.111
Yes	4	40.0%		13	61.9%		15	78.9%	

Table 6: Comparison B/W Urinary Tract Infection and Blood Sugar Levels

Urinary Tract Infection									
No					Yes				
Blood sugar levels	N	Mean	SD	Std. Error Mean	N	Mean	SD	Std. Error Mean	P value
Fasting Blood Sugar (mg/dl)	40	172.48	19.625	3.103	10	167.40	18.863	5.965	0.464
HbA1c (%)	40	7.850	.9685	.1531	10	7.630	.8718	.2757	0.516
Post-op Day 1 Sugar (mg/dl)	40	209.95	18.067	2.857	10	206.70	22.015	6.962	0.628
Post-op Day 3 Sugar (mg/dl)	40	213.95	20.351	3.218	10	207.50	20.781	6.571	0.376
Post-op Day 7 Sugar (mg/dl)	40	212.85	19.819	3.134	10	207.50	23.467	7.421	0.465
UTI	Good Control			Fair Control			Poor Control		P Value
	Count	%		Count	%		Count	%	
No	7	70.0%		17	81.0%		16	84.2%	0.654
Yes	3	30.0%		4	19.0%		3	15.8%	

Table 7: Duration of Surgery Association

	N	Mean	SD	Minimum	Maximum	P value
Inguinal Hernioplasty	12	141.50	44.365	32	177	0.642
Benign lesion excision	5	123.60	37.938	68	175	
Jaboulays procedure	6	111.00	53.989	31	169	
Lap cholecystectomy	6	107.00	54.853	38	176	
Mastectomy	4	125.25	50.427	81	177	
Thyroidectomy	7	132.43	17.242	104	149	
Ventral Hernioplasty	10	111.00	47.206	36	173	
Total	50	123.24	44.051	31	177	

Table 8: Distribution Length of Hospital Stay

	N	Mean	Std. Deviation	Minimum	Maximum	P value
Inguinal Hernioplasty	12	9.583	4.2950	5.0	19.0	0.993
Interval Appendicectomy	5	11.200	2.2804	9.0	15.0	
Jaboulays procedure	6	10.333	5.3914	6.0	19.0	
Lap cholecystectomy	6	10.167	4.4907	5.0	17.0	
Mastectomy	4	10.500	5.9722	5.0	19.0	
Thyroidectomy	7	10.429	5.2870	5.0	19.0	
Ventral Hernioplasty	10	11.000	3.9721	6.0	19.0	
Total	50	10.380	4.2900	5.0	19.0	

Table 9: Correlation Description

Blood sugar levels	N	Mean	Std. Deviation
Fasting Blood Sugar (mg/dl)	50	171.46	19.393
HbA1c (%)	50	7.806	.9455
< 7	10		
>7	40		
Post-op Day 1 Sugar (mg/dl)	50	209.30	18.723
Post-op Day 3 Sugar (mg/dl)	50	212.66	20.390
Post-op Day 7 Sugar (mg/dl)	50	211.78	20.456

Table 10: Fasting Blood Sugar and Complications (Mg/Dl)

Row Labels	Quartile 1 (n=10)	Quartile 2 (n=9)	Quartile 3 (n=6)	Quartile 4 (n=25)
Delayed Wound Healing	4.00%	6.00%	4.00%	14.00%
Urinary Tract Infection	6.00%	0.00%	6.00%	8.00%
Surgical Site Infection	8.00%	10.00%	10.00%	36.00%

Discussion

Demographic Analysis: The demographic data (age, sex, etc.) from this study are comparable with previous findings in perioperative surgical research. A higher proportion of female patients (68%) were observed, which is consistent with data from other surgical settings where female patients tend to have higher representation in elective surgeries.

The most common age group was between 51-60 years, followed by 31-40 years. This trend aligns with previous studies that suggest older adults are more likely to undergo surgeries and are at higher risk for both surgical complications and glycemic issues.

Glycemic Control and Postoperative Infections: The study found that 64% of the patients developed surgical site infections (SSIs), a significantly high number, which emphasizes the critical role of

glycemic control in infection prevention. In comparison to other studies, including Kwon et al [14] which identified that perioperative hyperglycemia more than doubled the risk of infections in general surgery patients, this study also found a strong association between elevated preoperative and postoperative blood glucose levels and the incidence of SSIs. Notably, although postoperative blood glucose levels were elevated across the study cohort, statistical significance was not reached for postoperative day 1, 3, and 7 blood glucose levels, suggesting that preoperative control may be more crucial in preventing infections than managing blood glucose post-surgery.

Blood Glucose Control and Surgical Outcomes: The analysis of postoperative complications, such as delayed wound healing, fever, and reoperation, indicated a clear relationship between poor glycemic control and the incidence of these

outcomes. This aligns with studies by Kwon et al [14] which found that hyperglycemia, even in non-diabetic patients, is associated with higher rates of complications, including infections, reoperations, and prolonged hospital stays. In line with this, Berhe et al [15] argued that intensive glycemic control may reduce infection rates but also noted the risks of hypoglycemia associated with strict control, which can potentially lead to adverse outcomes such as longer hospital stays and increased mortality. This study reinforces that a balanced approach is needed, where the aim should be to maintain glucose within an optimal range, avoiding both hyperglycemia and hypoglycemia.

Comparison between Surgical Site Infection and Blood Sugar Levels: The study shows a noticeable trend where patients with elevated fasting blood sugar levels were more likely to develop SSIs. Specifically, the mean fasting blood sugar in patients with infections was 175.34 mg/dl, compared to 164.56 mg/dl in those without infections. Although this difference did not reach statistical significance ($p = 0.058$), it aligns with findings from Kwon et al [14] who identified elevated fasting blood glucose as an independent risk factor for SSIs. Their research demonstrated that even a slight increase in preoperative blood sugar levels could compromise the immune system and increase the likelihood of infections. This study thus suggests that better preoperative glycemic control may play a critical role in preventing postoperative infections.

In terms of long-term glycemic control, the HbA1c levels were higher in the infection group (7.994%) compared to the non-infection group (7.472%), but the difference was not statistically significant ($p = 0.060$). Despite the lack of statistical significance, these findings are in line with the work of Hanazaki et al [4] who found that poor long-term glycemic control, as reflected by elevated HbA1c, is associated with a higher risk of infections due to impaired immune responses. Poor glycemic control impairs the function of immune cells like neutrophils and macrophages, making it more difficult for the body to fight off infections, especially after surgical procedures. Therefore, while the p -value in this study suggests no strong statistical association, the trend highlights the potential importance of good long-term glycemic control in reducing the risk of postoperative infections.

Comparison between Urinary Tract Infection and Blood Sugar Levels: The study shows that the mean fasting blood sugar level was slightly lower in patients with UTIs (167.40 mg/dl) compared to those without UTIs (172.48 mg/dl). However, this difference was not statistically significant ($p = 0.464$), suggesting that fasting blood sugar may not

have a strong influence on the development of UTIs in this cohort.

This finding aligns with studies by Kwon et al [14] who found that, unlike surgical site infections, urinary tract infections did not show a significant correlation with fasting blood glucose levels. Their research highlighted that UTIs may be influenced by other factors such as urinary catheterization or underlying urological conditions rather than blood sugar levels alone.

Similarly, the mean HbA1c levels were nearly identical between the two groups, with the infection group having a slightly lower mean HbA1c (7.630%) compared to the non-infection group (7.850%). The p -value of 0.516 indicates no statistically significant difference in long-term glycemic control between the groups. This finding is in agreement with Hanazaki et al [4] who suggested that while HbA1c is a useful marker for long-term glycemic control, its direct correlation with the risk of infections like UTIs may be weaker compared to SSIs. Their study emphasized that while HbA1c could influence the immune response, it may not be as strongly related to UTIs as it is to other complications, such as SSIs, where glycemic control plays a more prominent role.

Postoperative blood glucose levels on Days 1, 3, and 7 also showed no significant differences between the groups, with p -values for Day 1 (0.628), Day 3 (0.376), and Day 7 (0.465). These findings suggest that, in contrast to SSIs, postoperative blood glucose levels do not significantly impact the risk of UTIs. This aligns with Berhe et al. (2017), who also found that while elevated postoperative blood glucose is linked to an increased risk of SSIs, its association with UTIs is less pronounced. Berhe et al [15] study indicated that other factors, such as patient-specific factors, catheter use, and surgical techniques, play a more important role in UTI development than blood glucose control.

The mean fasting blood sugar level of 171.46 mg/dl with a standard deviation of 19.393 shows variability in preoperative glucose control, which aligns with studies by Kwon et al [14] who found that elevated preoperative fasting blood glucose levels are associated with an increased risk of surgical site infections (SSIs). These results suggest that poor glycemic control before surgery, as reflected by elevated fasting blood sugar, may contribute to the risk of infections and other complications post-surgery. Similar conclusions have been drawn by Berhe et al [15] who emphasized the importance of achieving optimal preoperative glycemic control to reduce the risk of postoperative complications.

The HbA1c levels in the study cohort had a mean value of 7.806%, with a standard deviation of

0.9455. HbA1c is a long-term marker of glycemic control, and this value suggests that the patients in this cohort had moderate long-term glucose control. However, elevated HbA1c levels are linked to an increased risk of both acute and chronic complications, as highlighted by Hanazaki et al [4] who found that poor long-term glycemic control, as indicated by higher HbA1c levels, significantly increased the likelihood of infections due to compromised immune function. These findings further support the need for targeted interventions to improve long-term glycemic control before surgery, as patients with higher HbA1c levels may face a higher risk of infections and delayed recovery. The increase in blood glucose levels during the postoperative period is consistent with the stress response to surgery, which can lead to transient hyperglycemia. According to Berhe et al [15] hyperglycemia during the postoperative period is strongly associated with an increased risk of SSIs and delayed wound healing. This correlation suggests that elevated blood glucose levels, even in the immediate postoperative period, may impair immune function and wound healing, further increasing the risk of complications. Kwon et al [14] also found that elevated postoperative blood glucose levels are associated with poor recovery outcomes and complications such as infections. Therefore, it is essential to monitor and manage postoperative glucose levels to minimize these risks and ensure optimal recovery.

A review by Hanazaki et al [4] supports the importance of tight perioperative glycemic control in reducing postoperative infections. They reported that hyperglycemia impaired leukocyte function, including reduced phagocytic ability and chemotaxis, both of which are critical in defending against infections. Additionally, a study by Berhe et al [15] emphasized that continuous insulin infusion during surgery offers better glycemic control compared to conventional methods, potentially leading to fewer infections and faster recovery.

The NICE-SUGAR study (2009), however, cautioned against overly aggressive insulin therapy, which could lead to hypoglycemia and associated complications, including increased mortality. The study concluded that a target range of 180 mg/dL was optimal for general surgery patients, suggesting that the lower limit of glucose control should not be too strict. [6] From the analysis of the relationship between blood sugar levels, HbA1c, and postoperative outcomes, the findings suggested that those with higher blood glucose levels may face a greater risk of complications such as infections and delayed wound healing. This was consistent with previous research, including Kwon et al [14] which indicates that poor glycemic control, as seen in the higher blood glucose range,

is linked to increased postoperative risks. Table 16 showed that a significant portion of the cohort (80%) had an HbA1c level greater than 7%, indicating suboptimal long-term glycemic control, which was associated with a higher likelihood of surgical complications due to impaired immune function and slower wound healing. The relationship between HbA1c levels and blood sugar ranges from the data shows that patients with blood sugar levels in the 120 to 180 mg/dl range had an average HbA1c of 7.19%, while those in the 181 to 220 mg/dl range had a higher average HbA1c of 8.80%. Despite this difference the p-value of 0.9256 indicates that the difference in HbA1c levels between the two blood sugar ranges is not statistically significant. This suggests that while blood sugar levels may influence HbA1c, other factors may also play a role in determining long-term glycemic control. The overall average HbA1c for the cohort was 7.806%, indicating a majority of patients in the study had suboptimal long-term glycemic control, which could contribute to an increased risk of postoperative complications.

Conclusion

The findings support existing evidence that maintaining optimal glycemic control before surgery plays a crucial role in reducing the incidence of infections and improving postoperative recovery. The study also found that while postoperative blood glucose levels were elevated, preoperative glycemic control was the most critical factor in preventing infections, as no significant difference was observed in postoperative glucose levels and infection rates.

Additionally, complications such as delayed wound healing and reoperation were more common in patients with poor glycemic control, further emphasizing the importance of managing glucose levels throughout the perioperative period. The analysis underscores that inadequate glycemic control is associated with longer hospital stays and an increased risk of complications, suggesting that effective blood glucose management could improve surgical outcomes and reduce recovery time. These findings align with literature that supports the role of perioperative glycemic control in preventing infections and promoting faster recovery.

Overall, the study concludes that perioperative glycemic control, particularly preoperative management, is essential for minimizing postoperative infections and complications. The findings suggest that targeting blood glucose levels within an optimal range before surgery is crucial for improving outcomes. However, the study also aligns with other research that emphasizes a balanced approach to glycemic management, avoiding both hyperglycemia and hypoglycemia. Further research is necessary to refine perioperative

glycemic management protocols and determine the ideal target blood glucose range for different surgical populations, ensuring that these practices are tailored to individual patient needs and surgical conditions.

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