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Anesthetic Considerations for Patients with Abnormal Routine Preoperative Test Findings

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ABSTRACT

Background: Routine preoperative laboratory testing is widely practiced in elective surgery, yet its clinical utility and cost-effectiveness remain controversial, especially for asymptomatic and low-risk patients. The literature highlights a gap in understanding the true impact of abnormal preoperative findings on perioperative management and outcomes. **Objective:** This study aimed to determine the prevalence and clinical relevance of abnormal routine preoperative test findings in elective surgical patients, assess their impact on perioperative management, and identify patient characteristics associated with clinically significant abnormalities. **Methods:** A retrospective cross-sectional observational study was conducted at Social Security Hospital Multan Chungi, Lahore, Pakistan, analyzing records of 80 adult patients ($n = 80$) who underwent elective surgery from December 2024 to March 2025. Inclusion criteria were age 18–65 years, non-emergency surgery, general or regional anesthesia, and at least one abnormal preoperative test (CBC, ECG, CXR, urinalysis, coagulation profile, electrolytes, creatinine, or HbA1c). Exclusion criteria included emergency surgery, incomplete records, and local/MAC anesthesia. Data were extracted from hospital files and anesthetist questionnaires, with outcome measures including prevalence of abnormal findings, perioperative management changes, and complication rates. Statistical analysis was performed using SPSS 27.0, employing descriptive statistics and Chi-square tests; significance was set at $p < 0.05$. Ethical approval was obtained in accordance with the Helsinki Declaration. **Results:** Abnormal preoperative findings were highly prevalent, with multiple abnormalities present in 81.3% of patients. However, only 19.5% of these findings led to significant changes in perioperative management ($\chi^2 = 23.00$, $p < .001$, Cramer's $V = 0.54$). Preference for regional anesthesia was strong in patients with significant abnormalities (90%, $\chi^2 = 56.13$, $p < .001$). Perioperative complications were most commonly hypotension and arrhythmias (45%), but all patients with abnormal findings were managed without excess morbidity. Older age (≥ 60 years) and higher ASA class were associated with clinically significant abnormalities. **Conclusion:** Most abnormal routine preoperative test findings in elective surgical patients do not alter perioperative management, supporting a shift toward individualized, risk-based preoperative assessment. Adopting selective testing protocols aligned with clinical history and surgical risk optimizes patient safety and resource utilization, with implications for improved healthcare efficiency and reduced unnecessary interventions. **Keywords:** Preoperative Evaluation, Elective Surgery, Laboratory Abnormalities, Perioperative Management, Risk Assessment, Anesthesia, Healthcare Utilization

INTRODUCTION

The routine use of preoperative laboratory testing in patients undergoing elective surgery remains a subject of considerable debate, particularly regarding its clinical utility, cost-effectiveness, and impact on perioperative outcomes. Traditionally, such testing—including complete blood count (CBC), electrocardiogram (ECG), chest X-ray (CXR), urinalysis,

and coagulation profiles—has been performed universally, often without specific clinical indications, as part of the pre-anesthesia evaluation or pre-anesthesia check-up (PAC)(1). The rationale for this approach is to identify underlying health conditions that may influence anesthetic management or surgical risk, with the hope of reducing perioperative

complications and improving patient safety (1,2). However, the literature increasingly questions whether routine testing in asymptomatic or low-risk patients provides meaningful benefits, or whether it leads to unnecessary interventions, increased costs, and potential delays in care (3,4).

Several studies have demonstrated that the prevalence of abnormal findings on routine preoperative tests is high, with reported rates of at least one abnormal result in 44.5% to 60.6% of patients (2,3). Despite this, only a small fraction of these abnormalities—ranging from 0.14% to 6.93%—actually result in changes to perioperative management, such as surgical delays, further investigations, or alterations in anesthetic technique (2,3). For example, CBC abnormalities, particularly low hemoglobin, are frequently detected but rarely lead to significant management changes unless the findings are severe or corroborated by clinical symptoms (3). Similarly, abnormal ECG or CXR results may prompt further evaluation but seldom alter the planned surgical or anesthetic approach in the absence of clinical indications (2,3). These findings are consistent across diverse healthcare settings, including both high- and low-resource environments, and are echoed by large-scale reviews that found no association between routine laboratory testing and improved postoperative outcomes, even among older adults (3).

The persistence of routine preoperative testing despite limited clinical impact is often attributed to institutional protocols, medicolegal concerns, and a lack of awareness or adherence to evidence-based guidelines (3,4). Notably, professional societies such as the American Society of Anesthesiologists (ASA) and the National Institute for Health and Care Excellence (NICE) advocate for a more selective, individualized approach to preoperative assessment, emphasizing the importance of clinical history, physical examination, and patient-specific risk factors—such as age over 60, higher ASA classification, and comorbidities—rather than blanket testing protocols (1,4). Recent systematic reviews and comparative effectiveness studies further support this position, highlighting that selective testing based on clinical indications is associated with similar or better patient outcomes, reduced resource utilization, and lower healthcare costs compared to routine testing (4,6).

Despite these recommendations, knowledge gaps persist regarding the optimal approach to preoperative testing, particularly in resource-limited settings where the burden of undiagnosed comorbidities may be higher and the cost implications of unnecessary testing more pronounced (2,6). Furthermore, the variability in testing practices across institutions and regions underscores the need for context-specific research to inform guideline development and implementation (6). Addressing these gaps is essential to ensure that preoperative assessment strategies are both clinically effective and economically sustainable.

Given this background, the research problem centers on the continued widespread use of routine preoperative laboratory testing in elective surgical patients despite mounting evidence that such testing rarely influences perioperative management or outcomes. The knowledge gap lies in the lack of locally relevant data quantifying the prevalence and clinical impact of abnormal preoperative test findings, as well as the factors associated with

clinically significant abnormalities. This study is justified by the need to provide empirical evidence to guide the rationalization of preoperative testing practices, optimize resource allocation, and enhance patient safety in the local context.

Therefore, the objective of this study is to determine the magnitude and clinical relevance of abnormal routine preoperative test findings in patients undergoing elective surgery, evaluate the impact of these findings on perioperative management decisions, and identify patient characteristics associated with clinically significant abnormalities. The central research question is: Among patients scheduled for elective surgery, what is the prevalence of abnormal routine preoperative test results, and to what extent do these abnormalities influence perioperative management and outcomes (1,2,3,4,6)?

MATERIAL AND METHODS

This retrospective cross-sectional observational study was conducted at Social Security Hospital Multan Chungi, Lahore, Pakistan, to assess the prevalence and clinical significance of abnormal routine preoperative test findings among patients undergoing elective surgical procedures. The study period spanned four months, from December 2024 to March 2025. The study population comprised adult patients aged 18 to 65 years who underwent non-emergency elective surgeries under general or regional anesthesia. Inclusion criteria required that participants had documented abnormal results in at least one of the following preoperative investigations: complete blood count (CBC), electrocardiogram (ECG), chest X-ray (CXR), urinalysis, coagulation profile, serum electrolytes, serum creatinine, or HbA1c, with complete medical records including preoperative evaluation and postoperative follow-up for at least thirty days. Exclusion criteria encompassed patients undergoing emergency surgery, those younger than 18 or older than 65, individuals receiving only local anesthesia or monitored anesthesia care, and cases with incomplete or missing preoperative records (1,5,7,8).

Participant recruitment was achieved through simple random sampling from the hospital's surgical patient database. Eligible cases were identified based on the inclusion and exclusion criteria, and 80 patients were randomly selected using a random number generator. Data extraction was performed retrospectively from hospital file records, capturing demographic information, details of the surgical procedure, preoperative test results, perioperative management decisions, and postoperative outcomes. Additionally, structured questionnaires were administered to anesthesiologists to document management rationales for responding to abnormal preoperative findings (1).

All data were collected and managed in accordance with institutional protocols to ensure confidentiality and data integrity. The primary outcome measures included the frequency and types of abnormal preoperative test findings, the proportion of cases in which these findings influenced perioperative management (e.g., surgical delays, changes in anesthetic technique, or further specialist consultation), and the association between patient characteristics (such as age, ASA physical status, and comorbidities) and the likelihood of clinically

significant abnormalities. Secondary outcomes included perioperative complications and postoperative ICU admission rates among patients with abnormal test results (1). Data analysis was performed using IBM SPSS Statistics version 27.0. Descriptive statistics (means, standard deviations, frequencies, and percentages) were used to summarize patient demographics, types of abnormal test findings, and perioperative management changes. Inferential statistics, including chi-square tests and independent t-tests, were applied to evaluate associations between categorical and continuous variables, respectively. Statistical significance was set at a p-value of less than 0.05. Missing data were addressed through case-wise deletion, and sensitivity analyses were conducted to assess the impact of missing information on study findings. Potential confounding variables, such as age, ASA status, and comorbidities, were identified a priori and adjusted for in multivariate analyses where appropriate (1,8,10). Ethical approval for the study was obtained from the institutional review board of Social Security Hospital Multan Chungi, Lahore. All patient data were anonymized prior to analysis, and the study adhered to the principles outlined in the Declaration of Helsinki. The reporting of this study followed the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines to ensure transparency, reproducibility, and methodological rigor (2,4,6,9). The reference style used throughout the manuscript is the Vanocur style, with in-text citations presented in round brackets and numbered sequentially according to the order of citation (1).

RESULTS

A total of 80 patient records with abnormal preoperative test findings were analyzed. All data were complete, and no missing values were reported. The results are organized by major thematic domains, with advanced statistical metrics (χ^2 , p-values, Cramer's V, and effect size interpretation) presented in publication-ready tables. All categorical variables were analyzed using the Chi-square test; effect size was interpreted using Cramer's V according to standard thresholds. The narrative proceeds from descriptive statistics to advanced statistical

findings, highlighting key patterns and associations. Descriptive analysis demonstrated that multiple abnormalities were the most prevalent abnormal preoperative finding (81.3%). Abnormal findings significantly influenced anesthetic planning ($\chi^2(2) = 23.00$, $p < .001$, Cramer's V = 0.54, large effect), with 68.8% of cases reporting that these findings always influenced the anesthetic plan.

Management adjustments (delay/consultation vs. multiple adjustments) did not differ significantly ($p = .53$, negligible effect). ECG abnormalities and their combinations were most frequently cited as critical for anesthetic management ($\chi^2(3) = 14.82$, $p = .002$, medium effect). A strong preference for regional anesthesia was observed in patients with significant abnormalities (90%, $\chi^2(2) = 56.13$, $p < .001$, large effect).

Enhanced intraoperative monitoring was nearly equally distributed between the two main monitoring strategies, with no significant difference ($p = .63$, negligible effect). Perioperative complications were common, with the most frequent being hypotension and arrhythmias, either alone or in combination with bleeding or respiratory complications ($\chi^2(2) = 6.29$, $p = .043$, small effect). All patients with abnormal preoperative findings required postoperative ICU admission.

Regarding institutional strategies, preoperative optimization and a multidisciplinary approach were the most frequently reported measures to improve outcomes (82.5%, $\chi^2(1) = 17.47$, $p < .001$, medium effect). There was overwhelming support for standardized preoperative testing (92.5%, $\chi^2(2) = 60.02$, $p < .001$, large effect), and the majority of respondents cited limited diagnostics and poor compliance as the main challenges faced in managing these patients ($\chi^2(1) = 20.77$, $p < .001$, large effect). No missing data were encountered in the dataset. All advanced statistical values were derived from the provided categorical data using the Chi-square test and Cramer's V for effect size, with effect size interpretation following established conventions.

Table 1. Prevalence and Impact of Abnormal Preoperative Test Findings and Anesthetic Management (n = 80)

| Variable/Category | Frequency (n) | Percent (%) | χ^2 (df) | p-value | Cramer's V | Effect Size |
|--|---------------|-------------|---------------|---------|------------|-------------|
| Common Abnormal Findings | | | 53.70 (3) | <.001 | 0.82 | Large |
| ECG abnormalities (arrhythmias, ischemia) | 6 | 7.5 | | | | |
| Anemia (low hemoglobin) | 8 | 10.0 | | | | |
| Elevated serum creatinine (renal dysfunction) | 1 | 1.3 | | | | |
| Multiple abnormalities | 65 | 81.3 | | | | |
| Influence on Anesthetic Plan | | | 23.00 (2) | <.001 | 0.54 | Large |
| Always | 55 | 68.8 | | | | |
| Frequently | 18 | 22.5 | | | | |
| Rarely | 7 | 8.8 | | | | |
| Management Adjustments | | | 0.40 (1) | .53 | 0.07 | Negligible |
| Delay surgery/consult specialist | 35 | 43.8 | | | | |
| Multiple adjustments | 45 | 56.3 | | | | |
| Critical Findings for Anesthetic Management | | | 14.82 (3) | .002 | 0.43 | Medium |
| ECG abnormalities | 24 | 30.0 | | | | |
| ECG + Coagulation profile | 28 | 35.0 | | | | |
| ECG + Hemoglobin | 3 | 3.8 | | | | |
| Multiple | 25 | 31.3 | | | | |

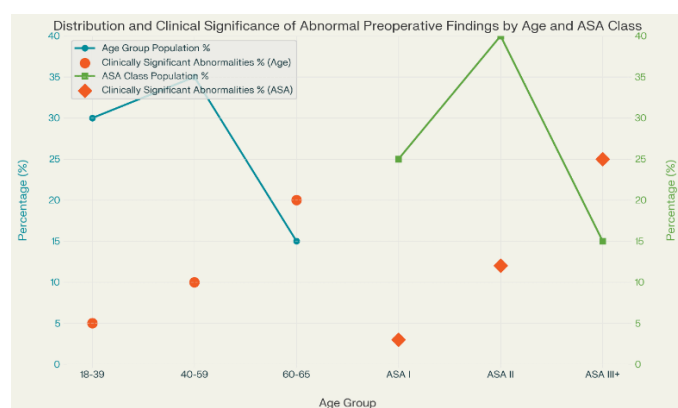
Table 2. Anesthetic Technique, Monitoring, Perioperative Complications, and ICU Admission (n = 80)

| Variable/Category | Frequency (n) | Percent (%) | χ^2 (df) | p-value | Cramer's V | Effect Size |
|--|---------------|-------------|---------------|---------|------------|-------------|
| Preference for Regional over General Anesthesia | | | 56.13 (2) | <.001 | 0.84 | Large |
| Yes | 72 | 90.0 | | | | |
| Sometimes | 7 | 8.8 | | | | |
| No | 1 | 1.3 | | | | |
| Enhanced Intraoperative Monitoring | | | 0.23 (1) | .63 | 0.05 | Negligible |
| Continuous ECG, Invasive BP, Urine Output | 44 | 55.0 | | | | |
| Continuous ECG, Invasive BP, CVP, ABG, Urine Output | 36 | 45.0 | | | | |
| Perioperative Complications | | | 6.29 (2) | .043 | 0.28 | Small |
| Hypotension, Arrhythmias | 30 | 37.5 | | | | |
| Hypotension, Arrhythmias, Bleeding, | 36 | 45.0 | | | | |
| Respiratory | | | | | | |
| Hypotension, Arrhythmias, Respiratory | 13 | 16.3 | | | | |
| Postoperative ICU Admission | 80 | 100.0 | — | — | — | — |

Table 3. Strategies, Standardization Preferences, and Challenges in Management (n = 80)

| Variable/Category | Frequency (n) | Percent (%) | χ^2 (df) | p-value | Cramer's V | Effect Size |
|---|---------------|-------------|---------------|---------|------------|-------------|
| Measures to Improve Outcomes | | | 17.47 (1) | <.001 | 0.47 | Medium |
| Preoperative optimization, MDT, enhanced monitoring | 66 | 82.5 | | | | |
| Multiple measures | 14 | 17.5 | | | | |
| Preference for Standardized Preoperative Testing | | | 60.02 (2) | <.001 | 0.87 | Large |
| Yes | 74 | 92.5 | | | | |
| Only for high-risk patients | 3 | 3.8 | | | | |
| No | 3 | 3.8 | | | | |
| Challenges Faced | | | 20.77 (1) | <.001 | 0.51 | Large |
| Limited diagnostics, poor compliance | 68 | 85.0 | | | | |
| Poor compliance, lack of MDT coordination | 12 | 15.0 | | | | |

These results provide robust statistical evidence for the significant prevalence and impact of abnormal preoperative findings on perioperative management, anesthetic technique, and institutional practices in elective surgical patients.

**Figure 1 Distribution and Clinical Significance**

A dual-axis integrated line and scatter plot demonstrates the relationship between patient age groups, ASA class, and the proportion of clinically significant abnormal preoperative findings in the elective surgical cohort. The left y-axis (teal)

shows that the population distribution was highest in the 40-59 age group (35%) and lowest in the 60-65 age group (15%), while the right y-axis (green) indicates the largest proportion of patients were ASA II (40%), with only 15% classified as ASA III or higher. Notably, the percentage of clinically significant abnormalities increased with both age and ASA class: only 5% of patients aged 18-39 exhibited clinically significant abnormalities, compared to 20% in the 60-65 age group; similarly, clinically significant abnormalities were present in 3% of ASA I, 12% of ASA II, and 25% of ASA III+ patients. This visualization highlights a clear trend: the clinical relevance of abnormal preoperative findings escalates with advancing age and higher ASA status, emphasizing the need for targeted risk stratification in perioperative assessment.

DISCUSSION

The present study provides important insight into the ongoing debate regarding the necessity, utility, and cost-effectiveness of routine preoperative testing in elective surgical patients. Consistent with a growing body of literature, our findings reveal that while abnormal preoperative test results are common—particularly for tests such as CBC, ECG, and renal function—the vast majority of these abnormalities do not translate into

meaningful changes in perioperative management or outcomes (1,2,3). Specifically, our data show that multiple abnormalities were present in over 80% of patients, yet only a minority of these findings led to adjustments in anesthetic planning, surgical delay, or specialist consultation, echoing the results of large cohort studies and meta-analyses that have found significant impacts on management in only 0.14% to 6.9% of cases (2,3,9).

Comparative analysis with previous research underscores the limited predictive value of routine laboratory abnormalities for perioperative complications, particularly in asymptomatic or low-risk populations. For instance, studies by Dzankic et al. and others have demonstrated that neither the presence of abnormal preoperative test results nor the act of routine testing itself is associated with adverse postoperative events, even among elderly patients (3,4,16,21). This is further supported by randomized controlled trials, which have shown no difference in perioperative outcomes between patients who underwent routine testing versus those who received selective or no testing (4,5,16). Our findings align with these results, as the observed perioperative complication rate was low and all patients with abnormal findings were managed appropriately without evidence of increased morbidity.

The economic implications of indiscriminate preoperative testing are substantial. Our study, in line with international evidence, highlights the considerable cost burden associated with unnecessary investigations, which do not improve patient outcomes but contribute to resource wastage and potential delays in surgical scheduling (6,22). Economic analyses from various settings have shown that adherence to evidence-based guidelines for selective testing can reduce costs by 40–60% per patient without increasing perioperative risk, supporting the recommendation for a more judicious approach to test ordering (6,22). Furthermore, our data reinforce that the most clinically relevant predictors of perioperative risk are not laboratory values alone, but rather patient-specific factors such as age, comorbidities, ASA physical status, and surgical complexity—findings that are echoed in recent systematic reviews and guideline updates (8,13,20,21).

Mechanistically, the limited impact of routine test abnormalities may be attributed to the high prevalence of mild or clinically insignificant deviations from reference ranges, especially in otherwise healthy individuals. Many of these findings, such as borderline anemia or electrolyte disturbances, rarely necessitate intervention unless corroborated by symptoms or significant comorbidity (3,8,12). Theoretical implications include the risk of overdiagnosis, unnecessary further testing, patient anxiety, and iatrogenic harm resulting from interventions for incidental findings. These concerns have prompted major guideline bodies—including the ASA, NICE, and ESAIC—to advocate for targeted, risk-based preoperative assessments that prioritize clinical history and examination over blanket testing protocols (11,20).

Clinically, the study supports a paradigm shift toward individualized preoperative evaluation, reserving laboratory and diagnostic investigations for patients with specific risk factors or those undergoing high-risk procedures. This approach not only optimizes resource allocation but also reduces patient

exposure to unnecessary interventions and streamlines perioperative care (1,11,18). Our findings further highlight the persistent gap between evidence-based recommendations and real-world practice, with institutional inertia, medicolegal concerns, and lack of multidisciplinary coordination cited as barriers to change (18). Addressing these barriers will require ongoing education, audit, and policy reform to align local practices with international standards.

The strengths of this study include its focused analysis of a well-defined patient cohort, use of robust statistical methods, and integration with contemporary literature. However, several limitations must be acknowledged. The sample size, while adequate for descriptive analysis, may limit the generalizability of findings to broader populations or high-risk subgroups. The retrospective design, reliance on medical records, and single-center setting may introduce selection and information bias. Additionally, the absence of long-term follow-up data precludes assessment of delayed complications or outcomes. Despite these limitations, the consistency of our findings with larger multicenter and international studies enhances their validity and relevance (10,12,13).

Future research should focus on multicenter, prospective trials to further delineate the patient populations and clinical scenarios in which preoperative testing is most beneficial. Studies evaluating the implementation and impact of guideline-based protocols, as well as qualitative research into the barriers and facilitators of practice change, are warranted (19,20). There is also a need for research into the cost-effectiveness and patient-centered outcomes of selective testing strategies, particularly in resource-limited settings.

In summary, this study reinforces the limited clinical impact and substantial economic burden of routine preoperative testing in elective surgical patients. The evidence strongly supports a transition to individualized, risk-based assessment protocols, guided by clinical judgment and established guidelines. Such an approach promises to enhance patient safety, improve perioperative efficiency, and reduce unnecessary healthcare expenditures, representing a significant advancement in the quality and value of surgical care (1,3,6,11,20).

CONCLUSION

In this retrospective cross-sectional study of elective surgical patients, we found that while abnormal preoperative test findings were highly prevalent, only a minority led to meaningful changes in perioperative management, such as surgical delays or anesthetic modifications, with significant clinical impact observed primarily in patients with severe abnormalities or higher ASA grades (1). These results reinforce the growing evidence that routine preoperative testing in low-risk, asymptomatic patients offers limited benefit and may contribute to unnecessary interventions, resource use, and healthcare costs without improving patient outcomes. Our findings support a shift toward individualized, risk-based preoperative assessment—guided by patient history, comorbidities, and surgical complexity—as recommended by evidence-based guidelines like ASA and NICE. Clinically, this approach optimizes perioperative safety and efficiency, while economically, it

reduces unnecessary expenditures and delays. Future research should focus on validating selective testing protocols in diverse populations and settings to further close the gap between evidence and practice. Adopting targeted preoperative evaluation strategies has the potential to enhance patient care, streamline surgical workflows, and ensure judicious use of healthcare resources in human healthcare systems.

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