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Factors Affecting Surgical Time-Out Protocol Implementation and Its Relationship With Intraoperative Errors: Basis for Policy and Program Enhancement

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ABSTRACT

This descriptive-correlational, cross-sectional study examined the factors affecting surgical time-out protocol implementation and their relationship with intraoperative errors among 52 operating room personnel in selected government and private Level 1 hospitals in San Jose del Monte, Bulacan, through total enumeration and a 50-item self-administered questionnaire. More than half the respondents (53.8%) lacked formal WHO Surgical Safety Checklist training. Factors affecting implementation were Favorable overall (M = 2.77), and the time-out was Partially Implemented (M = 3.30); errors were infrequent (M = 1.46), though 16 of 57 reported (28%) were serious. Factors were moderately and positively associated with implementation (r = .466, p < .001), driven by team-related (r = .455) and organizational (r = .424) factors, while implementation was moderately and negatively associated with error frequency (r = −.364, p = .008). A findings-based training program was proposed.

Keywords: *Surgical time-out, WHO Surgical Safety Checklist, intraoperative errors, patient safety, operating room personnel*

INTRODUCTION

Having a surgical safety policy is not the same as implementing it. Time-out phase compliance averages only 61%, with complete checklist execution in just 51% of cases (Habtie et al., 2025). Locally, only 54% of Philippine hospitals provide regular patient-safety training and only 32% monitor surgical never events (Tamondong-Lachica et al., 2024), while wrong-surgery incidents rose 26% in 2023, mostly from protocol non-compliance rather than absent policies. This study examined the organizational, team-related, and environmental factors affecting time-out implementation and its relationship with intraoperative errors in Philippine Level 1 hospitals, where this relationship has not been examined at this level.

Statement of the Problem

This study examined the factors affecting surgical time-out protocol implementation and their relationship with intraoperative errors among operating room personnel in selected Level 1 hospitals in San Jose del Monte, Bulacan, to inform policy and program enhancement. Specifically, it sought to determine (1) the respondents' demographic profile; (2) the factors affecting implementation in terms of organizational, team-related, and environmental factors; (3) the extent of implementation per WHO guidelines; and (4) the frequency and severity of intraoperative errors. It further tested whether a significant relationship exists between (5) the factors and the extent of implementation, and (6) the extent of implementation and the frequency of intraoperative errors, and (7) the policy and program enhancement proposed.

Scope and Delimitations

The study covered three variables—factors affecting implementation, extent of implementation, and intraoperative error frequency and severity—among OR personnel in selected Level 1 hospitals in San Jose del Monte, Bulacan, and was conducted from May to June 2026. It was delimited to the time-out phase, used self-reported data rather than direct observation, was limited to one city, and employed a cross-sectional design precluding causal inference.

Review of Related Literature

The WHO Surgical Safety Checklist reduced surgical mortality and complications across eight hospitals, including Manila, yet contemporary work distinguishes mere compliance from meaningful implementation requiring active team engagement. Organizational barriers tend to outweigh enablers, and operating-room distractions are linked to errors and fewer safety checks (McMullan et al., 2021). The checklist's benefits concentrate in the process and team domains it was designed to influence (Sotto et al., 2021), with clearer effects for provider than patient outcomes; validated severity systems confirm that adverse-event severity predicts postoperative complications (Dell-Kuster et al., 2020; Biyani et al., 2020).

Theoretical Framework T

The study was anchored on three complementary frameworks: Donabedian's Structure–Process–Outcome model, in which good structure raises the likelihood of good process and outcome; the SEIPS model, which specifies five interacting work-system components shaping care processes and safety (Carayon et al., 2006); and Reason's Swiss Cheese model, which explains how accidents occur when weaknesses across defensive barriers align (Wiegmann et al., 2022). Together, factors represent the structural domain and latent conditions, implementation the process domain and defensive barriers, and errors the outcome domain and active failures.

Conceptual Framework

INPUT	PROCESS	OUTPUT
• Respondents: surgeons, anesthesiologists, scrub nurses, circulating nurses • Eligibility: ≥6 months OR experience; government and private Level 1 hospitals, Bulacan • Seven research objectives	• Design: descriptive-correlational, cross-sectional • Data collection: 50-item self-administered questionnaire • Analysis: descriptive statistics, normality testing, correlation analysis	• Descriptive results • Correlational results • Proposed policy and program enhancement

METHODOLOGY

The study employed a descriptive-correlational, cross-sectional design—a non-experimental quantitative method that describes variables and examines their relationships at a single point in time without manipulation. This fit the aim of describing the factors, implementation, and errors and examining their associations.

Research Design

The study used a descriptive-correlational, cross-sectional design to examine surgical time-out protocols without manipulating the environment. Using a total enumeration approach, data were gathered from 52 eligible operating room personnel across selected Level 1 hospitals in San Jose del Monte, Bulacan. Participants completed a validated 50-item self-administered questionnaire covering demographics, implementation factors, time-out execution, and intraoperative errors. Data were analyzed in SPSS 26.0 using descriptive statistics and Pearson's r correlation coefficients to test relationships among the variables.

Research Steps

After literature review and instrument development, the protocol was submitted for ethical clearance, followed by Graduate School endorsement and written hospital-administrator permission. Data collection was then coordinated with OR unit managers, informed consent obtained, questionnaires administered and retrieved, and the data processed and analyzed.

Data Collection and Sample Selection

Total enumeration was used, as the eligible population of surgeons, anesthesiologists, scrub nurses, and circulating nurses with at least six months of OR experience across the selected Level 1 hospitals was small; personnel on extended leave, in non-surgical areas, or in training were excluded, yielding 52 respondents. The 50-item self-administered questionnaire measured demographics, factors affecting implementation (organizational, team-related, environmental), extent of implementation based on WHO time-out elements, and intraoperative errors informed by ClassIntra (Dell-Kuster et al., 2020) and EAUiaiC (Biyani et al., 2020). Content validity was established through expert review.

Data Analysis Methods

Data were analyzed in SPSS 26.0 using frequencies and percentages for demographics and weighted means for the three scales. Normality was assessed via the Shapiro-Wilk test with skewness (±2) and kurtosis (±7) criteria, and Pearson's r was used where these were met (Schober et al., 2018). Because complete enumeration captured the entire eligible population, correlation magnitude and direction were the primary basis for analysis.

Research Hypotheses and Validation

Two null hypotheses were tested at $\alpha = .05$: no significant relationship between the factors affecting implementation and the extent of implementation, and none between implementation and error frequency. Correlation coefficients were interpreted by magnitude, with the inferential layer indicating each coefficient's stability.

Study Limitations and Ethical Considerations

The study relied on self-reported rather than observed data, was limited to Level 1 hospitals in one city, and used a cross-sectional design precluding causal inference. It observed respect for persons, beneficence, and justice through voluntary written informed consent, minimal-risk procedures, and inclusion of all eligible personnel regardless of rank.

RESULTS AND DISCUSSION

SOP1. What is the demographic profile of the respondents? Respondents had a mean age of 34.64 years (SD = 6.22) and were majority female (65.4%); nursing personnel predominated, with circulating nurses (46.1%) and scrub nurses (30.8%) together exceeding three-quarters, while more than half (53.8%) had no formal WHO checklist training. The 53.8% training gap is the most actionable, since training and prior checklist exposure predict higher compliance (Habtie et al., 2025) and inadequate training recurs as a barrier (Paterson et al., 2024).

SOP2. What are the factors affecting surgical time-out protocol implementation in terms of organizational, team-related, and environmental factors? Factors affecting implementation were Favorable overall (M = 2.77, SD = 0.42), with Team-Related Factors the highest subscale (M = 2.99) and Environmental Factors the lowest (M = 2.51); interruptions and time pressure (both M = 2.17) were the only Unfavorable items. Conditions were broadly supportive, but the two Unfavorable environmental items locate where support broke down, aligning with evidence that OR distractions degrade performance and safety (McMullan et al., 2021) and mapping onto the SEIPS physical-environment component (Carayon et al., 2006).

SOP3. What is the extent of surgical time-out protocol implementation in accordance with WHO guidelines? The time-out was Partially Implemented overall (M = 3.30, SD = 0.56). Only the nursing team's confirmation of sterility and equipment reached Fully Implemented (M = 3.65), while team members introducing themselves by name and role was the weakest element (M = 2.98). The time-out was routinely but incompletely enacted, with verification steps outperforming team-orientation steps—yet completeness, not mere presence, drives the checklist's protective effect (Habtie et al., 2025).

SOP4. What is the frequency and severity of intraoperative errors? Errors were Not Occurring overall (M = 1.46, SD = 0.27), with Equipment/Resources the most frequent subscale (M = 2.03) and Patient ID/Site Verification the least (M = 1.08); half the respondents reported none, while 16 of 57 reported errors were serious (severity ratio 0.281). The low reported burden clusters in equipment, medication, and communication categories, consistent with patient-safety accounts of coordination failures and latent conditions and Reason's Swiss Cheese model (Wiegmann et al., 2022).

SOP5. Is there a significant relationship between the factors affecting implementation and the extent of implementation? The overall factors were moderately and positively correlated with implementation (r = .466, p < .001, 95% CI [.220, .660]), driven by Team-Related (r = .455, p < .001) and Organizational (r = .424, p = .002) factors; the Environmental dimension was negligible and non-significant (r = .093, p = .512). The null hypothesis was rejected for the team and organizational domains and retained for the environmental domain. Team-related and organizational conditions were most associated with fuller implementation, consistent with syntheses centering leadership and team engagement and with the checklist's team-and-process focus (Sotto et al., 2021).

SOP6. Is there a significant relationship between the extent of implementation and the frequency of intraoperative errors? Implementation was moderately and negatively correlated with error frequency ($r = -.364$, $p = .008$), and the null hypothesis was rejected. More complete implementation was associated with lower reported error frequency. Implementation fidelity was the process most closely related to the safety outcome, consistent with evidence that the checklist affects the outcomes it was designed to influence (Sotto et al., 2021).

SOP7. Based on the findings, what policy and program enhancement can be proposed? Following Donabedian's Structure–Process–Outcome logic, the proposed program pairs mandatory WHO checklist training (addressing the 53.8% untrained and the lowest-rated training item, M = 2.52) with micro-training on the weakest element, team introductions (M = 2.98), and leadership endorsement reinforcing the conditions associated with fuller implementation (r = .424; r = .455). Periodic fidelity audits address the low-rated monitoring item (M = 2.56) and the implementation–error association (r = −.364), while an environmental safeguard protects the time-out from the two Unfavorable conditions (both M = 2.17).

SUMMARY

This descriptive-correlational census of 52 OR personnel found a predominantly female, nurse-based, early-to-mid-career workforce, 53.8% of whom lacked formal WHO checklist training. Factors affecting implementation were Favorable overall (M = 2.77), the time-out was Partially Implemented (M = 3.30), and errors were infrequent (M = 1.46) though 16 of 57 were serious. Factors were moderately and positively correlated with implementation ($r = .466$, $p < .001$)—driven by team-related ($r = .455$) and organizational ($r = .424$) factors, with the environmental dimension negligible ($r = .093$)—while implementation was moderately and negatively correlated with error frequency ($r = -.364$, $p = .008$).

CONCLUSIONS

The workforce was predominantly early-career nursing personnel, a majority untrained in the WHO checklist; conditions affecting implementation were generally Favorable, strongest in team dynamics and weakest in the operating-room environment, where interruptions and time pressure were the specific problems; the time-out was only partially implemented, with core verification more consistent than team-orientation steps; errors were infrequent, though roughly 28% were serious; favorable team-related and organizational conditions—but not environmental ones—were associated with more complete implementation, which was in turn associated with fewer errors; and the findings supported a structured training program targeting the training, process-fidelity, monitoring, and environmental gaps.

RECOMMENDATIONS

Hospital administrators should institute mandatory WHO Surgical Safety Checklist training with documented completion, since 53.8% of personnel were untrained. Nurse educators should reinforce the team-oriented steps, particularly member introductions, and the quality committee should establish periodic element-by-element fidelity audits, given that fuller implementation was associated with fewer errors.

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AI DECLARATION STATEMENT

AI-supported tools helped with grammar and structure in creating this article. No AI tools were used to collect, analyze, or interpret data; all authors are credited for their academic contributions.

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