

Enhancing Communication in Local Anesthetic Handoffs: Implementation of An Sbar-Based Handoff Form

Kelsey Congress *, Danielle Curtis, Samantha Gongora, Adam Davies

College of Nursing, University of South Florida; Department of Nurse Anesthesia
*Corresponding author E-mail: kbcongress@usf.edu

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Abstract

Local anesthetic systemic toxicity (LAST) is a rare but potentially fatal complication resulting from unintended systemic absorption of local anesthetics, potentially exacerbated by communication failures during perioperative handoffs. Standardized communication frameworks, such as the Situation–Background–Assessment–Recommendation (SBAR) model, support safer transitions of care. This quality improvement project implemented a standardized SBAR-based local anesthetic handoff tool to improve interdisciplinary communication and reduce variability in dose reporting among perioperative staff. Guided by a Plan–Do–Study–Act framework, the project was conducted over 12 weeks at a 626-bed acute care facility. A total of 144 perioperative handoff evaluations were completed using the SBAR tool and assessed with the Handoff Clinical Evaluation Exercise (CEX), which evaluates organization, content, communication, and clinical judgment. Data were analyzed using descriptive statistics and nonparametric tests, including Kruskal–Wallis and Wilcoxon signed-rank analyses. Following implementation, median total Handoff CEX scores were consistent across the preoperative, intraoperative, and postoperative phases, at approximately 36. No statistically significant differences were identified between sender and receiver scores ($p = 0.612$) or satisfaction ratings ($p = 0.831$), indicating agreement among providers regarding handoff quality and tool usability. Although overall scores remained stable, the SBAR-based tool promoted consistent inclusion of critical dosing and safety information during perioperative handoffs. These findings suggest that structured communication tools can enhance reliability in high-risk medication communication and provide a sustainable framework to support patient safety and prevention of LAST in high-volume surgical settings.

Keywords: Communication; Handoff; LAST; Perioperative; SBAR.

1. Introduction

Miscommunication surrounding local anesthetic dosing in the perioperative period remains a significant patient safety concern. Effective interdisciplinary communication among anesthesia providers, perioperative nurses, and surgeons is critical to preventing adverse events. Local anesthetic systemic toxicity (LAST), although rare, is a potentially life-threatening complication that can occur when excessive doses of local anesthetics enter systemic circulation. LAST typically presents with central nervous system symptoms such as tinnitus, visual disturbances, or seizures, and may rapidly progress to conduction abnormalities, cardiovascular collapse, and cardiac arrest (Abbaszade et al., 2021). Although the incidence of LAST is low, estimated at approximately 0.27 per 1,000 peripheral nerve blocks, the risk remains clinically significant, particularly at institutions that perform a high volume of regional anesthetic procedures in orthopedic and bariatric populations (El-Boghdady et al., 2018).

Despite the severity of LAST, inconsistent recognition and reporting limit opportunities for early intervention (Abraham, Meng, et al., 2020; Tkach et al., 2023). These challenges are compounded by a lack of standardized communication practices across perioperative settings. Inadequate documentation and fragmented provider handoffs have been identified as contributing factors to dosing errors and poor continuity of care (Ramjaun et al., 2023; Schiavi et al., 2022; Hu et al., 2020). Effective interdisciplinary communication is essential to maintaining patient safety in these high-risk scenarios. Literature supports the implementation of structured communication frameworks, such as the situation, background, assessment, recommendation (SBAR) handoff format, to standardize information transfer and enhance situational awareness (Allen et al., 2023). The Agency for Healthcare Research and Quality (AHRQ) endorses SBAR as a best practice for critical communication, particularly during clinical deterioration or transitions involving multiple teams (Bell et al., 2022).

Structured handoff tools have been shown to reduce information loss, improve team collaboration, and promote continuity of care (Blazin et al., 2020; Desmedt et al., 2021; Abraham, Pfeifer, et al., 2021). In the context of local anesthetic administration, standardized tools may help reduce the risk of overdose and systemic toxicity. Intraoperative handoffs play a pivotal role in maintaining continuity of care, particularly when multiple teams or shifts are involved (Ferrara et al., 2017; Ron et al., 2024). Furthermore, the use of checklist-driven, consensus-based communication strategies has been shown to enhance anesthetic safety and provider satisfaction (Gitman & Barrington, 2018; Halladay et al., 2019; Ebertz et al., 2024).

Given these findings, the authors recognized the need for a structured intervention to improve perioperative communication about local anesthetic use. This quality improvement initiative proposes implementing a standardized SBAR-based local anesthetic handoff tool to

enhance interdisciplinary collaboration and reduce the risk of LAST. All perioperative team members, including certified registered nurse anesthetists (CRNAs), anesthesiologists, and nurses, participated in structured education and training on the handoff form. The intervention was implemented over 12 weeks and included pre- and post-intervention surveys to evaluate provider perceptions of communication effectiveness. By aligning evidence-based practices and national safety guidelines, this initiative sought to standardize local anesthetic communication and improve patient outcomes in a high-volume surgical setting.

2. Methods

2.1. Framework

The Plan-Do-Study-Act (PDSA) model was used to guide this quality improvement initiative, promoting continuous refinement through iterative cycles (Agency for Healthcare Research and Quality, 2024). In the Plan phase, communication gaps were identified, stakeholders engaged, and an SBAR-based handoff form was developed. During the intervention, the intervention was implemented across selected surgical units and was supported by structured staff education and systematic data collection. The Study phase assessed the tool's impact using pre- and post-implementation data and staff feedback. In the Act, improvements were made based on findings, with successful strategies scaled across surgical services. Ongoing evaluation and education were used to ensure sustainability (Kennedy & Jackson, 2022).

2.2. Target population

The target population includes adult surgical patients receiving local anesthetics via peripheral or truncal nerve blocks during the perioperative period, whether preoperative, intraoperative, or postoperative. Only patients who received nerve blocks with anesthesia were included. Perioperative staff participated in the project, including pre-op and PACU nurses, CRNAs, anesthesiologists, and surgeons. All providers were trained to use the SBAR handoff tool and submit documentation for review.

2.3. Setting

This project was implemented at a large 626-bed facility, featuring 18 operating rooms, 35 physician anesthesiologists, 94 CRNAs, and roughly 50 perioperative nurses. The hospital performs an average of 40 regional blocks weekly. The project targets the non-cardiac general adult surgical population, including inpatient and ambulatory surgical cases.

2.4. Outcomes

The primary outcome for this project was improved communication during the local anesthetic handoff. This was determined by utilization of the Handoff Clinical Evaluation Exercise (CEX) tool (Figure 1), which assesses handoff quality across domains such as organization, content, communication, clinical judgment, professionalism, and overall competency. This validated tool is effective for both nursing and physician handoffs (Ferrera et al., 2017; Horwitz et al., 2013; Lee et al., 2024). Additional data was collected from each local anesthetic handoff form (Figure 2), including patient weight and local anesthetic type, and the maximum safe dose will be calculated post-implementation for adherence purposes.

Situation								
Patient weight (kg)	Block type	Total LA used	Procedure					
Background								
Allergies	Current home medication (anticoagulants, etc)							
Assessment								
Block assessment/pain level	Any side effects noted? (dizziness, tinnitus, circumoral numbness)							
Recommendation								
Total max dose for LA	Amount remaining to reach the max dose	Plan for rescue anesthesia	Intraoperative dosing					
Local Anesthetic Max Doses								
LA	Max dose (mg/kg)	Max TOTAL dose						
Bupivacaine plain	2 mg/mL	175 mg						
Bupivacaine + epi	3 mg/mL	200 mg						
Ropivacaine plain	3 mg/mL	200 mg						
Lidocaine plain	4.5 mg/mL	300 mg						
Lidocaine + epi	7 mg/mL	500 mg						
Concentration % to mg/ML Conversion								
%	4%	3%	2.5%	2%	1%	0.5%	0.25%	0.125%
mg/mL	40	30	25	20	10	5	2.5	1.25

Fig. 1: Local Anesthetic Handoff.

Handoff CEX: assessment of the provider and the emission process (English version)											
Settings (○ not observed)											
Left Description		1	2	3	4	5	6	7	8	9	Right Description
25 interruptions; noisy, chaotic		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	No interruptions; silent
Rating		Unsat			Sat			Sup			
Organization/efficiency (○ not observed)											
Left Description		1	2	3	4	5	6	7	8	9	Right Description
Disorganized; Rambling		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Standardized signout; concise
Rating		Unsat			Sat			Sup			
Communication skills (○ not observed)											
Left Description		1	2	3	4	5	6	7	8	9	Right Description
Not face-to-face; understanding not confirmed; no time for questions; responsibility unclear; vague language.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Face-to-face signout; confirm understanding; elicits questions; assigns responsibility; concrete language
Rating		Unsat			Sat			Sup			
Content (○ not observed)											
Left Description		1	2	3	4	5	6	7	8	9	Right Description
Information omitted or irrelevant; omits clinical condition; 'to do's lack plan, rationale.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Includes all essential information; describes condition; 'to do's have plan, rationale
Rating		Unsat			Sat			Sup			
Clinical judgement (○ not observed)											
Left Description		1	2	3	4	5	6	7	8	9	Right Description
No recognition of sick patients; no anticipatory guidance		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sick patients identified; anticipatory guidance with a plan
Rating		Unsat			Sat			Sup			
Humanistic qualities/professionalism (○ not observed)											
Left Description		1	2	3	4	5	6	7	8	9	Right Description
Hurried, inattentive; inappropriate comments re: patients, family, staff		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Focused; appropriate comments re: patients, family, staff.
Rating		Unsat			Sat			Sup			
Overall sign-out competence											
Left	1	2	3	4	5	6	7	8	9	Right	
Low	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	High	
Evaluate satisfaction with the evaluation.											
Left	1	2	3	4	5	6	7	8	9	Right	
Low	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	High	
Comments:											
Horwitz et al. 2013 (reproduced with permission)											

Fig. 2: Handoff CEX.

2.5. Intervention

Before implementation, the project was launched with an educational session. All relevant staff, including anesthesia providers, nurses, and PACU personnel, received a double-sided handout: the local anesthetic handoff form on one side and six labeled CEX tools for pre-operative and post-operative senders and receivers on the other. Education included a demonstration and an opportunity for questions. The first phase of implementation, which lasted two weeks, served as a baseline data collection period. During this period, routine handoffs without the handoff form were completed with evaluation of the current practice. The second phase of implementation, which lasted two and a half months, collected data on communication using the standardized handoff forms. The completed CEX tools were deposited in a clearly labeled, locked black bin in the Post-Anesthesia Care Unit (PACU) accessible only to the principal investigators. Weekly audits were completed to monitor form completion, reinforce correct usage, and provide ongoing feedback and education as needed during the pre- and post-implementation phases. Data collected throughout both phases helped to measure consistency and quality of communication about local anesthetics.

2.6. Analysis

The project's impact was determined by comparing communication regarding local anesthetic administration with a standardized handoff vs a non-standardized handoff. Responses to the Handoff CEX by staff were recorded in an Excel spreadsheet, checked for completeness, imported into Statistical Package for the Social Sciences 30.0 (SPSS) software, and assessed for normality. Categorical data (e.g., communication and satisfaction) were characterized by computing medians, frequencies, and means as appropriate. Categorical data was evaluated post-implementation via Kruskal-Wallis and Wilcoxon Signed Rank Tests. Statistical significance was defined as $\alpha < 0.05$; however, this threshold was not met during the implementation.

3. Results

A total of 29 patients had a form to follow throughout the perioperative period. With the opportunity for two handoff evaluations at each phase of care transition, 144 responses were received throughout the project implementation. All 144 were received after implementation of the handoff, with no responses being received during the initial data collection phase.

The researchers analyzed the data using descriptive statistics for sender scores, receiver scores, and satisfaction scores. Median scores were similar across all phases of care transition, which led to the use of non-parametric testing due to non-normal distributions. Kruskal-Wallis testing was performed to determine handoff performance and satisfaction by clinical phase. No significant differences were noted between phases for sender total scores ($p = 0.448$, see Table 1), receiver total scores ($p = 0.772$, see Table 1), sender satisfaction ($p = 0.935$, see Table 1), or receiver satisfaction ($p = 0.251$, see Table 1). Within-case comparisons were examined using Wilcoxon signed-rank tests to determine whether sender and receiver perspectives differed during the same handoff event. Results showed no significant difference between sender and receiver total scores ($Z = -0.51$, $p = .612$, see Table 2), suggesting strong agreement in how both groups evaluated the handoff. Similarly, sender and receiver satisfaction ratings did not differ significantly ($Z = -0.21$, $p = .831$, see Table 2), indicating comparable positive perceptions of the handoff process. Overall, these results demonstrate similar handoff performance and satisfaction across phases, with alignment between sender and receiver evaluations following the implementation of the local anesthetic handoff form.

Table 1: Kruskal-Wallis Test

Kruskal-Wallis Test				
Ranks				
Sender total				
VAR00001	N			Mean Rank
.00	30			35.83
1.00	18			39.72
2.00	22			31.59
Total	70			
Receiver total				
VAR00001	N			Mean Rank
.00	30			33.98
1.00	18			37.94
2.00	23			37.11
Total	71			
Eval Satisfaction R				
VAR00001	N			Mean Rank
.00	30			41.22
1.00	20			36.88
2.00	23			31.61
Total	73			
Eval Satisfaction S				
VAR00001	N			Mean Rank
.00	30			36.93
1.00	18			34.75
2.00	23			35.76
Total	71			
Test Statistics ^{a,b}				
	Sendertotal	Recievertotal	Eval Satisfaction	Eval SatisfactionS
Kruskal-Wallis H	1.606	.517	2.767	.134
df	2	2	2	2
Asymp. Sig.	.448	.772	.251	.935
a. Kruskal-Wallis Test				
b. Grouping Variable: VAR00001				

Table 2: Wilcoxon Signed Ranks Test

Ranks			
Receiver total – Sender total			
	N	Mean Rank	Sum of Ranks
Negative Ranks	30 ^a	29.17	875.00
Positive Ranks	31 ^b	32.77	1016.00
Ties	7 ^c		
Total	68		
Eval Satisfaction R - Eval Satisfaction S			
	N	Mean Rank	Sum of Ranks
Negative Ranks	25 ^d	30.88	772.00
Positive Ranks	31 ^e	26.58	824.00
Ties	13 ^f		
Total	69		
Footnotes			
a. Receiver total < Sender total			
b. Receiver total > Sender total			
c. Receiver total = Sender total			
d. Eval Satisfaction R < Eval Satisfaction S			
e. Eval Satisfaction R > Eval Satisfaction S			
f. Eval Satisfaction R = Eval Satisfaction S			
Test Statistics^a			
	Receiver total – Sender total		Eval Satisfaction R - Eval Satisfaction S
Z	-.508 ^b		-.214 ^b
Asymp. Sig. (2-tailed)	.612		.831
a. Wilcoxon Signed Ranks Test			
b. Based on negative ranks.			

This project found that median total scores across all perioperative phases were approximately 36 (Figures 5 and 6), while mean satisfaction scores ranged from 5 to 7 (Figures 3 and 4). In comparison, current literature on handoff implementation using the Handoff CEX typically reports total scores between 42 and 50 and satisfaction scores of 7 to 8 as indicators of successful implementation (Ferrera et al., 2017; Horwitz et al., 2013). Although this project demonstrated comparable performance and satisfaction trends following implementation of the SBAR tool, the results suggest that further improvements are needed to enhance the effectiveness and long-term success of the local anesthetic handoff form.

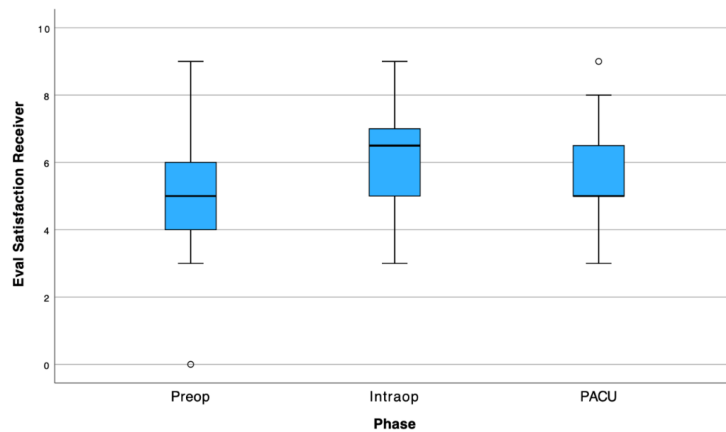


Fig. 3: Receiver Satisfaction.

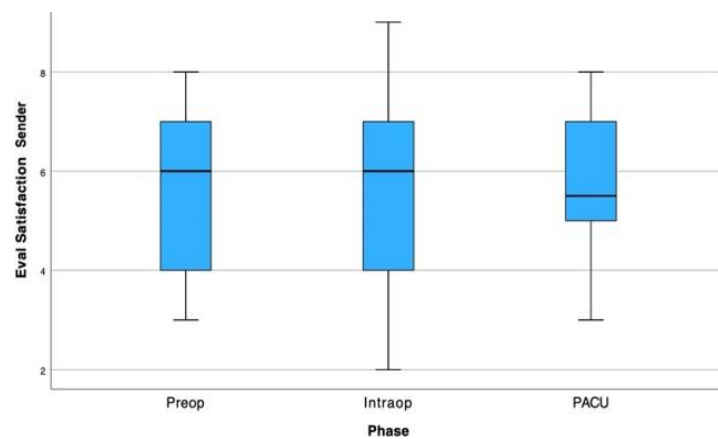


Fig. 4: Sender Satisfaction.

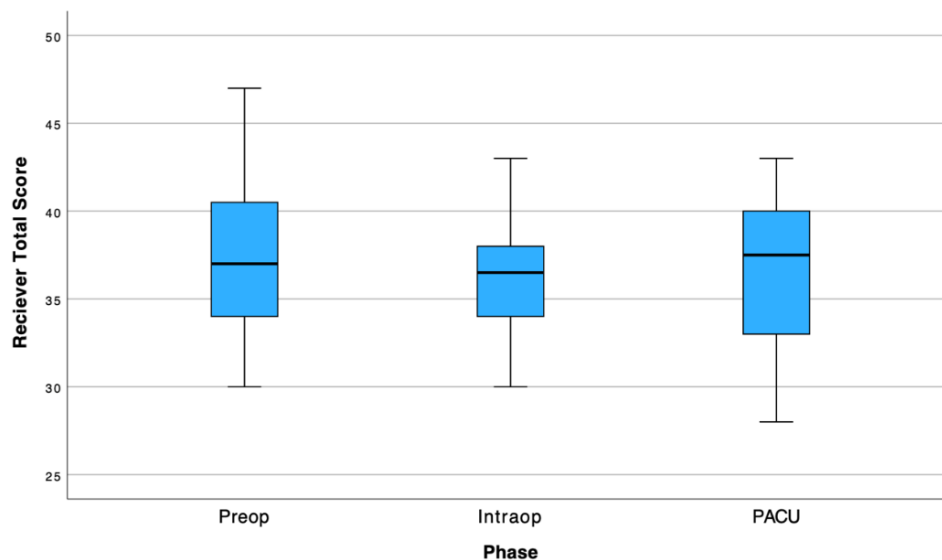


Fig. 5: Receiver Total Scores

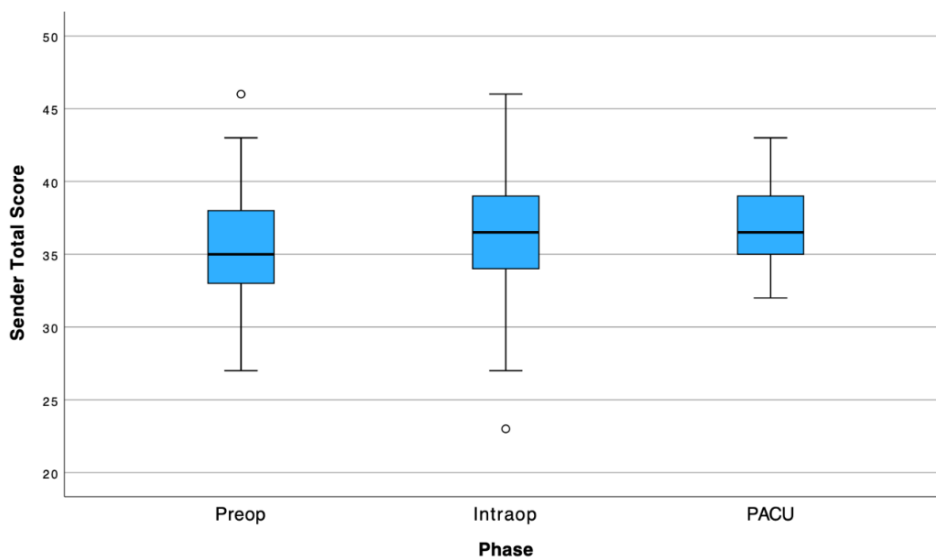


Fig. 6: Sender Total Scores.

4. Discussion

4.1. Summary

This quality improvement project aimed to standardize perioperative communication regarding local anesthetic administration to reduce variability and enhance patient safety. The SBAR-based handoff tool produced consistent communication performance across perioperative phases. These findings highlight the critical role of perioperative nurses and interdisciplinary teams in maintaining safe medication communication practices.

4.2. Interpretation

The absence of baseline data limits causal interpretation; however, consistent scores across perioperative phases suggest reliable adoption of the SBAR tool. Alignment between sender and receiver evaluations indicates shared understanding and usability of the structured handoff format.

Although no statistically significant improvements were detected, qualitative interpretation of the data indicates that the SBAR tool helped standardize essential elements of communication, particularly regarding local anesthetic dosing, maximum allowable limits, and patient-specific considerations. This is consistent with evidence showing that structured handoff tools, particularly SBAR, improve situational awareness and reduce communication failures (Haltermann et al., 2018; Lazzara et al., 2022; Müller et al., 2018). The lack of measurable improvement in CEX scores may reflect the short implementation period, competing workflow demands, or variable adoption among preoperative and intraoperative teams. Additionally, unchanged median scores may suggest that the tool maintained, rather than improved, existing communication quality, an important outcome within a high-volume surgical environment where miscommunication may contribute to LAST events.

Contextual factors also likely influenced performance. The project site's complex environment requires highly efficient communication processes. Variations in staffing, role responsibilities, and unit-level workflow norms may have hindered uniform adoption, particularly during baseline data collection when no forms were submitted. These contextual differences are well-documented barriers in handoff improvement initiatives and highlight the importance of targeted staff engagement and workflow integration.

4.3. Limitations

Key limitations include the absence of baseline data, small sample size, short implementation period, and inconsistent adoption. These factors limit statistical power and generalizability. Findings should be interpreted as early implementation outcomes.

Measurement limitations were also present. The Handoff CEX tool, while validated, relies on subjective provider assessment, which can be influenced by familiarity with the tool, interpersonal dynamics, or time constraints. Although weekly audits and ongoing education were intended to reinforce compliance, their short duration and competing clinical priorities may have limited their effectiveness. Future iterations of the intervention should address these limitations through enhanced training, stronger expectations for compliance, and incorporation of digital automation to improve data completeness and reduce variability.

4.4. Conclusions

Implementation of a standardized SBAR-based handoff tool resulted in consistent communication performance and aligned provider perceptions across perioperative phases. While statistically significant improvements were not observed, the intervention established a foundation for standardized communication, supporting patient safety and medication accuracy. Future efforts should focus on workflow integration, staff engagement, and electronic documentation to improve adoption and sustainability.

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