



www.bioinformation.net
Volume 21(9)



Research Article

Received September 1, 2025; Revised September 30, 2025; Accepted September 30, 2025, Published September 30, 2025

DOI: 10.6026/973206300213214

SJIF 2025 (Scientific Journal Impact Factor for 2025) = 8.478

2022 Impact Factor (2023 Clarivate Inc. release) is 1.9

Declaration on Publication Ethics:

The author's state that they adhere with COPE guidelines on publishing ethics as described elsewhere at <https://publicationethics.org/>. The authors also undertake that they are not associated with any other third party (governmental or non-governmental agencies) linking with any form of unethical issues connecting to this publication. The authors also declare that they are not withholding any information that is misleading to the publisher in regard to this article.

Declaration on official E-mail:

The corresponding author declares that lifetime official e-mail from their institution is not available for all authors

License statement:

This is an Open Access article which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly credited. This is distributed under the terms of the Creative Commons Attribution License

Comments from readers:

Articles published in BIOINFORMATION are open for relevant post publication comments and criticisms, which will be published immediately linking to the original article without open access charges. Comments should be concise, coherent and critical in less than 1000 words.

Disclaimer:

Bioinformation provides a platform for scholarly communication of data and information to create knowledge in the Biological/Biomedical domain after adequate peer/editorial reviews and editing entertaining revisions where required. The views and opinions expressed are those of the author(s) and do not reflect the views or opinions of Bioinformation and (or) its publisher Biomedical Informatics. Biomedical Informatics remains neutral and allows authors to specify their address and affiliation details including territory where required.

Edited by A Prashanth

E-mail: phyjunc@gmail.com

Citation: Viswanathan *et al.* Bioinformation 21(9): 3214-3217 (2025)

Surgical team communication and intraoperative errors: A cross-sectional study

Naveenkumar Viswanathan¹, Sailesh Kumar², Soomal Jamil³, Anvia Villina D'Souza^{4,*} & Alidjanov Xodijakbar Kashipovich⁵

¹Department of General Surgery, Prince Charles Hospital, Cwm Taf Morgannwg University Healthboard, Wales, United Kingdom;

²Department of Surgery, University of Alabama, Birmingham, England; ³Department of Forensic Medicine, Jinnah Medical and Dental college, Sharafabad, Karachi, 74800, Pakistan; ⁴Department of General medicine, Madras Medical College, Chennai, Tamin Nadu, India; ⁵Department of Faculty and Hospital, Tashkent Medical Academy, Tashkent, Uzbekistan; *Corresponding author

Affiliation URL:

<https://ctmuhb.nhs.wales/>

<https://www.uab.edu/>

<https://jmc.edu.pk/>

<https://www.tnmgrmu.ac.in/>

<https://tma.uz/>

Author contacts:

Naveenkumar Viswanathan - E-mail: drnaveenkumarviswanath@gmail.com; Phone: +91 7904697283

Sailesh Kumar - E-mail: sailesh.isk@gmail.com; Phone: +91 9486813072

Soomal Jamil - E-mail: soomaljamil1@gmail.com; Phone: +92 3060980002

Anvia Villina D'Souza - E-mail: anvia23@gmail.com; Phone: +91 7975638463

Alidjanov Xodijakbar Kashipovich - E-mail: Alidjanov@gmail.com; Phone: +998 90 982 44 66

Abstract:

The relationship between intraoperative error rates and the quality of communication within the surgical team is of interest. Using post-operative surveys and organized observation, 136 surgical procedures from various specializations were examined. The results showed that poor communication was strongly associated with higher error rates, especially when it came to important decision points and instrument handoffs. Real-time communication and effective preoperative briefings reduced the frequency of avoidable errors. Strengthening communication protocols may improve surgical safety and collaboration.

Keywords: Surgical outcomes, poor communication, intraoperative mistakes, safety, teamwork, operating room dynamics, cross-sectional research, human factors, and surgical team conduct.

Background:

Effective communication within the surgical team has a major impact on clinical outcomes and patient safety in the operating room (OR) [1]. Communication errors contribute to the occurrence of adverse events in various domains of health care [2]. High-stakes decision-making, interdisciplinary teamwork and complex surgical techniques create an environment highly vulnerable to communication-related errors [3]. Several studies have found that a significant proportion of adverse surgical events are caused by inadequate team communication, which includes misinterpretations, missing cues, and misunderstanding nonverbal signs [4]. Communication in the surgical field is influenced by a variety of factors, including team familiarity, surgical complexity, time constraints, and hierarchy [5]. Errors can happen in a variety of situations, including intraoperative choices, anesthetic updates, instrument swaps, and patient handovers [6]. The repercussions can range from minor technical problems to more significant problems including retained instruments, surgery performed at the incorrect place, or delays in emergency treatment [7]. Although the importance of communication in high-performance surgical teams has been demonstrated, most clinical settings continue to underuse standardized assessment and monitoring techniques [8]. Furthermore, the WHO Surgical Safety Checklist and other contemporary safety guidelines are frequently applied inconsistently [9]. The impact of communication dynamics on surgical errors in real-time practice must therefore be empirically evaluated immediately [10]. This cross-sectional study looks at the level of communication between surgical teams and how it relates to the severity of intraoperative errors [11]. Therefore, it is of interest to focus on observed and reported interactions across different specialties, the research intends to inform better communication training and system-level interventions that could enhance OR safety and efficiency.

Materials and Methods:

This cross-sectional study was conducted over a 4-month period in the surgical departments of two tertiary care hospitals. A total of 136 elective surgical procedures were observed across general surgery, orthopedics, urology, and gynecology. The inclusion criteria were procedures lasting over one hour with at least three surgical team members present (surgeon, anesthesiologist, scrub nurse, and circulating nurse). Emergency surgeries were excluded to avoid confounding variables such as time pressure and incomplete team briefing. Trained clinical observers, who were not part of the surgical teams, used a validated communication behavior checklist to document instances of clear, ambiguous, or failed communication during each surgery. Key communication points analyzed included preoperative briefings, intraoperative instructions, instrument handoffs, and response to critical changes. In addition, post-operative debriefing surveys were administered anonymously to all team members to assess perceived communication quality and incident awareness. Intraoperative errors were defined as deviations from standard procedure, including wrong instrument use, incorrect site preparation, delayed response to vital sign changes, and breaches in sterility. These were logged and verified independently through surgical logs and observer reports. Demographic and procedural variables such as team composition, surgery duration, and team experience were also collected to control for confounding factors. Data were analyzed using descriptive statistics, chi-square tests, and logistic regression to determine the strength and significance of association between communication quality and intraoperative error rates. Ethical approval was granted by the institutional ethics committees, and informed consent was obtained from all surgical staff involved.

Results:

Out of 136 surgeries observed, intraoperative errors were reported in 42 cases (30.9%). The analysis revealed a strong

correlation between poor communication practices especially during instrument handoffs and response to complications and the occurrence of these errors. Surgeries involving teams with high communication scores had significantly fewer errors. **Table 1** shows the distribution of surgical specialties observed. General surgery accounted for the largest proportion of cases (35.3%), followed by orthopedics (27.2%), urology (21.3%), and gynecology (16.2%). **Table 2** depicts the frequency of intraoperative errors across specialties. General surgery contributed the highest proportion of errors (40.5%), followed by orthopedics (28.6%), urology (16.7%), and gynecology (14.2%). **Table 3** differentiates the types of intraoperative errors observed (n = 42). The most common error was wrong instrument use (33.3%), followed by delayed response to patient vitals (23.8%), sterility breaches (21.4%), incorrect site preparation (11.9%), and missed verbal cues (9.6%). **Table 4** compares surgeries with and without preoperative briefings. Procedures with structured briefings had a significantly lower error rate (13.9%) compared with those without briefings (50.0%). **Table 5** shows the relationship between team experience and intraoperative error rates. Less experienced teams (<5 years) demonstrated higher error rates (47.2%) compared with moderately experienced (30.5%) and highly experienced teams (17.1%). **Table 6** depicts the impact of communication breakdown frequency on errors. Surgeries with ≥5 breakdowns showed the highest error rate (69.0%), compared with 3–4 breakdowns (33.3%) and 0–2 breakdowns (13.2%). **Table 7** differentiates error rates based on communication clarity during critical surgical events. Clear communication was associated with the lowest error rate (14.2%), while ambiguous (41.5%) and poor communication

(77.7%) were linked to higher errors. **Table 8** shows the relationship between instrument handoff accuracy and related errors. Frequent confusion led to the highest error rate (43.5%), compared with occasional delays (27.4%) and accurate/timely handoffs (8.2%). **Table 9** depicts postoperative survey findings on team trust. Low trust was associated with a markedly higher error rate (80.0%), compared with moderate (33.3%) and high trust levels (11.5%). **Table 10** compares logistic regression predictors of intraoperative errors. Poor communication clarity (OR = 5.71), absence of preoperative briefings (OR = 4.02), low team trust (OR = 3.88), and limited team experience (OR = 2.61) emerged as the strongest predictors.

Table 1: Distribution of surgical specialties observed (n = 136)

Specialty	Number of Surgeries	Percentage (%)
General Surgery	48	35.30%
Orthopedics	37	27.20%
Urology	29	21.30%
Gynecology	22	16.20%

Table 2: Frequency of intraoperative errors by specialty

Specialty	Total Errors	Percentage of Total Errors (%)
General Surgery	17	40.50%
Orthopedics	12	28.60%
Urology	7	16.70%
Gynecology	6	14.20%

Table 3: Types of intraoperative errors observed (n = 42)

Error Type	Frequency	Percentage (%)
Wrong Instrument Used	14	33.30%
Delayed Response to Vitals	10	23.80%
Sterility Breach	9	21.40%
Incorrect Site Prep	5	11.90%
Missed Verbal Cue	4	9.60%

Table 4: Impact of preoperative briefing on error rates

Preoperative Briefing	Surgeries with Errors	Total Surgeries	Error Rate (%)
Conducted	10	72	13.90%
Not Conducted	32	64	50.00%

Table 5: Team experience level vs. intraoperative error rate

Team Experience Level (Years)	Surgeries	Errors	Error Rate (%)
<5 Years	36	17	47.20%
5–10 Years	59	18	30.50%
>10 Years	41	7	17.10%

Table 6: Communication breakdown frequency and error occurrence

Number of Breakdowns	Surgeries	Errors	Error Rate (%)
0–2	68	9	13.20%
3–4	39	13	33.30%
≥5	29	20	69.00%

Table 7: Communication clarity during critical events versus error rate

Communication Quality	Surgeries	Errors	Error Rate (%)
Clear	77	11	14.20%
Ambiguous	41	17	41.50%
Poor	18	14	77.70%

Table 8: Instrument handoff accuracy and related errors

Handoff Quality	Frequency of Errors	Total Handoffs Observed	Error Rate (%)
Accurate and Timely	8	98	8.20%
Occasional Delay	17	62	27.40%
Frequent Confusion	17	39	43.50%

Table 9: Postoperative survey – team trust level and error rates

Trust Level Reported	Surgeries	Errors	Error Rate (%)
High	69	8	11.50%
Moderate	42	14	33.30%
Low	25	20	80.00%

Table 10: Logistic regression – predictors of intraoperative errors

Variable	Adjusted OR	95% CI	p-value
Poor Communication Clarity	5.71	2.64–12.34	<0.001
No Preoperative Briefing	4.02	1.89–8.53	<0.001
Low Team Trust	3.88	1.74–8.65	0.001
Inexperienced Team (<5 yrs)	2.61	1.18–5.75	0.018

Discussion:

This cross-sectional survey identifies intraoperative communication as the key to avoiding surgical mistakes. There was a strong correlation between compromising communication habits namely, during handoffs and high-risk decision nodes and intraoperative error rates. Teams that did not use formal preoperative briefs had an error rate almost four times greater than those that did, emphasizing the safety benefit of systematic preparation. These results are consistent with previous research proving that standardized communication guidelines minimize preventable adverse events in the operating room [12]. Surgical communication is more than just voice. It involves coordination, psychological safety, team dynamics, and trust. Handoff errors on instruments were especially common, frequently due to rushed or vague communication, highlighting the importance of accurate and standardized handoff procedures. Notably, regression analysis identified that variables like procedure duration or case complexity were less predictive of intraoperative safety than preoperative briefings, team trust, and clear communication [13]. Practically, what the study implies is that surgical safety programs should first focus on interventions like closed-loop communication training, compulsory preoperative briefings, and simulation-based teamwork training. Promoting a culture of psychological safety is also critical, as this helps all members of the team—including junior staff --to raise concerns, hence minimizing communication breakdowns. The strong associations found in this study underpin integrating systematic communication assessments into regular surgical audits [14]. One of this research's greatest strengths is the complementarity of observational data in real time and postoperative questionnaires, yielding both objective and subjective accounts of team communication. Having multiple specialties increases generalizability as well. Yet a number of

limitations must be noted. First, the observational nature restricts causal inference. Second, elective procedures only were studied, which may have underestimated error rates in emergency situations where time pressure is higher. Third, the presence of observers could have had some impact on team behavior (Hawthorne effect). Lastly, results are based on two tertiary hospitals that may not represent practices elsewhere in healthcare.

Conclusion:

Ineffective intraoperative communication significantly raises the risk of surgical errors, particularly during critical instrument handoffs and decision-making. Two crucial protective factors are a high level of team trust and organized preoperative briefings. By reducing avoidable complications, streamlined communication protocols can increase surgical safety.

Acknowledgement:

We acknowledge that first two authors contributed equally to this paper and hence they are considered as joint first authors.

References:

- [1] Calder LA *et al.* *Journal of Burn Care Res.* 2019 **40**:886. [PMID: 31287853]
- [2] Halverson AL *et al.* *Surgery.* 2011 **149**:305. [PMID: 20951399]
- [3] Bährend I *et al.* *Journal of Neurosurg.* 2020 **134**:1409. [PMID: 32470943]
- [4] Somville FJ *et al.* *J Patient Saf.* 2010 **6**:26. [PMID: 20306903]
- [5] Neily J *et al.* *JAMA.* 2009 **302**:1693. [PMID: 19917939]
- [6] Greenberg CC *et al.* *Journal of Am Coll Surg.* 2007 **204**:533. [PMID: 17382211]
- [7] Harréus U *et al.* *Head Neck Oncol.* 2013 **5**:2. [PMID: 23625711]
- [8] Lear R *et al.* *Journal of Surg.* 2016 **103**:1467. [PMID: 27557606]
- [9] Belyansky I *et al.* *Journal of Surg Res.* 2011 **171**:386. [PMID: 21601875]
- [10] Arenas-Márquez H *et al.* *Cir Cir.* 2008 **76**:421. [PMID: 18778549]
- [11] Gawande AA *et al.* *N Engl J Med.* 2003 **348**:1555. [PMID: 12796727]
- [12] Hu YY *et al.* *J Surg Res.* 2012 **177**:37. [PMID: 22591922]
- [13] Tørring B *et al.* *BMC Health Serv Res.* 2019 **19**:528. [PMID: 31358000]
- [14] Nazim SM *et al.* *J Pak Med Assoc.* 2021 **71**:S77. [PMID: 33582728]