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Verbal Communication Failures among Surgical Team Members: A Descriptive Observational Study

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Abstract

Background and Aim: Communication failures are a key source of medical errors, particularly in surgical settings where effective teamwork is essential. This study investigated the types and contexts of communication failures among surgical team members in hospitals in Tehran, Iran.

Material and Methods: A descriptive observational study was conducted from September to November 2022. Using stratified sampling, an experienced observer recorded verbal communications among general surgical teams during 52 procedures. Communication failures were identified based on Lingard's framework throughout the surgical workflow and assessed using 11 items of the WHO Surgical Safety Checklist (SSC).

Results: Among 350 observed communication events during 52 general surgery procedures, 28 (8%) were classified as communication failures. Occasion-related failures were most frequent (64.28%), followed by failures in content (17.86%), purpose (10.71%), and audience (7.14%). Nearly half of the failures occurred during anesthetic induction and the operative phase (48.57%). Failures most commonly involved reviewing clinical records (17.9%) and operating room equipment (14.3%) within SSC items.

Conclusion: Although infrequent, communication failures pose significant risk due to their potential consequences. The findings highlight critical targets for intervention, including enhanced teamwork training and optimized SSC implementation. Strengthening communication practices may reduce preventable adverse events and improve patient safety.

Keywords: Communication failures, operating room, surgical safety checklist, patient safety.

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Introduction

Medical errors are widely recognized as a serious global health problem. Estimates suggest that between 44,000 and 98,000 deaths occur annually due to medical errors [1-2]. The results of an integrative review study on medical errors reported that the most common medical errors are committed by nurses and nursing students, with medication errors being the most frequent one [3]. Such errors are often linked to physiological and cognitive limitations. Contributing factors include fatigue, heavy workload, and inefficient communication among healthcare providers [4-5]. Inefficient communication at all levels of care, whether between physicians, physicians and nurses, or nurses themselves, has been consistently identified as a major cause of medical errors, with serious consequences [6]. Numerous studies have emphasized the strong association between the quality of teamwork among healthcare professionals and patient safety outcomes [7-8].

The operating room is one of the most complex clinical environments, which requires close collaboration and coordination among multidisciplinary team members [9]. These complexities underscore the critical importance of communication in this setting, especially since more than 230 million surgical procedures are performed worldwide each year [10-11]. Despite the frequency and importance of surgical procedures, communication-related errors have remained underexplored in research.

To address patient safety concerns, the World Health Organization (WHO) designed the Surgical Safety Checklist (SSC) in 2008 as part of its Safe Surgery Saves Lives program [12]. The SSC is designed to enhance surgical safety primarily by improving communication and teamwork among surgical team members [13].

The effective use of this instrument has been associated with reduced mortality and postoperative complications in operating

rooms [13-14]. Nevertheless, the effectiveness of this tool depends largely on how well communication is established and maintained among team members. Studies from various countries have identified the barriers and implemented corrective measures to improve SSC use [15]. However, limited evidence exists in this regard in Iran [16]. Given these gaps, the present study was conducted to identify and classify verbal communication failures occurring during surgical procedures in three hospitals in Tehran.

By applying Lingard's communication failure framework (occasion, content, purpose, audience) in conjunction with the WHO's SSC, this study sought to provide evidence-based insights that can inform targeted interventions to strengthen communication and ultimately improve patient safety.

Methods

This descriptive-observational study was conducted from September to November 2022 in the general surgery departments of three selected hospitals in Tehran, Iran. General surgery procedures were chosen because they typically involve a high volume of communication in the operating room.

The study population consisted of surgical team members involved in general surgery procedures in the selected hospitals, while the surgical procedure was considered as the unit of observation and sampling.

A stratified sampling strategy was used to ensure that the sample reflected the variety of procedures. Based on a pilot observation of three procedures, the prevalence of communication failures was estimated at 5%. With a 90% confidence level, the required sample size was calculated to be 52 surgical procedures. The sample size was calculated using the following formula:

$$\mathrm{n} = \frac{Z^2 \times p(1-p)}{d^2}$$

In this formula, Z is the Z-score corresponding to the desired confidence interval, p is the estimated prevalence, and d is the margin of error.

Of the 52 observed procedures, 21 were herniorrhaphy, 9 were pilonidal sinus resection, 12 were cholecystectomy, and the remaining 10 consisted of general surgical management of trauma- and accident-related injuries.

Surgical procedures were included if they involved continuous participation of a surgical team during the operative workflow. Outpatient procedures not requiring anesthesia and emergency surgeries were excluded. Procedures were also excluded if informed consent for observational data collection was not obtained from all team members present.

Verbal communication events among surgical team members were observed directly by a trained researcher with 13 years of operating room experience. For each procedure, the observer monitored the entire surgical process, from patient admission to exit from the operating room. Surgical stages were defined based on functional workflow phases commonly used in previous observational studies of operating room communication, focusing on stages with the highest intensity of team interaction.

Communication events were documented in real time, and notes were taken to capture contextual details that could aid in interpretation of failures.

Communication failures were classified using Lingard's model [17], which defines four domains of failures, including "occasion," "content," "purpose," and "audience" [18]. These failures were further mapped onto the 11 items of WHO SSC [19] to determine their occurrence at different stages of the surgical process. Table 1 provides definitions and examples of each communication failure.

Table 1. Definition of the types of communication failures using the Lingard model

Communication failure	Definition	Example
Occasion	Poor timing in the expression of information	Surgical personnel, one hour after the start of anesthesia, asks whether antibiotics are prescribed or not, whereas antibiotics are desirable within 30 minutes of surgery.
Content	Inefficient or inaccurate transfer of information	The anesthesiologist asks if a special bed is ready for the patient, and the surgeon responds that there may not be an empty bed.
Purpose	Communication events in which the purpose of the message is unknown or inappropriate.	The surgical team discusses the availability of required equipment without reaching a clear decision.
Audience	Confusion in regard to the roles of team members	Nurses and anesthesiologists discuss patient positioning for surgery without involving the surgeon.

Data were analyzed using SPSS version 25. Descriptive statistics (frequency and percentage) were used to describe the distribution of communication failures by stage of surgery, as well as SCC items and Lingard domains.

Ethics approval was obtained from the ethical committee of Islamic Azad University, Tehran Medical Branch (IR.IAU.TMU.REC.1397.027).

Results

Across the 52 observed general surgery procedures, a total of 350 verbal communication events were recorded. The composition of surgical teams varied across procedures, and all communications occurring during the surgical workflow were included in the observations.

Across the 52 surgical procedures, 350 verbal communication events were recorded from a total of 1,352 possible events according to 11 items of SSC. Of these events, 28 events (8%) were identified as communication failures.

Communication failures occurred most frequently during anesthetic induction and the subsequent operation, accounting for

14 of 28 failures (50%). The distribution of failures by surgical stage and SSC item is summarized in Table 2.

Table 2: Distribution of communication failures according to surgical stages and SSC items

SSC items	Admission-entering the operating room	Entering the operating room-induction of anesthesia	Induction of anesthesia-Leaving the operating room
Patient information	1	0	2
Surgical site and procedure	0	2	2
Review of clinical records	3	1	1
Antibiotic prophylaxis	0	1	1
Allergies	0	0	0
Major considerations for patient management	1	2	2
Anesthesia equipment	*	2	2
Operating room equipment	*	1	4
Sterility of surgical instruments	*	0	0
Instrument, sponge, and needle counts	*	0	0
Specimen labeling and management	*	0	0
Cumulative Frequency of Communication Failures	5	9	14
**These items are not applicable in the "Admission-entering the operating room" stage.*			

Table 2 shows that the highest rate of failures was observed in the induction of anesthesia- Leaving the operating room, with 14 cases (50%). The highest frequency of verbal communication failure in all three stages of surgery was related to the review of patients' clinical records, with 5 cases (17.86% of the total 28 cases of failures). Also, the most frequent verbal communication failure in the admission stage was related to the review of the patient's clinical records, with 3 cases (60%) of the total 5 cases of failures in the admission stage. In the entry stage, the most frequent failures occurred in relation to surgical site, major considerations for patient management, and anesthesia equipment, all with the frequency of 2

cases (22.22% of the total 9 cases of failures in the entry stage). Finally, in the last stage, most failures were related to the operating room equipment, with 4 cases (28.57% of the total 14 cases of failures).

When classified according to Lingard's framework, occasion failures were the most common (18.28, 64.3%), indicating inappropriate timing of communication. Content failures accounted for 5.28 cases (17.9%), purpose failures accounted for 3.28 cases (10.7%), and audience failures accounted for 2.28 cases (7.1%). Observational notes indicated that content-related failures often involved incomplete patient information or insufficient discussion of major considerations for patient management. Purpose-related failures typically reflected a lack of a unified approach to problem-solving or unclear responses to questions (Table 3).

Table 3: The distribution of communication failures according to the SSC items and failure domains

SSC items	Occasion (n)	Content (n)	Purpose (n)	Audience (n)	Total (n)
Patient information (identity)	2	0	0	1	3
Surgical site and procedure	2	1	0	1	4
Review of clinical records	3	2	0	0	5
Antibiotic prophylaxis	2	0	0	0	2
Allergies	0	0	0	0	0
Major considerations for patient management	2	2	1	0	5
Anesthesia equipment	3	0	1	0	4
Operating room equipment	4	0	1	0	5
Sterility of surgical instruments	0	0	0	0	0
Instrument, sponge, needle counts	0	0	0	0	0
Specimen labeling and management	0	0	0	0	0
Frequency (percentage)	18 (%64.28)	5 (%17.86)	3 (%10.71)	2 (%7.14)	28 (%100)

Discussion

This study investigated verbal communication failures among surgical team members in three hospitals using the WHO's SSC and Lingard's communication failure model. We found that approximately 8% of observed communication events were associated with failures. They were most commonly related to occasion (64.3%), followed by content and purpose. The majority of failures occurred during induction of anesthesia and leaving the operating room, which are critical phases requiring timely and coordinated communication. These findings are consistent with the study of Lingard et al. (2004), which demonstrated that up to one-third of intraoperative communications were associated with failures, with timing being the most common one [18]. Moreover, the findings of a systematic review indicated that communication breakdowns in the operating room were directly linked to adverse patient outcomes, particularly when occurring during critical phases [19]. More recent evidence underscores that timing, multitasking, and workflow interruptions remain dominant contributors to miscommunication in surgical settings [7,20,21].

Recent prospective studies provide further support. For instance, an observational study in 2024 reported that about 80% of speech communication interference events during surgery were task-related, and 17.5% occurred at critical moments, often leading to delays or message loss [22]. Likewise, a 2025 investigation of robotic surgeries identified up to three miscommunications per hour, frequently associated with environmental disruptions and high noise levels, which were linked to increased duration of surgery and higher risk of patient harm [23]. Our findings also highlight contextual challenges specific to dynamic operating room environments, where hierarchical structures, simultaneous responsibilities, and noise can amplify risks. The

predominance of occasion-related failures underscores the importance of structured timing and prioritization of communication, particularly during anesthetic induction, which previous studies have also identified as a high-risk stage [7]. Encouragingly, structured interventions show promise in reducing these failures. A recent study in the United States implemented the standardized SHRIMPS (Surgical procedure, History, Relevant medications, Intraoperative events, Monitoring and equipment, Postoperative plan, and Special concerns) handoff protocol, achieving 100% compliance with handoffs and a 98.2% inclusion of critical elements, compared to only 34.4% pre-intervention [24]. Similarly, studies have shown that simulation-based teamwork training, use of digital or electronic SSC tools, and environmental modifications can substantially improve communication quality and patient safety [5,15]. In summary, while communication failures were relatively infrequent in this study, their timing and context made them disproportionately dangerous. Strengthening structured communication strategies, improving adherence to SSC protocols, and addressing both environmental and interpersonal barriers are critical steps toward enhancing communication, and patient safety.

This study has several limitations. First, data were collected in three hospitals, which may limit the generalizability of results. Second, data were collected by a single observer, potentially introducing observer bias. Finally, only descriptive statistics were used in this study. Thus, further studies with inferential analyses could provide deeper insights into factors associated with communication failures. Despite these limitations, the present study provides valuable evidence for prioritizing areas in surgical team communication that require appropriate intervention.

Conclusion

In conclusion, communication failures among surgical team members, while relatively uncommon, have significant implications for surgical patients and their health outcomes. Most failures occurred during induction of anesthesia and leaving the operating room and were primarily related to timing, incomplete information, and unclear communication objectives. These findings highlight the critical need for targeted interventions, including structured communication training and reinforcement of WHO's SSC. Enhancing communication skills of surgical team members is essential for reducing preventable errors and improving patient safety outcomes.

In future studies, more attention should be paid to the aspects of communication failures and their root causes.

It is recommended that policymakers and hospital managers strengthen institutional policies and standardized communication practices, such as structured briefings and regular interprofessional training, to address communication failures among surgical team members. They should also foster a culture of openness and psychological safety, along with ongoing evaluation of medical errors in order to enhance patient safety and improve overall performance in surgical settings.

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Conflict of Interests

The authors declare no competing interests.

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