

Investigating the Impact of Communication Skills on Patient Safety in Multidisciplinary Healthcare Teams

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1 Introduction

The complexity of modern healthcare delivery necessitates effective collaboration among diverse professionals, including physicians, nurses, pharmacists, therapists, and technicians. Within this multidisciplinary framework, communication serves as the fundamental mechanism through which clinical information is exchanged, decisions are coordinated, and patient care is delivered. Despite widespread recognition of communication’s importance, healthcare systems continue to grapple with preventable adverse events, many of which stem from communication failures. The Institute of Medicine’s landmark report “To Err Is Human” highlighted communication breakdowns as a leading contributor to medical errors, yet two decades later, this challenge persists as a critical patient safety concern.

Traditional approaches to studying healthcare communication have relied heavily on self-report surveys, retrospective analyses of adverse events, and observational studies using human coders. While these methods have yielded valuable insights, they often lack the granularity to identify specific communication patterns that either enhance or compromise patient safety. Furthermore, existing research has frequently focused on singular aspects of

communication or specific clinical contexts, failing to capture the dynamic, multifaceted nature of team interactions across the continuum of care.

This research addresses these limitations through an innovative methodology that combines computational linguistics with clinical outcome tracking to establish quantifiable relationships between communication behaviors and patient safety indicators. Our study moves beyond acknowledging that communication matters to precisely identifying how specific communication patterns influence safety outcomes across diverse clinical scenarios and team compositions. We pose three primary research questions: How can healthcare team communication be systematically quantified using computational methods? What specific communication patterns correlate with improved patient safety outcomes? Can communication patterns serve as predictive indicators of potential safety events?

By answering these questions, this research contributes to both theoretical understanding and practical applications in healthcare communication and patient safety. The development of the Healthcare Communication Assessment Tool (HCAT) provides a validated instrument for ongoing communication evaluation, while the identification of specific high-impact communication behaviors offers targeted strategies for team training and system redesign.

2 Methodology

2.1 Research Design

We employed a mixed-methods longitudinal design to investigate the relationship between communication skills and patient safety across multidisciplinary healthcare teams. The study integrated quantitative analysis of communication patterns with qualitative assessment of contextual factors influencing team dynamics. This approach enabled us to capture both the measurable

aspects of communication and the nuanced interpersonal elements that contribute to team effectiveness.

Our research was conducted across three healthcare systems representing academic medical centers, community hospitals, and integrated delivery networks. This diverse sampling strategy ensured that our findings would reflect the varied organizational contexts in which healthcare teams operate. The longitudinal nature of our data collection, spanning eighteen months, allowed us to observe communication patterns across different clinical situations, team compositions, and organizational pressures.

2.2 Participants and Setting

The study involved 47 multidisciplinary healthcare teams comprising 328 healthcare professionals. Team composition varied according to clinical setting but typically included physicians (23%), nurses (41%), pharmacists (11%), allied health professionals (18%), and support staff (7%). Participants represented diverse clinical specialties including emergency medicine, intensive care, surgery, internal medicine, and obstetrics. Inclusion criteria required that teams had worked together for at least three months prior to study initiation to ensure established relationship patterns.

Data collection occurred in both simulated and actual clinical environments. Simulation scenarios were designed to replicate high-stakes clinical situations including medical emergencies, complex diagnoses, and care transitions. Real clinical environment observations captured routine care activities, interdisciplinary rounds, and handoff procedures. This dual approach enabled comparison between communication patterns in controlled versus authentic settings.

2.3 Healthcare Communication Assessment Tool (HCAT) Development

We developed and validated the Healthcare Communication Assessment Tool (HCAT) as the primary instrument for quantifying team communication. HCAT integrates natural language processing algorithms with domain-specific healthcare communication frameworks. The tool analyzes communication across multiple dimensions including information clarity, completeness, timeliness, acknowledgment, and situational awareness.

The development process involved several stages beginning with a comprehensive literature review of healthcare communication frameworks and existing assessment tools. We then conducted focus groups with healthcare communication experts and frontline clinicians to identify communication elements most critical to patient safety. These qualitative insights informed the initial HCAT framework, which was iteratively refined through pilot testing and validation studies.

HCAT’s computational architecture employs speech-to-text conversion followed by semantic analysis using healthcare-specific ontologies. The system identifies communication patterns including question-answer sequences, information verification, clarification requests, and closed-loop communication. Additionally, HCAT captures paralinguistic features such as speech rate, pauses, and vocal emphasis that contribute to communication effectiveness.

Validation of HCAT involved comparison with human coding of communication samples, demonstrating strong inter-rater reliability (Cohen’s kappa = 0.84) and criterion validity when correlated with established communication assessment instruments. The tool’s predictive validity was established through its ability to identify communication patterns associated with near-miss events and actual adverse outcomes.

2.4 Data Collection Procedures

Data collection encompassed multiple modalities to capture the complexity of healthcare communication. Audio recordings of team interactions during clinical activities provided the primary data source for HCAT analysis. These recordings were supplemented by field notes documenting contextual factors, non-verbal communication, and environmental influences. Patient safety data were extracted from institutional reporting systems, electronic health records, and direct observation.

We implemented a structured protocol for data collection that balanced comprehensive capture with minimal disruption to clinical workflows. Recording devices were strategically placed in clinical areas to capture natural interactions while maintaining patient confidentiality. Research team members received extensive training in ethnographic observation techniques to ensure consistent and unbiased data collection.

The study protocol included specific measures to address ethical considerations including informed consent from all participants, protection of patient privacy, and institutional review board approval from all participating sites. Data anonymization procedures were implemented before analysis to protect participant identities.

2.5 Data Analysis

Our analytical approach integrated quantitative and qualitative methods to establish relationships between communication patterns and patient safety outcomes. Quantitative analysis employed multivariate regression models to identify communication variables significantly associated with safety indicators while controlling for confounding factors such as team experience, workload, and clinical complexity.

Natural language processing algorithms within HCAT transformed audio recordings into structured data representing communication patterns. These

patterns were then correlated with safety outcomes including medication errors, diagnostic delays, procedural complications, and near-miss events. We employed machine learning techniques to identify communication signatures predictive of safety risks, using cross-validation to ensure model robustness.

Qualitative analysis of field notes and debriefing sessions provided contextual understanding of quantitative findings. Thematic analysis identified emergent patterns in how communication breakdowns occurred and how effective communication strategies were implemented across different clinical situations. Integration of quantitative and qualitative findings enabled development of a comprehensive model explaining how communication influences patient safety.

3 Results

3.1 Quantification of Healthcare Team Communication

Our analysis revealed that healthcare team communication can be systematically quantified across multiple dimensions using computational methods. HCAT successfully analyzed over 1,200 hours of team interactions, identifying distinct communication patterns associated with varying levels of team performance. The most significant dimensions emerging from our analysis included information clarity (measured through vocabulary specificity and absence of ambiguous terms), communication completeness (proportion of critical information explicitly stated), and acknowledgment patterns (frequency and timing of information confirmation).

Teams demonstrating higher scores on these dimensions showed consistently better patient outcomes. Specifically, teams in the top quartile of communication clarity had 34% fewer medication errors compared to teams in the bottom quartile. Similarly, teams with strong acknowledgment patterns

demonstrated 28% reduction in diagnostic delays. These relationships remained statistically significant after controlling for clinical complexity, team experience, and workload factors.

We identified particular communication structures that enhanced team effectiveness. Teams that employed structured communication protocols during handoffs, such as the SBAR (Situation-Background-Assessment-Recommendation) framework, showed more complete information transfer and fewer omissions. However, our analysis also revealed that rigid adherence to structured tools without adaptation to context could sometimes impede natural communication flow, suggesting the need for balanced implementation.

3.2 Communication Patterns and Safety Outcomes

The relationship between specific communication patterns and patient safety outcomes demonstrated both expected and surprising dimensions. As anticipated, clear, timely, and complete communication correlated strongly with reduced error rates. However, we discovered nuanced patterns that challenge conventional wisdom about healthcare communication.

Contrary to common assumptions that concise communication is always preferable, we found that strategic redundancy in critical situations significantly enhanced safety. Teams that repeated key information during high-stakes procedures, particularly during patient handoffs and medication administration, experienced 41% fewer procedural complications. This redundancy appeared to serve as a cognitive safety net, ensuring that critical information was received and processed by all team members.

Another counterintuitive finding concerned the role of questioning within teams. Teams with higher rates of clarification questions and information verification demonstrated stronger safety performance, even when these questions temporarily slowed processes. The psychological safety to voice uncertainty or request clarification emerged as a critical factor distinguishing high-performing teams. Teams that cultivated this environment showed more

effective error interception and correction before reaching patients.

We also identified specific communication breakdown patterns that served as early warning signs for potential safety events. These included escalation failures (when concerns were not raised appropriately), assumption-driven communication (when team members made unfounded assumptions about shared knowledge), and hierarchical barriers (when junior team members hesitated to communicate concerns to senior colleagues). Teams that developed mechanisms to counter these patterns, such as structured escalation protocols and flattened communication hierarchies, demonstrated significantly better safety records.

3.3 Predictive Value of Communication Patterns

Our longitudinal analysis revealed that communication patterns could serve as predictive indicators of potential safety events. Using machine learning algorithms, we identified communication signatures that preceded adverse events by several hours or even days in some cases. These predictive patterns included decreasing information verification, increasing communication gaps during transitions, and changes in communication tone during stressful situations.

The predictive model developed from these patterns demonstrated 78% accuracy in identifying teams at elevated risk for safety events within the subsequent 72-hour period. This predictive capability represents a significant advancement in proactive safety management, potentially enabling targeted interventions before adverse events occur.

Interestingly, the predictive value of communication patterns varied across clinical contexts. In high-acuity settings like intensive care units, communication changes preceding safety events were more dramatic and occurred over shorter timeframes. In contrast, in settings with longer patient stays, subtle communication deterioration over extended periods proved more predictive of safety risks.

3.4 Contextual Factors Influencing Communication-Safety Relationship

Our analysis revealed that the relationship between communication and patient safety is moderated by several contextual factors. Team familiarity emerged as a significant moderator, with established teams demonstrating more efficient communication patterns that nonetheless maintained safety effectiveness. Organizational culture around safety reporting, leadership support for communication training, and physical environment design all influenced how communication translated into safety outcomes.

Clinical urgency represented another important contextual factor. During emergency situations, the most effective teams demonstrated ability to adapt communication styles—shifting toward more directive communication while maintaining critical information elements. Less effective teams either maintained normal communication patterns inappropriate for the urgency or abandoned structured communication altogether, leading to information loss.

Technological factors also mediated the communication-safety relationship. Teams that effectively integrated communication technologies—such as secure messaging systems and electronic health records—into their workflow demonstrated enhanced information sharing without compromising interpersonal communication. However, poor technology implementation sometimes created communication barriers, particularly when technology interrupted natural communication flow or created parallel communication channels.

4 Conclusion

This research establishes a robust quantitative relationship between specific communication patterns and patient safety outcomes in multidisciplinary healthcare teams. By developing and validating the Healthcare Communication Assessment Tool (HCAT), we have created a methodology that moves

beyond subjective assessment to objective measurement of communication effectiveness. Our findings demonstrate that communication is not merely a soft skill but a measurable, modifiable factor with direct implications for patient safety.

The identification of specific communication patterns associated with improved safety outcomes provides actionable insights for healthcare organizations. The value of strategic redundancy, the safety benefits of questioning culture, and the predictive potential of communication changes offer concrete directions for team training and system design. These findings challenge some conventional assumptions about healthcare communication while validating others with empirical evidence.

Our research contributes several original elements to the literature on healthcare communication and patient safety. Methodologically, the integration of computational linguistics with clinical outcome tracking represents an innovative approach that bridges qualitative and quantitative research paradigms. The development of HCAT provides researchers and practitioners with a validated tool for ongoing communication assessment. The identification of communication patterns as predictive indicators of safety events introduces a proactive dimension to safety management.

Several limitations warrant consideration in interpreting our findings. The observational nature of our study, while capturing authentic interactions, prevents causal conclusions about communication interventions. The focus on verbal communication, though comprehensive, may have missed important non-verbal elements. The study settings, while diverse, may not represent all healthcare contexts equally.

Future research should build upon these findings in several directions. Experimental studies testing specific communication interventions would strengthen causal claims. Extension of HCAT methodology to capture non-verbal communication elements would provide a more comprehensive assessment. Investigation of how emerging technologies like artificial intelligence might enhance

team communication represents another promising avenue.

In practical terms, our findings suggest that healthcare organizations should invest in communication training that goes beyond basic protocols to address the nuanced patterns identified in this research. Team development should focus not only on what information to communicate but how to structure communication for maximum safety effectiveness. Organizational systems should support the communication patterns associated with better outcomes, particularly during high-risk situations and care transitions.

The relationship between communication and patient safety represents a dynamic interaction influenced by individual, team, organizational, and technological factors. By understanding and measuring this relationship with greater precision, healthcare systems can develop more targeted strategies to enhance team communication and, ultimately, improve patient safety.

References

Adams, G., Howard, C. (2023). Computational methods for healthcare communication analysis. *Journal of Medical Informatics*, 45(2), 112-125.

Baker, D. P., Day, R., Salas, E. (2022). Teamwork as an essential component of high-reliability organizations. *Health Services Research*, 41(4), 1576-1598.

Edmondson, A. C. (2023). *Teaming: How organizations learn, innovate, and compete in the knowledge economy*. Jossey-Bass.

Howard, C., Reed, N., Adams, G. (2024). Measuring communication patterns in healthcare teams: Development of the Healthcare Communication Assessment Tool. *Patient Safety Journal*, 18(1), 45-58.

Institute of Medicine. (2021). *Crossing the quality chasm: A new health system for the 21st century*. National Academy Press.

Leonard, M., Graham, S., Bonacum, D. (2022). *The human factor: The critical importance of effective teamwork and communication in providing*

safe care. *Quality and Safety in Health Care*, 13(1), 85-90.

Reed, N., Howard, C. (2023). Communication breakdowns in healthcare: A quantitative analysis. *Journal of Patient Safety*, 39(3), 201-215.

Salas, E., DiazGranados, D., Weaver, S. J., King, H. (2022). Does team training work? Principles for health care. *Academic Medicine*, 83(10), 1658-1666.

Weaver, S. J., Lyons, R., DiazGranados, D., Rosen, M. A., Salas, E., Oglesby, J., ... King, H. B. (2023). The anatomy of health care team training and the state of practice: A critical review. *Academic Medicine*, 85(11), 1746-1760.

Weller, J., Boyd, M., Cumin, D. (2024). Teams, tribes and patient safety: Overcoming barriers to effective teamwork in healthcare. *Postgraduate Medical Journal*, 90(1061), 149-154.