



BMJ Open Defining conditions for effective interdisciplinary care team communication in an open surgical intensive care unit: a qualitative study

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ABSTRACT

Objective Poor interdisciplinary care team communication has been associated with increased mortality. The study aimed to define conditions for effective interdisciplinary care team communication.

Design An observational cross-sectional qualitative study.

Setting A surgical intensive care unit in a large, urban, academic referral medical centre.

Participants A total 6 interviews and 10 focus groups from February to June 2021 (N=33) were performed. Interdisciplinary clinicians who cared for critically ill patients were interviewed. Participants included intensivist, transplant, colorectal, vascular, surgical oncology, trauma faculty surgeons (n=10); emergency medicine, surgery, gynaecology, radiology physicians-in-training (n=6), advanced practice providers (n=5), nurses (n=7), fellows (n=1) and subspecialist clinicians such as respiratory therapists, pharmacists and dieticians (n=4). Audio-recorded content of interviews and focus groups were deidentified and transcribed verbatim. The study team iteratively generated the codebook. All transcripts were independently coded by two team members.

Primary outcome Conditions for effective interdisciplinary care team communication.

Results We identified five themes relating to conditions for effective interdisciplinary care team communication in our surgical intensive care unit setting: role definition, formal processes, informal communication pathways, hierarchical influences and psychological safety. Participants reported that clear role definition and standardised formal communication processes empowered clinicians to engage in discussions that mitigated hierarchy and facilitated psychological safety.

Conclusions Standardising communication and creating defined roles in formal processes can promote effective interdisciplinary care team communication by fostering psychological safety.

BACKGROUND

Critically ill patients in intensive care units (ICUs) depend on decision-making diffused among a rotating, diverse cast of faculty physicians from different specialties, physicians-in-training, nurses, dieticians,

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ The study interviewed a broad range of interdisciplinary clinicians caring for critically ill patients to capture the full range of conditions for effective interdisciplinary communication from all perspectives.
- ⇒ The study was conducted in a large, urban, academic surgical intensive care unit in a referral hospital to gain a deeper understanding of communication dynamics across different disciplines of subspecialist clinicians composed of ad hoc teams who have never worked together and many learners with monthly turn-over caring for complex critically ill and injured patients.
- ⇒ The study was limited to a single centre and may limit transferability of findings.

pharmacists, respiratory therapists and other supporting staff. Often, these ‘expanding and contracting’¹ teams assemble ad hoc to address the intricacies of individual patients’ cases. Frequently, their team members have never worked together. This complex context depends on the ability of the care teams to create situational awareness and execute teamwork skills, such as communication, coordination and cooperation.² Notably, communication has been found to be the highest cited contributor to medical error.³ Ineffective communication results from relational and social factors intrinsic to medical teams, such as the status, power, vertical hierarchy and role ambiguity.³

Effective interdisciplinary care team communication has been defined as the clear, brief and timely delivery of complete information among engaged key decision-makers. It allows team members to create shared mental models of the problem and make treatment decisions with situational awareness if those treatments fail.⁴ However, promoting effective interdisciplinary care

team communication across hierarchical and role-based boundaries is shown to be challenging,^{5 6} especially considering the different impacts of formal and informal communication patterns.⁷ While research finds that ineffective communication contributes to adverse patient outcomes, conditions for effective interdisciplinary care team communication, especially in surgical ICUs (SICUs) where surgical teams co-manage patient care, are not well defined.^{8 9}

The overarching goal of this study was to address this gap in the literature by identifying conditions for effective communication among interdisciplinary teams caring for patients in a large, urban, academic SICU in a referral hospital. A qualitative study of interdisciplinary clinicians at all professional levels who cared for critically ill and injured surgical patients was performed to identify the conditions for effective communication. We hypothesised that the complex structure of the setting would elucidate the most important conditions for effective communication among interdisciplinary care teams.

METHODS

Setting

This was an observational, cross-sectional study conducted at a single, open SICU at a large, urban, academic medical centre in the Midwestern USA from February to June 2021. Each patient was comanaged by at least two physician teams (intensivists and surgeons), ad hoc teams that had often never worked together, and many learners with little institutional memory. This environment's complex structure was ideal to understand conditions for effective interdisciplinary communication. The study sought to obtain data excerpts that contributed to the result's trustworthiness by providing a 'thick description' of data in context.¹⁰

An open ICU model has been defined as the critical care team and the patient's surgical team (or primary hospital admitting team) comanaging the patient during their stay in the SICU. The surgical team in this setting was commonly referred to as the 'primary' team. The critical care team conducted daily morning rounds and collaborated with the primary team on patient care decisions. There were often other consulting teams that supported specialised patient care decisions in addition to the critical care and primary surgical teams. The SICU had approximately 20 consulting service lines that passed through their unit on a regular basis. These service lines, such as respiratory therapy, were another integral part of a patient's care plan.

Patient and public involvement

The patient and public were not involved in the design, conducting, reporting or dissemination of the research.

Conceptual model

To explore factors relating to effective interdisciplinary communication, we referenced Mulvale *et al*'s¹¹

interprofessional collaboration gears model (figure 1). This model (the 'gears model') provided a framework for conceptualising how interdisciplinary collaboration factors connected from macro to individual levels. It presented collaboration as the outcome of four types of factors: macro (governance), meso (information systems and organisational culture), micro (team structure, team attitudes, social processes and formal processes) and individual (belief in interprofessional care and flexibility). This study team interpreted collaboration to be similar to communication, such that they share interrelated determinants. This study focused mostly on the gears model microlevel factors emerging from data: team structure, team attitudes, social processes and formal processes.

Semistructured interviews

Cohort description

The study examined effective interdisciplinary care team communication, exploring relationships and patterns as they were identified in these data.¹² A representative group of interdisciplinary roles (intensivists, colorectal surgeons, vascular surgeons, transplant surgeons, surgical oncologist, ethicists) and professional levels (faculty surgeon physicians, physicians-in-training, advanced practice providers (APPs) (eg, physician assistants and nurse practitioners), and specialist providers (eg, dietitians, respiratory therapists, pharmacists) that work in the SICU were purposefully enrolled to glean richer insight into the problem.

Recruitment

Participants were eligible for recruitment if they frequently cared for critically ill and injured patients. Participants were recruited via email by a study member to share their experiences around interdisciplinary communication in the SICU. A total of 33 participants were invited. No participants refused to participate, dropped out of the study or provided a repeat interview. Interviews and focus groups were conducted over Zoom. Only the participants and interviewers were present for the interviews. No patients or family members were involved in the study because they are rarely privy to interdisciplinary communication exchanges.

Interview guide development

Interview and focus group guides were designed to explore conditions for effective interdisciplinary care team communication of all professional levels caring for critically ill and injured surgical patients (online supplemental material file 1). The study team cocreated an interview guide with non-participant clinicians. The interview guide elicited narratives about the participant's interdisciplinary communication in the care of critically ill and injured patients—specifically their experiences sharing important information during patient care plan discussions and how patient care plan disagreements were approached.

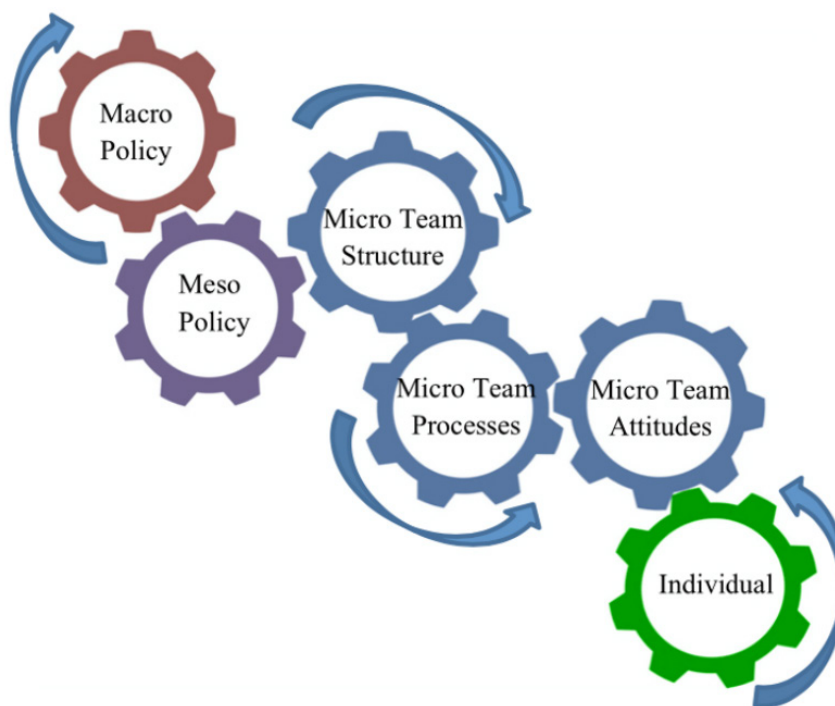


Figure 1 Conceptual model for assessing conditions for effective communication among interdisciplinary teams in surgical intensive care unit based on Mulvale *et al.*¹¹ Interprofessional Collaboration Gears Model (2016). Creative commons licence: <https://creativecommons.org/licenses/by/4.0/>. Macrofactors: governance; mesofactors: information systems, organisational culture; microfactors: team structure: champion/facilitator, team size; social processes: levels of conflict, open communication, supportive colleagues; formal processes: team vision/goals, quality audit/process, recognition, group problem-solving, team meetings, decision-making processes; team attitudes: feeling part of team, support for innovation; individual factors: belief in interprofessional care, flexibility.

A female PhD health services researcher (JJ), a male MD surgical research fellow (AE) and a female management PhD candidate (CMD), all with extensive experience in qualitative interviewing in a medical setting, conducted the interviews and focus groups. One study member (JJ) had a prior relationship with a few of the participants from previous research studies. The three

study team members did not work in the SICU and thus had no professional authority over participants. Participants were told that the study team was interested in understanding and improving interdisciplinary communication in the care of critically ill and injured patients. The interviews were audiorecorded, transcribed verbatim and deidentified. Field notes taken during the interviews were discussed at weekly team meetings. Interviews lasted approximately 60 min and were conducted until data saturation, or the point where the study team was not seeing new data introduced, was reached.

Analysis

Each week, study team members debriefed the raw data from recent interviews and identified emergent themes around conditions for effective interdisciplinary communication. When it was time to begin coding, eight people from the study team participated in an (initially) inductive thematic analysis.¹³ The codebook was created by each of the eight study team members. They all independently reviewed the same two transcripts to ascertain preliminary codes. After individual coding, the study team convened to discuss and reach consensus about the codes using a virtual whiteboard. Preliminary codes were added, clustered and consolidated in an iterative process with feedback from the study team. An experienced physician researcher (AMS) with expertise in interdisciplinary care team communication and a PhD qualitative researcher

Table 1 Participant guide for assessing conditions for effective communication among interdisciplinary teams in surgical intensive care unit

Role	No of participants
Intensivist	3
Surgical oncologist	1
Vascular surgeon	2
Colorectal surgeon	2
Transplant surgeon	2
Critical care fellow	1
Physicians-in-training	6
Intensive care unit nurse	7
Advanced practice providers	5
Respiratory therapist	2
Pharmacist	1
Dietician	1

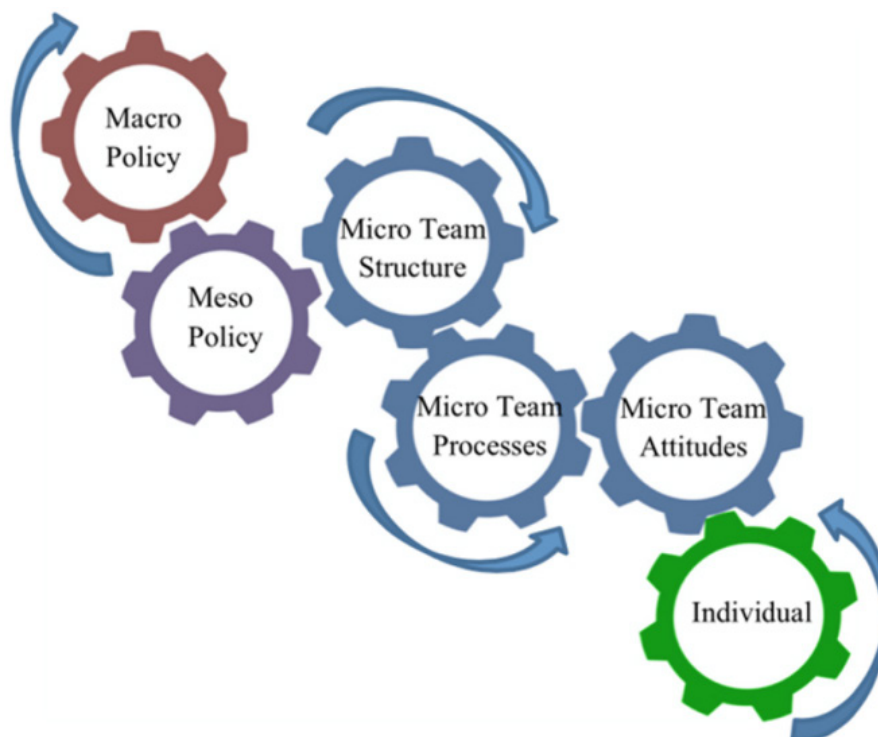


Figure 2 Adapted Mulvale *et al*'s¹¹ interprofessional collaboration gears model for assessing conditions for effective communication among interdisciplinary teams in surgical intensive care unit. Macrofactors: open surgical ICU mesofactors: organisational culture of hierarchy microfactors: Variability in role definition, lack of formal communication processes giving rise to informal communication pathways individual factors: value psychological safety.

specialising in microsystems (JJ) also introduced deductive codes from the literature around teamwork climate,¹⁴ physical and psychological accessibility,¹⁵ and distribution of shared responsibility.¹⁶ CMD selected an additional transcript for the team to code to test and refine the codebook. The team reconvened to reach agreement over the codes. Once the codebook (online supplemental material file 2) was finalised, the transcripts were coded by dyads, which resolved coding conflicts through partnered consensus. MAXQDA software was used to support coding and analysis. For member checking, we invited participants to provide feedback on the main themes through a workshop and a priority matrix survey.¹⁷

RESULTS

A total of 6 interviews and 10 focus groups were conducted. The sample of interdisciplinary participants included 10 physicians (intensivist, surgical oncologist, vascular, colorectal and transplant surgeons), intensive care nurses (n=7) and subspecialists such as respiratory therapists, pharmacists and dieticians (n=4) (table 1). The sample included all professional levels including faculty surgeons, physicians-in-training (n=6), fellows (n=1) and APPs (n=5). Five themes were identified as conditions for effective communication among interdisciplinary teams caring for patients in a large, urban, academic SICU (figure 2).

Unclear role definitions were amplified during patient care decision-making

The open model structure of the SICU fostered a culture of shared responsibility between the interdisciplinary care teams that comanaged patient care. Unclear, diffuse responsibility blurred boundaries between the critical care team and consulting services. As one faculty surgeon noted, the complex patient care problems can overlap, making critical care management '...a lot greyer about, 'what am I handling and what are [the consultants] handling?' The diffusion of responsibility was met with tension over who was responsible for different aspects of the patients' care.

The ICU is...a juggernaut with lots of people that work in it...because of the nebulous reporting structure there, it could be a little challenging sometimes to figure out who is the decision maker, or who do I speak to about this or that? *Faculty Surgeon*

Participants noted that ambiguity around roles and responsibilities inhibited care team members from making care decisions and escalating communication. Participants shared that this led to delays in care. Non-physician team members spent extra time seeking advice from colleagues and searching through patient charts to find who might be overseeing a patient. Even when there was a call number in the patient notes, it would sometimes be an incorrectly listed. As one nurse said:

In the [Epic] summary page, there is a section that shows you who is 'primary'...but that doesn't necessarily mean that's who you're supposed to page. *Bedside ICU Nurse*

Participants indicated that designating responsibility for specific aspects of patient care to each interdisciplinary care team, creating shared mental models around team boundaries, and establishing points of contact (and appropriate back-up contacts) could aid efficient team communication around patient care.

Formal processes for interdisciplinary care team communication were underused

The formal mechanisms around interdisciplinary care team communication included daily team meetings, multidisciplinary rounds, and patient admissions and handoffs. The implementation of multidisciplinary rounds received positive feedback from interdisciplinary clinicians for providing a platform for different roles to converge on patient care. Many surgical teams sent representative team members, such as APPs, to the critical care team morning multidisciplinary rounds or invited the critical care team to their own team's morning rounds.

Participants reported that the effectiveness of communication during these formal processes varied by the lead faculty surgeon and their team culture. Rounds were enacted differently depending on the faculty surgeon's preferences and priorities. As one nurse stated:

...regarding rounds, I think it's very much faculty surgeon-specific and driven. So, there's some faculty surgeons that value the interdisciplinary...and they take the time to make sure everyone's included and everyone understands what's going on. And then there's other faculty surgeons who that's not a priority for them... So I think that can delay care, and that's when communication breaks happen. *Bedside ICU Nurse*

Participants indicated that more standardised communication during formal processes could promote knowledge sharing. One nurse reported how a lack of standardised handoff procedures can lead to unintentionally sharing 'half the story'.

They give you sign out, but... and you get half the story. Then there you are, the primary nurse with the ICU physician-in-training overnight, trying to figure out the plan of care for this patient until the day team comes to see them. *Bedside ICU Nurse*

Current organisational dynamics promoted informal communication pathways

Participants noted that team members often relied on informal communication pathways because formal processes were lacking. Informal communication pathways included texting, paging, unplanned visits to the OR, unplanned visits to the critical care offices and hallway conversations. They allowed for rapid updating

and information exchange outside of formal processes. Informal communication pathways seemed important given the emergent issues that arise and necessitate quick decision-making.

[Faculty surgeon] and I will use a lot of cell phone or texting and [Faculty surgeon] will even come down to the OR. Or he'll know I'm actually stuck in the OR for six hours. They'll need to get some message to us, and text just isn't good enough, so he'll walk down to the operating room. *Faculty surgeon*

While there are benefits to informal communication pathways (such as getting immediate, relevant patient updates outside of designated meeting times), participants reported that having an abundance of informal communication led to an 'overcommunication' problem. Participants explained that constant communication between multiple types and levels of providers in the SICU did not always equate to an efficient sharing of knowledge. Additionally, informal communication pathways in the complex SICU environment were not always structured for following-up on information.

It varies from month to month, and it depends on the day and what's going on. But I have witnessed a lot of delays in patient care, and a lot of delays in patient throughput, because there hasn't been follow-up, or those 'checking back in with each other' type communication. *Nurse clinical coordinator*

Informal communication pathways were influenced by physical proximity (accessibility) and relationships with clinicians. If an answer was needed quickly, clinicians would consult the critical care team members nearby on the floor and/or clinicians with whom they had established rapport. Participants underscored how face-to-face communication and physical accessibility were valued. The availability of clinicians on the floor, such as APPs, made their role in care decisions more clinically relevant.

I think the ICU team sometimes is more in communication with the nurses because they are literally on our unit so that we are able to voice our concerns immediately because they sit right there and we're right there, too. *Bedside ICU Nurse*

As a workaround for approval on patient care decisions, participants stated that they can get a quick, or potentially more favourable, response by seeking permission or advice from people they know. While informal communication pathways was an effective tool, communication issues arose when team members used the pathways to circumvent appropriate approval. Participants reported that this often occurs when team members are navigating disagreements between the SICU and primary teams.

'If Mom says no, go to Dad', and that's what they'll do...you know how little kids do that. Sometimes people in the ICU will do that if they hear "no"

from one person, they'll go to a different person.
Physician-in-training

Hierarchy influenced the communication practices of physicians-in-training

Both formal processes and informal communication pathways were subject to cognitive biases that influenced communication behaviours. Participants reported that the negative expressions of cognitive biases, such as over-valuing voices of authority in hierarchical systems, could diminish team members empowerment, especially in non-physicians.

As the main figures of authority, faculty surgeons were reported to have the strongest influence and felt to be responsible for teaching physicians-in-training 'how to work with others'. Participants, including physicians-in-training, noted that as part of the physician-in-training learning process, physicians-in-training adopted faculty surgeons' styles during their rotation. Physicians-in-training tended to model behaviours more from their team's faculty surgeons than from faculty surgeons on other teams or from non-faculty surgeon team members. However, participants were uncertain whether faculty surgeons were fully aware of their influence on interdisciplinary care team communication.

It was just that it was not paid attention to...depending on who the faculty surgeon is in the ICU, it can be run very differently. As is on our service, depending which faculty surgeon is currently on for that week, it can be run very differently. *APP*

Participants reported that when communicating with non-physicians, physicians-in-training would mirror their faculty surgeon's practices for creating (or reducing) psychological safety and minimising (or increasing) the presence of hierarchy. As nurses noted:

Some physicians-in-training are great with it, some have no desire to speak with nurses. They're going to speak only to the doctor and the nurse can figure it out later. My point is that it also comes from the faculty surgeons. There's some faculty surgeons that have no desire to communicate with the nurse...well, of course that behavior then is demonstrated to the physicians-in-training who follow the same behavior.
Nurse clinical coordinator

Team cultures and practices that inhibit the non-physician voice block an optimal exchange of information, weakening effective interdisciplinary care team communication. When the hierarchy was flatter, trusting relationships between physicians-in-training and nurses could greatly facilitate interdisciplinary communication. Physicians-in-training and nurses (both within and across teams) built trusting relationships through patterns of interactions where they saw each other work with patients, took feedback and achieved consensus. The relationship between nurses and each individual physician-in-training

had to be established anew every month because SICU physicians-in-training changed monthly. Physicians-in-training earned the trust of bedside SICU nurses when they made informal visits before and after morning rounds to check on the patients and get updates from the nurses. This demonstrated respect for the nurses, valuing their perspective and flattening the interdisciplinary hierarchy.

During rounds, [the physician-in-training] had an excellent presentation, they asked us what we thought was going on...and then they'll circle back, talk to families, and just stuff like that... this person wants to be here. Then the trust comes in too. If I come to someone and I'm like, "this patient, this is what happened and I'm concerned." And they are like, "okay," and then they come with me and they assess the patient too... seeing that stuff from physicians-in-training helps build trust. *Bedside ICU Nurse*

Conversely, nurses earned the trust of the physicians-in-training when they would speak up to educate the physician-in-training, providing rationale to guide care based on their critical care experience and knowledge.

It's their first time putting in orders...it's a matter of us being like 'hey, you put this in and that's not safe,' or, 'you have to change it to this because,' for X, Y, Z reasons. That helps them trust us because we're not going to do things that will harm the patient, and we're going to help them figure out what needs to be done. *Bedside ICU Nurse*

Standardised practices supported the development of psychological safety and interdisciplinary team engagement

A high level of psychological safety sets the stage for participants to engage meaningfully and earn team members' trust. Participants, particularly non-physician team members such as APPs and nurses, expressed a desire to feel more engaged and psychologically safe in team-level patient decision-making. These participants stated that they were more likely to speak up and share their perspective in team discussions when they felt encouraged by high-status team members (ie, faculty surgeons) to provide input on the care plan. Support from high-status team members was demonstrated by direct invitation (eg, asking team members to attend the meeting or to speak during rounds), mindful presence (eg, allowing team members to finish speaking, not interrupting them or walking away), and validation (eg, acknowledging and acting on what team members communicate).

It's just a nice invitation to bring up additional issues. Sometimes there's nothing additional...it's just nice to be offered that opportunity. *Clinical provider*

However, routines supporting psychological safety varied by faculty surgeons. While many faculty surgeons welcomed the input of non-physician team members, some either rejected non-physician team input or

bypassed them during rounds completely. One non-physician participant pointed out that faculty surgeons can use physical cues to show physicians-in-training and other team members that the non-physician's input is valued. Otherwise, 'you feel you have to interject or catch if the team starts to walk away while you're mid-sentence'. Participants reported that can be impacted by how faculty surgeons and higher-level team members demonstrate respect and trust to non-physician team members outside rounds as well.

...the faculty surgeon [physician] made a comment to their team about not listening to the non-physician and making sure that they take things to a more higher-level and I couldn't have helped feeling insulted....I understand that I am definitely a lower-level staff member, but at the same time this is coming from a higher-level person who's telling me to carry out these plans. *APP*

DISCUSSION

The goal of this study was to identify conditions for effective communication among interdisciplinary teams caring for patients in a large, urban, academic SICU. Two key conditions, clear role definition and standardisation of formal processes, were found to support the creation of psychological safety. In the absence of formal communication processes, clinicians expressed a tendency to engage in informal communication, which could be subject to bias. Our findings uniquely address a gap in the literature in which conditions for effective interdisciplinary team communication are not clearly defined,⁸ particularly in the complex SICU setting, and illustrate the relationship between micro-level factors driving communication outcomes.

Others have found that conditions, such as physical accessibility,¹⁵ can also influence the effectiveness of a team's communication.¹⁸ Interdisciplinary care team communication can also serve different purposes depending on whether it is patterned as formal (scheduled) or informal (ad hoc).⁷ Formal communication can help reduce the complexity of the exchange,¹⁹ yet informal communication can yield greater, more timely insights.²⁰ Team members might resort to informal communication when systematic issues, like workflow and scheduling, or lack of psychological safety prohibit them from participating in formal communication events.²¹

As Cumin *et al* found, 'information was five times more likely to be effectively communicated if it was mentioned during a formal team communication'.²² Our findings contribute to the argument that effective interdisciplinary care team communication would benefit from being more formalised, especially between high-level individuals in teams.²³ Studies have shown that standardised communication tools in formal processes, such as goal sheets, improve the perception of communication among team members,²⁴ reduce variations in how teams

communicate,¹⁴ foster clearer discussions around patient goals²⁵ and improve the overall transfer of knowledge.²⁶

There were limitations to this study. First, this was a single-unit study in an urban academic hospital which limits transferability to rural or non-academic hospitals. Yet, by speaking to a wide variety of interdisciplinary clinicians, we gained rich insight into the complexity of interdisciplinary communication both within and between teams. Our rich findings were validated with participant checking of clinicians that have worked in other ICUs. Thus, we believe our findings likely reflect communication issues across other ICUs in other academic hospitals. Second, data collection via interviews and focus groups relied on the participants' perception of communication, instead of direct observations by study team members in situ. However, a concordant observational study of five units in the same hospital validated and reinforced the critical impact of leadership on team psychological safety during formal communication processes.²⁷ Third, these data were collected during the COVID-19 pandemic when there were objectively greater stress and burden placed on interdisciplinary clinicians. The backdrop of pandemic stress may have impacted the nature and intensity of participant responses.

Future work

Clinicians reported that previous attempts had been made to standardise formal processes in the ICU. The implementation of standardised routines is challenged by the ICU's high turnover and need for frequent learner education. A future direction is to engage physicians and leadership in cocreating and championing new standardised processes. Together, we plan to scope a communication intervention that addresses the findings of this study.

CONCLUSION

ICUs, which care for critically ill and injured patients, depend on effective interdisciplinary team communication. Standardising communication patterns and clearly defining roles could minimise reliance on informal communication and create the foundation for psychological safety.

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REFERENCES

- Hawryluck LA, Espin SL, Garwood KC, *et al*. Pulling together and pushing apart: tides of tension in the ICU team. *Acad Med* 2002;77:S73–6.
- Salas E, Wilson KA, Murphy CE, *et al*. Communicating, coordinating, and cooperating when lives depend on it: tips for teamwork. *Jt Comm J Qual Patient Saf* 2008;34:333–41.
- Sutcliffe KM, Lewton E, Rosenthal MM. Communication failures: an insidious contributor to medical mishaps. *Acad Med* 2004;79:186–94.
- Lingard L, Espin S, Whyte S, *et al*. Communication failures in the operating room: an observational classification of recurrent types and effects. *Qual Saf Health Care* 2004;13:330–4.
- Rangachari P, Rissing P, Wagner P, *et al*. A baseline study of communication networks related to evidence-based infection prevention practices in an intensive care unit. *Qual Manag Health Care* 2010;19:330–48.
- Shoham DA, Harris JK, Mundt M, *et al*. A network model of communication in an Interprofessional team of Healthcare professionals: A cross-sectional study of a burn unit. *J Interprof Care* 2016;30:661–7.
- Reeves S, Rice K, Conn LG, *et al*. Interprofessional interaction, negotiation and Non- negotiation on general internal medicine wards. *J Interprof Care* 2009;23:633–45.
- Beckmann U, West LF, Groombridge GJ, *et al*. The Australian incident monitoring study in intensive care: AIMS-ICU. the development and evaluation of an incident reporting system in intensive care. *Anaesth Intensive Care* 1996;24:314–9.
- Alvarez G, Coiera E. Interdisciplinary communication: an uncharted source of medical error. *J Crit Care* 2006;21:236–42.
- Geertz C. *Interpretation of cultures: selected essays*. New York: Basic Books, 1973.
- Mulvale G, Embrett M, Razavi SD. Gearing up' to improve Interprofessional collaboration in primary care: a systematic review and conceptual framework. *BMC Fam Pract* 2016;17:83.
- Glaser BG, Strauss AL. *Awareness of dying*. New Brunswick, NJ: AldineTransaction, 1965.
- Braun V, Clarke V. Using thematic analysis in psychology. *Qualit Res Psychol* 2006;3:77–101.
- Leonard M, Graham S, Bonacum D. The human factor: the critical importance of effective teamwork and communication in providing safe care. *Qual Saf Health Care* 2004;13:85–90.
- Liu P, Lyndon A, Holl JL, *et al*. Barriers and Facilitators to Interdisciplinary communication during consultations: a qualitative study. *BMJ Open* 2021;11:e046111.
- Stey AM, Wybourn CA, Lyndon A, *et al*. How care decisions are made among Interdisciplinary providers caring for critically injured patients: A qualitative study. *Surgery* 2020;167:335–9.
- Devers KJ. "How will we know "good" qualitative research when we see it? beginning the dialogue in health services research". *Health Serv Res* 1999;34:1153–88.
- Zimmerman JE, Shortell SM, Rousseau DM, *et al*. Improving intensive care: observations based on organizational case studies in nine intensive care units: a prospective, multicenter study. *Crit Care Med* 1993;21:1443–51.
- Vaughan D. The dark side of organizations: mistake, misconduct, and disaster. *Annu Rev Sociol* 1999;25:271–305. 10.1146/annurev.soc.25.1.271 Available: <https://www.annualreviews.org/toc/soc/25/1>
- Burn S, Boese K, Faden L, *et al*. Recognising the importance of informal communication events in improving collaborative care. *BMJ Qual Saf* 2019;28:289–95.
- Ervin JN, Kahn JM, Cohen TR, *et al*. Teamwork in the intensive care unit. *Am Psychol* 2018;73:468–77.
- Cumin D, Skilton C, Weller J. Information transfer in Multidisciplinary operating room teams: a simulation-based observational study. *BMJ Qual Saf* 2017;26:209–16.
- Santhosh L, Sewell J. "Hospitalist and Intensivist experiences of the "open" intensive care unit environment: a qualitative exploration". *J Gen Intern Med* 2020;35:2338–46.
- Pronovost P, Berenholtz S, Dorman T, *et al*. Improving communication in the ICU using daily goals. *J Crit Care* 2003;18:71–5.
- Schwartz JM, Nelson KL, Saliski M, *et al*. The daily goals communication sheet: A simple and novel tool for improved communication and care. *Jt Comm J Qual Patient Saf* 2008;34:608–13.
- Lingard L, Espin S, Rubin B, *et al*. Getting teams to talk: development and pilot implementation of a checklist to promote Interprofessional communication in the OR. *Qual Saf Health Care* 2005;14:340–6.
- Abahuje EDC, Lin KA, Tesorero K, *et al*. *Impact of Team Characteristics and Leadership on Information Sharing in Multidisciplinary Intensive Care Units, A Mixed Methods Study*.

Supplementary File 1: Qualitative Interview Guide for Assessing Conditions for Effective Communication Amongst Interdisciplinary Teams in Surgical Intensive Care Units

1. Interviewee starts off with personal story about team-team communication.
2. Could you please describe your role in the ICU?
3. Could you please tell me about a time you communicated something you felt was important about a patient plan? How did that go?
4. Could you please tell me about a time you had something you felt was important to communicate about a patient plan, but decided not to share?
5. What happens if there's a disagreement with the patient plan?

Supplementary Material File 2: Codebook for Assessing Conditions for Effective Communication Amongst Interdisciplinary Teams in Surgical Intensive Care Units

Code
Psychological safety
Social norms
Relationships
Attendings not used to pushback
Excluded in discussions
Chance to ask questions
Valued opinions
Status
Hierarchy
Cognitive bias
Respect
Ownership
Deferring decisions
Delegation
Responsiveness
Attending preferences
Primary team gives approval
Anticipatory thinking
Communication
Agreement on care plan
Changing plans
Inter/intrapersonal
Formality
Mode
Assignment of a calling consultant
Fast decision-making
Handoffs
Shift to shift handoffs
Floor to SICU handoffs
Speaking up
Going directly to top of hierarchy
Rounds
Rounding at different times
Pre-rounding
Post-rounding
Work organization
Morning rounds
Communication with family

More consultants, more mixed messages to family
Need to smooth over confusion with family
Conflicting messages between teams
Tone
Updates
Variability in mechanism of communication
Regular interactions
Communication tools
Notes
WhatsApp
Texting group chats
Roles and responsibilities
Role definition
Role of APP
Point person
Mediating person
Constant in ICU
Advocate for attending
Role of 2nd year
Team manager
Psychological accessibility
Physical accessibility
Cognitive load
SICU - NIGHT
SICU - DAY
Managing expectations
Rotations
Staffing

Standards for Reporting Qualitative Research (SRQR)*<http://www.equator-network.org/reporting-guidelines/srqr/>**Page/line no(s).****Title and abstract**

Title - Concise description of the nature and topic of the study Identifying the study as qualitative or indicating the approach (e.g., ethnography, grounded theory) or data collection methods (e.g., interview, focus group) is recommended	1/5-6
Abstract - Summary of key elements of the study using the abstract format of the intended publication; typically includes background, purpose, methods, results, and conclusions	1/1-24

Introduction

Problem formulation - Description and significance of the problem/phenomenon studied; review of relevant theory and empirical work; problem statement	3/51-60
Purpose or research question - Purpose of the study and specific objectives or questions	3/66-72

Methods

Qualitative approach and research paradigm - Qualitative approach (e.g., ethnography, grounded theory, case study, phenomenology, narrative research) and guiding theory if appropriate; identifying the research paradigm (e.g., postpositivist, constructivist/ interpretivist) is also recommended; rationale**	6/126-129
Researcher characteristics and reflexivity - Researchers' characteristics that may influence the research, including personal attributes, qualifications/experience, relationship with participants, assumptions, and/or presuppositions; potential or actual interaction between researchers' characteristics and the research questions, approach, methods, results, and/or transferability	5/111-120
Context - Setting/site and salient contextual factors; rationale**	4/75-83
Sampling strategy - How and why research participants, documents, or events were selected; criteria for deciding when no further sampling was necessary (e.g., sampling saturation); rationale**	5/94-102
Ethical issues pertaining to human subjects - Documentation of approval by an appropriate ethics review board and participant consent, or explanation for lack thereof; other confidentiality and data security issues	5/99-102
Data collection methods - Types of data collected; details of data collection procedures including (as appropriate) start and stop dates of data collection and analysis, iterative process, triangulation of sources/methods, and modification of procedures in response to evolving study findings; rationale**	5/114-133

Data collection instruments and technologies - Description of instruments (e.g., interview guides, questionnaires) and devices (e.g., audio recorders) used for data collection; if/how the instrument(s) changed over the course of the study	5/104-133
Units of study - Number and relevant characteristics of participants, documents, or events included in the study; level of participation (could be reported in results)	7/139-149
Data processing - Methods for processing data prior to and during analysis, including transcription, data entry, data management and security, verification of data integrity, data coding, and anonymization/de-identification of excerpts	6/130-133
Data analysis - Process by which inferences, themes, etc., were identified and developed, including the researchers involved in data analysis; usually references a specific paradigm or approach; rationale**	6/122-129
Techniques to enhance trustworthiness - Techniques to enhance trustworthiness and credibility of data analysis (e.g., member checking, audit trail, triangulation); rationale**	6/129-133

Results/findings

Synthesis and interpretation - Main findings (e.g., interpretations, inferences, and themes); might include development of a theory or model, or integration with prior research or theory	7/139-343
Links to empirical data - Evidence (e.g., quotes, field notes, text excerpts, photographs) to substantiate analytic findings	8/159-161 ; 8/170-171 ; 9/189-193 ; 9/197-200 ; 10/212-215 ; 11/225-228 ; 11/237-239 ; 12/247-250 ; 12/265-267 ; 13/274-278 ; 14/290-296 ; 14/300-304 ; 15/328-329 ; 16/339-343

Discussion

Integration with prior work, implications, transferability, and contribution(s) to the field - Short summary of main findings; explanation of how findings and conclusions connect to, support, elaborate on, or challenge conclusions of earlier scholarship; discussion of scope of application/generalizability; identification of unique contribution(s) to scholarship in a discipline or field	16/345-376
Limitations - Trustworthiness and limitations of findings	17/377-391

Other

Conflicts of interest - Potential sources of influence or perceived influence on study conduct and conclusions; how these were managed	19/397
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Funding - Sources of funding and other support; role of funders in data collection, interpretation, and reporting	19/399
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*The authors created the SRQR by searching the literature to identify guidelines, reporting standards, and critical appraisal criteria for qualitative research; reviewing the reference lists of retrieved sources; and contacting experts to gain feedback. The SRQR aims to improve the transparency of all aspects of qualitative research by providing clear standards for reporting qualitative research.

**The rationale should briefly discuss the justification for choosing that theory, approach, method, or technique rather than other options available, the assumptions and limitations implicit in those choices, and how those choices influence study conclusions and transferability. As appropriate, the rationale for several items might be discussed together.

Reference:
O'Brien BC, Harris IB, Beckman TJ, Reed DA, Cook DA. **Standards for reporting qualitative research: a synthesis of recommendations.** *Academic Medicine*, Vol. 89, No. 9 / Sept 2014
DOI: [10.1097/ACM.0000000000000388](https://doi.org/10.1097/ACM.0000000000000388)