Impact of Interprofessional Teamwork on Aligning Intensive Care Unit Care with Patient Goals
A Qualitative Study of Transactive Memory Systems

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Abstract

Rationale: Although aligning care with patient goals is fundamental to critical care, this process is often delayed and leads to conflict among patients, families, and intensive care unit (ICU) teams. Interprofessional collaboration within ICU teams is an opportunity to improve goal-aligned care, yet this collaboration is poorly understood. A better understanding of how ICU team members work together to provide goal-aligned care may identify new strategies for improvement.

Objectives: Transactive memory systems is a theory of group mind that explains how high-performing teams use a shared memory and collective cognition. We applied this theory to characterize the process of interprofessional collaboration within ICU teams and its relationship with goal-aligned care.

Methods: We conducted a secondary analysis of focus group ($n = 10$) and semistructured interview ($n = 8$) transcripts, gathered during a parent study at two academic medical centers on the process of ICU care delivery in acute respiratory failure. Participants ($N = 70$) included interprofessional ICU and palliative care team members, surrogates, and patient survivors. We used directed content analysis, applying transactive memory systems theory and its major components

(specialization, coordination, credibility) to examine ICU team collaboration.

Results: Participants described each ICU profession as having a specialized role in aligning care with patient goals. Different professions have different opportunities to gather knowledge about patient goals and priorities, which results in dispersion of this knowledge among different team members. To share and use this dispersed knowledge, ICU teams rely on an informal coordination process and "side conversations." This process is a workaround for formal channels (e.g., health records, interprofessional rounds) that do not adequately convey knowledge about patient goals. This informal process does not occur if team members are discouraged from asserting their knowledge because of hierarchy or lack of psychological safety. Conversely, coordination succeeds when team members recognize each other as credible sources of valued knowledge.

Conclusions: We found that ICU team members work together to align care with patient goals and priorities, using transactive memory systems. The successful function of these systems can be disrupted or promoted by ICU organizational and cultural factors, which are potential targets for efforts to increase goal-aligned care.

Keywords: interprofessional teamwork; patient-centered care; critical care; palliative care

Delivery of critical care in the intensive care unit (ICU) includes challenging decisions about initiating, continuing, or withdrawing life-sustaining interventions. Ideally, these decisions are aligned with patient goals and priorities. Yet, this alignment process is often delayed, which contributes to conflict among patients, families, and ICU teams (1–5). Efforts to improve goal-aligned care have primarily focused on improving the communication of individual clinicians with patients and their surrogate decision-makers (6–8). However, ICU care involves large interprofessional teams, and collaboration within these teams influences the quality of care (9–12). Despite growing attention to interprofessional collaboration, little is known about how and to what extent different professions on an ICU team work together to deliver goal-aligned care. A better understanding of this collaborative process may uncover new strategies to align ICU care with patient goals and priorities.

Transactive memory systems theory has promise to improve our understanding of how ICU teams collaborate (13, 14). This theory explains how high-performing teams develop a group mind with a shared memory system, extending the cognitive capacity of any individual team member. This theory of distributed cognition is distinct from other teamwork models that focus primarily on tasks and behaviors (15). Transactive memory was first described in the field of psychology in 1985 (16) to explain how people in successful, long-term marriages rely on each other as a shared repository of knowledge. This memory system is described as: "what you know, what I know, what we know, and how we get that knowledge from one another" (17). Effective transactive memory systems incorporate three major components: 1) specialization, defined as unique expertise of team members who have distinct but complementary areas of knowledge; 2) coordination, defined as the process of how team members share, access, and use each other's knowledge; and 3) credibility, defined as trust among team members that each member obtains and remembers their respective knowledge. Since the 1980s, transactive memory systems have been observed and investigated in teams across professional settings and are associated with better team performance and higher professional satisfaction (18–21). Despite the promise and face validity of this theory in critical care, no empirical studies have examined how transactive memory systems function within ICU teams.

While conducting a broader study to map ICU care processes for acute respiratory failure, we expected to identify profession-specific tasks and behaviors related to goal-aligned care. Instead, we found evidence of a latent knowledge-sharing process between ICU team members that relies on fluid relationships. Based on these initial observations, we theorized that ICU teams use transactive memory systems when delivering goal-aligned care, but successful function of these systems varies—representing opportunity for improvement and intervention. In this secondary analysis, we applied transactive memory systems theory to characterize how interprofessional collaboration takes place within ICU teams and to identify modifiable factors that influence its effectiveness.

Methods

This study is a secondary qualitative analysis of data gathered in a parent study investigating processes of ICU care delivery for acute respiratory failure at two academic medical centers in the Midwestern United States. During the parent study, we uncovered an emergent theme suggesting that ICU team members rely on a latent knowledge-sharing process and fluid relationships to deliver goal-aligned patient care. To further characterize this theme, we conducted this in-depth, secondary analysis of the entire parent study data set. This analysis adheres to consolidated criteria for reporting qualitative research (COREQ) guidelines and standards for conducting in-depth secondary qualitative analyses (21, 22).

Parent Study Overview
In the parent study, interprofessional adult medical ICU and palliative care team members participated in focus groups ($n = 10$), and surrogate decision-makers for ICU patients (herein surrogates) and patient survivors participated in semistructured interviews ($n = 8$). The focus groups and interviews were moderated using guides (see Appendices E2–E4 in the data supplement) that included questions on the process of interprofessional care delivery, specific professional roles in this process, and how ICU care relates to patient goals. We provided surrogate and patient participants with an infographic prompt illustrating the different ICU team members. All focus groups and semistructured interviews were audio recorded and transcribed verbatim.

Northwestern University was the Institutional Review Board of record for the parent study and approved all study activities; each participant in the parent study provided written informed consent and received a participation incentive. The online supplement includes additional parent study details (Appendix E1).

Data Analysis
In this secondary analysis, we used the methodological orientation of directed content analysis (23). We conducted two rounds of coding with open, inductive coding followed by directed, focused coding (24). MAXQDA 2020 (VERBI Software, 2019) was used to organize the analysis. During open coding, four investigators from diverse professional backgrounds (human factors engineering [D.S., M.B., and B.D.], medicine and public health [J.M.]) independently coded all transcripts, line by line. Interactions among interprofessional team members, patients, and families were coded, and a taxonomy was built and refined. Coders held weekly meetings with two additional investigators (J.M.K. and D.A.W.) to review applied codes, resolve discrepancies, and update the taxonomy. During open coding, we observed that collaboration within ICU teams resembles transactive memory system theory.

Subsequently, we conducted a literature review on transactive memory systems to

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inform a second round of directed, focused coding. We created a second taxonomy, organized by the three components of transactive memory (specialization, credibility, and coordination). Two investigators who conducted open coding (D.S. and J.M.) used this taxonomy to independently recode all 18 transcripts. Coders held weekly meetings with two additional investigators (J.M.K. and D.A.W.) to review applied codes, resolve discrepancies, revise the taxonomy, and describe themes. After this consensus coding process was complete, the four investigators continued to meet weekly to conduct a higher-level analysis of the relationships between themes and to iteratively revise the emergent theory. This higher-level analysis was completed once no new relationships between transactive memory system themes were identified in the data.

Results

We analyzed qualitative data from 10 focus groups and eight interviews with a total of 70 participants, who represented nine healthcare professions, surrogates of ICU patients, and patient survivors (Table 1).

Specialization

Both healthcare team members and surrogate participants described specialized roles for professions on the ICU team during the alignment of care with patient goals (Table 2). Different professions have different clinical activities in the ICU, which provide unique access and interactions with patients and their families. For example, respiratory therapists are at the bedside for long periods of time providing breathing treatments. During this time, therapists share technical expertise about the mechanical ventilator with the patient and/or their family, and some families share their own reflections about the ventilator and what the patient would say about its acceptability. Similarly, physical and occupational therapists can elicit important goals and limits during the course of bedside treatment sessions:

We make them do the tough things. We're asking them to get up, get moving, and we're talking about future plans. And sometimes we do have those conversations, of, "I don't want to do this anymore. I'm done. I want to go home." (Occupational therapist)

Table 1. Characteristics of study participants

Characteristic (*N* = 70)	
Healthcare team members (*n* = 59)	
ICU team member	46 (78.0)
Palliative care team member	13 (22.0)
Professional role	
Attending physician*	17 (28.8)
Nurse*	14 (23.7)
Fellow physician	7 (11.9)
Chaplain*	5 (8.5)
Occupational therapist	4 (6.8)
Advanced practice provider*†	3 (5.1)
Physical therapist	3 (5.1)
Respiratory therapist	3 (5.1)
Social worker*	3 (5.1)
Years since completion of professional training, median (IQR); (*n* = 52)‡	6.0 (4.0–12.0)
Female	38 (64.4)
Age, yr	
20–30	15 (25.4)
31–40	26 (44.1)
41–50	12 (20.3)
51–60	4 (6.8)
61–70	2 (3.4)
Race/ethnicity	
White, not Hispanic/Latinx	50 (84.7)
Hispanic/Latinx	3 (5.1)
Black or African American	2 (3.4)
Asian	2 (3.4)
Other§	2 (3.4)
Surrogates and patient survivors (*n* = 11)	
Surrogates of ICU patients‖	9 (81.8)
ICU patient survivors	2 (18.1)
Female	8 (72.7)
Age, yr	
20–30	—
31–40	1 (9.1)
41–50	2 (18.2)
51–60	2 (18.2)
61–70	1 (9.1)
>70	5 (45.5)
Race/ethnicity	
White, not Hispanic/Latinx	4 (54.5)
Black or African American	4 (35.4)
Hispanic/Latinx	2 (18.2)
Asian	1 (9.1)

Definition of abbreviations: ICU = intensive care unit; IQR = interquartile range.
Data are given as *n* (%) unless otherwise noted.
*Both ICU and palliative care team members participated from this professional background.
†Nurse practitioner or physician assistant.
‡Seven participants had not completed training.
§Other includes "other race" or "other ethnicity," missing, or declined to answer.
‖The relationship of surrogates to the patient included spouses (three), cousins (three), adult children (two), and parent (one).

These unique, specialized roles were described as an asset, helping teams build a collective, "deep well" of knowledge about patient goals and priorities. This collective knowledge grows and develops over the course of a patient's ICU stay, as their response to life-sustaining intervention unfolds. However, because each profession has different means and opportunities to gather knowledge from patients and families, this collective knowledge is dispersed among different team members. This dispersed knowledge was described as an untapped resource that is not always shared.

ICU physicians have the specialized role and responsibility to guide care plans and make decisions. However, physicians typically cannot spend long periods of time in direct contact with patients and surrogates:

Table 2. Key themes of specialization among intensive care unit professions during goal-aligned care delivery

Themes of Specialization	Exemplary Quotes
ICU physicians have the responsibility to guide care delivery	ICU physician: "*Now as a good ICU doctor, I think you guide patients into making the appropriate medical decision.*" ICU nurse: "*If you have a stronger attending that says 'this, this, this,' I think you're in much better hands. They set the tone of how this is going to go.*"
ICU nurses spend time in close proximity and have a strong bond with patients and families	ICU nurse: "*I've been in situations where [a surrogate] is like, 'I just need to say this to someone, and you're the one that's here right now. I just need you to hear me say this.'*" ICU physician: "*The nurse gets to know the family and the patient really well, and sometimes the family will express their thoughts to the nurse without necessarily involving us.*"
Respiratory therapists have valued technical expertise	Respiratory therapist: "*[Families ask us] 'Where does that tube go?' to 'You mean, it blows air in?' There's some great questions they ask as to, 'What's going on with my family?' And most of them want that information.*" Surrogate: "*The respiratory therapists were so helpful in explaining what the machine was. What all of the little buttons on the machine and what all of the numbers meant. […] The therapists were very forthcoming with 'Is she getting better today or is she getting worse today?'*"
Physical and occupational therapists focus on functional goals and long-term outcomes with patients and families	Occupational therapist: "*Usually, I'll just say, 'Your goals are really important. We really value your goals. We want you to live your life the way you want to live.' So I usually just have a really frank discussion. Just trying to hang on to those tangible, achievable goals.*" Physical therapist: "*I try and make sure that from a physical therapy standpoint that the family and the patients are aware of what [prolonged mechanical ventilation] might entail, and if I get any sense that maybe they're not 100% on board with this plan, then I think that's something that I will bring up.*"
Chaplains support families during moments of crisis	Chaplain: "*[The team] is calling a 'rapid,' then the chaplain might be there with the family, providing comfort, so might be available. And maybe follow and continue down to the MICU with the family.*" Surrogate: "*It was rapid response and all of that was going on, the chaplain came in. Initially, I'm like, 'Why are they here? Someone not telling me something?' I'm getting a little more nervous, but she was just there to hold my hand and that extra support. And then, I ran into her a couple of weeks later and it was like 'Oh, hi.'*"
Social workers connect team members, patients, and families with the outside world	Social worker: "*We can see, from the previous psychosocial assessment, what their baseline is. And then, I brought it to the attention of the care team, of saying, 'Hey, this is not who this guy normally is—he's [paraplegic], but he drives.'*" ICU physician: "*So you can't identify a primary decision-maker. The next step after that is to engage social work because there are certain things that they do to help locate the patient outside of what the primary team will do.*" Surrogate: "*The [social worker] was a great resource for me—the personal side of it, without the medical side of it. I was getting worried about his insurance […] She was the one, really, intricately involved in the [long-term acute care hospital] conversations.*"

Definition of abbreviations: ICU = intensive care unit; MICU = medical intensive care unit.

The attending doctor, which guides the whole thing—his process was only felt in the hallways, but his presence was never in the room really. (Surrogate)

Some physicians try to overcome this challenge by actively seeking out knowledge about patient goals and priorities held by other members of the ICU team. An ICU physician described routinely teaching new interns the importance of seeking out the specialized, credible knowledge held by nurses and respiratory therapists. This physician reflected that, in addition to this informal teaching practice,

we ought to think about a way that more consistently and systematically mines that deep well of information. (ICU physician)

Without this active step by physicians, role-related professional boundaries can prevent team members from sharing their knowledge within ICU teams. Participants described being "bound by their license" and underscored the importance of "staying in your lane" and "within your scope of practice." These boundaries limit how professions interact with patients and their surrogates and constrain how they relate to other professions on the ICU team.

Coordination
Participants drew a distinction between coordinating "where we are at, medically" and coordinating overarching care plans according to patient goals and priorities. ICU teams' medical coordination involves using

physiological data about organ systems to guide each profession's daily activities—tailoring medications, ventilators, and therapy sessions. This type of coordination takes place through formal channels that are well designed for this purpose, such as the electronic health record (EHR) and daily interprofessional rounds. In contrast, ICU team members rely on an informal coordination process to share and use their dispersed, evolving collection of knowledge about patient goals and priorities. This informal coordination takes place through "side conversations" and "side comments" and is rarely documented, which can cause loss of knowledge:

We are not in the habit of writing that [knowledge] down. So, you keep it in your

head for three shifts and then it's fallen off. There's a complete lack of how that is documented. (ICU nurse)

This informal process arises as a workaround for formal channels that inadequately support coordination of overarching care plans related to patient goals and priorities. When the EHR does contain documentation related to patient goals and priorities, study participants described how this knowledge gets "lost" in a "mountain of notes." During daily rounds, coordination about overarching care plans and patient goals mostly takes place as an afterthought, at the end of a discussion about organ systems and physiology:

On the very bottom of [our rounding script], it says "additional concerns." What additional requests do you have? It says goals of care now. (ICU nurse)

Surrogates described daily rounds as their primary but brief opportunity to interact with ICU physicians, who "would at least say what the plan for the day was" (Surrogate). When rounds fail to address overarching plans and alignment with patient goals, team members are unsure of how to deliver care:

No one really knew what was going on. […] Palliative comes around and they're like, "so what's the plan?" And I'm like, "I don't even know what just happened." [The ICU team] came. They left. They said some teaching points and they're on their way. (ICU nurse)

ICU family meetings were described by participants as the culmination of this informal coordination process and as the unique forum where overarching care plans and major decisions are ultimately made. These meetings typically take place after informal side conversations and comments among interprofessional ICU team members reach a poorly defined "threshold," after which the team members:

escalate to a meeting and a decision process that's ultimately framed within the patient's goals. (ICU physician)

Because this coordination process is informal, it is strongly influenced by culture within the ICU team. Psychological safety, defined as a belief that the environment is safe to question others and engage in open discussions (25), promotes this informal

coordination within ICU teams. When psychological safety is present, participants described feeling empowered, and even expected, to share their knowledge about patient goals. Psychological safety also helps teams overcome the constraints of hierarchy and role-related boundaries. Conversely, a lack of psychological safety can discourage team members from sharing. A chaplain described the need to be "brave and courageous" to share important knowledge about patient goals with a physician on the ICU team. The impact of psychological safety was even described by a surrogate:

I kept expecting any day somebody's going to be having a conversation about end-of-life, or removal of life support, or reasonable expectations of meaningful recovery. Nobody was broaching the subject. I didn't want it to sound like I was giving up on him, or that I didn't trust their ability to cure him. I just didn't feel like me bringing it up—me bringing it up was not the right thing. (Surrogate)

Credibility
In transactive memory systems theory, credibility is defined as trust that each team member obtains and accurately recalls their respective components of the collective knowledge. Within ICU teams, perceptions of credibility are highly variable and depend on professional role and individual's reputation. For example, ICU team members consider the professional role of the person offering knowledge, when determining its credibility:

Within our own care team, the different degrees of people who might raise things, you might take into account differently. (ICU physician)

How many thousands of thousands of hours, how many thousands of patients have [ICU nurses] interacted with and worked with and seen this play out? And then you get a resident who is just out of med school and—it's hard for them too, in their first or second rotation in an ICU. This is the moment this could change the entire course of the patient's goal. Like, right then. (ICU nurse)

Perceptions of credibility also vary among individuals in the same profession, based on their extent of ICU experience and reputation within the team. Participants described experienced ICU nurses with

adjectives that evoke credibility, including "strong" and "seasoned." Less-experienced nurses were described as "junior" and lacking confidence. Distinct from experience, some ICU team members have a reputation as being less credible as individuals, based on prior observed behaviors. Generally, surrogate participants perceived the ICU team as credible and described feeling comfortable and "being ready to trust the whole team," although several surrogates described variation in credibility among team members:

The only times I will leave to go home to try to get some rest is if I really feel comfortable with the nurse and I feel that he's safe. If I'm getting the sense that, "I don't know; I'm not comfortable enough," I'm not going to leave; I'll stay overnight. (Surrogate)

Perceptions of credibility influence informal coordination within the ICU team. Several participants even described choosing to withhold knowledge about patient goals from other team members who they believed to be unskilled in interactions with patients and families.

Organization of ICU Staffing and Transactive Memory Systems
The continuous rotation of team members can have both favorable and unfavorable influences on the function of ICU teams' transactive memory systems. A new team member may offer a new perspective or may have more credibility, thereby overcoming conflict:

Oftentimes the conflict is based on a little bit of personality, and so when those personalities change, lo and behold, a log jam can clear up and they're able to move forward. (Palliative care physician)

However, participants generally described this rotation as disruptive to transactive memory within ICU teams. Because the coordination process is informal and generally not documented, important pieces of the collective knowledge about patient goals can be lost when individuals rotate off the team. The rotation of ICU physicians was seen as especially disruptive, because of their specialized leadership role in guiding the care plan. When a new physician takes over, care plans can change abruptly according to the physician's perspective, and
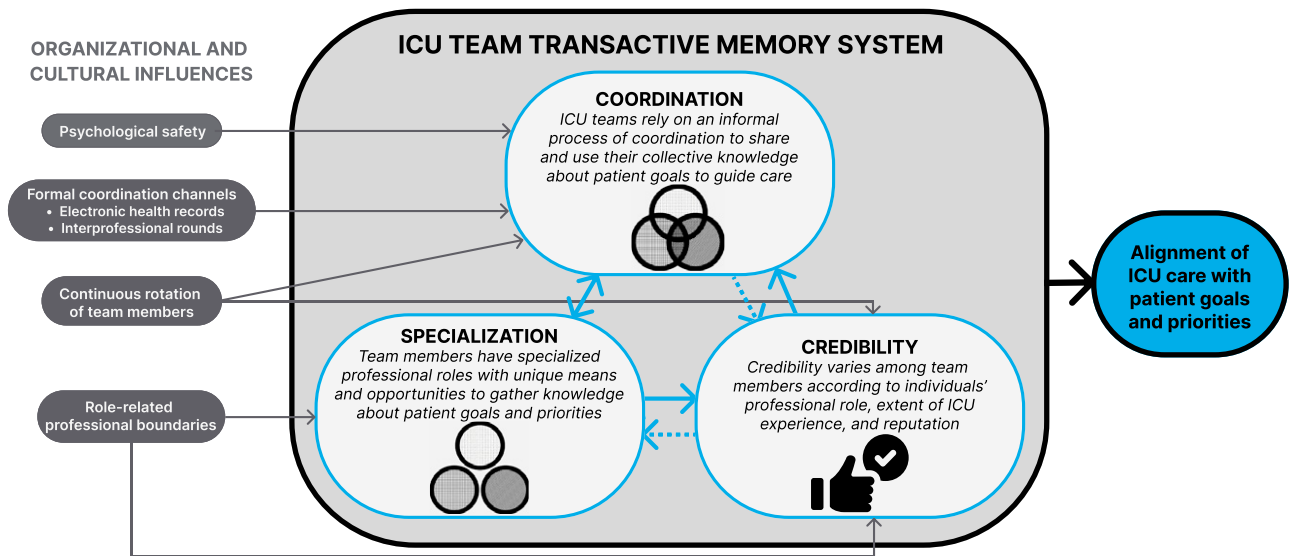
Figure 1. A model of the transactive memory systems used by intensive care unit (ICU) teams during the alignment of ICU care with patient goals and priorities. This model summarizes and integrates the primary findings of our qualitative analysis. It is organized by the three major components of transactive memory (specialization, credibility, and coordination) and illustrates how these components are currently operationalized within ICU teams. We found important interactions between the components of transactive memory that influence the system's successful function. For example, when ICU team members recognize and value each other's specialized role, they perceive each other as credible. This credibility, in turn, promotes sharing of knowledge through the informal coordination process. When coordination is successful, each team member can prioritize and carry out their specialized role. Yet, when specialized roles are not recognized or valued, coordination is disrupted or does not occur. Solid arrows between memory system components indicate interactions that were demonstrated in this analysis. Dashed-line arrows indicate potential interactions that likely occur but were not demonstrated in this analysis. We found important organizational and cultural factors that influence the successful function of these memory systems, including role-related professional boundaries, continuous rotation of team members, formal channels of coordination (e.g., electronic health records and interprofessional rounds), and psychological safety.

both ICU team members and surrogates described this as distressing and confusing.

An Integrated Model of Transactive Memory Systems within ICU Teams
We integrated our primary qualitative findings into a model (Figure 1) that illustrates how ICU teams currently use transactive memory systems to align care with patient goals and priorities and how organizational and cultural factors of the ICU system influence the function of this system.

Discussion

In this secondary qualitative analysis of adult medical ICU care delivery at two academic medical centers, we found that interprofessional ICU teams hold a deep well of knowledge about patient goals and priorities. However, this knowledge is dispersed unevenly throughout an ICU team, according to members' specialized professional roles. When team members perceive each other as credible, this collective knowledge is shared within the team through

informal coordination channels and is used to direct care and decisions. This informal coordination is a flawed workaround for formal coordination channels, such as the EHR and interprofessional rounds, that inadequately support collaboration about patient goals and priorities. Together, these findings demonstrate that ICU teams indeed use transactive memory systems to align care with patient goals but with varied success because of cultural and organizational factors. Transactive memory systems and the potentially modifiable factors influencing their successful function are promising targets for efforts to improve goal-aligned care in the ICU.

Our findings have important clinical implications for ICU teams. The existing deep well of knowledge about patient goals and priorities within these teams is an immediately available resource that is underutilized. By increasing the recognition of who knows what within ICU teams, this study can help promote earlier and more effective use of this collective knowledge to guide care. This study also adds to what is known about the important roles of nurses, chaplains, and social workers in goal-

aligned care (26–34) by highlighting underappreciated professions in this domain—including occupational, physical, and respiratory therapists. Beyond recognition of knowledge and roles, this study also highlights a need for a cultural shift within ICU teams to improve the effectiveness of this shared memory system. Instead of staying within lanes and scopes of practice, our findings confirm the importance of creating psychological safety (35) so that each specialized role can effectively contribute to the collective knowledge.

Our findings also have important implications for those who design and implement interventions to improve goal-aligned care in the ICU. Prior interventions in this area have primarily focused on individual-level communication between team members and surrogates (32–34, 36–40). Our findings suggest that intrateam interactions can be an important mechanism in aligning ICU care with patient goals and, thus, are a promising target for new interventions. Several studies have demonstrated the potential to intervene and improve nurse–physician interaction

(41–43), and our transactive memory system model can build on this work. Our model identifies specific, mechanistic targets for interventions (specialization, coordination, and credibility) and shows how to leverage the entire interprofessional team. For example, our study findings can inform the design of new channels of coordination to support goal-aligned ICU care. These channels need to be durable, to sustain the collective memory as team members rotate. They need to be accessible to all professions on the team, to effectively use this collective knowledge. They need to be formalized, to overcome hierarchy and concerns of psychological safety. Future work is necessary to determine whether the EHR and interprofessional rounds can be extended and improved to serve these functions or whether a new platform of collaboration should be used.

Finally, our findings have conceptual implications for the study of ICU teamwork. We developed a specific model of distributed cognition or group mind that helps explain how different ICU professions interact— through transactive memory systems. By applying observations from the social sciences (16–21) to our data, we developed the first transactive memory system model specific to ICU teams. This group mind concept is unique among ICU teamwork models (44), because it characterizes collaboration as a shared cognitive process. The related concept of a shared mental model prioritizes team members being "on the same page" with shared, common knowledge (45, 46). In contrast, transactive memory system theory suggests that high-functioning teams allow different members

to hold different knowledge, with a system to share and access dispersed knowledge whenever necessary. This form of group mind is valuable in the fast-paced, data-rich, interprofessional ICU environment as a tool to increase the cognitive capacity of any individual team member. The notion of groupthink is a popularized concept related to group mind, but it refers specifically to the unfavorable tendency of group members to form premature conclusions because of prevailing group opinions (47). In contrast, transactive memory systems theory illustrates how the group mind can be leveraged as an asset. We applied this theory and demonstrated the benefit of transactive memory systems in the alignment of ICU care with patient goals, but we also identified challenges to their successful function. In the future, these fundamental mechanisms of teamwork can be extended to other domains of ICU care and other healthcare settings.

Strengths and Limitations

This study has strengths and limitations. The broad stakeholder representation in the parent study provides a comprehensive perspective on ICU teamwork. However, the total number of stakeholders from any single perspective was small. Only two patients were able to attend semi-structured interviews with their surrogates, as most patients had ongoing illness or had died. The two patient participants had few recollections of ICU team collaboration because of their critical illness, and so our results do not reflect patient perspectives. Our study was conducted at highly resourced medical ICUs at academic medical centers, and transferability of these findings to sites

with different staffing models, training environments, and resources is unknown. In addition, transactive memory systems theory emerged during open coding; data collection did not directly elicit participant perspectives on this theory. We also provided surrogates and patients with a basic infographic and description of different ICU team members (Appendix E4), which could have influenced their recollections of role specialization. Our transactive memory model is not exhaustive; it does not illustrate all relevant features of ICU teamwork or ICU team professional roles. Nevertheless, this study offers a new model that can inform future efforts to specify, expand on, and develop interventions that support transactive memory systems within ICU teams.

Conclusions

We found that ICU teams work together to align care with patient goals and priorities, using transactive memory systems. However, the successful function of these systems can be disrupted or promoted by ICU organizational and cultural factors. Future work should investigate whether improving the function of ICU teams' transactive memory systems can increase the alignment of ICU care with patient goals and priorities. ∎

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