Final Progress Report

A Novel Debriefing Strategy for Interprofessional Simulation-Based Team Training

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Abstract

Purpose: To develop, test, and assess the impact of an innovative approach to debriefing after interprofessional simulation-based team training (ISBTT). Scope: Despite the growing popularity of ISBTT in healthcare, suboptimal interprofessional collaboration continues to compromise safety and quality of patient care. We postulated that current ISBTT approaches are not effectively designed to improve interprofessional dynamics. We therefore developed structured debriefing guidelines for ISBTT, determined feasibility and acceptability, and examined their impact on attitudes toward teamwork, perceptions of safety culture, and team performance. Methods: We used a design research approach to iteratively develop and pilot guidelines, gathering feedback from facilitators and reviewing video-recorded simulation sessions and debriefings to guide modifications. We collected baseline and post-implementation data on measures attitudes to teamwork, safety culture, and team performance. Results: We successfully created and implemented novel guidelines for debriefing and prebriefing and noted a positive impact on interprofessional co-facilitation and a shift in debriefing content with more attention to team dynamics. We also noted improved interprofessional learning. We did not note any improvement in quantitative measures. The pandemic likely created many confounders, as our study period overlapped with the start of the pandemic, resulting in several changes that impacted our study and study outcomes.

Key Words: simulation, teamwork, debriefing, interprofessional

Purpose: To develop, test, and assess the impact of an innovative approach to debriefing after interprofessional team training that uses simulation to emphasize team dynamics and processes and promote development of collaborative skills.

Scope

Background: Interprofessional simulation-based team training (ISBTT) has gained popularity in healthcare as a means to optimize interprofessional teamwork.[1-5] Reports in the literature support the use of ISBTT based on changes in attitudes and perceptions of teamwork among healthcare professionals, improved nontechnical skills in both simulated and real-life scenarios, and improved patient safety outcomes.[6,7] Yet, there is also evidence that ineffective interprofessional collaboration and communication continue to compromise safety and quality of patient care.[8-13] Complex hierarchies and power dynamics between different professionals are major factors in impeding effective teamwork[14,15]; however, prior research has shown that these topics are rarely discussed during ISBTT,[16] and current ISBTT approaches may not be designed to effectively improve interprofessional dynamics. Our own review of published reports describing ISBTT programs found that the majority of these programs are based in principles of Crisis Resource Management (CRM) or related frameworks but rarely considered all competencies required for effective interprofessional collaboration.[17] Moreover, most programs appear to rely on contact theory and the assumption that individuals from different professional groups will learn to collaborate by attending simulation sessions together. However, contact theory states that equal status of participants is a prerequisite for learning,[18] which is unlikely to be the case in ISBTT, considering the complex hierarchies and power dynamics between and within healthcare professionals. Thus, for ISBTT to be effective in improving interprofessional collaboration, consideration of all interprofessional competencies and acknowledgment of complex power dynamics on healthcare teams are likely essential. Debriefing after simulation is the element of ISBTT that has the greatest likelihood of creating change, because most learning from ISBTT is thought to occur as a result of reflection and discussion during the debriefing.[19-23] Although best practices for debriefing have been published and various models exist,[19,23-26] empirical evidence for such practices is sparse. Moreover, most published guidelines do not explicitly discuss how to debrief interprofessional teams, despite common recognition that this

is more challenging than for uni-professional teams.[27,28] Thus, there is little guidance on how to facilitate ISBTT and even less when seeking to address power and hierarchy. We therefore developed structured guidelines for debriefing of simulation scenarios during ISBTT and examined the feasibility and acceptability of such guidelines and the impact on the following outcomes: 1) teamwork members' attitudes toward teamwork, 2) team performance during simulation, and 3) perceptions of safety culture at our institution.

Context/setting: We conducted this work in the setting of the previously established UCSF Benioff Children's Hospital (BCH) mock code program, an ISBTT program at our institution that has been in existence since 2006.[29] The program involves scheduled simulation-based team training sessions, or "mock codes," that take place in situ on patient care units with participants who work on those specific units. Scenarios focus on pediatric emergencies as they occur in real life, including, but not limited to, cardiopulmonary arrests ("codes"). Participants consist of nursing staff and physicians (residents, fellows, or attending physicians) as well as clinical pharmacists, pharmacy students, medical students, and sometimes respiratory therapists. Medical trainees participate as part of their scheduled rotations and attend several times a year, whereas all nurses are required to participate on at least an annual basis. Participation by others varies by hospital unit. We conducted this work in two acute care units and the pediatric intensive care unit, with sessions occurring monthly in each unit. Participants are assigned roles consistent with their professional positions. The sessions follow a structured format, with two scenarios per session (5-10 minutes), each followed by a semi-structured group debriefing (approx. 20 minutes). In a short prebrief prior to the first scenario, facilitators orient the participants to the mannequin and the purpose of the training. Scenarios are selected ahead of time from an existing pool of unit-specific scenarios, each with predefined critical actions for successful management of the patient in the scenario. Each session is facilitated by two nurses and two physicians. In each scenario, two facilitators (one nurse, one physician) operate the mannequin and perform any necessary confederate roles while the two other facilitators observe, take notes, and facilitate the debriefing. Facilitators utilize a critical action checklist to assist with note taking. During the debriefing, facilitators initiate discussions regarding key events based on their observations and encourage team members to provide each other feedback. The facilitator pool consists of experienced charge nurses, nurse educators, advanced practice nurses, hospitalists, and pediatric intensive care fellows and faculty.

Methods

Study design: We used principles from educational design research to organize our work.[30] Educational design research takes place in three phases: 1) a preliminary research phase during which the problem that the design will address is more closely examined, relevant educational theories are identified, and guiding design principles are developed; 2) a prototyping phase in which the intervention is developed based on educational theory and corresponding design principles, then tested and modified based on empirical findings; and 3) an assessment phase to evaluate the performance of the final version of the intervention. Figure 1 provides a diagram of the study design.

Data sources/collection: During the preliminary research phase, we examined team debriefings in existing ISBTT programs and factors that facilitate or hamper discussion of team dynamics and processes. We used these data to formulate tentative design principles, further informed by published theoretical frameworks relevant to the interprofessional learning context, including the social identity framework and transformative learning theory. In addition, we incorporated recommendations from Paradis and Whitehead to incorporate discussions about team dynamics[31] and from Bainbridge and Regehr, who proposed that skills required for effective collaboration in teams include social capital, building perspective taking, and conflict

management.[32] The resulting set of tentative design principles informed the first version of guidelines for a structured prebriefing and debriefing process. During this phase, we also collected baseline data for all of our outcome measures. Over the course of 3 months (November 20, 2020 – February 23, 2021), we video recorded all simulation sessions and collected survey data, as outlined below.

Intervention: During the prototyping phase, we implemented and tested the guidelines created in the preliminary research phase with two iterations over the course of 6 months. At the start of this project, there were 26 active facilitators (17 RNs, 1 NP, and 8 MDs) in our ISBTT program for the units included in this project. Between February 8, 2021, and March 15, 2021, we trained all the facilitators during five 1-hour sessions on the use of the new guidelines. We implemented the first version of the guidelines on March 5, 2021. To examine adherence to guidelines by facilitators and participants' engagement in debriefing, two investigators not directly involved with any of the simulations (NB and SVS) reviewed video-recorded simulation scenarios throughout the implementation phase. Using content analysis (described in detail below), they evaluated both the focus and process of the pre- and debriefing against the design principles; taking notes during video review and comparing observations in meetings. To elicit feedback from facilitators on the debriefing guidelines, we created a semi-structured interview guide. The questions delved into facilitators' motivations for being involved in mock codes, their perceptions of the new guidelines, and challenges they had faced using the new guidelines. Based on review of video-recorded simulations and facilitator feedback, the same two investigators made recommendations for adjustments to the debriefing guidelines, which were discussed by the entire project team before the second iteration of the structured guidelines was created. We sent all facilitators the updated guidelines with an explanation of changes and implemented the revised version starting on June 4, 2021, after which we continued data collection to examine the feasibility, acceptability, and impact of the intervention.

Measures:
Quantitative measures: To assess the impact of our intervention, we collected data on a variety of measures related to teamwork and patient safety, as outlined below.
   a. To measure *attitudes toward teamwork*, we used the Attitudes Toward Health Care Teams scale (ATHCT) with permission from the authors.[33] The ATHCT was initially developed for geriatric outpatient settings and subsequently was validated in other settings in a three-phase study. The developers report adequate internal consistency for each of the three study phases (Cronbach alpha > .7 for all subscales) as well as evidence of test-retest reliability and external validity. We made small adaptations to the scale for the purpose of our study by changing language about team meetings to team training to fit the experience of our study participants. The original tool used the term "interdisciplinary team" instead of "interprofessional team." As is true across the literature on interprofessional teamwork, the terms "interdisciplinary" and "interprofessional" are often used interchangeably, even though interdisciplinary technically refers to representation from multiple disciplines within medicine (e.g., surgery, anesthesia, medicine). In the vernacular of our clinical teams, the term "interdisciplinary," however, is used to describe interprofessional work; we therefore opted to keep this terminology and included a descriptive definition to clarify our meaning. We incorporated the tool into an online survey instrument (Qualtrics™, Provo, UT) and piloted it with six participants in our team training program prior to start of data collection. We made minor adaptations to the language based on their input. We invited all participants in simulations during the pre-intervention and post-intervention assessment periods to complete the survey.
   b. To measure *safety culture*, we used a modified version of the Safety Attitudes Questionnaire (SAQ).[34] Designed for multiple clinical areas, the SAQ measures healthcare professionals' attitudes toward, and perceptions of, patient safety based on

six dimensions: Teamwork Climate, Safety Climate, Perceptions of Management, Job Satisfaction, Working Conditions, and Stress Recognition. In the original publication on the SAQ, which consists of 60 items, the authors reported a Raykov's ρ coefficient of 0.9, which represents strong reliability of the instrument. Subsequently, a short form with 32 items was created, and, per the developer's recommendation, we used the first 14 items of the short form, which measure teamwork and safety climate. We adapted the items to our context, imported them in an online survey instrument, and invited all physicians, nurses, and pharmacists working in the units in which we had implemented the debriefing guidelines to complete the survey.

c. To measure *teamwork performance* during simulation, we adapted the Mayo High Performance Teamwork Scale (MHPTS).[35] The MHPTS was developed for interprofessional teamwork in crisis situations; in the initial publication, the authors report satisfactory internal consistency and construct validity by traditional psychometric indicators (Cronbach's alpha, 0.85) as well as by indicators from the Rasch model (person reliability, 0.77; person separation, 1.85; item reliability, 0.96; item separation, 5.04). They reviewed video-recorded simulation scenarios and assigned MHTPS scores to each team. They compared their ratings, calculated inter-rater reliability based on their initial rating, and subsequently reconciled differences to obtain final scores entered in the analyses comparing different teams and examining changes over time.

Qualitative data: We collected three sets of qualitative data during the study: 1) video recordings of ISBTT sessions (including the pre- and debriefing) throughout the study period, (October 2020 – December 2021), 2) video recordings and observation notes from facilitator trainings on the new guidelines (in February and March 2021), and 3) audio recordings of interviews with facilitators during the implementation phase (March – August 2021). To assess whether the guidelines impacted conversations in terms of participation in, and content of, debriefing, we compared these conversations before and after implementation of the guidelines. We selected seven sessions from the period preceding implementation of the first iteration of guidelines and seven sessions from the period after implementation of the final iteration for qualitative analysis, including an equal number of sessions from acute care versus intensive care in the pre- and post-implementation samples. Although analysis of videos focused on the pre- and debriefing, recordings of the associated simulation scenario were included to provide necessary context. One investigator (NB) attended all facilitator training sessions and took detailed notes, integrating actual quotes afterward from recordings made during training. For facilitator interviews, we created a brief semi-structured interview guide to obtain facilitators' feedback on the debriefing guidelines and to identify any challenges encountered during debriefing using the new guidelines. Interviews were conducted by one of four researchers (NB, MJ, MN, and LT), lasted up to 30 minutes each, and were audio recorded and professionally transcribed with removal of identifying information.

Analysis

Quantitative analysis: We recoded data for survey items with reverse scoring before calculating total scores for each participants. Using the total scores, we calculated descriptive statistics and used ANOVA and t tests to examine pre-post and between-group differences.

Qualitative analysis: We analyzed video-recorded prebriefings and debriefings using both qualitative content analysis and thematic analysis. Qualitative content analysis aims to identify patterns in the data based on categorizations derived from research questions and has been used in case studies to analyze complex phenomena.[36,37] The goal is not to arrive at definitive conclusions supported by statistical analysis but, rather, to identify patterns that can be further understood through other approaches to qualitative analysis. We conducted qualitative content

analysis of video-recorded debriefings to examine both the frequency of contributions made by nurse and physician facilitators and the content of their contributions. To this end, we created a coding scheme that categorized facilitator contributions as either scripted (i.e., debriefing guidelines included a prompt for a facilitator to speak), prompted (i.e., a different facilitator asked the facilitator to speak), or spontaneous. To code pre- and debriefing content, we defined four categories: 1) logistics/expectations; 2) medical management; 3) communication and teamwork; and 4) power dynamics and hierarchy. We came to these four categories based on initial review of two video-recorded sessions not included in the final analysis by three investigators (AW, NB, and SVS). One investigator (AW) subsequently coded all ISBTT sessions included in the comparison with these coding schemes, using web-based video annotation software (Vimeo.com, Inc, NY, NY)

For thematic analysis, we followed the six steps outlined by Braun and Clarke.[38] We engaged with the steps in an iterative way to refine our analysis while collecting and analyzing more data. First, two authors (NB, SVS) familiarized ourselves with the data at time of data collection and through review of video recordings and generation of transcripts. Second, we imported all data items (observation notes and interview transcripts) into Dedoose software for qualitative data analysis (SocioCultural Research Consultants, LLC, Manhattan Beach, CA, USA), and the same two authors used this software to generate initial codes by reading each data item carefully. We used concepts from the new facilitation guidelines (e.g., interprofessional collaborative approach to facilitation, perspective taking) as codes and developed other codes inductively from the data. Third, we exported coded data into Excel spreadsheets and reviewed each coded extract to identify themes. During this process, we separated the data to create two sets of themes: one set focused on interactions between facilitators, and the other focused on debriefing content and interprofessional learning. Fourth, we reviewed themes in each set and examined coded extracts that belonged to each theme to refine themes and enhance our understanding of the findings. As we aimed to identify latent themes, meaning themes that go beyond the verbatim content of the data and require interpretation,[38] we also consulted the literature pertaining to our themes to enrich our understanding of each theme. Fifth, we defined themes and determined the content of each theme. Finally, we shared the findings among the entire research team to discuss our interpretation of the data. Although we did not engage in formal member checking with facilitators, we analyzed whether our findings resonated with researchers who were involved in the simulation program.[39]

Researcher reflexivity
Our research team includes physicians (AW, MJ, JE, DF, SVS), nurses (LT, MN, AL), and a medical sociologist (NB), all with expertise in health professions education. Two researchers (LT, SVS) were part of the original design of the simulation program, and several authors were facilitators in the program (AW, MJ, JE, SVS, LT, MN), although only three physicians facilitated simulation sessions during the study period (AW, MJ, JE). We were all involved in the development of the new facilitation guidelines, and we iteratively revised the guidelines throughout the implementation phase of our study. Our involvement in developing the guidelines and in the simulation program enabled us to have a better understanding of the process of developing and using guidelines; it was also critical to the adoption of the guidelines. For the purposes of this article, researchers who were not directly involved in facilitation and could therefore cast a more critical eye on interactions between facilitators (NB, SVS) who analyzed the data reported findings to the rest of the researchers for additional discussions.

Limitations: As a result of the COVID-19 pandemic, we had to adjust the format of the sessions during part of the study period, with some of the participants joining by video conference. This obviously had a major impact on communication and teamwork and, as a result, created a major confounding factor in all of our analyses. In general, the multitude of changes in healthcare

operations and other challenges resulting from the pandemic constitute a potential confounder in several of our outcome measures related to patient safety. We initially had intended to also collect data on patient safety events at our institution for pre-post comparison; however, considering these challenges, we did not think that doing so would provide meaningful results.

Figure 1: Study design with the different study phases
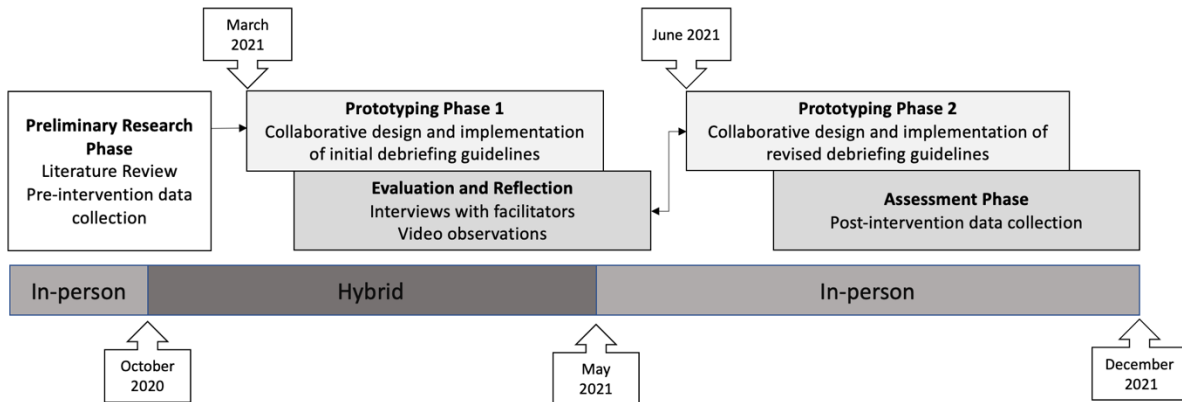
Results

Principal findings:

During the preliminary research phase, we conducted a literature review and developed five design principles for interprofessional debriefing guidelines through iterative discussions among the research team (Table 1). We used these design principles to create the first iteration of the guidelines, which we adapted based on observations and feedback obtained in interviews and focus groups as outlined below. A summary of changes made to the first iteration and the final guidelines are included in the Appendix.

Table 1 Design Principles for Interprofessional Debriefing Guidelines

Design principle	Rationale/theoretical basis
1. Interprofessional collaborative approach to facilitation	Model desired behaviors; increase psychological safety for participants, social identity theory
2. Expect active participation by all	Transformational learning theory
3. Focus on teamwork and collaboration	Principles of interprofessional education, recommendations by Paradis et al[31]
4. Encourage perspective taking	Transformational learning theory, recommendations by Bainbridge and Regehr[32]
5. Make issues of hierarchy and power explicit	Recommendations by Paradis et al[31]

Quantitative data: For baseline data collection, we asked all 115 eligible participants (89 RNs and 26 MDs) in the simulation sessions that occurred between November 20, 2020, and February 23, 2021, to complete the ATHCT survey, and 87 responded, for a response rate of 76%. During the post-intervention period, from September 20, 2021, through December 15, 2021, a total of 113 participants (70 RNs and 43 MDs) received the survey, and 80 responded, for a response rate of

71%. There was no statistically significant change in total ATHCT score among participants in the simulation sessions from pre intervention to post intervention (Table 2).

Table 2 Attitudes Toward Healthcare Teams Scale Scores Pre and Post Intervention

	All respondents	RN	MD
Pre intervention	103.4±8.4	102.8±7.9	105.6
Post intervention	99.2±13.2	100.1±9.9	98.4
P value	NS	NS	NS

Values represent mean scores ± standard deviation. Max total score = 126. NS = not significant at P=0.05

We distributed the SAQ to 730 nurses, physicians, pharmacists, and respiratory therapists who work in the units in which the simulation sessions occur; we received 331 responses, for a response rate of 45%. As summarized in Table 3, SAQ scores *decreased* over the time period in which our intervention took place, a difference that was statistically significant and, in post-hoc analysis, was found to be due to a decrease in SAQ scores among both nurses and physicians.

Table 3 Safety Attitudes Questionnaire Scores Pre and Post Intervention

	All respondents	RN	MD	Other
Pre intervention	55.0±9.1	54.8±9.1	54.7±9.2	46.1±12.2
Post intervention	51.6±6.9	51.7±6.2	49.5±5.7	50.8±5.8
P value	<0.001	<0.001	0.006	NS

Values represent mean scores ± standard deviation. Max total score = 70. NS = not significant at P=0.05

Ratings of team performance during simulation sessions based on video review using the MHTPS tool were not different before or after implementation of the guidelines (Table 4a). Team performance during simulation sessions in the PICU received significantly higher ratings than team performance on the acute care floor (P<0.001).

Table 4a Mayo High-Performance Teamwork Scale Scores Pre and Post Intervention

	All	PICU	Floor	Scenario 1	Scenario 2
Pre	23.1±4.4	27.5±0.8*	21.4±4.4	23.1±4.9	23.1±3.3
Post	25.2±3.1	24.5±2.6*	25.5±2.7	25.5±3.9	24.9±2.4
P value	NS	NS	NS	NS	NS

*Values represent mean scores ± standard deviation. Max total score = 30. NS = not significant at P=0.05 (pre-post comparison), *PICU teams scored significantly higher than floor teams throughout the study period, P<0.001.*

Qualitative data
Table 4b summarizes all qualitative data collected during the study period. For the qualitative content analysis, we reviewed an equal number of video-recorded sessions before and after (7 each). We included all data sources in the thematic analysis.

Table 4b: Qualitative Data Sources Before, During, and After Implementation of Guidelines

Type of data	Pre	During	Post
Observations/video recordings of simulation sessions	10	6	7
Observations of train-the-trainer sessions	3	4	N/A
Interviews with facilitators	N/A	21*	N/A

*21 interviews total with 18 unique individuals: 10 RN, 8 MD

The results of qualitative content analysis are summarized in Table 5. Prior to implementation of guidelines, physician facilitators did the majority of the talking, providing over 80% of all contributions during pre and debriefing. With the implementation of structured guidelines, nurse facilitators' contributions increased. Though scripted contributions (as dictated by the guidelines) accounted for a large proportion of this increase, we also observed more prompted questions (i.e., facilitator is asked to speak by the other facilitator or a team member) and spontaneous contributions from nurse facilitators. We also noted a shift in the content of discussions and who contributed what type of content, with most notably an increase of nurse facilitator contributions to discussions about medical content and overall more discussion about teamwork and communication. Although power and hierarchy were hardly ever discussed prior to implementation, these topics did get discussed, both prompted and spontaneously, with new guidelines in place.

Table 5 Qualitative Content Analysis of Facilitator Contributions to Prebriefing and Debriefing Before and After Implementation of Guidelines

	Nurse Facilitators		Physician Facilitators		Total	
	Pre	Post	Pre	Post	Pre	Post
Type of contributions						
All	24 (17%)	100 (41%)	119 (83%)	141 (59%)	143	241
Scripted	0 (0%)	64 (45%)	0 (0%)	40 (17%)	0 (0%)	104 (43%)
Prompted	0 (0%)	4 (2%)	6 (4%)	11 (5%)	6 (4%)	17 (7%)
Spontaneous	24 (17%)	32 (13%)	113 (79%)	90 (37%)	137 (96%)	122 (51%)
Content of contributions						
Logistics/expectations	7 (5%)	32 (13%)	24 (17%)	40 (17%)	31 (22%)	72 (30%)
Medical management	8 (6%)	37 (15%)	59 (41%)	49 (20%)	67 (47%)	57 (24%)
Communication and teamwork	9 (6%)	24 (10%)	34 (24%)	49 (20%)	43 (30%)	73 (32%)
Power dynamics and hierarchy	0 (0%)	7 (5%)	2 (1%)	12 (5%)	2 (1%)	19 (8%)

Data points represent the number of contributions in each category across all sessions in a time period (pre vs post, seven sessions in each period), and percentages are calculated with all contributions in time period as denominator.

We identified three major themes in the data: 1) changing interactions between facilitators, 2) shift in debriefing content, and 3) enhanced interprofessional learning.

Theme 1: Changing interactions between facilitators
Prior to implementation of the guidelines for interprofessional co-facilitation, we only observed interprofessional facilitation on specific topics. In concordance with findings from the qualitative content analysis, physician facilitators typically dominated the conversation during both prebriefings and debriefings. Nurse facilitators were hesitant to contribute to the conversation; they sometimes spoke during prebriefings but rarely during the debriefings. On the rare occasions that interprofessional co-facilitation occurred prior to implementation of the structured guidelines, it focused on a limited number of topics, including orienting participants to the simulation session during prebriefings and discussing equipment and clinical aspects of the scenarios during debriefings.

During and after implementation of the structured guidelines, we observed a shift in interaction patterns between facilitators. During prebriefings, all facilitators followed the guidelines and took turns leading the conversation. During debriefings, nurse facilitators' contribution increased, although physician facilitators still frequently dominated. We did, however, more frequently note that physician facilitators invited nurse facilitators to speak and, on a number of

occasions, we observed that, when physician facilitators wanted to contribute to what nurse facilitators were saying, they asked for permission instead of taking the lead.

All facilitators universally endorsed the value of the guidelines during interviews. They reported liking how they outlined a collaborative approach to facilitation, and nurse facilitators appreciated that the guidelines gave them a clear role. Nonetheless, some facilitators struggled with implementing the guidelines as intended. Physician facilitators frequently continued to take the lead during debriefings if they saw it as essential to discuss clinical information or if a nurse facilitator seemed uncertain. Nurse facilitators, on the other hand, tended to defer to physician facilitators to confirm what they were saying, which was particularly true for less experienced nurse facilitators.

Theme 2: Change in debriefing content
As discussions prior to implementation of new guidelines were nearly always led by physicians, they tended to focus on clinical aspects of the scenarios relevant to physician participants. These aspects, including technical skills, protocols for emergencies, and use of medications, were typically discussed in the form of knowledge transfer between facilitators and team members, although sometimes they were discussed in the context of teamwork or role allocation. Physician facilitators often mentioned teamwork and communication during the prebriefing, explaining that the purpose of mock code is to practice teamwork and that they would address these topics during the debriefing. Indeed, in most debriefings, physician facilitators discussed examples of good teamwork or communication that occurred during the scenario. We observed many instances of facilitators and participants sharing compliments on good teamwork and communication. On occasion, facilitators prompted conversations of suboptimal communication or ineffective teamwork, but they tended to address these shortcomings at a superficial level without delving into why participants had experienced such challenges. A few physician facilitators occasionally acknowledged noticing power and hierarchy and their impact on teamwork and communication. When this occurred, the discussion was brief and limited to generic statements about the importance of speaking up for patient safety, especially questioning decisions by physician team leaders. In the pre-implementation phase, nurse facilitators' contributions were mostly limited to discussions of logistics (i.e., how to get help in an emergency, how systems work, etc.); however, on rare occasions, they brought up nurse-specific observations around teamwork and communication. Similar to physician facilitators, their contributions about teamwork tended to focus on praise for team members and stayed at a superficial level.

After we implemented the guidelines, clinical aspects of scenarios were still a major component of the debriefing discussions, but nurses were more involved in the discussion. Discussions about medical management were less physician focused and more frequently occurred in the context of discussing teamwork. Nurse facilitators viewed this change positively and reported that it prevented the discussion from becoming too teachy, whereas the prior focus often was on clinical questions from residents. Physician facilitators, however, became more concerned about residents' learning, as they feared the guidelines did not leave enough room for discussion of clinical aspects of the scenarios. Some of them recognized that learning of medical content knowledge and teamwork are often connected and reported needing additional time to discuss these clinical aspects. Discussions of teamwork and communication continued to focus primarily on what had gone well, but nurse facilitators were more involved in these conversations, making it more interprofessional. Participants sometimes described how they themselves had not performed optimally during the scenario, but other participants typically were quick to highlight the positives. Over the course of the implementation period, facilitators as well as participants seemed to get more comfortable with probing questions about challenges, and we observed

more open discussions about opportunities for improvement; these were frequently followed by compliments or explanations for the challenges experienced.

Power and hierarchy were more frequently discussed after implementation of the guidelines, with nurse facilitators bringing these topics up in almost every session as prompted by the guidelines. Initially, we observed variability in facilitators' comfort with discussing power and hierarchy, but, over time, all facilitators became more skilled and frequently included clear examples from scenarios and references to real-life experiences. Participants noticed this shift, and some expressed appreciation for the explicit addressing of power and hierarchy during the debriefing. Although all facilitators became more skilled, some continued to feel challenged by these discussions. Select facilitators worried about creating a negative atmosphere if power and hierarchy were brought up too often during the session. As a result, we continued to note variability between different facilitators and sessions, as well as missed opportunities to delve into how power dynamics may prevent clinicians from asking for help or admitting uncertainty.

Theme 3: Enhanced interprofessional learning
Prior to implementation of the guidelines, interprofessional learning mostly occurred because participants learnt about each other. For instance, nurse participants explained what their role entails during emergencies. On occasions, we observed physician facilitators describing nurses' roles to the group, without letting nurses speak for themselves. Learning about each other did not happen explicitly in the reverse direction (i.e., we did not observe any explicit discussions about the physicians' role on the team).We also observed instances of interprofessional learning from each other, when participants explained their rationale for certain actions during the scenario to the group. We observed this type of learning most frequently in the form of physicians explaining their clinical decision making to the rest of the team. Perspective taking was uncommon, and mostly occurred in the context of physician participants explaining the help they needed from the team as team leaders.

The new guidelines not only gave RN facilitators a bigger role in pre- and debriefing but also helped facilitators ask prompting questions in a manner that appeared to elicit more conversation by the whole team. Interprofessional learning from and about each other increasingly included more perspective taking focused on the nursing perspective, including the role of nurses in leadership positions (i.e., charge nurses) and how this role played into power dynamics within the team. Other discussions around perspective taking were initiated by residents who described feeling vulnerable and lost in some scenarios, thus prompting a broader conversation about how participants may collaborate to help each other. We also noticed increased recognition that leadership and experience are both sources of power but that individuals in leadership positions may not have the most experience on the team, and vice versa.

Outcomes:

We created novel guidelines for pre- and debriefing of ISBTT, focused on interprofessional co-facilitation and discussion of team dynamics, including power and hierarchy to optimize interprofessional learning. In line with our educational design research methodology, we created the guidelines in an iterative fashion, making adaptations to the first version based on observations and feedback collected during implementation. The final guidelines are included in the Appendix along with a table explaining modifications made during the study period. Four manuscripts resulted from the work so far (see below).

Discussion

We used an educational design research approach to develop and implement new guidelines for pre- and debriefing of interprofessional simulations, with the ultimate goal of improving the educational impact of ISBTT on interprofessional teamwork and collaboration in actual practice. By grounding the design in theoretical design principles and soliciting input from stakeholders throughout the process, we were able to successfully integrate these guidelines into an existing ISBTT program and adapt it to the needs of the facilitators and our context.

Educational design research is becoming increasingly popular in medical education, as it is an approach that ensures strong theoretical foundation as well as practical applicability.[30] As several experts in interprofessional education have expressed, the impact of interprofessional education on actual teamwork has been disappointing thus far.[14,15,32] Some have attributed this to a failure to sufficiently engage with theory,[31] which results in educational interventions that either lack theoretical underpinnings for their design or are based on theories that have no or limited applicability. In our recent review of the literature on ISBTT, we noted that this assertion is very much true for published ISBTT programs, as they rarely describe what theories inform program development. Instead, most ISBTT programs draw on conceptual frameworks, such as Crisis Resource Management and TeamSTEPPS, without taking their origins and limitations into account and without consideration applicability to the interprofessional context.[17] Thus, selecting theories is an important element of designing IPE interventions, including ISBTT, and educational design research encourages a thoughtful approach to this process.

Others have argued that IPE's failures are a result of the discrepancy between idealized notions of interprofessional teamwork and how collaboration occurs in actual clinical practice.[32] This discrepancy between ideal and real is not unique to education; in the clinical environment, policy makers often have beliefs about work that differ from how work is actually performed in the clinical environment, and this misalignment is thought to underlie many failed patient safety and quality improvement initiatives.[40,41] Studies of interprofessional teamwork in healthcare similarly show that daily work is often not accomplished by unified teams but by individuals with different professional identities, skills, and goals for patient care.[13,42,43] In addition, interprofessional collaboration is frequently hampered by conflict, power, and hierarchy.[9,10,13,15] Considering practical application in real life is another key element of education design research, as the prototyping phase allows for testing the intervention in context with input from stakeholders to guide adjustments to the intervention.[44]

The third phase of educational design research, evaluation and reflection, aims to evaluate the performance of the final version of the intervention. Although we had postulated that implementing the guidelines would have a positive impact on attitudes toward teamwork, perceptions of safety culture, and actual team performance, our data did not show such an effect for any of the selected measures. In fact, scores on the SAQ declined during our study period. We believe that the pandemic created multiple confounders that impacted these measures. First, pandemic restrictions went into effect and then were loosened during our study period. We therefore had to adjust the format of the sessions from fully in person to a hybrid format, which likely changed team dynamics as well as our ability to observe all aspects of teamwork in a similar manner. Second, the SAQ asked more broadly how people perceive safety culture at the institution, and a decline in scores can likely be explained by the many changes in workflow, the PPE and staffing shortages that characterized certain phases of the pandemic, and the overall increase in burnout and decrease in morale. Last, although we managed to stay within the planned timeline for the study despite pandemic challenges, we had fewer people attend the simulation sessions overall than initially planned; in particular, we had fewer people who attended the sessions in person. This may have diluted the impact of our intervention, as we reached fewer people than intended. In general, it needs to be acknowledged that changing our ISBTT sessions involved a

shift in culture, and, as evident from our qualitative data, such culture change takes time for people to adapt to. We clearly noted a gradual shift in how facilitators interacted with each other toward a more collaborative approach, in which nurse facilitators had a more prominent role. This, together with the scripted prompts in the guidelines, shifted debriefing conversations toward team dynamics and created an environment in which interprofessional learning between team members was enhanced.

From our interviews with facilitators and review of video-recorded sessions, we learned a number of important lessons that inform next steps at our own institution and can assist others with adaptation of our guidelines to other contexts and settings. First and foremost, we believe that the interprofessional composition of our team was a major factor in the success of this work. Including stakeholders from both nursing and physician facilitator groups in the work created buy-in and allowed for quick adoption of the guidelines. It also allowed us to obtain timely feedback from both facilitator groups, which led to quick revisions. Second, scripted guidelines proved to be helpful in empowering facilitators to discuss teamwork, hierarchy, and power. Yet, to become facile in such conversations requires practice and feedback, to which end we are currently establishing a peer-to-peer facilitator coaching program. Last, different stakeholder groups may have different priorities for ISBTT; to keep all groups engaged, this needs to be taken into account. Most prominently in our program was the observation by some physician facilitators that a strong focus on teamwork and collaboration limits the space dedicated to discussion of medical learning points. To address this, we are developing asynchronous debriefing materials that transmit such information to participants.

Conclusion

In conclusion, we successfully developed and implemented guidelines for prebriefing and debriefing ISBTT, employing an interprofessional approach to facilitation that promotes discussions about teamwork, collaboration, hierarchy, and power as well as perspective taking. Future work will explore how such an approach impacts interprofessional collaboration in clinical practice and ultimately, patient care.

Significance

To our knowledge, this is the first study that took an education research design approach to the development and implementation of guidelines for ISBTT. Considering the limited evidence base for interprofessional education strategies in general and in ISBTT in particular, we believe that our work makes an important contribution to the existing literature. Our guidelines can be adapted by others and provide a basis for additional research examining individual and contextual factors contributing to the success of ISBTT in optimizing interprofessional collaboration.

Implication

Our work reinforces previous observations that power dynamics and hierarchy are persistent factors that influence how interprofessional teams function in simulation and in actual patient care. It also indicates that culture change to shift such dynamics can happen, but it takes time, training, and reinforcement. It also requires close attention to any barriers and consideration of all stakeholders needs.

List of Publications and Products (Bibliography of Published Works and Electronic Resources from Study—Use AHRQ Citation Style for Reference Lists).

Ju M, Bochatay, Essakow J, Tsang L, Nottingham M, Franzon D, Lyndon A, van Schaik SM. Debriefing guidelines to address power and hierarchy in interprofessional simulation-based team training. *Simulation in Healthcare; under review*

Bochatay N, Ju M, O'Brien B, van Schaik SM. A scoping review of interprofessional simulation-based team training programs: are they used to their full potential? *Manuscript in preparation, target journal Simulation in Healthcare*

Bochatay N, Ju M, Nottingham M, Tsang L, Essakow J, Franzon D, Werne A, Lyndon A, van Schaik SM. Modeling what we teach: an instrumental case study of interprofessional facilitation in simulation-based team training. *Manuscript in preparation, target journal Qual Health Research*

Bochatay N, Werne A, Ju M, Essakow J, Nottingham M, Tsang L, Franzon D, Lyndon A, van Schaik SM. Changing the Conversation: Impact of a Structured Debriefing Guide for Interprofessional Simulation-based Team Training. *Manuscript in preparation, target journal Simulation in Healthcare*

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Benioff Children's Hospital San Francisco
Interprofessional Mock Code Facilitator Guide

Prebrief (5 minutes)

▶ **Nurse Facilitator: Welcome and introductions** (name and role)

▶ **Physician Facilitator:** *Goal*

"We are doing mock codes to practice scenarios of caring for acutely ill children as a team, so we are well prepared for real-life scenarios. We will pay special attention to the dynamics within our team that help or hamper teamwork."

▶ **Nurse Facilitator:** *Ground rules*

"We should set some ground rules, and I invite everyone to provide suggestions. I'll start with...."[these are examples to fill in, participants provide]

▶ **This is a safe space**: what we do and say here stays here

▶ **We are here to learn:** it is okay to make mistakes

▶ **Everyone participates:** If you are not actively participating, you are an active observer; we learn the most if we are all engaged

▶ **Be respectful:** it is okay to disagree, and sometimes important to disagree, but with respectful tone; use "I statement"

▶ **Assume good intentions:** everyone here is doing their best

▶ **Suspension of disbelief:** the more you act how you would in real life, the more you will get out of the scenario

▶ **Physician Facilitator:** *Agenda for the day*

"There will be two scenarios today, 5-10 minutes in length, with a 10-20 minute debrief after each scenario"

▶ **Nurse Facilitator:** *Review mannequin*

"We would like to orient you to the mannequin."

▶ Heart and lung sounds

▶ Pulses (Sim Jr. left radial, brachial, carotid; SimBaby left radial, brachial, femoral)

▶ Fontanelle in SimBaby

▶ Do not put stickers on or put IVs in

▶ **Physician Facilitator:** *Instructions for observers*

"Observers will be filling out a tool, and we will ask you to provide feedback to the participants on observed behaviors and interactions"

▶ Distribute QR code or printed sheet for MHPTS team work scale

▶ **Nurse Facilitator:** *Addressing power*

▶ We also would like to recognize that *hierarchy* and *power dynamics* play a role in these mock codes as well as in real life situations.

▶ We want to remind you that we are here to work together, and that each individual brings a unique perspective.

▶ We should strive to collaborate and create an environment where everyone feels comfortable to speak up.

Debrief (15-20 minutes)
Main focus for facilitators:
Nurse Facilitator: Assess mental model, discuss role of hierarchy (speaking up)
Physician Facilitator: Perspective taking

▶ **Physician Facilitator** ~ Thank and congratulate people for participating, acknowledging that it's challenging and how every person experiences the session differently due to their position (i.e., MD/RN) and years of experience. Remind participants of ground rules *(1 min):*

▶ **Nurse Facilitator- Assess mental model** (helps to assess communication) Invites **ALL** to self-reflect:

  ▶ Directed to <u>Charge RN</u>: What was going on with this patient?
  ▶ Directed to <u>MD leader</u>: What did you think was going on?
  ▶ Directed to <u>All</u>: Did others think similarly?

  ▶ Nurse facilitator: Comment if models match or differ. If you notice that there are differences in the mental models… question why this might be, explore why the charge nurse/MD might have different viewpoints?

▶ **Nurse Facilitator** (can ask for MD input) Clarifies any main teaching points from general and specific learning objectives (e.g., medical management, workflow around codes, etc.)

▶ *POTENTIAL QUESTIONS (to be asked by nurse/MD facilitator) ~ **Bolded ones** are highly recommended:*

  ▶ **Did factors related to hierarchy or power dynamics play any role?**
    Does being a nurse or resident influence how you respond in the scenario?
  ▶ **What do you think you would have done in X's role; can you imagine how this was for that person?**
  ▶ How did you feel about the teamwork in this scenario? How did this impact the mental models?
  ▶ Did you notice any break in communication/collaboration? If so, why do you think they occurred?
  ▶ Have you been in a similar situation that you didn't feel you could speak up, and why was that (in real life)?
  ▶ Open-ended Qs: Why do you think you didn't say anything?

▶ **Nurse Facilitator**: Closes the debrief - examples of ways to close

  ▶ Summarize how observed behaviors impacted scenario flow and outcome
  ▶ Ask participants to share one thing they will take away from this session back to the bedside regarding teamwork

TAKE NOTES:	**COUNT TO 10:**	**INVITE:**	**BE CURIOUS:**	**MORE PERSPECTIVE TAKING PROMPTS:**	**KEEP TRACK OF TIME:**
EVEN IF JUST A QUICK SCRIBBLE TO REMIND YOURSELF OF THINGS THAT YOU MAY WANT TO ADDRESS DURING THE DEBRIEF	SOMETIMES SILENCE IS AWKWARD AND WE JUMP TO FILL THE VOID	INVITE THOSE WHO ARE NOT SPEAKING TO SPEAK	BEING CURIOUS ABOUT PEOPLE'S THOUGHTS, MOTIVATIONS	*WHAT WOULD YOU HAVE DONE IF YOU WERE IN THE SHOES OF X…*	GENTLY INTERRUPT PEOPLE WHO TAKE UP A LOT OF SPACE

APPENDIX B. Changes made to initial guidelines and rationale for changes

Design principle	Guideline element(s)	Observations	Recommendations
1. **Interprofessional collaborative approach to facilitation**	• Assigned roles and scripts for RN and MD facilitators in prebriefing and debriefing	Works well in prebriefing, debriefing still mostly physician led	a. More prominent role for RN facilitator early in debrief b. Ask MD facilitators to review their own videos and reflect on creating space for RN facilitator
2. **Expect active participation by all**	• Discuss as ground rule in prebrief • Assign participants active roles and observers • Invite participants and observers to speak in debrief	Variable participation in debrief, if RN facilitators have a clear presence, RN participants appear to speak more.	a. Create more space for RN facilitator (see above) b. Explicitly invite RN participants to speak
3. **Focus on teamwork and collaboration**	• Highlight goal in prebrief • Focused questions in debrief	Most debriefs focus primarily on teamwork and collaboration. Some MD facilitators comment there is a need for discussion of medical content.	a. Early in debrief, ask for mental model regarding patient medical condition b. Develop asynchronous method for in-depth medical content knowledge sharing
4. **Encourage perspective taking**	• Discuss as ground rule in prebrief • Focused questions in debrief	Doesn't happen consistently.	a. If mental models are incongruent, explore why the team thinks others have a different model b. Include example questions in guidelines to promote perspective taking
5. **Make issues of hierarchy and power explicit**	• Set expectation in prebrief • Focused questions in debrief	Variable whether this is addressed; participants don't always seem comfortable, and facilitators vary in comfort and skill. Some feel the framing in the prebrief is too direct.	a. Change wording in prebrief to explicitly acknowledge the tension between experience versus position/role without necessarily using words like hierarchy and power b. Example questions with open-ended framing c. Elicit examples from real life