Beyond the Team: Understanding Interprofessional Work in Two North American ICUs

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ABSTRACT

Objective: To examine the ways in which health care professionals work together in the ICU setting, through a consideration of the contextual, organizational, processual, and relational factors that impact their interprofessional collaboration.

Design: Over 350 hours of ethnographic observation and 35 semi-structured interviews with clinicians in two intensive care units were collected by two medical anthropologists over a period of 6 months.

Setting: Medical surgical Intensive Care units in two urban research hospitals in Canada and the United States.

Main results: While the concept of teamwork is often central to interventions to improve patient safety in the ICU, our observations suggest that this concept does not fully describe how interprofessional work actually occurs in this setting. With the exception of crisis situations, most interprofessional interactions in the two ICUs we studied could be better described as forms of interprofessional work other than teamwork, that include collaboration, coordination, and networking.

Conclusions: A singular notion of team is too reductive to account for the ways in which work happens in the ICU, and therefore cannot be taken for granted in quality improvement initiatives or amongst health care professionals in this setting. Adapting interventions to the complex nature of interprofessional work and each ICUs unique local

context is an important and necessary step to ensure the delivery of safe and effective patient care.

INTRODUCTION

Ineffective teamwork and team communication in health care settings has long been associated with increased patient harm and sentinel events (1-4). Research on patient safety in intensive care units (ICUs) describes barriers to communication and teamwork that point to embedded hierarchies, differences in professional cultures, and medical dominance (5-9). Recent interventions that attempt to address these 'obstacles' have largely been formulated within the framework of changing 'organizational culture,' with a focus on systems rather than individual practitioners (10-14).

Models from high-risk industries, such as aviation and nuclear energy, have been influential in patient safety movements in healthcare over the past two decades. Specifically, safety culture assessments, incident reporting, safety checklists, crew resource management, and simulation training have been widely adopted in an effort to improve the quality of care delivery. Teamwork is central to these interventions, and is described as involving collaborative decision-making, team coordination, team communication, trust, and a lack of conflict (15-20). Furthermore, most interventions assume that different professionals work together as a team. In his review of the concept of 'teamwork' in health care, Reeves provides a definition of teamwork that incorporates the most common elements discussed in the literature: a cohesive group with shared team identity, clarity, interdependence, integration, and shared responsibility (21).

While scholars have discussed the limitations of uncritically adopting teamwork models from other high-risk industries to healthcare (21-25), little work has been done to elaborate the specific nature of how teams function in the ICU. Does the definition of teamwork that is so often taken *a priori* structure how work is carried out in the ICU setting? This question is important, because, as researchers have noted, the effectiveness of interventions depends on their adaptation to the specific clinical context of the ICU in which they are implemented (27- 31). To date, few studies have offered a systematic examination of the clinical ICU contexts in which these teams are imagined to function.

Through a larger, multi-sited ethnographic study of eight ICUs in North America, we encountered various forms of interprofessional interactions between different health care professionals that did not neatly fit into the category of teamwork. In examining how work actually takes place in the various ICU settings, this study contributes to critical analyses of ICU teams (32-34) and demonstrates the complexities and nuances of work in the clinical setting of the ICU. This is imperative in informing effective interventions for improving care delivery in critical care, as it goes beyond idealized descriptions of how different professionals work together in order to reveal what happens in practice in this setting (3, 15).

MATERIALS AND METHODS

Study Design

This study used an ethnographic approach to investigate interprofessional interactions and ICU cultures in the two ICU sites described above. Ethnography is employed when the objective is to develop an understanding and description of a phenomenon or culture (35). A conceptual framework was used to guide data collection, which allowed for a comprehensive view of work practices in the ICU by examining process-related, relational, contextual, and organizational factors (21, 36). Our research found that these factors both limited and enabled the possible expressions of teams, and relatedly, interprofessional interactions in two ICU units. Additionally, categorizations of interprofessional work, described by Reeves et al. (21) were used to identify types of work carried out by clinicians. These included: collaboration (interactions or communication over specific issues, but no shared identity), coordination (individuals work in parallel and meet to review and discuss shared work), or networking (individuals move through networks as the need arises for specific skills or expertise).

Following researcher triangulation principles (37), the researchers met weekly (via telephone) during data collection for cross-site discussion, to continuously refine and expand emerging findings. A process of open-coding of field notes was used to identify data within major themes or categories. These categories were refined through a constant comparison method whereby coded data are compared with the rest of the data to establish analytical categories (38). Consistent with established qualitative analysis procedures (39), field notes and interview transcripts were iteratively coded utilizing the

sensitizing framework and emerging themes. The research was approved by the IRB at The University of Pittsburgh and the REB at The University of Toronto.

Data collection

Between January 2013 and August 2014, approximately 350 hours of observation were gathered at two urban teaching hospitals, one in the US and one in Canada by two medical anthropologists. In addition to ethnographic observation, 37 one-hour semi-structured interviews were conducted with clinicians across sites. A purposeful maximum variation sample (40) was used in order to ensure that an accurate representation of the professions working in the respective ICUs was reflected in the data. Informal interviews were also conducted with clinicians during observation, in order to attain further clarification about particular instances or interactions observed.

Table 1. Data collection by site

		Site 1	*Site 2*
Observations		*197 hours*	*167 hours*
Clinician Interviews	*Staff intensivists*	*3*	*2*
	Medical trainees	*6*	*2*
	Nurses	*5*	*5*
	Other health professionals (e.g. respiratory therapists, physical therapists, social workers, nutritionists)	*7*	*6*

Site Descriptions

Site 1 was a teaching hospital located in an urban city in Canada. The closed medical surgical ICU has 24 funded beds and is a tertiary and quaternary care unit. Patients in the ICU are cared for by an intensivist-led group of fellows, residents, respiratory therapists, nurses, pharmacists, social workers, dietitians, and physical therapists. The term "other

health professionals" is used to describe non-nursing and non-medical professionals working in the ICU.

Site 2 was a community teaching hospital located in an urban city in the U.S. The open medical surgical ICU has 14 beds and is led by a group practice of intensivists who rotate every two weeks. Additionally, there are multiple Family Medicine resident/intern teams that have four-week rotations in the ICU. Nurse staffing is routinely one nurse for every two patients with the addition of a charge nurse. Other professions assigned to the ICU include a pharmacist, respiratory therapist, dietician, social worker, and case manager.

RESULTS

Analysis of field notes and interviews revealed key findings regarding the nature of teamwork and interprofessional collaboration in the ICU. These were: 1) Clinicians regularly evoke a teamwork model when describing how the unit functions; 2) In practice, interprofessional interactions of various kinds—including, but not limited to collaboration, coordination, or networking—suggest that teamwork is only one type of work that takes place in this setting and is rarely interprofessional; 3) The role of the medical team in the ICU demonstrates the most teamwork, and at the same time, influences other forms of interprofessional interaction possible in both formal and informal settings in the ICU.

Notions of Teams and Teamwork in the ICU

When examining how the two ICUs in our study were described by health care professionals, the term "team" came up very frequently in our data. Whether in informal interviews with clinicians, observations of conversations between healthcare providers, or in descriptions of how the ICU functions by clinicians, the notion of a team was articulated regularly. In interviews with clinicians, we asked them to draw and/or describe the ICU team or teams as they experience it. Analogies such as "a family," "a well-oiled machine," or "a ship" with the lead physician as the captain, were often used to describe a team of equals. Responses from clinicians ranging from other health professionals to medical staff reflected a broad and inclusive notion of team, with the doctor at the head.

> *So I think any care in the ICU, the patient and the family are the centre, they are really what our focus is on that group. So I put them in the centre in a circle and I'm basically doing spokes off of it because I don't really feel that any team member is really higher up than the others. Yes, the intensivist makes the final decisions I think on most of the medical care but the intensivist takes into factor everything else that has been going on too, so I did put them at the top of the circle. But I wouldn't put them on the top of a pyramid or anything like that. (Social Worker, Site 2, June 6, 2014)*

The use of a crisis as an example of "good teamwork" was a recurrent theme expressed by professionals at both sites, and is reflective of these findings in research on teamwork

in acute care settings (41). For instance, many clinicians emphasized interprofessional teamwork during crises:

> *I really like to talk about when we have a crisis, and resuscitation, or, patient loses airway, and when there is good collaboration from that perspective, good leadership, good team members, the messages goes in the right direction and being understood by all the team. I think that's the most important, when you achieve your goal with all team, I think that's a good day for me, from that perspective, when you have an emergency, especially in the ICU, just because it's a multi professional event. (Interview with Fellow, Site 1, July 17, 2014)*

Within this framework, clinicians also pointed out frustrations in regards to the team—specifically, clinicians who are "not team players." This marks the boundaries of the ideal expressions of an all-inclusive team; membership is based on actively being a part of the team by helping others and making a contribution beyond the minimal job requirements:

> *There are people that are willing to be part of the team, and those that avoid being part of the team. When you see that, it's tough. (Interview with Intensivist, Site 1, July 16, 2014)*

Another factor that disrupts and problematizes the idealized team is when the decision-making hierarchy is complicated by the merging of care under two teams or specialties—an issue observed at Site 2, which is an open ICU:

> *So, if there are too many hands in the cookie jar, so it's like affecting the patient and the way I provide care to the patient because I don't know whose orders to follow. So, then you're making a*

bunch of phone calls and wondering do I go to surgery for this or do I go to my intensivist for this. (Nurse, site 2, 4/30/14)

While health care providers in our study repeatedly used the concept of a team rhetorically, in practice, this signaled more of a reference to their co-location in a shared clinical space, rather than the elements that constitute classic definitions of a team (such as, shared team identity, clarity, interdependence, integration, shared responsibility, etc.) (21). What we observed in practice was more complex, and not fully characterized by the concept of a team or teamwork.

Beyond the idealized team: understanding interprofessional interactions

In observing the ways in which professionals interacted in the two ICUs, we found that relational factors such as different professional cultures, hierarchies within and between professions, and medical dominance influence the ways in which work took place in these specific settings. As the next section demonstrates, the dominance of medicine related to the profession's legal responsibility had a direct effect on the processual and relations factors such as the role and work practices of non-medical health care professionals in the ICUs.

Through our observations of other health professionals, it was evident that repeated interprofessional interactions and communications take place informally throughout the day. Our findings suggest that a number of these other health professionals stress the importance of their presence in the unit, as it enables them to interact and communicate

with others when they are around. Several members of the interprofessional team are not able to be physically present in the ICU throughout the entire day, e.g., the dietician, pharmacist, respiratory therapist, and social worker. Our observations detail how consultations and information exchange occurring throughout the day take advantage of when these professions are present, with a preference for face-to-face communication. While physicians describe this work as important to the work of the ICU, these interactions take place mostly outside of interprofessional rounds in the informal realm. Specifically, there is no formalized structure to allow for a systematic interaction among physicians and other health professionals in the ICUs we studied. In an interview, a care manager describes interprofessional collaboration:

> *I think that the residents are here all day every day, that they're accessible, the intensivist is accessible, and all the disciplines are available at some point in the day. I think for the most part you're able to see everybody that you need to collaborate with most days. (Care Manager, Site 2, 3/24/14)*

From another interview, a social worker went on to explain that this informal practice leaves open the possibility of miscommunication, or of being left out of procedures related to her role by the physician:

> *[W]hat can be frustrating is when we're trying to be proactive and do our job and give the doctor, for instance, the important information. And sometimes they forget or they just go ahead and do something that we assume they know isn't proper protocol and we were trying to prevent that from happening, and sometimes it still gets mixed up.* (Interview with Social Worker, Site 1, July 10, 2014).

Various health professionals (e.g. dietitians, pharmacists, nurses) echoed these frustrations, related to being left out or not heard by other professionals (and in particular, physicians), at both sites. Not all of these were related to a lack of formal structures for communication or work. In our observations of multidisciplinary rounds, for example, we found many instances of interprofessional collaboration that were not necessarily characteristic of the classic definition of teamwork. For example,

> *RN: Rounds start with the resident that has been assigned to that patient. And then the nurse has a head-to-toe assessment and then after that then the respiratory therapist will interject with his or her assessment. And then the nutritionist will do their assessment and then they do the plan of care. And then they'll go into further assessment with all of the labs and then the pharmacist will discuss the drugs. And then it goes back to the resident, what they feel the plan of care should be and it's the changing of the orders and they write the orders.*
>
> *Interviewer: It sounds like the role of the pharmacist and respiratory therapist and nurse is very much a reporting or consulting role.*
>
> *RN: Yes absolutely… (Interview with Nurse, Site 1, August 6, 2014)*

While described in interviews by ICU professionals as providing an ideal forum for interprofessional teamwork, in practice, these rounds suggest that the medical professionals function as a team, and other participants are called upon to report or offer specialized information to this team. For instance, during rounds, it was common for medical staff and trainees to discuss the care plan and medical issues as a group, and solicit information from other health care professionals (nursing, respiratory therapy, dietary, pharmacy) as needed:

The rounding group is standing by the bedside desk for bed 18. The bedside nurse stands facing the group and summarizes the 'head-to-toe' report from the flowsheet. When she is done, one of the residents reads out the labs. When she is done, the pharmacist lists the patient's medications. The intensivist asks her, "Is there an isolate or is that empirical?" She hands the medication list to the intensivist. As the intensivist looks at the list, another resident begins to summarize the patient care plan. As she is doing this, the intensivist, fellow, and residents gather closer to form a circle and discuss the patient's trajectory and plan in more detail amongst themselves (Field note April 9, 2014, Site 1).

This structure was common in all the rounds we observed at both sites. Other health professionals and nursing primarily participated in the form of reporting, or answering questions. On the occasion that suggestions are made and concerns are raised by interprofessional and nursing staff, these are usually directed to medical staff for their approval or consideration. For example,

During rounds on the patient in bed 18, the resident completes reading labs and turns to the pharmacist and asks, "Oh, meds?" The pharmacist lists the meds and says, "He's been having agitation overnight, so you might want something for that."

Fellow: "He needs something for sleep, but I'd rather avoid benzo." The pharmacist turns to another resident, on the outer edge of the group and whispers, "We're just swapping one set of problems for another," and rolls her eyes. After the rounding group moves on to the next bed, the nurse says to the pharmacist, privately, "So, what's your opinion?" and the pharmacist responds, with an order she would suggest.

Nurse: "Then why didn't you say?"

Pharmacist: "Because the team made their decision. They want to avoid benzos, but are giving morphine! I would prefer going up on [name of med] instead of opiodes."

Nurse: "So where is your convincing?"

Pharmacist: "I tried." The nurse rolls his eyes. (August 8, 2014, Field note, Site 1)

Factors affecting interprofessional input include hierarchy, professional power, professional socialization, and trust in and respect for other professionals (36). Thus, there is a spectrum of greater and lesser interprofessional inclusion in the patient care plan depending on the specific configuration of these dynamics within the ICUs. Below are two examples that illustrate this variation:

Some of us that have been around for a while, and are jaded, think it's a bit of a waste of time to have the nurse present [during rounds], it's like they're throwing a bone to the nurses, to have their involvement in rounds, here, you guys can have this, present the patient. So I think the head to toe, for me, kind of pisses me off. (Interview with Nurse, August 22, 2014)

I think that it did not take as long as it has for other teams that I've experienced to be kind of accepted and incorporated as part of the team. So I felt like I didn't have to push my way in. I felt like I was, it was kind of taken for granted that I was part of the team and that I was going to offer help and I just had to prove myself as a worthy resource...I feel like the number one advice I would have is to be confident and in order to do that though, you would have to be very careful with your recommendations or the answers that you give so that you're not being confident with an answer that you're not 100% sure of because then they'll act on it… if they came to you and asked for a recommendation, like 99% of the time were going to go with your recommendation. (Interview with Pharmacy resident, Site 2, 9/19/14)

Professional Dominance and Interprofessional Interactions

The previous section indicates the existence of a singular medical team within the ICU, which is a smaller, uni-professional team responsible for decision-making regarding patient care plans (and relatedly, is legally responsible for those plans as well). The dominance of medicine in decision-making and its hierarchical position in relation to other health care professions were significant factors in how routines and rituals are organized (for example, rounds) and how space was used within the ICUs we studied. Medical decision-making ultimately resides with the attending and residents. As one resident describes interprofessional communication in the ICU:

> *It's everybody else that needs to talk to me, and I just have to be there. I just have to show up. Like I don't have to try. (Interview with resident, Site 2, 5/29/14)*

Our observations of the medical team during rounds, at both sites, demonstrate their socializing function as a space for the training of junior physicians, thus emphasizing the centrality of the medical profession to the function of rounds.

For Site 1, medical staff are deferred to, even when suggestions are made by other professionals, and fellows and staff physicians often encourage residents (directly or indirectly) to be authoritative:

> *The group is rounding on the patient in bed 19. After the bedside nurse gives the 'head to toe' report, the doctor turns to the resident (to whom the patient is assigned) and asks, "Are we going to give her antibiotics?" The pharmacist checks the computer monitor and says, "She is not on*

anything now. Maybe amoxicillin?" The doctor responds, hesitantly, "Ok, maybe for a few days…" The resident says, "She is allergic to penicillin." The doctor, frustrated, responds, "Ok, then [name of medicine] or nothing. I don't care. I'm just trying to empower you to do something!" (March 25, 2014, Field note, Site 1)

*A new group of residents begin their one-month rotation, so the attending physician explains the structure of rounds to them as they round on their first patient. She explains, "Once everyone [in the interprofessional team] has had a chance to speak, at the end of the conversation, the resident that presents the patient will give a plan." She stops speaking to the group when she notices that one of the residents is writing in the patient chart, and instead addresses the resident directly: "I do not want you to report the nurse's head-to-toe report, you are legally responsible, so do your own assessment. **You** are the physician **in charge**—do **your own** assessment." Turning to the group, "I do not like when you write notes during rounds because you end up writing the nurse's head-to-toe report." (original emphasis, August 25, 2014, Field note)*

At site 2, we also observed the deference to medical staff, but found that this practice was not always reproduced by medical staff themselves. Rather, we observed that other health care professionals often exhibited an internalization of medicine's authority. Additionally, at site 2, intensivists differed in the degree to which they encouraged the involvement of other health care professionals.

At both sites, the medical team also met separately and in private throughout the day (in teaching, socializing, hand-off, informal updates) and interacted as a sub-group during rounds to whom information is provided by other professional groups, who in essence function as 'reporters' of clinical information. 'Insider' conversations highlight the

dynamics of this medical sub-team. In the following excerpt, a fellow gives an example of how communication amongst the medical team changes during handover, where there are no interprofessional or nursing staff present:

> *So, outside of rounds, there is a lot of information to be passed. So, the handover from overnight is actually pretty key, because this is a time when doctors are talking to doctors. There are no nurses around, there's no allied health around, there's no patients and their families around, so there's a lot of … I don't even know what the right word is, but off-the-cuff remarks about what's going on, what are the biggest problems. [A]t morning handover rounds, it's more big-picture stuff. So, overall, did they get better, did they get worse? Is there a troubling family interaction I need to watch out for? Is there some controversy about the consultant teams, and are there opinions that are being thrown around and we just have to deal with it today? So, more big-picture things, but also more cavalier comments. On rounds, we know that everyone is listening. We know that the whole team is there, the patients are usually, the family members are at bedside, they're encouraged to take part in rounds. So, that is very formalized, but a lot of times, things are not said on those rounds because it's not appropriate.* (Interview with Fellow, May 7, 2014, Site 1)

The following except is of a private meeting in a common area of the ICU between two interns. Here they discuss a patient's care plan, rather than discussing as a team during rounds:

> Intern talks to male intern. He leans on the counter. Male intern says, "Two great minds we can figure it out. I admitted her to IMC two days ago, what happened?" Intern talks, "Condition C was called…" (Feb 13, 2014, Field note, Site 2).

In both sites, conversations among the medical professionals often take place informally in groups, or in private spaces in the ICU, such as the viewing room, away from public spaces. In these interactions, conversations are noticeably more candid than what was observed during, for example, public rounds. The following excerpt is from "sign-over," which takes place in the viewing room at the end of the day and is attended by all medical staff: doctors, fellows, and resident. Here, the medical team reviews each patient and raises concerns that may arise overnight:

> *Resident summarizes the status of patient 15, suggesting possible drug addiction*
>
> *Fellow: What did the patient tell you?*
>
> *Resident: Well, he said he hasn't used crack since 1972*
>
> *Fellow: Did you ask him what year it is?(Group laughs)*
>
> (Field notes, August 8, 2014, Site 1)

DISCUSSION

This study offers a rare examination into the specific forms of interprofessional work and teamwork that are practiced in two North American ICUs. While prior research has argued that it is necessary to acknowledge the complexities and nuances of teams at play in ICUs (42, 43), our study is unique in offering an ethnographic view of the various kinds of interprofessional work within two ICUs in two different countries. In doing so, our findings challenge the singular conception of teams or teamwork in critical care.

While the idealized notion of teamwork (shared team identity, clarity, interdependence, integration, and shared responsibility) does reflect how health care professionals described their work in both ICUs, our observations suggest that these portrayals are not congruent with how interprofessional work actually occurs. With the exception of crisis situations, most interprofessional interactions in the two ICUs we studied could be better described as forms of interprofessional work other than teamwork, that include collaboration, coordination, and networking (21). These forms, described by Reeves et al., highlight the various ways in which health care professionals interact or communicate regarding specific issues (collaboration), work in parallel on shared work (coordination), or meet—virtually or in person—as needed based on specific skills or expertise (networking). These forms of interaction were more common in our observations of interprofessional work, and suggest a lack of an "interprofessional team" in practice. These findings are consistent with critical literature on interprofessional collaboration in ICUs (32, 42).

Health care professionals at both sites highlight the multiple teams in which they participate and how these are marked by specific boundaries of inclusion and exclusion, as well as processual and relational factors such as trust, hierarchy between and within professions, rotations, and routines within the unit. Additionally, our observations indicated the possible wider impact of medical dominance on shaping these routines and hierarchies, as evident in the informal rules that govern practices such as rounds and decision-making. The dominant role of medicine has been well-researched in various

fields, and our findings contribute to literature on the dominant role of medicine within a larger interprofessional work environment (44-46).

Although many of the group interactions described in this paper involve a range of professionals, a close examination reveals that teamwork and interprofessional interactions are not the same. On the contrary, the expressions of teams and teamwork that we examined limits or broaden interprofessional interactions across a continuum that adapts based on need (e.g. medical crisis). For example, the dominance of the medical team in decision-making, as seen during rounds, determines the ways in which other professionals interact. The hierarchical and non-inclusive interactions that we observed do not suggest that the ICUs exhibited a failure of teamwork, but rather, forces us to consider how professionals work together in the delivery of patient care outside such a frame altogether.

CONCLUSION

A singular notion of team is too reductive to account for the ways in which work happens in the ICU, and therefore cannot be taken for granted in quality improvement initiatives or amongst health care professionals in this setting. Improving teamwork and interprofessional communication in the ICU requires an understanding of how these processes function in particular clinical settings in relation to the processual, relational, organizational and contextual factors that shape them. This is an important and necessary step in adapting interventions to the specificities of this health care setting to ensure the delivery of safe and effective patient care.

REFERENCES

1. Kohn LT, Corrigan JM, Donaldson MS. To Err Is Human: Building A Safer Health System. Washington, DC, National Academies Press, 2000

2. Institute of Medicine. Keeping Patients Safe: Transforming the Work Environment of Nurses. Washington, DC, National Academies Press, 2004

3. The Joint Commission. Behaviors that undermine a culture of safety. Issue 40, July 9, 2008

4. Brennan TA, Leape LL, Laird NM, et al: Incidence of adverse events and negligence in hospitalized patients. Harvard Medical Practice Study. *N Engl J Med* 1991; 324:370-376

5. Thomas EJ, Peterson LA. Measuring errors and adverse events in healthcare. *J Gen Intern Med*. 2003; 18:61–67

6. Manias E, Street A. The interplay of knowledge and decision making between nurses and doctors in critical care. *Int J Nurs Stud* 2001; 38:129–40

7. Fox N. Discourse, organisation and the surgical ward round. *Sociology of Health and Illness* 1993; 15:16-20

8. Baggs JG, Schmitt MH. Nurses' and resident physicians' perceptions of the process of collaboration in an MICU. *Res Nurs Health* 1997; 20:71-80

9. Hill K. The sound of silence—nurses' non-verbal interaction within the ward round. *Nurs Crit Care* 2003; 8:231–9

10. Sexton JB, Thomas EJ, Helmreich RL: Error, stress, and teamwork in medicine and aviation: Cross sectional surveys. *BMJ* 2000; 320:745–749

11. Pronovost P, Weast B, Rubin H, et al: Implementing and validating a comprehensive unit-based safety program. *J Patient Safety* 2005;1:33–40

12. Rothschild JM, Landrigan CP, Cronin JW, et al. The critical care safety study: the incidence and nature of adverse events and serious medical errors in intensive care. *Crit Care Med* 2005; 33:1694-700

13. The Joint Commission. Behaviors that undermine a culture of safety. Sentinel Event Alert, 40: July 9, 2008

14. Institute of Medicine. Crossing the quality chasm: A new health system for the 21st Century. Washington, DC, National Academies Press, 2001

15. Reader TW, Flin R, Mearns K, et al: Developing a team performance framework for the intensive care unit. *Crit Care Med* 2009; 37:1787–1793

16. Flin R, Maran N: Identifying and training non-technical skills for teams in acute medicine. *Qual Saf Health Care* 2004; 13.1:80–84

17. Sevdalis N, Davis R, Koutantji M, et al: Reliability of a revised NOTECHS scale for use in surgical teams. *Am J Surg* 2008; 196:184–190

18. Catchpole K, de Leval M, McEwan A, et al: Patient handover from surgery to intensive care: Using Formula 1 pit-stop and aviation models to improve safety and quality. *Paediatr Anaesth* 2007; 17:470–478

19. Pronovost PJ, Thompson DA, Holzmueller CG, et al: Toward learning from patient safety reporting systems. *J Crit Care* 2006; 21:305-315

20. Reader T, Flin R, Lauche K, Cuthbertson B: Non-technical skills in the intensive care unit. *Br J Anaesth* 2006; 96:551-559

21. Reeves S, Lewin S, Espin S, et al. Interprofessional Teamwork for Health and Social Care. Oxford, Wiley-Blackwell, 2010

22. McCulloch P, Rathbone J, Catchpole K. Interventions to improve teamwork and communications among healthcare staff. *Br J Surg* 2011; 98:469--479

23. Gombert, J, Jahn, S, Rivera-Rodriguez AJ, Is Teamwork Really that Beneficial in Health Care? *In:* Lim G, Herrmann, JW (Eds): Proceedings of the 2012 Industrial and Systems Engineering Research Conference, Orlando, May 19-23, 2012

24. Reader TW, Cuthbertson BH. Teamwork and Team Training in the ICU: Where Do the Similarities with Aviation End? *Critical Care* 2011; 15.6:313.

25. Gaba D, Rogers J: Have we gone too far in translating ideas from aviation to patient safety? *BMJ* 2011; 342:198-199

26. Elder N, Brungs S, Nagy M, Kudel I, Render M. Nurses' Perceptions of Error Communication and Reporting in the Intensive Care Unit. *J Patient Saf* 2008; 4:162-168

27. Elder NC, Brungs SM, Nagy M, et al. Intensive care unit nurses' perceptions of safety after a highly specific safety intervention. *Qual Saf Health Care* 2008; 17:25-30

28. Thomas E, Sexton J, Helmrich R, Translating teamwork behaviours from aviation to healthcare: development of behavioural markers for neonatal resuscitation. *Qual Saf Health Care* 2004; 13.1:55-64

29. Vogus TJ, Sutcliffe KM. The Safety Organizing Scale: development and validation of a behavioral measure of safety culture in hospital nursing units. *Med Care* 2007; 45:46–54

30. Pronovost P, Weast B, Rubin H, et al. Implementing and validating a comprehensive unit-based safety program. *J Patient Safety* 2005; 1:33–40

31. Institute of Medicine. Keeping Patients Safe: Transforming the Work Environment of Nurses. Washington, DC, National Academies Press, 2004

32. Hawryluck L, Espin S, Garwood K, et al: Contexts of Professional Practice: Pulling Together and Pushing Apart: Tides of Tensions in the ICU Team. *Acad Med* 2002; 77.10:S73-S76

33. Piquette D, Reeves S, LeBlanc V. Interprofessional ICU team interactions and medical crises: A qualitative study. *Journal of Interprofessional Care* 2009; 23:273–285

34. Lewin S, Reeves S. Enacting 'team' and 'teamwork': Using Goffman's theory of impression management to illuminate interprofessional practice on hospital wards. *Soc Sci Med* 2011; 72:1596–1602

35. DeWalt K, DeWalt, B. Participant observation. Lanham, MD, Rowman and Littlefield, 2011

36. Paradis E, Leslie M, Gropper M, et al: Interprofessional care in intensive care settings and the factors that impact it: Results from a scoping review of ethnographic studies. *J Crit Care* 2013; 28.6:1062-1067

37. Yin RK. Case study research: design and methods. Fourth Edition. Thousand Oaks, California, Sage Inc., 2009

38. Lundgren-Laine, H, Salantera,S. Think-Aloud Technique and Protocol Analysis in Clinical Decision-Making Research. *Qualitative Health Research* 2010; 20.4:565-75

39. Bernard R. Research Methods in Anthropology: Qualitative and Quantitative Approaches. Walnut Creek, CA, AltaMira Press, 2002

40. Patton M. Qualitative Research and Evaluation Methods. California: Sage Publications, 2002

41. Garland A. Improving the ICU: part 2. *Chest* 2005; 127.6:2165-2179

42. Lingard L, Espin S, Evans C, et al. The rules of the game: interprofessional collaboration in the intensive care team. *Critical Care*. 2004; 8.6:R403-R408

43. Rose L. Interprofessional collaboration in the ICU: how to define? *Nurs Crit Care* 2011; 16.1:5-10

44. Long D, Forsyth R, Carroll K. The (im)possibility of clinical democracy. *Health Sociology Review*. 2006; 15.5:506-519

45. Coombs M, Ersser S. Medical hegemony in decision-making—a barrier to interdisciplinary working in intensive care? *J Adv Nurs* 2004; 46.3:245-252

46. Nugus P, Greenfield D, Travaglia, J et al. How and where clinicians exercise power: Interprofessional relations in health care. *Soc Sci Med* 2010; 71:898-909

Tables

1. Data collection by site.

Table 1

Data collection by site		*Site 1*	*Site 2*
Observations		*197*	*167*
Clinician Interviews	*Staff intensivists*	*3*	*2*
	Medical trainees	*6*	*2*
	Nurses	*5*	*5*
	Other health care professionals (e.g. respiratory therapists, physical therapists, social workers, nutritionists)	*7*	*6*