DOING OUR WORK BETTER, TOGETHER: AN APPLICATION OF RELATIONAL COORDINATION

THEORY TO EXPLORE AND SHAPE EXCELLENCE IN TRAUMA CARE

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CHAPTER 1 INTRODUCTION

Study Purpose

Trauma patients can suffer harm as a result of poorly integrated care and conflict between teams involved in the patient journey. Most proposed solutions focus on protocols and systems, but trauma care providers are human – and their behaviour is also affected by how they feel about their colleagues and their work.

As part of a larger project, in collaboration with trauma care providers, I aimed to examine the relationships, interactions and culture within health service staff involved in the early phases of care of major trauma patients. The purpose of this work was to inform focused improvement strategies to enhance those relationships and improve care. The results of the survey and interviews described here are part of a larger collaborative ethnography and quality improvement project which will be described throughout to provide context.

Trauma

Trauma is a common disease with significant morbidity and mortality.[1] Common causes of traumatic injury include motor vehicle collisions, falls, violence, and self-inflicted wounds. While injury prevention efforts in Australia have significantly reduced the burden of disease, trauma remains the leading cause of death for those aged 1-44 and it often results in significant

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[1] The publication of "Accidental Death and Disability: The Neglected Disease of Modern Society" in 1966 sparked the modern era of thinking about trauma as a disease. (National Research Council Committee on Shoc 1966) The resultant approach to trauma prevention and treatment has been like that of traditional diseases such as infections or cancer. (Mullins 1999)

ongoing disability for survivors. (Australian Institute of Health and Welfare 2018; Evans et al. 2018)

There is a spectrum of traumatic injury ranging from single-system disorders in patients who will go on to recover fully, to catastrophic multi-system injuries resulting in death. Trauma patients are often the most acutely unwell in the hospital, with time sensitive interventions standing between them and dying from their injuries. This requires professionals from around the hospital, with all different skillsets, to care for them in a timely fashion. To that end, trauma teams have been implemented by emergency departments around the world to rapidly assess and treat patients. (Groenestege-Kreb, van Maarseveen, and Leenen 2014) Since their inception in 1973, which likely represents the single most important development in trauma care, outcomes for patients have been improving. (Groenestege-Kreb, van Maarseveen, and Leenen 2014) Depending on the degree of injury, the group of providers involved in delivering care to trauma patients at the time of their arrival includes paramedics, emergency physicians, emergency nurses, anesthesiologists, respiratory therapists, general surgeons, orthopedic surgeons, neurosurgeons, radiologists, vascular surgeons, radiographers, intensivists, porters, blood bank personnel, and operating theatre staff.

There have been significant and diverse advancements within trauma care that have contributed to better outcomes for patients. For example, since the publication of landmark study the medication tranexamic acid has been used to slow bleeding in patients with severe hemorrhage. (Roberts et al. 2013) New research has also changed the approach to transfusion in patients requiring blood products. (Gonzalez et al. 2016) Rapid development of technologies has allowed for the expanding use of interventional radiology to manage injuries previously

requiring invasive operations. (Otsuka et al. 2018) These are just a few of the examples of the

rapid advancements in trauma resuscitation and surgery. Groups such as the Eastern

Association for the Surgery of Trauma and the Western Trauma Association have produced

guidelines that outline the agreed upon best practices in trauma management and help

clinicians make decisions at the point of care. (Kasotakis et al. 2019; Western Trauma

Association 2018) Furthermore, some teams are using simulation to help diagnose, then

ameliorate inefficiencies in the resuscitation room and improve team behaviours and crisis

resource management. (Petrosoniak et al. 2018) This diverse progress has led to rapid changes

in the practice of trauma care.

Despite, and perhaps even because of these advancements, trauma medicine is

complex. For any individual patient there are often competing clinical priorities that are not

always easily reconciled. *Should the patient with both a ruptured spleen and bleeding in the*

brain have an operation on their head or abdomen first? Can we do both at the same time?

Beyond competing priorities in the individual patient's clinical condition, trauma care providers

enter the resuscitation room with their own realities, training backgrounds, perceptions of their

colleagues, and other responsibilities that may color their engagement and interactions around

a particular case. *How many other patients are waiting to be seen in the department? The*

neurosurgeon was short with me on the phone yesterday, should I call her again? Such

complexity illustrates that trauma care is more than simply caring for an individual patient, it is

an example of healthcare as a "complex socio-technical system." (Hewett et al. 2009) Conflict

between groups within a team is common and an ongoing source of adverse events in many

medical fields. (Riskin et al. 2015) Challenges include strong subgroup identity, workload

pressures, uncertainty, time pressure, communication breakdown, and lack of coordination.

Patient outcomes improve when care is integrated. The development and training of trauma

teams was the first step towards that goal of integration; understanding and improving the

relational foundations of teams to optimize performance is the next frontier. (Groenestege-

Kreb, van Maarseveen, and Leenen 2014; Hicks and Petrosoniak 2018)

Trauma Care at the Gold Coast University Hospital

The Gold Coast University Hospital (GCUH) is a large tertiary care hospital in Southport,

Queensland, Australia. It is home to the busiest emergency department in Australia with an

influx on average of over 350 patients a day. GCUH established a trauma service in 2013,

concurrent with the opening of a new physical facility. Over 400 staff from a variety of

disciplines and work groups participate in the care of major trauma patients. In the financial

year 2017/18 there were 1739 trauma team activations.

Trauma activations are separated into two discrete categories at GCUH, trauma "Alert"

and trauma "Respond." The decision to activate an "Alert" or "Respond" is made by the triage

nurse, nurse in charge, or treating physician at the point of contact or during the initial patch

call with paramedics. Trauma "Alerts" are the lowest level of activation and are based on the

mechanism that puts a patient at risk for severe injury. Trauma "Alerts" indicate that nursing

staff, additional emergency medicine staff, the trauma service, and medical imaging should

attend to the patient. A trauma "Respond" is the higher level of activation and is an indication

that the patient has a severe, life-threatening, injury. This notification results in a broader

activation of resources including anesthetics, surgery, operating theatre coordinators, and

intensive care.

There are key identifiable groups involved in the early phases of major trauma care and

their inter-relationships for the initial phases of major

trauma patient care are represented in Figure 1. Each group

is represented by function or geographic location, rather

than professional discipline.
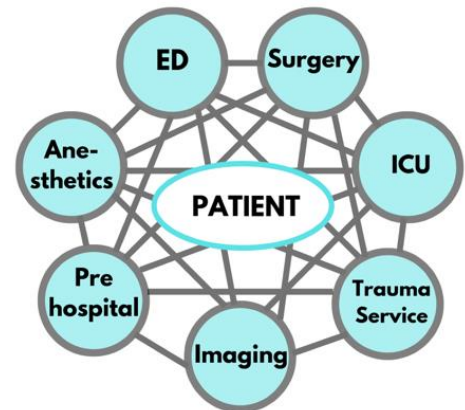
Fig. 1. Groups of healthcare providers involved in the early care of major trauma patients

Over the last four years, the trauma and simulation

services at GCUH have collaborated to improve trauma care

at the hospital through monthly in situ simulation of trauma

cases. These simulations involve providers from across the care continuum – paramedics,

emergency department staff, medical imaging, operating theatre staff, surgery teams and

intensive care teams, as well as support services such as blood bank, orderlies, and security.

Simulations are followed by a large group debrief with the practitioners, led by a facilitator who

prompts reflection on the clinical processes and outcomes through discussion between

providers to identify problems and proposed solutions. The debrief issues are summarized after

each simulation in a quality activity report, provided to service leads from each department

involved in the simulation.

Staff are expected to participate in these simulations as part of their education, and as a

standard part of trauma service delivery improvement.

About the Researcher and Project Team

In addition to completing my master's in anthropology, I am a senior emergency

medicine resident in my fourth of a five-year training program in Canada. This fourth year

provides flexibility to engage in elective experiences which has allowed me the opportunity to

travel to and work in Australia, at GCUH, for the year while completing thesis work at this

location. In July of 2018, I was a new face to GCUH, but through engaging in part time clinical

work, teaching, and research, I have become fully embedded in the department.

Throughout my medical training I have rotated through a wide variety of other

specialties including psychiatry, surgery, intensive care, pediatrics, orthopedics, internal

medicine, cardiology, and obstetrics and gynecology. Over the past six years, I have been most

fascinated by the human aspects of the work. Parallel training in anthropology has made me

acutely aware of the subtle differences in culture between specialties. Part of what drew me to

emergency medicine is that the department acts as the hub of the hospital. It is a physical space

where services, all with slightly different outlooks, come together to care for patients. I am

endlessly fascinated by the human elements that underpin the ability to do that well. Since

trauma care brings multiple groups to the bedside to care for one patient, I quickly jumped at

the opportunity to study relationships amongst these care providers for my thesis project.

The project would not have been possible without engagement of a diverse team with

representation and contributions from all key stakeholders and departments. In fact, this

project was driven by individuals interested in trauma within each department. Early

consultation with a broad group of leaders from the groups outlined in Figure 1 led to the

development of research questions and improvement goals which the research team then

supported. The research team was comprised of me, Darren McLean a project lead at the Centre for Health Innovation at GCUH, and Victoria Brazil who is a senior emergency physician and trauma team leader. Community members on the project team, were providers from each of the disciplines including Martin Wullschleger (MW) and Don Campbell who are directors of the trauma service, MW is also a surgeon. Matt Scott is a trauma nurse, Andrew Donohue is anaesthetist with specific interest in resuscitation and retrieval medicine, Gary Berkowitz is a high acuity response paramedic, James Winearls is an intensivist, and Dan Martin is the director of medical imaging. Charlotte Alexander is a junior doctor who has worked for the trauma service, surgical service, and emergency department at GCUH. In initial consultation, the community members on the project team decided that understanding and improving relationships between trauma care providers was of interest and importance as a potential path towards improving patient care. They also had specific interest in understanding the role of monthly trauma simulations. I offered logistical and methodological support for those goals.

CHAPTER 2 LITERATURE REVIEW

Three main bodies of work are associated with the theoretical underpinnings of my thesis – collaborative ethnography, social capital and relational coordination (RC), and medical simulation. In this chapter I will introduce these concepts and explain how they relate to trauma care and the defined research questions.

Collaborative Ethnography

Methods within the discipline of anthropology typically fall along a continuum of participant involvement from fully researcher driven methods at one end to fully participatory methods at the other. Most modern day applied anthropology is at the participatory side of that continuum, with varying degrees of involvement and empowerment of participants throughout the research process. This leaning is likely a post-colonial response to the relatively dark record of exploitation of research subjects during historical anthropology practices. (Parsons and Harding 2011) It is also rooted in a fundamental belief that knowledge is socially constructed and should therefore be of interest to and relevance for those with whom one is working. (Brydon-Miller, Greenwood, and Maguire 2003; Higginbottom and Liamputtong 2015)

Collaborative ethnography is a research approach in the social sciences which engages participants in all stages of project conceptualization, research, and analysis, providing continuous commentary and evaluation which becomes reintegrated back into the research process. (Higginbottom and Liamputtong 2015; Lassiter 2005; Fluehr-Lobban 2008; Stull and Schensul 1987) A cyclical progression of collective fact finding and reflection evolves, leading to inquiry and action that is community desired, and community driven. Given the diverse

development and uptake of collaborative ethnography, there are variable features to the approach, including involving principal consultants as editors, focus groups, editorial boards, collaborative ethnography teams, community forums, and cowritten texts. (Lassiter 2005) Collaborative ethnography emphasizes the development of a participatory network within a group or organization. The research itself becomes a community building exercise and can ethically empower those who may not usually have a voice. (Higginbottom and Liamputtong 2015; Lassiter 2005; Fluehr-Lobban 2008; Greenwood, Whyte, and Harkavy 1993; Brydon-Miller, Greenwood, and Maguire 2003) For these reasons, collaborative ethnography seemed a logical approach to embolden frontline trauma care providers to share their stories, collectively reflect on their experience, and drive progress.

Collaborative ethnography has evolved as a research approach in anthropology mostly through American, post-modern, and feminist roots. (Lassiter 2005) For example, Sol Tax used a deliberately collaborative style that broke with the standards of the time and resembled early action research. The successes and details of his approach have been debated, but through the "Fox Project" he worked with the Mesquaki tribe in Iowa to identify and study things that mattered to them and that might improve their lives. (Foley 1999) Through collaboration, he sought to make anthropology more socially relevant. Even more pertinently, through the 1970s and 1980s, postmodern and mainly feminist scholars challenged anthropologists to rethink the goals of ethnography. (Marcus 1986; Lassiter 2005; Fluehr-Lobban 2008) In doing so they led to the creation of collaborative methods that confront authority in the ethnographic process and reduce power imbalance between researchers and those being researched. (Marcus 1986; Lassiter 2005) "Subjects" and "informants" become "participants" and "collaborators." This

approach was developed in a different context nearly contemporaneously and has become

participatory action research, a form of social activism in which investigators partner with

disempowered groups at all stages of the process from design through to presentation in ways

that are democratic, liberating, and seek to shift power and effect change. (Baum 2006;

MacDonald 2012; Greenwood, Whyte, and Harkavy 1993; Stringer 2013) In the same era these

shifts were occurring across anthropology, experts in other fields such as economics,

psychology, sociology, and management were having similar revelations about the importance

of including participants and communities in the design, conduct, interpretation, and actions

related to research. (Brydon-Miller, Greenwood, and Maguire 2003; Lassiter 2005; Heron and

Reason 1997) Despite significant differences in tradition and practice, the move towards

collaborative methods represents a broad shift towards engaging in work that is more relevant

to communities. For groups engaging in collaborative ethnographies, the research process can

often be as important as the research outcomes. (Higginbottom and Liamputtong 2015;

Greenwood, Whyte, and Harkavy 1993; Stull and Schensul 1987)

While common in social science contexts, collaborative methods and ethnography in

general are rather unfamiliar to many in the medical community who are often rooted in more

positivist mindsets and engage in projects that align with that worldview. (Albert et al. 2008)

Commitment to the idea that the process is as important as the outcome, and the mind-shift

necessary to understand that the project can change and evolve in unpredictable ways, can be

quite confronting. The role of the researcher changes for every collaborative ethnographic

context based on what the community wants and needs. Given the novelty of collaborative

ethnography to the group, for this project my role was to provide methods support and

maximize the participatory process, while exploring specific research questions that the project team developed around relationships and culture.

Social Capital and Relational Coordination

Social capital is a theoretical lens in anthropology, the social sciences, and management research, with multiple definitions and applications that can be useful in understanding networks and relationships at the organizational level. (Adler and Kwon 2002) Broadly speaking, the various definitions of social capital fit into two main groups, bridging social capital and bonding social capital. (Adler and Kwon 2002) Bridging social capital focuses on how an individual's external ties to other people can be used as resources for personal advancement. For example, Bourdieu's concept from his broader work on habitus and fields suggested that individuals possess power based on their network. He defined social capital as, "*the aggregate of the actual or potential resources [of an individual] which are linked to possession of a durable network…*"(Bourdieu 1986) To contrast, bonding social capital focuses on how the additive strength of all ties within a network facilitate the community's pursuit of collective goals. For example, Putnam described social capital as, "*features of social organization such as networks, norms, and social trust that facilitate coordination and cooperation for mutual benefit.*" (Putnam 1995) This definition highlights the importance of how a group's internal structure can affect cohesiveness and the ability to work towards common goals. Bridging social capital emphasizes the power of relationships for individuals while bonding social capital highlights the power of relationships for groups. More recently, working definitions have incorporated both bridging and bonding forms of social capital; Adler and Kwon state, "*Social capital is the*

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goodwill available to individuals or groups. Its source lies in the structure or content of the

actor's social relations. Its effects flow from the information, influence and solidarity it makes

available to the actor." (2002) In the specific setting of trauma care, this final definition of social

capital resonates most. Both bridging and bonding social capital are relevant. Trauma care

providers rely on the power of their individual relationships to accomplish specific tasks (e.g.

the trauma team leader consulting a colleague) but the success of the trauma service overall

relies on the additive strength of all such individual relationships (e.g. getting a trauma patient

to operating theatre relies on over 20 individuals interacting with each other effectively).

Despite challenges navigating the complexity that exists in the landscape of theories concerning

social capital, the fundamental notion that there is inherent value in strong relational ties is

clear. Applying this literature to the project at hand, I was left with the question, *how can*

relational ties be measured and targeted for improvement in an effort to better care for trauma

patients?

Relational Coordination (RC) is a theoretical lens that provides one such conceptual

avenue to measure the relational strength of work teams and demonstrates the relevance of

those ties to measurable outcomes like better patient care. RC theory describes relational

factors that facilitate optimal work in high functioning organizations. (Gittell 2006; Gittell 2016)

The theory highlights contributing factors to the informal coordination of work between

individuals and groups in complex, interdependent work environments. It illustrates how

relationships, and their associated social capital, can translate into real benefit for a group. It

specifies three relational dimensions that support coordination: shared goals that transcend

specific functional tasks, shared knowledge that enables team members to understand how

their tasks interrelate with others, and mutual respect that allows members to overcome status

barriers and positively regard the work of others. These relational factors have been strongly

linked to social capital of healthcare providers in outpatient medical settings. (Lee 2012) In high

functioning teams, the relational dimensions are reinforced by communication that is timely,

frequent, accurate, and problem solving-based. Together, the three relational dimensions (shared knowledge, shared goals, and mutual respect) and the four features of communication (timely, accurate, frequent, and problem solving-based) make up the key components of relational coordination seen in Figure 2.
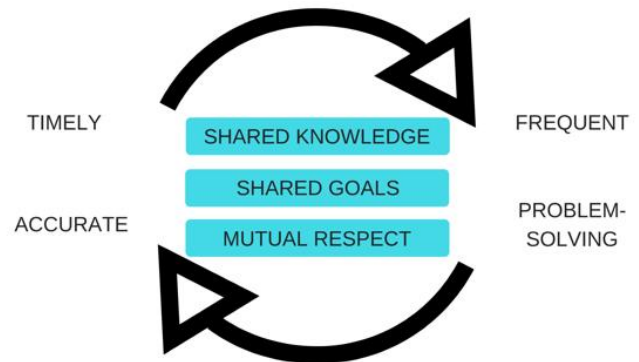
Fig. 2 - RC theory suggests relational dimensions (shared knowledge, shared goals, and mutual respect) when combined with communication (that is timely, accurate, frequent, and problem-solving based) teams can effectively coordinate complex work. (Gittell 2016)

RC theory was developed by Jody Gittell in the 1990s through research related to the

airline industry. (Gittell 2006; Gittell 2016) Like trauma care, air transit is a complicated

undertaking. Each day hundreds of thousands of passengers, and their baggage, travel

nationally and internationally. This requires the coordination of many different parties – ticket

agents, baggage handlers, managers, passengers etc. Gittell chose the airline industry as a

model for organizations whose work is complex, interdependent, uncertain and time

constrained. Early in her investigation, she recognized that Southwest airlines was as a model

company in terms of performance outcomes and customer satisfaction. She began to compare

Southwest with other providers in attempt to understand what made it more successful than its

competitors. In doing so she identified that shared goals, shared knowledge, and mutual

respect in the setting of mutually reinforcing communication that is frequent, timely, accurate, and problem-solving based were essential components of coordination. She found that the relational dimensions enabled the formation of a collective identity which could then facilitate collective action. (Gittell 2006; Gittell 2016)

The component factors of RC, and the aggregate "RC Index" can be quantitatively measured reliably across settings. Cross-sectional observational studies across multiple different contexts show correlations between high degrees of RC and success in industry specific outcomes. (Gittell 2016) The theory has been applied in various healthcare settings ranging from outpatient clinics, to surgical wards, to medicine wards, to nursing homes; in those contexts, high degrees of RC have been correlated with reduced patient pain scores, shortened hospital stays, and higher job satisfaction for providers. (Gittell et al. 2000; Gittell 2009; Gittell 2016; Lee 2012; Blakeney et al. 2018; Gittell et al. 2018) Although not previously applied in hyper-acute contexts such as the initial management of major trauma, RC offers an attractive lens for inquiry in this setting, particularly when considering the context in which Gittell originally formulated the theory. She purposefully chose to examine coordination through the lens of a work process that was complex, time constrained, and interdependent. Major trauma care certainly meets all of those criteria.

More recently, RC scholars have proposed movement away from studying the RC Index metric as a single measure of correlation in cross section, and instead focus on how the index can be activated as an enabler of community reflection and quality improvement. Organizations can calculate RC analytics, and then use those results to facilitate targeted changes. (Gittell 2009; Gittell 2011; Gittell et al. 2015) Most groups using RC in this fashion send out the

quantitative RC survey which provides numeric results in the form of the RC Index and analytics related to specific relational and communication domains between groups. These numeric values are then used as a nexus for reflection in group meetings. (Gittell 2011) This applied use of RC was of interest to trauma leaders at GCUH, who sought to understand relationships but with the goal of tangibly improving the care of trauma patients. I paired the quantitative RC survey with qualitative questions, participant-observation and interviews to gain deeper understanding about how the relational and communication dimensions of RC in the setting of trauma care manifest and to further support quality improvement. As far as I am aware, this combined quantitative and qualitative application of RC for quality improvement has not been previously described.

Medical Simulation

The project team also identified a particular interest in understanding if and how trauma simulation exercises, outlined in the introduction, impact the culture and relationships of the service. These exercises take significant resources, and while the general sense on the ground is that they are useful, a detailed understanding of their utility had not been undertaken to date.

Healthcare simulation has been used to improve trauma care using a variety of training and quality improvement principles. (Knudson et al. 2008; Capella et al. 2010) Measures of impact of these interventions have been mostly quantitative - related to skills or knowledge acquisition, although more recently there have been efforts to measure teamwork behaviours and clinical outcomes as measures. (Capella et al. 2010; Couto et al. 2015)

There is increasing interest in using 'in situ' simulation – conducted in the actual care environment – as a simulation modality that supports teamwork training, and also the identification of latent safety threats related to the environment or care systems within that environment. (Steinemann et al. 2011; Petrosoniak et al. 2018; Miller et al. 2012; Rosen et al. 2012; Brazil 2017) In situ simulation is often restricted to a single team or department, and less frequently is conducted across organizational interfaces. The optimal design and delivery of in situ simulation to effectively address real world trauma team performance has not been studied. Most in situ design is focused on the clinical conditions being simulated, rather than design or debriefing strategies to enhance team relationships and culture.

Simulation, though, can be situated as a cultural practice beyond simply an educational or quality improvement tool. (Revet 2013; Pelletier and Kneebone 2016; Purdy et al. 2019 A) When viewed through this lens, design and debriefing choices not only reflect work-team culture but might potentially shape it too. (Pelletier 2016; Purdy et al. 2019 A) During simulation exercise design, educators write a case that includes the details of a specific patient presentation and the expected actions of participants and associated simulated response to those actions forming a narrative of sorts. Appendix A is an example of one such simulated trauma case. The way that narratives are designed and the way that participants are positioned in these narratives, goes far beyond teaching medical and technical skills. (Pelletier and Kneebone 2016) Simulation can reinforce ideology about the profession and signal social expectations and values. (Purdy et al. 2019 A) Pelletier and Kneebone demonstrated that simulation itself – and the associated fictional realities, narratives, participants and their contexts – dictate that what is learned goes beyond the intended outcomes of the educators.

They suggest that that simulation has the potential to "bring new realities into being," meaning that what we do in simulation may also shape and change lived reality. (Pelletier and Kneebone 2016)

Over the past five years, a unique commitment to boundary crossing between teams has been the hallmark of trauma simulation at GCUH, although the impact of the simulation design, debriefing, and participation in these exercises for providers has not yet been examined. *Does this exercise shape culture and relationships? How?* As part of the larger collaborative ethnography, the project team was keen to explore questions that lie deeper to the surface than standard approaches related to team behaviours and quality indicators that are common in simulation literature.

Research Questions

Overall, I combined principles from collaborative ethnography and RC theory to approach questions related the relationships between trauma care providers at GCUH and the impact of a trauma simulation program on the development of RC. Data gathered for this thesis were embedded in a larger study that sought to engage the trauma provider community in developing interventions to improve trauma care. The research questions I sought to answer were:

1. How do the dimensions of RC theory (shared goals, shared knowledge, mutual respect, and communication) manifest in the provision of major trauma care?

2. How does an in situ trauma simulation program impact RC between groups involved in trauma care delivery at GCUH?

3. What quality improvement interventions can trauma care providers conceive, develop, and implement through collaborative, reflective practice?

CHAPTER 3 METHODS

Overview

The trauma service at GCUH has an impressive portfolio in traditional, quantitative,

trauma research, but wanted to expand their quality improvement initiatives. The project team,

described in Chapter 1, was particularly interested in understanding how relationships affect

work in the context of trauma and wondered if they could positively shape the relationships

between different care providers. This was on the heels of a number of other departments in

the hospital undergoing smaller studies focused on relationships through the Centre for Health

Innovation, and from insights generated around relationships as fostered through the trauma

simulation program over the past four years. Despite considerable interest, there was limited

expertise within the group to facilitate a systematic approach to the study of relationships and

culture. It is in this context which I provided theoretical and methodological support. In direct

consultation and collaboration with the project team, I elected to explore trauma care through

the lens of RC theory, which as previously discussed has close ties to theories of social capital.

This guided exploration was designed as an enabling step in the larger project that centred

around using RC data to facilitate collective reflection and community envisioned change.

Over a three-month period, I engaged a community of trauma care providers in a mixed-

methods collaborative ethnography. This included an initial consultation with leaders in trauma

care, narrative surveys, participant observation, interviews, and a quantitative measure of RC.

Data gathered during the initial phase were shared with participants which informed

interpretation, collective reflection, and the collaborative development of interventions to

shape relational domains. As of April 2019, these interventions are in various stages of participant-led implementation and evaluation. The data reported in this thesis is from the initial stage of the project including narrative surveys, interviews, and the quantitative measure of RC. Data from participant observation, informal interviews, and participant working groups were conducted as part of the larger project at GCUH and are presented as secondary, supporting data throughout the thesis for additional context.

Initial Consultation

I met with VB at an emergency medicine conference 18 months in advance of moving to the Gold Coast. She is an emergency physician and trauma team leader with specific academic interest in team performance. At the time, we discussed the possibility of applying concepts from anthropology to better understand and improve trauma teams. She acknowledged this to be a significant interest to the GCUH trauma program and identified leaders at the institution who would be most appropriate to consult in the initial conceptualization and design of such a project. These leaders, who made up the core project team, were from each of the working groups outlined in Figure A and further described in Chapter 1.

Through a series of emails and meetings the core project team expressed interest in improving team performance, in part by understanding the relationships between the different groups involved in the initial management of severe trauma patients. The team interest in relationships stemmed from a number of experiences. Firstly, all individuals described times when they perceived that conflict between teams negatively affected care. They also recognized that good relationships often facilitated faster, better care for patients. Many on the

team had also heard of other departments at GCUH that had undergone RC analysis through the Centre for Health Innovation, which primed them to the idea that relationships could be a focus for quality improvement. Finally, all had engaged in trauma simulations over the past four years, and felt that this impacted their work relationships, but were unsure how or why this was the case. These considerations together drove interest in further exploring the relationships between trauma care providers as a first step in a quality-improvement process. During these meetings I suggested the idea of including frontline trauma care providers as much as possible throughout the process. All on the core project team were keen to democratize engagement which ultimately led to the overall design of a collaborative ethnography through the lens of RC theory.

Data Collection

Survey

The core project team distributed a survey (Appendix B) with three distinct parts: RC survey (not included for copyright purposes), narrative experience with trauma care, and experience with in situ simulation. The RC questions assessed the strength of communication and relationship ties between participating work groups. Participants were asked to rate their perceptions of communication and relationship behaviours between their own work group and the other work groups along the 7 dimensions of RC. (Gittell 2011) The RC survey is a tool that has met psychometric validation standards across multiple populations and is suitable for use across team boundaries in the healthcare setting. (Gittell 2011; Gittell et al. 2015; Valentine, Nembhard, and Edmondson 2015) Four narrative questions related to experience with trauma

care provision and five questions related to experience with in situ simulation followed the RC

survey. These questions were piloted and refined with representatives from each group. The

survey was distributed to all care providers in each of the working groups depicted in Figure A.

The survey was administered via a unique on-line survey link sent to the work email

address of all staff in each of the working groups in Figure A. The research team collected the

names of these staff from the respective line managers and sourced their respective

Queensland Health email addresses using the Outlook email address book. A total of three

emails, the first introduction email and survey link and two follow-up reminders were sent to

participants.

Interviews and Participant Observation

To further contextualize the survey results, I conducted five semi-structured interviews

(interview guide Appendix C) with key personnel. These interviews were recorded and

transcribed. As part of the broader project, over a three-month period I also conducted

participant-observation and informal interviews. This included approximately 75 hours of

participant-observation of randomly selected traumas, consecutive educational activities, and

daily activities of individual trauma providers identified through key informants. During

participant observation of traumas, I was involved from initial alert to the team, through to final

patient disposition. I focused specifically on observing interactions and communication

between members of different groups on the trauma team. Observations were focused around

the RC domains but were not exclusively limited to that framework if there were other aspects

of team performance and relationships that seemed particularly relevant. Participant-

observation of educational activities was also focused on RC domains. Time spent with individuals during their daily activities was less structured participant-observation and was focused on building understanding of how trauma care is provided at GCUH in the context of other work. I engaged in an additional 25 hours of informal interviewing of trauma providers across these contexts. This activity informed field notes. Participant-observation and informal interviewing stopped when saturation of RC themes occurred, and no new themes were identified as determined by EP, CA, and VB. Data gathered as part of the larger project from participant-observation and informal interviews are included in the results of this thesis as the insights and perspectives I gained from this process are impossible to separate from my interpretation of survey and interview data. The entire research experience shaped my understanding of the results that I present.

Data Analysis

Quantitative RC data were analyzed by the RC analytics team according to procedures detailed by the instrument's developer. (Gittell 2011) According to their standard practices, RC indices were constructed at the individual participant level across each of the seven dimensions of RC then aggregated to the group level. Collation at the group level provided a numeric indicator of the strength of each relational interface in each dimension between and within each working group. This means that each individual participant rated other working groups and their own working group across all seven RC dimensions. The values for individual participants within a specific working group were then combined with all the others in that same working group to create the RC index rating between and within groups. For example, a

surgeon completed the survey scoring all groups across all dimensions. Her results, and calculated RC indices were then combined with all other surgeons to create the aggregate RC values between groups (e.g. surgery's perceived RC with emergency medicine) and within groups (e.g. surgery's perceived RC with members of their own group). An overall "Team Score" for the entire cohort was also calculated by the RC analytics team as the aggregate of all RC indices. Cut points for strength of ties (weak, moderate and strong) between and within groups are based on norms from established data. (Gittell 2011)

Qualitative data from narrative surveys, participant-observation, informal interviews, and interviews was input into NVivo and analyzed using a recursive approach. (Shensul & LeCompte 2012) Data were anonymized then coded by EP and CA using the RC framework (shared goals, shared knowledge, mutual respect, and four domains of communication) as initial themes. Further themes were identified and agreed upon by EP and CA. Information from initial data collection (survey and early participant observation) informed further participant-observation, informal interviews, and interviews. This simultaneous deductive and inductive approach has been previously described by Schensul & LeCompte. (2012)

The initial analysis (from surveys and interviews) and original data were presented to the project team for further interpretation and initial member-checking. Insights and further questions generated from the initial data became the focus of observation and informal interviews as the ethnographic process evolved. Data from these field notes were then input into NVivo and analyzed as above.

Participant Working Groups

The qualitative and quantitative data from the ethnography were not designed to be evaluative, but rather served as a launch point for collective reflection, discussion, and design of collaborative interventions with a broader group of participants. At two points, findings were shared with all trauma care providers via written communiques. All providers were invited to smaller in-person group meetings where the findings were discussed in detail and open to further interpretation. At those same meetings, VB facilitated a discussion that sought participants' perspectives on potential interventions to improve trauma care based on the initial findings. The potential interventions suggested during participant working groups were brought back to the team of core leaders in each of the clinical areas for prioritization. Champions for each intervention, not necessarily core project team members, were identified for ongoing action. Support of the research team and simulation service were available for those designing, instituting, and evaluating specific projects. The implementation and evaluation of these individual projects is ongoing as of April 2019.

Ethical Considerations

Informed consent for participation in the survey and formal interviews was obtained. For the survey, which was distributed online, consent was indicated through a click through process. For interviews, written consent was obtained. Audio from interviews were transcribed and anonymized then the audio was destroyed. Transcriptions and survey data were stored in a password protected file on a password protected computer. Ethical approval for the initial measure of relationships through surveys and interviews was granted by University of North

Texas.

The broader project including the survey, participant observation, informal interviews, and formal interviews, and working groups was approved by the Gold Coast Hospital and Health Service Human Research Ethics Committee (EC00160). Consent for participant observation and informal interviews of staff was based on an opt-out and verbal consent basis. Given the fluid nature of trauma care (many different parties in and out of the room requiring immediate action and not convening collectively afterwards) it was impossible to acquire written consent at the time of observation. All staff members potentially involved in the early phases of major trauma care were made aware in advance via departmental email and announcements at grand rounds that participant-observation may occur during trauma activations between August-November 2018. Plain language description of the project and role of the participant-observer was shared multiple times before and throughout the observation period with opportunities for staff to raise questions or concerns with researchers or an independent third party. Every two weeks a schedule of observation times was posted at the administration desk of the emergency department and individuals could anonymously contact a third party to request that observation not take place on specific day if they wished not to participate. Furthermore, at traumas I identified myself as an observer and sought verbal consent from the trauma team leader to proceed with observation. Though this study was designed to study trauma care teams not patients, signed informed consent was obtained at the first possible opportunity (once emergent needs of the patient were attended to) from patients or substitute decision makers who were present during my observations of the team. Verbal consent was obtained before informal interviews of staff.

"[there was a] *multi trauma patient that required CPR and thoracotomy - it still sticks in my mind- excellent communication in a room full of people…I just remember standing back thinking we are all trying so hard with the same goal to try and save this young person's life - the communication was short and sharp and not offensive and in the chaos, there was in fact calm."* – Emergency Nurse

Overview of Findings

The findings in Chapter 4 relate to the application of the RC framework to data from surveys, interviews, and fieldnotes to explore how relational coordination manifests in trauma care at GCUH. Chapter 5 showcases specific ways in which RC might be fostered in trauma through team briefings, translational simulation, and community-developed interventions. Overall the three relational dimensions and four aspects of communication outlined in RC theory were easily identified as important in trauma care and facilitated community reflection on how trauma providers might do their work better, together.

Relational Coordination in Trauma Care

The RC survey, narrative survey, and interviews provided insights about the state of relationships and the ability to coordinate work in the current context of trauma care at GCUH. As mentioned above, data presented below served as a jumping off point for community reflection and action, rather than for evaluative purposes. In this section I wrestle with my first research question by outlining overall RC quantitative analytics for the group then presenting qualitative findings related each of the RC domains including relational dimensions (shared goals, shared knowledge, and mutual respect) and enabling communication practices (timely,

accurate, frequent, and problem-solving based) to show how RC manifests in the unique setting of trauma.

RC Analytics

As seen in Figure 3 and Figure 4 below, the overall initial picture from the baseline quantitative RC data was that of strong interdepartmental relationships (in green) with opportunities for progress (relationships in red). Thirty-seven percent (180/482) of providers across all care groups completed the survey with variability in response rates between groups. (ED 43%, Trauma 93%, ICU 35%, QAS 100%, Imaging 29%, Anaesthetics 24%, General Surgery 12%). The RC "Team Score" was 3.83 which correlates to moderate ties between all groups. Figure 3 shows the breakdown of the RC "Team Score" by RC domain. RC indices between and within groups are depicted in Figure 4. This data was presented with the qualitative data below, to trauma care providers as an enabler of reflection about relationships, ability to coordinate work, and how trauma care might be better.

(N=180)	Mean	Min	Max	% N/A
RC Index	**3.83**	**3.43**	**4.16**	**9%**
Frequent Communication	4.17	3.65	4.65	9%
Timely Communication	3.75	3.33	4.25	10%
Accurate Communication	3.77	3.41	4.09	10%
Problem-Solving Communication	3.71	3.27	4.01	14%
Shared Goals	4.01	3.65	4.34	10%
Shared Knowledge	3.66	3.30	4.21	6%
Mutual Respect	3.75	3.32	4.18	7%
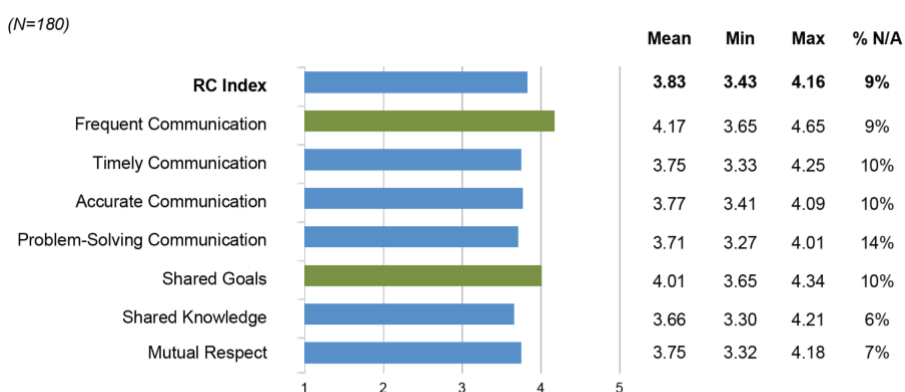
Fig. 3 - RC team metrics showing average scores for all trauma care providers combined across each RC relational and communication domain

Ratings of

Ratings by	Emerg	Trauma	ICU	Prehosp	Surg	Imag	Anaes
Emergency	4.53	4.19	3.89	4.29	3.39	3.78	3.52
Trauma Service	4.17	4.61	4.07	4.09	3.46	3.53	4.02
Intensive Care	3.67	4.04	4.36	3.72	3.37	3.50	3.90
Pre-hospital	4.66	4.29	3.16	4.26	3.34	3.63	3.36
General Surgery	3.91	4.14	4.10	3.50	4.14	3.50	4.00
Medical Imaging	4.17	4.06	3.71	3.58	3.48	4.61	4.01
Anaesthetics	3.81	3.95	3.93	3.78	3.58	2.89	4.57

	Within Group	Between Group
Weak ties	<4.1	<3.5
Moderate ties	4.1-4.6	3.5-4.0
Strong ties	>4.6	>4.0

Fig. 4 - RC index between and within care provision groups

Of particular note are the strong ties of trauma service as rated by other groups. These positive relationships were apparent throughout the study, particularly in participant observation and working groups. Others saw the trauma service as the centre of care for patients from the moment patients entered the hospital in the resuscitation bay to the day they were discharged and beyond through to rehab and trauma follow up clinics. The trauma service admits patients, but they also follow patients under the care of other services, as such they have consistent and frequent contact with all parties involved. They were often described as "*problem-solvers*" and regarded as supportive and as an enabler of others' ability to do their job as well as possible. I spent time discussing how this reputation came to be and one trauma nurse told me,

> "*We tread a very gentle path. We try to leave very few footprints whilst going through all these different teams. We knew that when we set this* [the trauma service] *up it was going to be new and foreign. We had a lot of tribes to work with and work in between. You know, surgery, neurosurgery, orthopedics, ED, theatre, ICU, the wards, all these*

people we had to get on with to make it work. So we have done a really good job of being…um…non-invasive but advisory." – Trauma Nurse

This approach was echoed in conversations with other members of the trauma service including its directors. To put it simply, the trauma service overtly and deliberately prioritises functional, supportive relationships with their colleagues of all varieties around the hospital.

Also uncovered by the RC analytic data were weaker ties with the surgical service as rated by all other groups, except anaesthetics. The reasons for this are complicated, and even in my expanded qualitative study not fully uncovered. One contributing factor seemed to be the strong presence of trauma service surgeons during daytime hours which limited trauma involvement of other general surgeons and registrars who provide after-hours coverage only. For the purposes of this study the trauma service surgeons were categorized by participants as members of the trauma service not the surgical group. Interaction with other surgeons, which occurs only outside of trauma service hours, is much more limited and may contribute to the finding of weaker RC ties with the surgical group in our results.

A second perceived issue, related to the competing priorities of surgeons, and the reality that sometimes they are not available when needed. One participant wrote,

> *"Probably the worst situation is where an activation gets no response or where needed team members are physically stuck and unavailable but needed. For example, out of hours surgeon on call in theatre with emergency case…and a red blanket type patient* [critically unwell bleeding patient] *presenting in ED so there is no shared decision making or clear availability of surgical/anaesthetic/theatre services."* – ICU physician

This quote and other informal conversations highlighted that surgeons, who provide coverage overnight and after hours when the trauma service is not available, often have significant competing priorities which may prevent them from fully engaging with the shared goals for a

trauma patient in the ED. Their responsibilities for other surgical patients and with other unwell

patients on the ward sometimes result in delays in their presence or ability to provide the

necessary care. Dramatic moments, such as the one described in the quote were rare in my

experience but the long-lasting effects on other providers if they did occur was significant. The

inability to provide something they knew a patient needed seemed unsettling. More frequent

than such dramatic situations were delays in assessment or decision-making. One emergency

physician wrote,

> *"Trauma activations at night do not go as well…the surgical registrars often disappear*
> *without communicating management plans (probably because they don't know the*
> *plans). It takes an awful lot longer to come to a management plan about a patient's*
> *disposition (OT vs no OT) at night."* – ED Physician

Stories, both the dramatic and just the inconvenient, travelled quickly and persistently amongst

other care groups. It was not unusual to come into the hospital and hear a registrar at ED

handover say comments such as these paraphrased versions, *"the patient is still in the*

department because the surgeons can't make up their minds" or *"you are not going to guess*

how many times I had to call the surgeons before they came and saw the patient." The story

then seemed to belong to everyone who heard it. If it was particularly sensational it was passed

on again. Some of these perceptions, experiences, and attitudes towards the surgical group

were shaped by frustrating experiences outside of trauma care specifically but were likely

impossible for participants to compartmentalize when considering relationships in the setting

of trauma. A multidirectional pattern of negative talk, one that interestingly crosses

international borders from my experiences as a trainee in Canada, likely directly threatens the

development of mutual respect between groups and could have contributed to the result of

weaker relational ties with surgeons in our study. I have been on the telling and receiving end

of these stories many times throughout my training. Being the anthropologist observing them

in through the lens of team relationships has dramatically shaped my understanding of their

significance. Further issues related to mutual respect are explored in the section "Mutual

Respect."

Two surgical registrars provided me with important perspectives in informal

conversations and in the formal interview. Interestingly, they were not particularly surprised by

the findings – in that they knew their relationships could be better with other groups. One said

that they wished there was "*less assumption both ways*" which highlights an understanding of

the schism that exists. One nurse echoed the dangers of the assumptions that we make about

our colleagues. She said,

> *"...other groups and services have other priorities that we don't understand. When a trauma patient comes in they become the priority in the emergency department and we kind of assume that they are also everybody else's priority and that may be an unfair assumption."* – ED Nurse

Fundamentally, in our discussions it was clear that surgical registrars want to do a good job.

Like other groups, they felt frustrated and stressed when competing priorities prevented them

from engaging with trauma cases effectively. Occasionally they felt misunderstood and

overwhelmed. Importantly the surgical registrars highlighted to me that they receive little

introduction to the expectations of their role in trauma when they are on a block that provides

coverage overnight. Their understanding of their role on the trauma team is one that they have

largely forged themselves, often without anyone specific to model. One surgical registrar

participated in a three-month block with the trauma service and found that time to be

transformative in terms of his understanding of how trauma care works at GCUH and the role of

the surgical registrar in the team. Both of these registrars voiced interest in improving relationships but did not know how it could be done.

The result of poor relational ties between most groups providing trauma care and the surgical service requires ongoing reflection and investigation. I feel that I just got below the surface in my work. Relationships with surgeons impact the care of patients well beyond trauma and efforts to improve them are likely to have more broad reaching implications too. The weaker ties identified through RC metrics drove certain community interventions, outlined in the section "Community Developed Interventions."

Overall, I found that the graph and table outlining relational ties were an effective way to initiate a discussion around relationships with groups of clinicians who are not used to having a language or even a desire to discuss what they perceive to be "*soft*" topics. The data rich table, which we shared via communique, helped to draw participants into discussion in interviews, informal conversations, and in the working groups. There was always a brief focus on the numbers by participants. The trauma service even shared a few high-fives over their row of green. But quite quickly, in all groups and with all individuals, the discussion pivoted away from numbers to a more nuanced conversation of relationships in trauma and a forward-looking vision about how trauma care could be better at GCUH. Those discussions went well beyond red, blue, green and informed the community developed interventions. Alone, I find the table rather unhelpful, but it came alive when participants reflected on what it meant to them, their practice and how they might improve.

Shared Goals

Qualitative data illuminated the importance of shared goals in maintaining momentum along the trajectory of care for critically injured trauma patients. In this section I will identify the types of shared goals that are relevant in trauma care, the importance of the team leader in synthesizing and communicating those goals to the team, threats to leader synthesis of shared goals, and the concept of collective responsibility when shared goals are lacking.

The overarching shared goal for the trauma team seemed simple; all providers wanted to provide high quality, patient centered care. However, several other goals had to be aligned for that overarching ideal to be met. These goals were often the focus of formal teaching in trauma, identified by individuals as important in informal conversations, and were frequently raised in debriefs. Common "micro goals" included 1) the identification and management of immediate life threats 2) simultaneous assessment and treatment of injuries 3) acquisition of early diagnostic imaging and, 4) determination of patient disposition (ICU, theatre, ward). Case by case "micro goals" based on specific patient presentations were also often identified such as the setting of a blood pressure targets for a patient with traumatic brain injury or the simultaneous assessment of a fetus in the pregnant trauma patient. Individuals on the team contributed to the achievement or failure to achieve these "micro goals", often contributing to many or all the goals as part of their role. In the narrative survey we asked participants to describe traumas that went well and traumas that went poorly. The interpretation of these qualifiers was left in the hands of participants but reflects the language used in the hospital every day to discuss clinical experiences by healthcare professionals. In general, there is a sense that cases can "go well" from a team perspective even if the outcome for a patient is poor.

Usually this is a situation in which a patient is severely injured and despite a near heroic team effort the patient dies. Similarly, even when patient outcomes are good, the trauma team can be left feeling they could do better as a group. For example, emergency physicians described situations where patients had minimal injuries, and ultimately would do well, but required admission to the hospital but faced significant challenges in identifying a service that would admit them resulting in lengthy stays in the ED. Reflections from participants in response to broad questions about cases that went well and cases that went poorly often focused on the alignment of the above "micro goals." Survey respondents noticed when traumas went smoothly, goals and patient trajectory were clearly defined. One ED nurse wrote,

> "*trauma resuscitations work well when all specialties have the patient's best interests at heart and are able to communicate to the whole team in a timely manner including plan for treatment and priority of tasks*." – ED Nurse

Similarly, in traumas that participants felt went poorly the priorities around management were less well defined and sometimes even conflicting. One anesthetics consultant noted, "[in a trauma that went poorly] *everyone* [was] *doing their own thing without any coordination, people having conflicting opinions on management and unwilling to have cordial discussions.*" These quotes are representative of many from the survey, interviews, and observations that identify the presence of shared goals as important for effectively caring for the severely injured trauma patient whose condition can change rapidly. *So, how in these challenging conditions do teams define and prioritise goals*?

Narrative responses and interviews provided insight, into how shared goals were defined for a specific trauma patient and upheld in real time. Primarily it seemed to be the responsibility of the team leader, but informed by the expertise of others in the room. Survey

respondents recognized the importance of the trauma team leader in setting the trajectory for the patient and facilitating momentum towards the achievement of "micro goals." The role of the trauma team leaders is held by emergency medicine consultants during the day and emergency medicine registrars overnight. One described their role below,

> "*I tend to coordinate the care and overall early management with involvement of trauma services to determine disposition of critically unwell patients. I coordinate team members responsible for airway, primary and secondary survey whilst managing resuscitative care, coordinating treatment and assisting inpatient teams with disposition planning.*" – ED Consultant

This description shows the large amount of complex information the team leader is assessing and processing in real time to facilitate and drive care. The challenge for the trauma leader becomes synthesizing information in a way that can help alert and align each of the teams (airway, primary and secondary survey, resuscitation, inpatient teams) to the main priorities for the patient and expedite movement along the expected trajectory. Another trauma team leader recognized the importance of that assimilation process.

> "*I feel that the role of the team leader is more than just making decisions, it is also about controlling the atmosphere of the room so that there is a clarity of vision and direction of care that the team can follow.*" – ED Consultant

This "*clarity of vision and direction of care*" often manifested as defined priorities with tangible associated outcomes. For example, one trauma team leader wrote the below reflection on a trauma they felt went well.

> "[The] *patient* [was] *coming in via care flight with suspected head injury otherwise stable with negative FAST and intubated on scene.* [We were] *notified in advance, roles allocated prior to patient arrival, discussed likely issues with the patient and how we would manage them + likely sequence of events prior to patient's arrival. Timelines given* [for example] *expect patient to have had CXR + pelvis by 5 mins, CT by 10 mins and up to theatre in 15 mins…*"- ED Consultant

In this example, the team leader was able to align shared "micro goals" (early imaging and disposition) even before the patient arrived. This gave all involved the opportunity to understand how their specific role fit into the overall goal. Furthermore, precise times related to those goals served as a benchmark for which the entire team was striving towards. Specific goals with an associated timeline were not just a preference of trauma team leaders but were also reiterated as particularly helpful from others on the trauma team through the narrative responses and again in interviews with the trauma surgeon, emergency medicine nurse, and trauma nurse who said,

> *"…this team leader kept timing what we were going to do. In 2 minutes I want this done, in 3 minutes I want this done, in 4 minutes we'll go to CT or whatever. So those time points and that direction just really worked well for us and the patient, the patient was conscious and you know ended up having a reasonable outcome from all of this but… I could also tell that they felt confident in the surroundings of what was happening. And those time points were virtually met and you know we progressed through a really well, organized, trauma resuscitation.*" – Trauma Nurse

While there were many examples of definable goals for specific cases such as time to operating theatre, prioritization of external hemorrhage control, and securing the airway, the overall concept of getting to the CT scanner quickly and safely came up most often and is relevant to the vast majority of trauma cases. It seemed that the information provided by that specific diagnostic imaging test contributed significantly to further defining the disposition and management for most trauma patients accounting for its recognition as an important goal in the resuscitation timeline. It was a clear marker of forward momentum in patients' care.

In most cases the trauma team leader appropriately shouldered the responsibility of synthesizing expertise to create goals then communicate those goals to the team, however, there were some circumstances when they failed to do so adequately. These circumstances

occurred with even the most experienced leaders at the helm. Examples of such situations

included cases where there were multiple competing injuries (i.e. head injury and abdominal

trauma and pelvic trauma), or when there was a particularly complex patient (i.e. pregnant

trauma patient), or when there were significant department pressures (i.e. multiple patients

requiring resuscitation), or most often when the team leader felt that they had identified and

communicated goals but those on the team did not perceive it to have happened. The

consequences were often particularly relevant for nursing staff who were responsible for

enacting medical orders but sometimes had a limited set of resources for doing so. One nurse

described the issue from their perspective in the narrative survey.

> "*Each consultant or registrar from each specialty often butt heads with who should be making decisions and what needs to happen next. This can become extremely difficult for nursing staff as we have 2-3 and sometimes 4 doctors giving different orders which are all conflicting. I have been in situations where I am given a verbal drug order by an ED doctor which was then questioned by the anesthetic doctor and then the two squabbled over whether it should be given and how much and why not etc - while the patient is deteriorating in front of us.*" – ED Nurse

This perspective demonstrates the effect of a lack of shared goals on direct patient care.

Patients may not receive the medications they require, tests that should be completed, or care

they need when competing demands are not prioritized effectively and communicated clearly.

Given the importance of shared goals and the occasional failure of team leaders to

adequately provide "*clarity of vision and direction of care*", I became increasingly interested in

understanding how teams navigate in situations when they feel that definition of shared goals

are lacking. *The goals were expected to be synthesized and communicated by the team leader*

but what happens when that does not occur? Trauma teams naturally prepared then enacted

contingency plans for high-risk situations (e.g. having a back-up plan, or three, for a challenging

intubation of a patient with severe facial trauma during a simulation or offered support and advice to a registrar struggling to put in a chest tube) but contingency planning for the more common and potentially dangerous setting of a leader who fails to provide lack of clarity around shared goals was not the norm. In informal interviews it seemed that trauma care providers were often attuned to circumstances when "*clarity of vision and direction of care*" were not provided by the team leader and found it distressing but did not feel empowered to identify and enact mechanisms to prompt or support the leader in identifying those shared goals for the group. This hesitancy was sometimes related to hierarchy (i.e. a junior registrar feeling that they could not speak up to a staff) or a desire not to offend (i.e. senior ED colleagues not wanting to be perceived to "take over" a resuscitation). In other circumstances, individuals made efforts to address the lack of shared goals. One responded by taking over the leadership void directly. In an interview a surgeon told a story about a time when he felt that he had to redefine goals for a particular patient, and in doing so realized that he may be overstepping some usual role boundaries.

> "*I just didn't want to have a peri-arrest who then needs a thoracotomy, not a laparotomy, or both. Let's face it. So, I actually sort of stepped in and took him* [the trauma leader] *out of the resuscitation space and said "look the patient needs a laparotomy, we go now." I know I was quite firm about that…. It worked. The patient was basically called red blanket right then and that was the initiation to pack and go. I heard then from others that this consultant felt very offended.*" –Surgeon

Another strategy was basic clarification with the team leader. I observed that in certain circumstances individuals, usually senior nursing staff, on the team tried to seek out the shared goals from the leader. In an interview one nurse shared,

> "*I would like to think that it's part of the senior nurse's practice to say "where are we headed with this, what is the ceiling of care for this patient." To prompt the "where is this endpoint?" I think it's really important, really important.*" - ED Nurse

I occasionally saw variations on the question "*where are we headed?*" asked by other team

members. Usually it came from another ED consultant, the trauma surgeon, senior nurse, or

senior ED registrar. Yet, such a question could conceivably come from anyone in the room. This

simple question almost always prompted the team leader to provide a summary of the case so

far, then define priorities for the team moving forward. It was usually well received and

effective in getting the case back on track. These moments led me to conceptualize the

presence of shared goals as a total team, not solely an individual team leader, responsibility.

Meaning there is a role for team members to identify when the leader is not adequately

providing direction then encourage and support them to do so – in the same way that team

leaders recognize then support others struggling with their assigned tasks. In the section

"Mutual Respect" I will further explore the factors that make teams psychologically safe enough

for this type of interpersonal risk taking in the face of defined hierarchies and defined roles.

Shared Knowledge

In the RC framework, shared knowledge specifically relates to understanding the roles

of others on the team. In this section I will explore the importance of roles in the trauma bay,

the interdependency of roles within the hospital, and how trauma care providers develop this

knowledge.

The most basic way already in place that trauma teams at GCUH built knowledge of

roles was by having each person who entered the trauma bay put on a sticker that stated their

role. The ED consultant wore "medical team leader." The ED registrar was the "airway doctor"

or "procedure doctor." ED nurses donned one of three ED nursing role stickers. Consulting

services had appropriate labels too. Individuals answering the survey recognized that the labels

were necessary but probably not sufficient to truly understanding roles. One survey respondent

wrote,

> *"…knowing non-ED team members (i.e. with regards to skills and personality) allows for*
> *better communication, problem-solving and trust in each other's decisions."* – ED
> Consultant

In the survey and interviews, some groups felt underutilized as a result of misunderstanding of

roles. For example, anesthetists attended the trauma responds but an ED registrar usually acted

as the primary airway doctor and was aided by an airway nurse. This left the anesthetics

physician relatively free for other tasks, a reality that sometimes went unrecognized by the

team leader. Anesthetists ventured that their vascular access skills were underutilized and

described situations when they felt uncomfortable as they stood back and watched junior ED

staff struggle to place cannulas, ultimately delaying care for the patient. Similarly, the ICU

physicians felt as though they could be of significant assistance in the direct management of

concerns related to elevated intracranial pressure or the management of the transfusion

process. They noticed the ED team leader taking on the minutia of the management of these

relatively complex tasks, while also trying to maintain broader situational awareness.

Comparatively, in complex traumas that went particularly well it seemed that teams

understood what individuals in particular roles were capable of then trusted them to use those

skills autonomously towards achieving the pre-defined team goals. For example, a trauma

nurse described a situation where they recognized that the team leader assigned individuals

into sub-teams (airway, hemorrhage control, vitals and access, procedures) then allowed those

teams autonomy to function rather independently. Individuals were then able to work at the height of what they felt they could contribute. They said,

> *"[in a trauma that went well] I particularly remember a motor bike accident, some nasty injuries to limbs and chest, but what really stood out was the...preparation, prearrival preparation and the direction of the team leader...He was able to direct all the participants in the team to number one assume their roles, and identify themselves in their roles with their gowns and label but also then introduce each other by name and got those teams to work through what they needed to prepare before the arrival. So each section was working together."* – Trauma Nurse

This type of team structure, one that incorporates sub teams, required strong understanding of roles of the individuals involved, relied on a trust that people would ask for help when needed, and required that sub-teams understood the overall priorities for the patient as discussed in the previous section. The team leader facilitating this overall structure had to understand the skill level and mix of those involved and create sub teams that were well suited to specific tasks in a way that supports the overall goal. Some professional teams have the advantage of working together all the time, this is not the case for trauma. On a given day, for a given case, an ad hoc group of individuals gathered to care for a patient. Those people were at various stages of training, had various levels of comfort with trauma, and had relatively unspecified strengths and weaknesses. Knowledge of roles was not static and often had to be re-established at the beginning of each case, though this did not always happen. We will explore later in this chapter how the team briefing was used by some team leaders to rapidly establish knowledge about roles.

Knowledge of roles and their interdependency facilitated the coordination of care for trauma patients. For example, during an interview one of the HARU paramedics described a time when he was at the scene of a stabbing at around 9pm. He recognized that given the hour

of day the ED consultant would soon be leaving the ED. He was aware of their usual schedule

and practices so chose to call earlier than he otherwise would, even before arriving at the scene

he was headed to. He said,

> *"…I mean on my last night shift we had a person that was stabbed three times at 9
> o'clock at night and we were going to rescue them from up on an island. So I phoned the
> consultant and said – I know you normally go home around 10 or 10:30 but I'm going to
> have someone who has been stabbed 3 times uh if you want to stick around that would
> probably be ideal. So yeah, you know enough about their usual method of operation to
> be able to phone and give them heads up..."* – HARU Paramedic

It seems simple but in fact, this phone call represents an example of a sophisticated form of

tacit organizational knowledge that can significantly impact patient care. The early phone call

meant that the patient arrived and was met by an experienced senior consultant rather than

the potentially junior night registrar. Such awareness of how an individual's work interrelated

with that of another's was an essential feature in traumas that went well. Other examples

included CT radiographers reflecting on the fact that simple actions undertaken in the trauma

bay (removal of jewelry, belts, and maintenance of ability to bring the arms above the head)

dramatically improved their ability to obtain high quality images in an efficient a manner. They

noted that when this was not done in advance the patient often spent an extra 5-10 minutes in

the CT scanner. In discussions during simulation exercises and working groups, other members

of the trauma team were unaware of just how important consideration of these factors was to

the job that CT radiographers were performing. This extra time in the scanner was perceived by

all to be unsafe for the patient and inefficient for the department. Furthermore, during a

discussion with an anesthetics registrar I learned about how he conceptualized his role as an

intermediary between the trauma bay and the operating theatre. He reflected that when he

served as an effective intermediary between two different worlds he felt that he could get

patients the care they need more smoothly.

> "He explained to me that "we aren't here so much for the airway - I mean you guys can
> do that most of the time - but we are here to facilitate opening theatre if that's where
> we are headed…" He explained that even though in this case he wasn't needed for the
> airway there still was a very real chance that this patient had intrabdominal trauma that
> would require an OR so he would hang around to see the imaging etc.
>
> If she does need to go to the OR than he would have to work with the anesthetic
> assistant to get things going upstairs. "We can't just go up there and *poof* start
> operating. There are lines to get ready, medications to draw up, equipment to check.
> That stuff takes time and if I can start it early from down here if I know that's where we
> are going then even better. I might be able to predict things. But if I leave then I may be
> behind the eight ball if someone forgets to phone me back. I might have to call my boss
> in too because I am pretty junior and better to know where this is headed early so I can
> give them a heads up if necessary."" – Field Notes

Caring about, and finding ways to maximize understanding around interconnected work was

identified as one path to elevating team performance.

Given the importance of knowledge of roles inside and outside the trauma bay, I

became interested in understanding just how individuals and teams develop that knowledge

about their colleagues. In Chapter 5 I will explore how the team briefing can incorporate explicit

discussion of roles which might ultimately bolster RC for an individual trauma case. However,

time spent together and curiosity about others daily realities also seemed to increase that

understanding overall. One paramedic described that he found handover with ED physicians

who had spent time with HARU to be easier. He told me,

> "[handovers go well with] *those who have spent some time in the HARU program. It's
> preaching to the choir so whether it's the consultants who are you know senior and have
> stayed on the program like XXX and XXX to the people who were registrars on the
> program like XXX. They really understand why I may or may not have done something
> and the time pressures.*" – HARU Paramedic

A trauma nurse noted that they felt surgery residents' perceptions of the trauma service changed as they spent time with the team. For 3-6 months surgery residents are able to work with the trauma program which provides insight into the realities of acute and long-term care of trauma patients. They noted,

> "*That person* [resident] *changed over the time with us to be a much more approachable and engaged surgeon.... And now they say* "they [the trauma service] aren't so bad" *or* "we should really help them [the trauma service] *they are only a little team.*""- Trauma Nurse

There were some other opportunities in medical training for overlap in experiences. For example, ED registrars had to complete an anesthetics term. However, such crossover experiences were not always the case and they disappeared in frequency as individuals become more specialized. Once a fully trained consultant there was very limited, to no, overlap. Furthermore, there was no crossover in formal training between professional groups. I was left wondering how individuals efficiently develop knowledge about roles beyond their own*. How do we develop tacit organizational understanding?* Further work is needed in this area but in Chapter 5 I will explore how in situ simulation might be an effective space for teams to spend time together and to deliberately and inadvertently enhance role understanding. Interestingly, this project itself, through its deliberate collaborative design, brought leadership from disparate groups together regularly and may in and of itself served to enhance role understanding between key personnel in various departments.

Mutual Respect

Mutual respect is seemingly the simplest to understand, but is also the most confronting dimension of relational coordination for trauma care providers. In this section I will explore how

mutual respect manifests (or sometimes doesn't manifest) in trauma care, it's importance in

the creation of psychological safety, and begin to explore how it can be fostered deliberately.

At a bare minimum, mutual respect manifested as collegiality and courtesy.

Unfortunately, for a variety of reasons, this minimum standard was not always met. For

example, despite data that alludes to the importance of CT images in determining trajectory

and care for trauma patients, the CT radiographers described feeling ignored and unimportant

to the team. One said, "*As a radiographer we seem to be quite invisible in a lot of situations.*

When we are scanning, doctors come in and take over our computers and monitors with little or

no communication with us." Though critical to the care of the trauma patient, they were not

made to feel that way by others. A lack of mutual respect featured prominently in the

descriptions of traumas that went poorly. One team leader wrote,

> "[In a case that went poorly we cared for] *an unstable trauma patient with a vascular*
> *injury to the right arm and a tourniquet on, where the vascular surgery registrar was*
> *difficult to deal with. He arrived and was rude, critical of management so far, and*
> *disruptive to the ongoing team-based management of the patient. As the medical leader*
> *I found this challenging to deal with.*" – ED Consultant

The reasons for conflict in this situation and others were not always clear. It was sometimes

driven by circumstance, sometimes by personality, and most often by external stressors. In the

scenario described, the consequence of the behaviours was a situation where the team leader

had to use cognitive space to manage interpersonal conflict rather than focus efforts and

energy towards caring for the patient. However, trauma team leaders were also actually the

source of stress for the team. Occasionally, situations arose where the trauma leader behaved

in a way that did not foster mutual respect. One trauma team member wrote,

> "[it was a] *hypovolaemic arrest;* [the] *ED consultant declined assistance from other*
> *teams (as anaesthetic registrar told to stand aside when my input was offered/concerns*

raised) despite clearly suboptimal airway, poor IV access, lack of warming, and completely inadequate volume of fluid/blood being transfused (cold into already cold patient). ED consultant [was] *clearly stressed and losing control of situation, raising voice/getting angry with other non-ED team members."*

The team leader raising their voice and getting angry with the team certainly evidences a lack of basic respect, but even earlier in this scenario there seemed to be an erosion of the relational dimension through perceived dismissal of legitimate concerns from the anesthetic trainee. This is a dramatic example but there were many similar but more subtle stories where members of the team felt dismissed, ignored or under-valued. These negative experiences related to a lack of mutual respect threaten future ability to take interpersonal risks – a concept known as psychological safety which has been identified as important for functional teams. (Edmondson 1999; Edmondson and Lei 2014) Even experienced and well-respected members of the team struggled to break through the hierarchy at times and would be even less likely to do so in an environment that did not actively promote mutual respect. One trauma nurse, in reference to speaking up to clarify team priorities for a patient in whom the team were struggling to cannulate, explained,

> *"In hindsight often you know, you think, "I should have done that" and but then again, its embarrassment. "Am I thinking right? Am I going to look really stupid in front of everybody?" It's that thing, I've been here 15 years, I should know that by now. But I'm not quite sure."* – Trauma Nurse

When I asked the same trauma nurse about conditions in which they would feel comfortable speaking up they described leadership styles that demonstrated vulnerability and which sought additional input from members of the team. The trauma nurse felt those behaviours signaled to team members that they are valued as contributing partners. They noted,

> *"…a calm, confident manner and open and clear communication generates trust. No one has to know everything and team leaders that are willing to admit that and say "well*

look, I've thought of all I can, is there anything else anyone can think of or have I missed something?" you know, that is a confident practitioner who is thinking of the patient's best interest." -Trauma Nurse

A trauma surgeon further explained the importance of individuals being able to take an interpersonal risk and share if they are failing. He felt this could only occur when team members were operating in an environment that was psychologically safe (e.g. if a junior doctor is struggling to place a cannula he/she will only speak up if they do not feel they will be punished for missing their attempt). He also noted the team leader's distinct role in creating and maintaining a psychologically safe environment.

> *"I guess they* [the team leader] *can create a style or a culture a micro-culture if you want to call it team culture that it is actually possible to feedback even failures, you know. Because we don't like to say "I'm not succeeding," or "I can't get this blood cannula in," but I think the culture needs to be created so that is possible. Because otherwise we are not going to win. We are not always going to succeed in the first instance."* – Trauma Surgeon

While reading and hearing these stories I began to understand that mutual respect was about far more than simple collegiality. It was a fundamental belief that others on the team brought important perspectives and were valued contributors. When this belief was incorporated into individuals' and the team's perspective it served to underpin the types of behaviours that are typically regarded as respectful. One paramedic described his reverence for the handover process in an interview. He valued the role of the team leader in taking over care of the patient and recognized the importance of this transition process going smoothly and collegially. He said,

> *"I'm very aware that we have now left my area of comfort which is pre-hospital and I am now a guest. We are meeting each other in the foyer. It's the ED's foyer, it's not our foyer. I am happy to state it* [a question about where best to handover the patient] *in a question form. I'd say, "Hey Eve, I'm pretty happy he's got no urgent needs. You happy for the handover to be on the trolley?"* – HARU Paramedic

In another example, one participant wrote about an interaction between an ED trauma team leader and a cardiothoracic surgeon. The team had been alerted to the fact that a critically unwell patient was arriving by helicopter. Members of the team were meeting on the helipad to decide whether the patient would go down to the ED or directly to the operating theatre as a "Red Blanket" (alert called for critically hemorrhaging patients to emergently prepare the blood bank and operating theatre).

> *"Stab wound to chest. Secondary transfer from a peripheral hospital. Patient anticipated to be critical upon arrival. Anaesthetics, ICU, cardiothoracic surgeon all attended ED. Agreed that ED would greet patient on helipad and, unless new information, Red Blanket to OT. Cardiothoracic surgeon at helipad ante-room: "You make the decision and I'll follow it." Patient in tamponade - to OT - seamless transfer of all systems. Mutual respect including with flight staff."* – ED Consultant

In an alternate but conceivable version of this narrative, the cardiothoracic surgeon might have difficulty relinquishing surgical decision making to a non-surgeon (the ED trauma team leader) or in this exact narrative it is easy to believe that the ED team leader could have been nervous about making a challenging call. The supportive words spoken by the surgeon to his colleague in the ante-room signalled that the cardiothoracic surgeon valued the role of the trauma team leader and believed her/his role, to provide "*clarity of vision and direction of care,*" was an important contribution. The cardiothoracic surgeon in this scenario appeared to have high regard for his colleague and demonstrated it outwardly in a way that allowed for streamlined decision-making and the ability to integrate care for the patient about to arrive.

When mutual respect was lacking, individuals sometimes demonstrated problematic compensatory and reactionary behaviours. For example, there was concern for lack of mutual respect between general surgical consultants and their residents providing overnight coverage

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– though notably this issue was raised by ED trainees, ED consultants, and ED nurses not the few general surgery respondents. The voiced perception was that surgical residents might be hesitant to call their consultants overnight before all information is available (e.g. imaging results) for fear of reprisal. For trauma patients, particularly those who are unstable, all information is not always available before escalation up the hierarchy is appropriate, as patients may need to go to theatre rapidly. Others perceived that general surgical registrars were nervous to make this phone call. One trauma surgeon noted, "*I think there is still a certain unevenness, or I hope it's not fear, just an unevenness not to call.*" Avoidance of escalation, as a result of hostility or a lack of mutual respect, was an example of a problematic reactionary behaviour. Other examples of troubling reactions that we encountered included disengagement (i.e. leaving the resuscitation without notice), attempt to take over (i.e. giving orders to nurses behind the back of the team leader), or inability to perform tasks as described by a trauma nurse in an interview below.

> "*Then you are all fearful. It just degenerates the whole situation. And then people who are fearful make silly mistakes. Or don't know what to do because they go blank. You know staring at the headlights sort of thing.*" – Trauma Nurse

From these examples, and others, I started to appreciate how presence or lack of mutual respect directly translated into the ability to coordinate and provide care. This prompted investigation around how providers developed and enacted the belief that others' perspectives and roles and contributions were valuable. In an interview one nurse summed up this line of inquiry rather perfectly. She said, "*I don't know how you build relationships but that is what it is about. If you actually care about the person you are speaking to as a human being, then you are solution oriented.* [You] *Can't be a dick.*" A detailed exploration of why and how

particular individuals intrinsically value others and demonstrate that respect is beyond the

scope of this study, but I did find evidence that some providers were actively learning and

adapting their style to outwardly demonstrate mutual respect. One trauma surgeon described

an adaptive process that took place when he moved to the institution. Throughout his interview

he embodied respect for ED trauma providers but described that in his early days, despite this

internally held belief, team leaders sometimes felt disrespected after encounters with him. He

found this quite troubling. As such, he adapted his communication style because he recognized

the importance of others on the team feeling valued.

> *"…It took me a year or two to get to know everybody with the skill set and the style. And so I try to match that and include that in in the communication conversation and decision making because yes, I don't like run-over somebody like I've just said before. It probably felt for him [the trauma team leader] like that. So that's where I learned to just communicate perhaps earlier and different."* – Trauma Surgeon

The same trauma surgeon described going back down to the ED after operating on trauma

cases if he felt that the interactions with the team in ED hadn't gone particularly well.

> "*I had a good conversation afterwards and you know, I explained why I did it* [certain decisions and actions]… [the interaction] *needed some debrief after, some explanation and it's fine. There was nothing really. He understood and said, "it's all good.""* – Trauma Surgeon

This action demonstrated an awareness of the importance of mutual respect for the

preservation of ongoing working relationships and a more sophisticated understanding of the

need for amelioration when outward actions may have breached inward ideals.

Unfortunately, this study did not uncover a simple trick to sparking this same degree of

mindfulness in all practitioners. However, I did identify several mechanisms through which

teams started to create an environment that signalled mutual respect to all involved. Again, the

team leader was identified as a key node in the development of such a climate. From simple

actions like acknowledging team members when they enter the room, to facilitating

introductions, the team leader often set the tone. Though not sufficient, this modeled tone was

necessary for mutual respect amongst the team. The team briefing, discussed later in this

chapter, was a natural place to openly foster mutual respect through simple actions at the

beginning of each case. Actions taken after the case concluded also presented the opportunity

for teams to foster mutual respect. At GCUH regular debriefs were not the norm and tended

only to occur in emotionally charged or particularly extreme cases. However, participants raised

the potential value of relatively informal debriefs – or after-action reviews - as a mechanism for

the team to learn together. It seemed that learning together, and seeking excellence together,

might facilitate the development of mutual respect through collective constructive experience.

In an interview one nurse described an informal debrief after a case. They recalled,

> *"We had a bit of banter amongst ourselves about how we could have improved what we did without any formal feedback from anybody else and I just think that's really important for a team. I think that medical staff needs to know that we are there for them and that they are there for us. And we are in this together. That's how you learn together."* – ED Nurse

Throughout the survey response data, particularly as it related to the question about how the

trauma service could improve, many participants voiced a desire to increase the frequency of

team debriefs as a way to learn about the case but also identify any issues with care that could

be easily fixed or changed for the next case. In simulation exercises and in my day to day

clinical practice I began piloting two simple questions. I started asking, "What went well?" and,

"How do you think we could have done just 1% better for this patient?" So far, I have heard

very tangible thoughts, and suggestions. More significantly, I have received feedback from

providers that they felt this question was empowering. They described that it invited them into

the fold of team learning. Collaborative team learning as a potential avenue for the development of mutual respect requires further investigation was is supported by similar reflections from other learning events such as trauma rounds, case reviews, and simulation exercises. In Chapter 5 I will further explore simulation as an avenue for fostering mutual respect within and between teams.

Communication

In RC theory, the three relational dimensions previously explored (shared goals, shared knowledge and mutual respect) are reinforced by communication that is timely, frequent, accurate, and problem-solving based. Data important to the relevance of communication was messily intertwined with examples about the relational dimensions, in the quotes included up to this point and throughout the rest of the thesis. This entangled reality is in keeping with the concept that communication is an enabler and reinforcer of shared goals, shared knowledge, and mutual respect. Trauma team members do not experience any of these in isolation but as mutually reinforcing aspects of effective teamwork. In this section I will outline the importance of timely, frequent, accurate, and problem-solving based communication in the setting of trauma.

I found that timely communication was crucial throughout the trauma patient's journey. An often-noted aspect of trauma cases that went well was adequate notice from paramedics. One participant wrote,

> "*With good pre-hospital management and timely, accurate communication with hospital teams, we were able to follow red blanket protocol, activating this prior to the patient's arrival. This meant that we were able to bypass ED and take the patient straight to OT*

[operating theatre] *where a surgeon was ready to operate straight away."* – Trauma Nurse

In this case, early prehospital notification allowed for an adjustment of the patient's trajectory directly to the operating theatre; in other instances, the early prenotification allowed the ED team to adequately prepare in the trauma bay. By many accounts a good team briefing (explored in Chapter 5), whereby shared goals were created and knowledge about roles established, was helpful for the overall care for the patient. This exercise was much easier to perform with timely notification from paramedics. Continuing along the patient's journey, I found that individuals at each transition point valued timely notification of involvement or even potential involvement. For example, one CT radiographer wrote,

> "[a trauma went well with] *timely and accurate communication about the nature of the trauma to myself in CT. After performing the initial assessment contact was made with me to confirm availability in the CT scanner."* – CT Radiographer

This required the team to be thinking about not only where the patient was coming from, where they were at present, but also where they were destined. Sometimes the teams experienced "speed bumps" in the journey that slowed progression along the care trajectory. These were often related to delays in imaging results that were necessary for surgical decision making and disposition planning. Sometimes it took up to an hour to receive formal reports – mostly because trauma scans are very involved for radiographers to read in full. This delay meant that many of the trauma team members would physically leave the department, to go attend to other tasks, while waiting for results. It could then be challenging to get in contact with all the relevant parties once results were available and decisions could be made. Other "speed bumps" included decisions related to disposition, when the patient was not sick enough for ICU (i.e. not intubated) but too sick for a standard ward (i.e. needed close nursing care or

observation) or when there was conflict about who the appropriate admitting service was. These "speed bumps" were most frequent and troublesome for the moderately injured trauma patient that did not require obvious emergent surgical intervention or ICU care but who would require ongoing observation and possibly delayed intervention. The way in which teams navigated a loss of momentum differed but the most effective seemed to be when they employed strategies that were proactive. One team leader described his approach to mitigating delays in CT scan reporting. Instead of waiting for the entire scan he asked that the radiology resident do a "radiology primary survey" (quick read of the scan while they sit together to identify life threatening injuries or those potentially needing surgical intervention). This "radiology primary survey" provided timely communication about critical imaging results that allowed key decisions to be made while the entire trauma team was still present which maintained forward momentum of the resuscitation. This approach was identified by the community as one to consider employing more frequently.

It was unsurprising that accuracy in communication was also essential for high quality trauma care. Crisis resource management communication practices are commonly taught to trauma care providers now and featured predominantly in narratives about traumas that went well. These practices include behaviours such as closed-loop communication which is known to improve the accuracy of communication. Individuals in our study recognized these practices increased the accuracy of communication, and overall felt they were performed quite well as a team on most occasions. However, other issues related to accuracy of communication were identified, particularly as it related to information ascending hierarchies. One participant wrote,

"I have memories pre-trauma team of a stab wound bleeding significantly and the surgical registrar not conveying the severity of the situation to the surgical consultant

and being in a situation where a man was slowly (rapidly?) bleeding out without a surgeon coming to take him to theatre." – ED Consultant

This example raised interesting issues related to the accuracy of communication. First, it demonstrates a common practice at GCUH – that often a more junior member of a specialist team was the one speaking to the specialty consultant, rather than the senior member of the team who was requesting specialty input. This required that the junior member understood the situation adequately, could accurately describe it, and felt comfortable doing so to their boss. There were any number of places along that chain of necessary events that accuracy of communication could fail, particularly when shared goals were not clear, the experience level of the consulting trainee was not adequately appreciated, or mutual respect was not present. Some trauma providers expressed frustration with the culture at GCUH with respect to chain of command. For example, one participant said,

> *"It is an absolute waste of time to call the chain down or communicate the chain down to the lowest grade, like the intern, and then go across the specialty intern and then up again back and forth. That is just rubbish. That never made any sense to me. But that seems to be an unfortunate thing about the culture here*." – Trauma Surgeon

The other reflection point this issue highlighted was related to where the responsibility of communication lies. Ultimately, as with most other aspects of this framework, I have come to conceptualize it as a team responsibility. When the patient was bleeding out after what was perceived to be an inaccurate discussion with the surgical consultant, as described above, what prevented others on the team from stepping in to rectify the situation? Discussions with participants indicated that that hierarchy, fear of being incorrect, and not wanting to offend colleagues or members of other teams contributed to such moments of passivity. Alternately, I also witnessed times and received responses about moments when colleagues did intervene,

often gently but effectively. Since doing this research I have started to notice educators

focusing on further exploration and promotion of communication, as a team rather than

individual, responsibility in simulation debriefings and trauma meetings. For example, in one

simulation exercise the patient the team was caring for had been brought in by police with

multiple injuries. He was agitated but not violent. The trauma team provided care for

approximately 25 minutes before the scenario was stopped and participants returned to the

debrief room. The hospital security team voiced angst over the fact that the medical team had

not invited security to search the patient. They were concerned for the entire 25 minutes that

the patient might have been carrying a weapon that he would use it against the team. No one

on the medical team had even considered that a search of the patient would be necessary; all

agreed though that they would have been happy for security to intervene early. The simulation

facilitator asked what prevented security from raising this issue during the simulation, and

sought actions that would have made it easier for them to feel they could contribute. *Should*

the team leader need to prompt security or should have security offered their expertise? What

are the factors that affect decisions around communication in real time? This line of questioning

resulted in a fruitful conversation between members of all groups. There were no clear answers

because even though hospital policy states this patient should have been searched the security

team did not feel, that they were in a position to interrupt the work of the medical team to do

so. This is an example of where mutual respect and communication intersect. The security

officer self-identified as a less important member of the team and as such did not feel

positioned to communicate important information and ideas. During the debrief the

perspective of the security officers was listened to by a team that was willing to engage in deep

conversations about complex issues related to team performance and communication. At the end of the debrief one of the security guards told me that he would be more likely to say something now as a result of the exercise. In Chapter 5, I will further explore how simulation might foster RC at and the intersections of relational dimensions and communication as this example demonstrates.

The importance of appropriate frequency of communication was also noted by participants. This seemed to be crucial for the trauma team in the room and also for the coordination with services external to the trauma bay. One participant wrote, "[traumas go well] *when there has been complete calm and the leading MO* [medical officer] *is communicating regularly with all involved in the trauma care*." The desired frequency of communication in the trauma bay from providers seemed to be an "update" every 5-10 minutes from the team leader with the trajectory and priorities or if there was a significant change in patient status that required a redirection. Team leaders appreciated frequent communication from the team about tasks that had been completed or tasks that could not be performed.

The care of the trauma patient also required the coordination of services outside of the trauma bay including paramedics, medical imaging, operating theatre, and interventional radiology. CT technicians highlighted that increased frequency of communication was helpful for them in planning how the trauma patient fit in to the other responsibilities. One wrote,

> *"When a trauma arrives initially it is helpful for us in medical imaging to be notified. It is helpful if we are kept in the loop in regards to when the patient will be ready for scanning. As we are such a busy hospital we in CT are not in a position to just stop scanning and wait for a trauma patient to be ready to come over."* – CT Radiographer

This reflection highlighted that a single notification to CT, which they receive as part of the initial page, was not enough for coordinating the scan to happen in a streamlined fashion. Care for the trauma patient as often unpredictable. As such notification of CT at the outset did not translate into a standardized time that the team arrived at the scanner. Some patients required 15 minutes of initial stabilization while some required 30 minutes. Some did not require a CT at all. As the cases evolved, the timing of movement towards CT became clearer but was quite unpredictable from the outset. The same issues existed with transfer between other services and areas of the hospital. Teams or departments receiving patients understandably wished to have clarity around when that would happen and the only way that was achieved was through frequency of communication. The difficulty was that increasing frequency of communication placed additional burden on the team who were in the trauma bay. They were often stretched thin in providing direct care for the patient at baseline. Frequent updates to teams outside of the room required an individual to step away from those immediate responsibilities physically and cognitively. Throughout the study, however, I began to appreciate that frequency of communication did not have to mean direct or even verbal communication. Just prior to commencing this study, trauma providers suggested having a live video feed (not recorded) available between the resuscitation bay and the imaging department. This meant that CT radiographers could glean important information, necessary for their phase of care, without interrupting or requiring input from teams in the trauma bay. With a video feed in place CT radiographers had the ability to physically see when a patient was ready or near ready for transfer to CT and what equipment would be necessary in the room (ventilator stand, number of IV poles). They could then hold the scanner only when the team was ready. This intervention

eliminated many nuisance back and forth phone calls between those in the trauma bay and those in CT and maximized efficiency for the imaging department. Informal discussions with surgeons and anesthetics suggested that a similar set up would be helpful in facilitating the seamless transfer of patients to and from the operating theatre.

The final dimension of the RC framework is that communication should be rooted in problem-solving. Trauma teams were made up of a wide variety of individuals from different contexts who brought varying expertise and perspectives. Those differences were essential to team performance. Communication that maximized the ability of each of these groups to contribute meaningfully towards solving the complex problems that trauma patients present was important for performance. Throughout the study in narratives, interviews, and participant-observation there were many times when teams had conflicting opinions about the management of a patient. Avoiding conflict was certainly not the goal for teams that performed well, in fact they expected and valued differences in opinion. I found that engagement and management of that conflict helped teams to perform in a way that they were satisfied with. When communication around conflict was not rooted in problem solving, participants were often dissatisfied with performance. Participants described situations where conflicting opinions, and adversarial engagement with that conflict, led to less than ideal management for the patient. One participant wrote, "[traumas go poorly] *when people having conflicting opinions on management are unwilling to have cordial discussions, everyone shouting over each other.*" This quote revealed that poor communication during engagement with the problem, not necessarily the problem itself, was detrimental. One trauma surgeon further reflected the importance of productive conversation,

"Sometimes, particularly in the major resuscitations, I found it's important to have an exchange in information, not just in information but also sort of thought process exchange. What's going on. Because we can all get tunnel vision." - Trauma Surgeon

This quote highlights the importance of individuals not only sharing opinions but also sharing reasoning behind those opinions. Since those contributing to the team came from different backgrounds, understanding the thinking and reasoning of colleagues was necessary to engaging in productive problem-solving for the patient. I found that when productive problem-solving based communication occurred, providers were most often grateful and recognized its value. One trauma team leader wrote, "[in a trauma that went well] *the ICU consultant was present and helped with procedures and also politely made a suggestion for an omission on my part ensuring the patient got good care."* This quote again highlights the importance of a team environment and culture in which individuals feel as though they can raise ideas as discussed earlier in the chapter, including team leader behaviours and norms within the group. It also highlights the close interplay between the dimension of mutual respect and the ability to engage in problem-solving. Members of the team had to genuinely feel valued by others to both engage in problem-solving and be receptive to the suggestions of others in that process.

Participants identified that the presence of senior decision makers, rather than junior trainees alone, from contributing groups increased the likelihood that productive, problem-based communication could occur. The involvement of senior decision makers was most relevant in moments when definitive management or disposition of a patient relied on input from surgical specialties. Occasionally, this occurred with critically ill patients (for the decision to go to the operating theatre immediately) but more often it related to the multi-injured

patient who did not require immediate intervention but still necessitated management and

disposition plans from consulting services. One participant wrote:

> *"Trauma activations at night do not go as well, without senior decision makers present. The surgical registrars often disappear without communicating management plans (probably because they don't know the plans). It takes an awful lot longer to come to a management plan about a patient's disposition (OT or no OT) at night."* - ED Fellow

In particularly challenging situations the presence of senior decision makers was helpful for

problem-solving based communication because senior physicians had the requisite expertise to

engage in the problem-solving process for the issue at hand including the ability to contribute

most effectively to problem formulation and solution development. For example, if there is a

critically unwell trauma patient but no available ICU beds the senior ICU physician may have the

power to open another bed card while a junior registrar cannot offer that as a solution. Or if it

is unclear whether the patient should go to the operating theatre or interventional radiology

(sometimes a challenging decision to make) the senior surgeon should contribute expertise and

must be present if the decision is to go to theatre. When junior doctors have reached the limits

of their problem-solving capacity, the next step is appropriately getting more senior staff

involved in the situation – a problem-solving based form of communication itself. Issues related

to a lack of senior decision maker presence occurred when there was a hesitancy for juniors to

include their seniors early in the problem-solving process or if they were unable to accurately

portray the situation which limited the ability to receive appropriate advice over the phone, as

discussed previously in the sections on "Mutual Respect" and "Communication." The deliberate

inclusion of senior decision makers in complex situations is only fair to those more junior who

are learning too. They cannot be expected to have all the answers but can be part of the

process of solving the problem by involving senior staff in a timely fashion when appropriate and necessary.

As with most other domains, I became interested in understanding how traumas teams fostered problem-solving based communication. I noticed that some team leaders enacted more formal mechanisms to set up problem-solving based communication in the care of trauma patients. Using a structured team briefing, trauma team leaders sought input in a constructive way from teams to initiate problem-solving based communication before the patient even arrived in the trauma bay. This attitude carried through the resuscitations. Brief after action reviews were another strategy that primed the team for problem-solving moving forward. A final identified mechanism was simulation debriefings. One participant wrote,

> *"The debrief is fantastic to explore the perspective of each of the participants and understand why various decisions were made. With thank understanding it can then highlight effective strategies that worked well and also some of the things didn't work that will allow future improvement."* – ED Registrar

Further review of team briefings and simulation for fostering RC follow in Chapter 5.

Overall, each of the dimensions of communication in the RC framework were relevant to trauma care and often served to reinforce shared goals, shared knowledge, and mutual respect. In addition to the importance of accuracy, frequency, problem-solving, and timeliness of communication we noticed that participants often also commented on affective aspects of communication too. For example, they would note that trauma team leaders were "*calm*" or consultants were *"friendly"* or the room was *"quiet"*. While some of these affective features might be accounted for by mutual respect or clearly defined goals they might also represent a dimension of communication not fully accounted for by the RC framework in the context of acute trauma.

CHAPTER 5 SUPPORTING, TRAINING TOWARDS, AND IMPROVING RC IN TRAUMA

Up to this point, the application of the RC framework to trauma enhanced my

understanding around how shared goals, shared knowledge, mutual respect and

communication manifest to support coordination of work in this unique environment but my

experiences as a participant-observer highlighted significant variability around the degree to

which RC was present across individual resuscitation cases. There was obvious inconsistency in

what providers were experiencing on the front lines on a case by case basis. Sometimes the

features of strong RC in trauma were present, sometimes they were lacking. This granularity of

individual experience is not provided by the quantitative RC metrics most often used in RC

quality improvement processes. The discrepancy in experience left me wondering whether it is

possible to enhance RC amongst trauma care providers and how to do so? This chapter

highlights only some of the interventions that could support, train towards, and potentially

shape RC. The first section on team briefings provides theoretical footing to a practice

inconsistently performed but of significant value through the RC lens, the second section shows

how a translational simulation program impacts RC, and the final section highlights

interventions envisioned and now in various stages of implementation by the broader trauma

community. This chapter, which addresses my second and third research questions, represents

the exciting, but early, stages of a trauma program dedicated to improvement using evidence

rooted in relationships.

Team briefings – Setting up Relational Coordination for Your Resuscitation[2]

One of our trauma surgeons said it best, "*It all comes down to the preparation, the pre-brief.*" In this section I outline a simple practice, the team briefing, that can contribute to setting up relational coordination for a single resuscitation case. The team briefing can facilitate the rapid development of relational coordination at the point of care between members of an ad hoc team. I observed that at GCUH it was practiced inconsistently and without significant theoretical foundation. The below application of RC theory to the concept and practice of team briefings provides support for their value and proposes a consistent and deliberate structure to maximize impact. Through review of narrative survey responses and through participant observation, I identified the team briefing as an enabler of team performance. When performed well, it seemed to scaffold RC for a team at a beginning of a case. These observations inspired and informed one of the interventions outlined in the section "Community Developed Interventions" called "OneTeam Practice." OneTeam Practice is a newly implemented daily ritual in which resuscitation teams practice a team briefing through team mental rehearsal with the expressed purpose of practicing, promoting, and standardizing the practice of team briefings at GCUH.

My initial interest in team briefings was based on the frequent identification of them as a factor related to why traumas went well by participants in the narrative survey. In fact, I

initially identified "team briefing" as an additional theme relevant to trauma performance beyond those covered by the RC framework. It featured prominently in the narratives of trauma resuscitations that went well. They responded,

> "*Roles* [were] *allocated prior to patient arrival,* [we] *discussed likely issues with the patient and how we would manage them + likely sequence of events prior to patients' arrival."* – ED Consultant

> "[There was] *clear role allocation pre-patient arrival with flexibility within role to re-distribute workload once clinical condition known / changed."* – ED Registrar

> "[There] *was enough prep time given,* [we were] *able to fully prepare the team…time to prepare all drugs and infusions. Ability to pre-empt where we felt the resus would go after stabilization."* – ED Nursing Team Leader

> "*Teams* [are] *given heads up early so they can plan what to happen and patient priorities. Able to coordinate what to happen first and a clear plan before patient arrival so can be implemented quickly and efficiently."* – ED Nurse

The theme "team briefings" surpassed any other identified factor such as time of day or availability of resources in trauma cases perceived to have gone well and were often noted to be missing in cases that went poorly.

This unanticipated finding prompted me to focus on team briefings in my informal discussions and participant observation experiences. I was interested in understanding why team briefings worked, how they were conducted, and in understanding their role in facilitating RC amongst trauma providers During participant observation I observed different team briefing styles and also was surprised that for about half of traumas there seemed to be no briefing performed at all. An example of a team briefing from field notes from a simulation exercise is below.

> ""*Alright, let's allocate some roles." The ED team lead says clearly stating who will be doing what. When he got to ICU he asked if they had been in touch with neurosurgery (and they had been). He briefed the airway team (ED, anesthetics registrar, and airway*

nurse) that the patient had been intubated already and that they would just need to confirm tube placement and make sure they were happy with the vent. He said - why don't you talk about your approach together for a couple minutes after the brief. "Everybody, the goal here is pretty simple. This patient mostly has head trauma, was GCS 3 on scene and is already intubated, coming from a small hospital. We will do a quick primary survey then get to the scanner as fast as possible. We will be using neuroprotective measures so head of the bed up and let's get some 3% out and ready to hang. Any questions?"" – Field Notes

I started to appreciate, from team briefings like the one above and others observed, that the RC domains I was studying to understand performance between groups of people within an organization were the same factors that made team briefings so important for coordination of individual trauma cases. I found that effective team briefings served to scaffold each domain of RC at the beginning of a given case for the specific care team involved – setting up *shared knowledge* (about each team member's role and about the patient's condition), *shared goals* (by outlining initial, and contingency, priorities for patient management), *mutual respect* (by learning names and thanking everyone for attending), and setting the stage for *timely* and *problem-solving based communication* (by asking for input from others attending). The team briefing was not a separate theme from RC as I first coded it, it was in fact each of the components of RC in collective action.

One model for team briefings, proposed by Hicks and Petrosoniak, was used by a few of the trauma leaders in modified form at GCUH. (2018) In informal interviews and simulation debriefings this approach was recognized as an exemplary. The model included 1) what we know about the patient 2) what we plan to do 3) what we might have to change 4) assigning roles. Application of RC theory to an adapted version of this team briefing framework in Figure 5 demonstrates how each phase relates to development of specific RC dimensions. This model informed the "OneTeam Practice" daily mental rehearsals and is promoted in weekly registrar

and monthly trauma simulations.

In informal conversations and participant observation, barriers to team briefings included lack of time or cases in which there was no pre-notice of patient arrival. The proposed briefing approach takes no more than 2-3 minutes and sets up RC for the entire case. As such, I feel strongly that it should be a prioritized team activity even when time is short or even if the patient has already arrived. If necessary, the brief could be repeated at the earliest possible moment in the resuscitation when all parties are present. Further understanding and mitigation of the barriers to implementing team briefings in all trauma and medical resuscitations should be of priority for resuscitation researchers.

Mapping of the RC framework to team briefings provides theoretical support for this practice. The below model can be used as a practical tool for providers interested in optimizing their team briefings for RC.

Briefing Phase — RC Domain Target

1. Introductions
- Thank the team for coming
- Ask for the names and ensure that they are visible throughout the resuscitation (written on gowns, name tags)

This phase facilitates **MUTUAL RESPECT** between members of the team. When the leader explicitly demonstrates each team member is valued this can be incorporated as a team belief. Introductions set the tone for the degree of **MUTUAL RESPECT** expected throughout the case.

2. What we know
- Share relevant and available case details such as age, case details, and last vitals
- Synthesize what this information means for the team

The second phase lays the groundwork of **SHARED KNOWLEDGE** between all members of the team, as it pertains to the specific case.

3. What we expect (plan A)
- Given those relevant details, outline what we expect to happen in the first 10 minutes
- Set patient care priorities

The third phase identifies **SHARED GOALS** for members of the team. While individuals will be charged with specific tasks, they will have a better understanding of how those tasks fit into the bigger picture of caring for the patient.

4. What might change (plan B/C)
- Given what we know what could go wrong or change?
- Briefly discuss patient care priorities in those circumstances

The fourth phase creates **SHARED KNOWLEDGE** about potential complications - which makes changing direction and associated **SHARED GOALS** easier, if needed.

5. Roles
- Assign specific roles
- Ask each member to briefly run through their role to identify any forseeable problems
- Identify and pair groups of people who are a functional team

This phase translates **SHARED KNOWLEDGE**, as it relates to other team members' roles, not the patient specific details. We know that mutual role understanding is an integral aspect of implicit coordination.

6. Suggestions/Concerns
- Though open to suggestions throughout the briefing, directly solicit thoughts from the team by asking a question such as, "this is a complicated case, what have I missed?"

This final phase further supports **MUTUAL RESPECT** by signalling that input is valued. It lays the foundation for **COMMUNICATION** that is *problem-solving based* and *timely*.

Fig. 5 Team briefing structure to optimize RC for resuscitation teams.(Purdy et al. 2019 B)

Translational Trauma Simulations

GCUH has an established monthly trauma simulation program, however, its impact had

not been evaluated in the five years it had been running. The general sense amongst trauma

providers was that it was valuable in ways that went beyond learning around specific cases, but

those hunches had not been explored in any detail. We used survey questions and interviews to

understand trauma care providers' experiences with in situ trauma simulations. In the larger

study this data was paired with participant observation of and informal interviews related to

the simulation experience. I was specifically interested in understanding whether in situ

simulation impacts RC between groups. One hundred individuals (56% of total survey

responders) answered narrative questions specifically related to simulation exercises. I found

that RC was a relevant construct for understanding the mechanisms through which simulation

shaped trauma team function. Additional themes related to the understanding the impact of

simulation, beyond RC, were also identified. This data highlights that simulations can impact RC

and raise the possibility that simulation design and delivery can specifically target relationships

and culture in complex teams.

The Simulations

The trauma simulation experience at GCUH was unique. The monthly simulations were

coordinated by a highly skilled team of simulation educators; usually around 5-8 were involved

in the design and delivery of the challenging cases. Debriefs were conducted by an expert

simulation educator with significant experience in simulation and resuscitation team science. I

have worked in many hospitals throughout eight years of medical training and have not come

across a group that provides this type of setting for teams to train in. Cases ranged from the

head injured pregnant trauma patient, to a pediatric drowning, to an agitated patient with stab

wounds, to a patient with severe facial injuries. Individual participants varied from month to

month but representatives from each of the groups involved in major trauma care were always

included. Below are field notes, created as part of the larger project, from a representative

simulation case to provide context to the activity. The case below was run in the actual

resuscitation bay in the active emergency department. A live feed, with video and audio, was

streamed to a separate conference room where 15-30 other individuals observed the case.

> *"This month's trauma simulation was a severe head injury complicated by hypotension in a patient who had been assaulted. The pre-brief started as it always does with an intro to sim, and introduction of the team and a few important reminders….*
>
> *…The team received the incoming report and had 7 minutes to prepare for the arrival of the patient. The consultant ED physician asked for a few key things in addition to normal role allocation during this time…*
>
> *In what felt like no time the HARU medic was there with a critically ill patient. They came through the doors and the consultant asked "stable/unstable?" The medic replied "unstable, so this is going to be a rapid handover." The medic proceeded to tell the room about the patient including the known injuries and interventions. At about 30s into the handover it seemed like the consultant physician was getting antsy about still having the patient on the stretcher. He started looking towards the monitor - noticing hypoxia and hypotension. He moved closer towards the patient and made eye contact with the wardie and nurses. The handover ended and the patient was transferred rapidly to the stretcher. There were obviously competing priorities. Airway, Circulation, and serious head injury.*
>
> *The team leader started the focus on A. The airway team took about a minute to decide they were happy. So they moved onto B. The patient was hypoxic and had had a finger thoracotomy in the field. The leader asked the ED reg doing the primary survey to re-finger the thoracotomy to see if that had any result, it didn't. The airway team continued to fiddle with vent settings and oxygenation seemed to improve. Later on the anesthetic registrar voiced some frustration about the fact that the bag from EMS wasn't plugged into the oxygen which he sees as a problem commonly and he thinks certainly contributed to the hypoxia in this case.*

Where's the blood? The team lead asked for a third time. Let's get that hanging now please. You could see his mind moving towards C. He and the doc doing the primary survey communicated about sources of bleeding. E-fast negative, no obvious long bone fractures. Need for a pelvic binder. They were happy with peripheral access and at about this point in time the ICU got the ROTEM back and started deciding what blood products were needed. It is unclear whether anybody actually notified the blood bank about likely need for a massive transfusion protocol. The patient's BP stayed in the 70s-80s without a clear bleeding source except multiple facial fractures. There was no clear intervention to improve the hemodynamics - other than ongoing transfusion available in the resus room.

Quietly, without really anybody noticing the general surgery fellow put in a chest tube and asked if one was needed on the other side.

An XR chest and pelvis were taken. No-one was wearing lead (comes up later that there is not enough lead for it to be worn by the team) so the team had to come out and one person returned in to watch the patient while XRs were taken….While outside of the room the team leader looked to the ICU consultant, his senior registrar and the consultant neurosurgeon who had just arrived asked "any thoughts?" They shook their head, except for the neurosurgeon who said "we just need the scan, and oh do you think he needs a chest tube?"

"Ok he said, priorities are getting to scanner vs dealing with circulation here. I think we need to get to scanner, so can you bring the blood products we'll need?" He said looking at the ICU boss. She nodded."

This set of field notes showcases the complexity of the simulation case and the high degree of fidelity in terms of task fidelity (insertion of a chest tube, challenges with ventilation), cognitive fidelity (a realistic challenge), emotional fidelity (obvious stress in the team leader during the length while the patient was on the stretcher with abnormal vital signs), and team fidelity (presence of team members performing their actual roles). I have included these field notes to provide context to the type of simulations the simulation team is capable of coordinating and running on a monthly basis. This context is important when considering the below findings about the impact of the simulation program at GCUH.

RC and Simulation[3]

During analysis using the RC framework all domains of the construct were easily

identified. The concept of simulation as an enabler of mutual respect was most predominant

followed closely by its effect on the development of high-quality communication. The ability for

simulation to facilitate shared goals and shared knowledge were less prominent but also readily

recognized. I review each of these themes below.

In terms of shared goals, participants commented on how the simulation exercises

allowed them to understand common shared management priorities:

> "[the simulations are] *Absolutely of value…We practice together, becoming like a team that is being coached. We get to know each other, give space and gain understanding of each other's roles, and are informed and reminded of our common goals (time to protect airway, time to OT [operating theatre]) and common challenges (safety in CT scanner with an unstable patient)."* - Anesthetist

Some participants reflected on how practice in simulations translated to achievement of shared

goals in clinical work. For example, one participant defined that the goal of the trauma team

was to facilitate the seamless transition of patients from the prehospital environment, to the

ED trauma bay, to the operating theatre and define their final disposition. One paramedic

noted how simulations have improved his own handover process, which feeds into that overall

shared goal. He wrote,

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[3] Some of the included data and ideas related to RC and simulation included in this section and the "Discussion" section have recently been published as per this citation [Brazil, Victoria, Eve Purdy, Charlotte Alexander, and Jack Matulich. 2019. "Improving the Relational Aspects of Trauma Care Through Translational Simulation." *Advances in Simulation* 4(10): 1–10. doi:10.1186/s41077-019-0100-2.]. This article was published under a Creative Commons 4.0 Attribution only license.

"I have noticed improvements over the years because of this [simulation] *both in my handovers and the reception of them. Knowing what the ED staff needs allows me to better streamline and deliver handovers to them."* – HARU Paramedic

Overall, I found that participants saw simulation as a way to identify shared goals as a group, then practice and troubleshoot movement towards them.

In the domain of shared knowledge two distinct types of knowledge were identified as important in simulation, clinical knowledge related to the specifics of the simulated case and knowledge of trauma roles and processes. One nurse commented in the survey, "*as a nurse it consolidates my understanding of the injuries and treatment and where things went wrong or right and why.*" However, thoughts related to specific clinical practice were less common than observations about the improved knowledge of the roles and processes of the trauma team. One respondent noted, *"I have become more familiar with the actual roles and workload of various other parties/individuals in the trauma team."* A trauma team leader learned that with better understanding of roles of others on the team they could consider, "*delegating a task to a micro team and allowing their full autonomy unless there is an issue (airway/transfusion protocol).*" Another survey respondent reflected that the value of simulation was related to understanding the differences between ED and anaesthetic airway management and the department specific protocols unique to the ED environment. "*Awareness of ED protocols (e.g. the airway checklist) and how this can be acknowledged by us (anaesthetics) without compromising safe and timely airway intervention.*"

Mutual respect was the most commonly coded domain in both the survey data and field notes. Phrases such as "*breaking down barriers,*" "*team building,*" and "*connection*" were

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frequently used by participants to describe why they felt the simulation exercises were

valuable. Some participants outlined how simulations impacted professional relationships.

> *"I think the real value is getting to know our colleagues from other departments outside of a real-life stressful situation. That familiarity is then incredibly helpful when faced with a real trauma."* – Anesthetics Consultant

> *"[the team leader] also reflected on the fact that it was a bit challenging to work with people that you don't know. He said, "at the old hospital you just called up and they were your 'mates' but that's not the case here." Later in the debrief both the neurosurgeon and the ICU consultant reflected on the fact that this [simulation] was a nice way to actually make some of those relationships and get to know each other."* – Field Notes

> *"It was only a sim but you get so immersed and amped up with it that it's like serving time together in Afghanistan or something, in away. All of a sudden that team has a bit of camaraderie and universality and you remember each other."* – Trauma Nurse

With respect to communication – an enabling factor in the RC framework - there were

many generic comments in the survey responses such as, "*I think it gives you a good chance to*

work on your communication skills with colleagues." The RC framework further divides

communication into four component parts (frequent, timely, accurate, and problem-solving

based). When comments were detailed enough for this analysis, I found that participants

reflected most-often on the problem-solving based aspect of communication. They identified

simulation as a place to practice collaborative decision-making between specialties with one

participant commenting, "*I have found that those who participate in the sims incorporate the*

lessons into their practice, especially around communication and collaborative decision

making." Consistent focus on accurate communication methods was noted as translating into

practice by some participants in the survey and informal interviews, with one commenting,

"*communication has greatly improved across our trauma team. clear role allocation early, clear*

leader, close loop communication, etc." Comments related to frequent and timely

communication were rarely identified, however, informal discussions and observations as part

of the larger study facilitated understanding that the simulation exercises themselves served to

promote frequent communication- not only around a specific patient but at a system level - by

providing a space each month for specialties to come together for open dialogue. The

facilitated space that simulation provided seemed to foster a frequent, respectful, and

problem-solving based interdisciplinary conversation.

Participants noted changes in behaviour and practice they felt were a result of the

simulation program. These included a wide range of practical examples spanning professions,

departments and RC domains. Changes ranged from modest, incremental improvements (e.g.

checklists and handovers), to alterations in fundamental team structure (e.g. increasing sub-

team autonomy). The below field notes from a debrief after a simulation of a patient with

competing abdominal and neurotrauma priorities demonstrates an example of a conversation

that took place between many professional groups. This particular debrief related to knowledge

of roles in a way that demonstrated mutual respect and fostered problem-solving based

communication. It shows the complex interplay of relational and communication domains,

while demonstrating how simulation might provide a space for trauma providers to consider

complex issues. I was privileged enough to be involved in many such discussions in monthly

simulation exercises.

> "*There was general consensus that assigning ourselves [trauma providers] into functional teams (airway, breathing, circulation, procedures, external management) may be better than organizing ourselves by our disciplines (anaesthetics, nursing, ED, surgery). However, many reflected that we feel more comfortable viewing ourselves by our disciplines because that is the way that we have been trained and those are the people who we recognize. We got to the point that we decided that in this type of*

complex situation sub teams are probably a good idea, and started to talk explicitly about how to make that happen." – Field Notes

Personal and Team Learning

In addition to the effect of simulation on RC dimensions, I found an additional theme, "Personal and Team Learning" that was relevant to understanding how simulation affects individuals and teams. As with the domain of shared knowledge from the RC framework, the personal and team learning related to both technical trauma care lessons, and those relating to team roles, functions and relationships. Many practical examples of translation to practice focused on communication and other teamwork behaviours, with relatively few relating to technical skills. The habits of reflection seemed to be as important as the learning from any specific simulation experience at both a personal and team level.

For individuals, simulations seemed to spark reflection around confidence in practice and motivation to improve. One registrar wrote, "*we all get nervous and it's a great way of stepping through situations that you could possibly be faced with hours after the sim, it helps you prepare mentally.*" While a consultant mentioned, "[simulation] *makes me brush up on certain detailed knowledge that perhaps I did not have at my instant recall - invites me to continue to read around cases and improve.*" Other participants recognized tangible changes in their personal practice that resulted from simulation experience. For example, one nurse wrote, "*I communicate in resus (resuscitation) differently now. I advocate for names on gowns.*" These quotes suggest that the simulation experiences can prompt personal reflection and learning in a way that goes beyond the specifics of the exact case presented in the room and extends into practice.

At the team level, participants also recognized that simulation affected group metacognition. One respondent described a sense that the team was improving its ability to have useful discussions in debriefs, "[in simulation we] *often make some solid learning points and debrief areas of improvement. I think everyone is getting better at useful discussion and not blame*." Learning to reflect constructively as a group was closely linked to problem-solving based communication in the RC framework. As one individual wrote, "[simulation] *definitely helps to reflect on good/bad things and work towards solutions as a group*." I also noticed that participants felt that these skills around reflective practice and productive conversations translated to practice. One anesthetic consultant wrote, "*I have found that those who participate in the sims incorporate the lessons into their practice, especially around communication and collaborative decision making.*"

Simulation Design and Delivery Considerations

Survey responses provided important information for simulation educators about aspects of the simulation sessions, that facilitated learning and bolstered RC. Respondents perceived different aspects of the simulation experience (design, delivery and debriefing) to be relevant to the outcomes. The need for a high degree of task realism was clear, including technical and environmental aspects, but even more important was the degree of realism of interactions, challenges and affective experience. One participant highlighted all of these issues when they wrote,

> "*The in-situ simulation is very realistic to the real situations. They are usually noisy events with lots of people you probably have not met before. They do re-create the real-world issues we face with managing the team, trying to not lose momentum etc.*" – ED Registrar

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Beyond the experience in the simulation case, the debrief was of key importance for participants in terms of personal and team learning, and it provided a space to explore between and within teams. One participant wrote, "*debriefing encourages different departments to communicate in ways that cannot occur when a sick patient still needs active management in a structured and led safe space.*" Others found that simulation debriefs modeled communication strategies and mutual respect.

> "*I find the experience empowering, as you are afforded the opportunity to discuss things in a calmer environment. You can receive positive feedback which makes you feel good. It's not an environment of "name and shame." We are lucky enough to have a decent pool of people who run and debrief the scenarios.*" – Senior ED Nurse

The above quote highlights the role simulation educators have in deliberately building a psychologically safe environment for learning to take place. Their role was further highlighted by a participant who wrote,

> "[the debrief] *makes it feel safe to participate again because I feel very safe with debriefers. They are very good at pointing out how we can improve as a team and making common goals more clearly visible.*"- Anesthetic Consultant

Altogether, the data related to the simulation program highlighted the critical importance of simulation design, delivery, and debriefing for the simulation experience for participants. It showed that both explicit and implicit messaging related to RC domains and individual and team learning are incorporated by participants and affected by the design.

Community Developed Interventions

As part of the larger project, and to address my third research question, data from the initial phase was communicated to all trauma care providers through a communique and open

working meetings with each group were held to reflect on and build from the findings. In total I co-facilitated seven, one hour working groups with 69 providers over a one-month period. No formal working group meeting was held with the high acuity response paramedic group, as this was a small cohort external to the hospital, with whom we sought input via email, informal and formal interviews, and through paramedic collaborator GB's direct communication with his colleagues. I was unable to arrange a meeting with the surgical group despite attempts to schedule. Further reflection on engagement with the general surgical group is in the "Discussion" section. Input was sought via alternate means including informal and formal interviews with surgical residents. From these working groups, potential interventions were brought to the core leadership for prioritization and implementation planning.

Table 1 shows sixteen interventions co-created with participants, and prioritized by the leadership team, for implementation as they relate to specific organizational interfaces. Some interventions were structurally rooted (e.g. video feed from resuscitation room to theatre) while others were more process focused (e.g. team briefing rehearsals). Most interventions also included a relational component. Relationships featured either directly (e.g. peer feedback for trauma team leaders) or more often indirectly, as the design and development naturally brought people together from across organizational interfaces (e.g. collaboration between anaesthetics and paramedics to improve handover of critically bleeding patients in the operating theatre). The implementation of these sixteen interventions are in varying stages from planned to completed; their impact is being monitored through a variety of scholarly projects, many headed by the participants themselves rather than the core project team. For example, a mixed group of CT radiographers, emergency registrars, nurses, and orderlies have

implemented and are evaluating a project designed to improve transfer to and from the CT

Scanner "Fast and Safe," while an emergency medicine fellow and nurse have collaborated to

implement and evaluate "OneTeam Practice" a daily mental rehearsal of team briefings.

Table 1 – Community developed interventions

Intervention	Teams involved
Trauma Team Expectations of Conduct Registrars and residents providing trauma coverage currently receive minimal introduction as to the expectations of that role. The trauma service is creating a document outlining high expectations around behaviour, communication, and conduct involved in trauma care to be circulated at the beginning of every term.	Trauma service, distribution to all others
OneTeam Practice Our work showed that team briefings are essential for laying a foundation for relational coordination for a single case. To improve, our emergency teams have started a mental rehearsal each morning. The video in Appendix D shows an example of this practice.	ED
Trauma Leader Feedback Emergency trauma team leaders now have the opportunity to receive structured feedback on their performance from fellow consultants, registrars, nurses or other trauma team personnel.	ED primarily
To CT "Fast and Safe" Simulations Radiographers and emergency teams are working collaboratively to develop and evaluate a spiral simulation curriculum to improve the transfer of patients to and from the CT scanner.	ED, medical imaging
Event Management Trauma service is designing and implementing a number of interventions to improve crowd control.	Trauma, ED
Radiology "Primary Survey" In an effort to improve efficiency and facilitate decision making, the ED team leaders and radiology registrars are encouraged to engage in the radiology "primary survey" where the radiologist reviews the CT scans while the patient is on the table to identify significant injuries and determine if further imaging is needed before patient leaves the CT scanner.	ED, medical imaging, trauma
Combined Radiographer/Radiologist and ED Teaching Deliberate inclusion of radiographers and radiology registrars in monthly ED resuscitation/trauma teaching is now standard.	Medical imaging
Maximizing Radiographer Presence at Alerts and Responds Medical imaging is critical to the early phases of trauma management and is an adjunct to the primary survey. The radiographer team are working to improve attendance at traumas through improving communication channels and attending team briefings.	Medical imaging
Feedback with High Acuity Response Paramedics Paramedics are responsible for the initial assessment of major trauma patients and often provide initial life-saving interventions. As a group they undergo a rigorous audit process but often do not have all of the information they need to evaluate their work. The trauma service is now working with the paramedic service to provide access to imaging and provide early feedback related to their assessments and interventions.	Trauma, pre-hospital

(*table continues*)

Red Blanket Handover Simulation Paramedics rarely enter the operating theatre. When they do it is in the context of a red-blanket (direct to theatre, critically bleeding trauma patient). Anaesthetics and paramedics have designed and implemented handover simulations to improve relationships and performance in this rare, high stakes encounter.	Anaesthetics, pre-hospital, trauma
Damage Control Workshop Anaesthetics, trauma, and surgery designing and delivering a one-day interactive workshop with a focus on damage control resuscitation and damage control surgery.	Anaesthetics, trauma, surgery
Trauma Operating Theatre simulations Anaesthetics, surgery, and trauma are working with the simulation service to design and deliver trauma-related simulation exercises on a quarterly basis.	Trauma, anaesthetics, surgery
ED to Operating theatre to ICU handover A critical moment of transition is the transfer of patients from theatre to ICU. The most unwell patients may not yet have had trauma imaging or completion of a primary survey. Through a number of educational, simulation, and systems interventions anaesthetics, surgery, ICU and ED will explore ways to optimize transitions in trauma leadership.	Trauma, ICU, ED, anaesthetics, surgery
Trauma Stand Downs Trauma team leaders to initiate a trauma "stand down" after the radiology primary survey at which time all teams must discuss and document plans for the patient before decanting. To be incorporated in "Trauma Team Expectations of Conduct" and ongoing simulation exercises.	ED, trauma
Video Feed to Operating Theatre For critically unwell patients requiring theatre, a video feed from trauma bays will be available in the anaesthetist, scrub nurse, and surgeon in the emergency operating theatre so that the team can be directly aware of injuries, vascular access, and progress towards theatre.	ED, surgery, anaesthetics
Trauma Simulation Training Continue monthly simulation training but with updated focus on fostering relational foundations of work across interfaces by through scenario creation and debriefing focus.	All
Trauma Operating Theatre Relational Coordination To build on this work, the anaesthetics and surgery groups are interested in focusing on relational interfaces once the patients reach the operating theatre. They intend to undergo a similar study to the own performed but with focus on the patient who is in the operating room, not the trauma bay. This will include some new groups (blood bank, operating theatre staff, vascular surgery, cardiothoracic surgery) with some overlap from the current study (surgery, ICU, anaesthetics, trauma).	Anaesthetics, surgery, ICU, trauma

CHAPTER 6 DISCUSSION

Relational Coordination in Trauma Care

While RC theory has been used in healthcare settings such as post-surgical wards,

inpatient wards, and outpatient clinics, to our knowledge, we are the first group to apply the

concept to a hyper-acute resuscitation environment of severe trauma. (Romero et al. 2014;

Blakeney et al. 2018; Gittell 2009; Gittell 2016) I simultaneously collected qualitative data, in

addition to the RC metrics, to build further understanding about this construct in the setting of

trauma and to facilitate deeper reflection for trauma care providers. The RC domains accounted

for many of the factors identified in resuscitations that went well and were perceptibly missing

from those cases that were felt to be less than ideal. I found RC to be a useful framework in the

acute trauma environment and hypothesize it can likely be applied more broadly to think about

work in other resuscitation contexts.

Value-add of Qualitative Approaches in RC

Qualitative RC data, in combination with the quantitative RC analytics, served as a

powerful launch point for facilitating engagement of a web of trauma care providers in

meaningful, collective reflection about the work that they do, and how they might do it better.

The RC metrics survey has been used across a variety of industries for quality improvement

purposes, but we were the first to use a new functionality that allowed for the integration of

narrative survey questions. To my knowledge we are also the first, for quality improvement

purposes, to pair the measurement of RC metrics with an ethnography. The additional insight

provided by qualitative data provided vital granularity around how RC manifests in trauma

which directly informed interventions designed by participants. For example, the importance of team briefings in facilitating RC for individual trauma cases would not have come to light through RC metrics alone (which lead to the "OneTeam Practice" intervention and a united focus on this in simulation exercises) or we may not have identified that surgical registrars do not have any introduction to their responsibilities as members of the trauma team (which lead to the development of the "Trauma Team Expectations of Conduct") or we may not have appreciated "time to CT" not only as a quality metric but as an indicator of resuscitation momentum (which lead to "To CT Fast and Safe" curriculum). It is unclear which, if any, of these interventions would have come about with the use of RC metrics and working groups alone but we perceive added benefit to our mixed-methods approach. The qualitative lens also allowed us to raise important questions that might be a focus of future study such as the relevance and interaction of affective aspects of communication in the RC framework.

Reflection on Interventions

There was wide variation in the nature of the specific interventions suggested. The diversity in outputs is evidence of the multifaceted ways in which trauma care providers experience relationships in the context of their work and how they perceive they can shape those connections. Team briefings, trauma stand downs, codes of conduct, simulation, and feedback mechanisms are not new concepts in trauma care but trauma providers chose to channel energy in these directions in an effort to improve relationships. This adds to my understanding of why these types of interventions might be important. I was particularly intrigued that nearly half of the proposed community-developed interventions included some

form of simulation. In answering my second research question, I found that simulation as the ability to impact RC, particularly mutual respect between groups. This finding likely accounts for participants' intuitive choice to use it as a method for improving RC when developing interventions. The potential for simulation to shape culture is in keeping with previous research in the medical school context. (Purdy et al. 2019 A) I recognize that participants' previous positive experiences with simulation at GCUH and the presence of simulation educators on the core project team may account for why it features so prominently in proposed interventions at our site.

As noted throughout the findings, I had difficulty engaging general surgeons. I see this as a critically important finding itself. Ethnographic data showed that most contact with surgeons happened outside of trauma service hours (since there are two trauma surgeons who provide coverage in hours) and during these times surgical registrars often had significant competing priorities (page 36) and sometimes challenges related to mutual respect (page 56). These realities contributed to significant threats to RC with this group and account for the weaker ties observed. Deliberately fostering RC with surgeons remains a particularly high priority for trauma care. A number of the community-developed interventions directly aim to improve the coordination of decision making without any significant investment from surgical teams. These include exercises targeted to improve team briefings and the practice of trauma stand downs. But perhaps more importantly, directed efforts to further understand surgical priorities and perspectives are underway. These efforts, proposed by anesthetists (who have the strongest relational ties with surgeons) and surgeons themselves, include damage control resuscitation surgical simulations and a similar study of RC of teams involved in the trauma patient's journey

once in the operating theatre. Both of these programs are designed to include continued

overlap with trauma care providers from multiple other disciplines but in a different, perhaps

more meaningful, setting for surgeons. I am optimistic these endeavours might facilitate further

understanding and simultaneously impact RC between groups.

RC for the Clinician and Educator

This thesis represents only the very superficial start at situating findings within the

context of what is already known about team and leader behaviours, team structures, and

resuscitation organizational behaviour. I intend to continue this considerable task through

publications and workshops that are relevant to and actionable for clinicians on the ground

such as my most recent publication, "The team briefing: setting up relational coordination for

your resuscitation." (Purdy et al. 2019 B). In the meantime, for trauma care providers these

findings suggest that RC serves as a valuable framework for reflection on the everyday

coordination of work.

Individual trauma providers, regardless of their positioning, might consider how on the

next shift they will seek to identify shared team goals, more clearly understand knowledge

around roles, and foster mutual respect. They might reflect on their communication practices

and how those allow for or impede the coordination of care. RC theory provides a structured

framework for such reflections which educators might also draw from when mentoring junior

staff or providing coaching for colleagues. For trauma teams the findings of this study should

inform the implementation of a number of key practices such as team briefings designed to

deliberately lay foundations for RC at the beginning of a case and after-action reviews which

allow a brief moment in time for teams to learn together, an important step in fostering RC particularly as it relates to mutual respect.

Collaborative Ethnography and RC as an Intervention

For institutions, this study provides a model for how a collaborative ethnography designed informed by qualitative and quantitative RC data can foster functional employee relationships in a systematic way and that goes well beyond encouraging collegiality – a worthy goal in the pursuit of organizational excellence. (Gittell 2009) This project was designed deliberately with a foundation in collaborative methods towards the goal of empowering participants to reflect on their community, drive change, and improve relationships. Beyond the independent effect of any one specific product that results from a collaborative ethnography, the design and conduct of project itself often influences communities and culture. (Lassiter 2005; Fluehr-Lobban 2008) This was consistent with my experience facilitating such work at GCUH.

The design of the project itself brought leaders from varying departments into frequent contact to reflect on interdepartmental relationships, values, and goals. The meetings and correspondences of the core project team resulted in thoughtful reflection and a joint vision. At one particular research meeting, the core project team reflected that working on the study seemed to bolster RC within the team and across interfaces in ways that individuals found positively affected their clinical work too.

Often individual departments undergo quality improvement processes but it is rare to have as close a grass-roots collaboration across organizational interfaces. This work ignored

those traditional barriers and hierarchies. In doing so, I not only facilitated community-driven change but anecdotally strengthened relationships and clarified the collective mission while doing so. The project design acted as a clear value-signal around a number of important domains. The collaborative approach enacted the professed value of working closely with each other. It offered an opportunity to practice and outwardly exhibit mutual respect between often disparate groups. The focus on relationships throughout the conduct of this study and distribution of results, signalled to every trauma provider that the organization believes that relationships are essential to high quality care. Finally, the collaborative design marked the understanding that the core project team are confident that every team member can contribute to quality improvement and has worthy ideas to explore.

Now, with ongoing support from the research team, trauma care providers are the ones driving the design, implementation and evaluation of this series of interventions that span organizational boundaries. By bringing people to the same table, sharing narratives related to experiences, and collectively creating a path forward I appreciate that the project itself fostered the development of shared goals, shared knowledge, and mutual respect in a way that spanned hierarches and crossed professional interfaces within the organization. As designed, the project itself was in fact a relational intervention. Overall, I hope that it serves as a gentle reminder that understanding the quality of trauma care provided requires investigations beyond those metrics we can easily measure and even the process of doing so may have impact.

There were significant challenges to facilitating ethics approval in the hospital setting. The methods described here are quite different from those which are usually used in hospital-based research and as such our team was met with significant skepticism from a traditionally

scientifically positioned group. Unfortunately, this experience is consistent with research suggesting that there are significant barriers to the acceptance of social sciences research in biomedical communities. (Albert et al. 2008) Specifically, the unit of study for this project seemed unfamiliar. Rather than studying patients as "subjects" I was working with trauma care providers as "participants". This lens was further complicated by the fact that patients were still peripherally involved (i.e. present during observation of care providers) but not the focus of direct study. Furthermore, the fluid nature of participant observation in the fast-paced world of trauma, lack of hard quantitative outcomes, and the desired but unpredictable evolution of a collaborative ethnography were understandable sources of angst. Through a long series of collegial dialogue and careful collaboration, I was able to work through these issues with the institutional ethics board in a way that I am confident protected and respected the rights of patients and staff appropriately while upholding the integrity of the project design. In doing so, I am optimistic that I have opened minds around what constitutes high quality, ethical research at this particular institution but recognize the baseline skepticism and unfamiliarity I faced will continue to be a challenge throughout my career as an anthropologist in a biomedical world.

Translational Simulation

Findings related to my second research question suggest that an established trauma simulation program can have a profound impact on the relational aspects of care and the development of a collaborative culture, with perceived tangible impacts on teamwork behaviours and institutional systems and processes. This effect was observed in simulations with a perceived high degree of team and task realism, and with explicit simulation design, preparation and

debriefing approach targeted toward relational aspects of care. To what extent the impact is attributable to each individual factor is not known, but overall, study respondents recognise a significant impact of the simulation experience on their learning and development of relationships with other care providers and teams.

Over half of trauma providers who answered the overall RC survey had participated in trauma simulations, evidence of significant engagement of these provider groups with the simulation process. The extent to which this level of engagement, over a sustained period, is required for this impact is also not known, nor is whether that engagement is cause or effect of the relational impact and developing collaborative culture. As Mannion et al suggest,

> "*any relations between culture and health service outcomes are likely to be mutual and recursive: that is, perceived performance is as likely to shape local healthcare cultures as culture is to shape local healthcare performance.*" - Mannion, Davies and Marsahll (2005)

Simulation experience data provided compelling evidence that simulation can target all aspects of RC - shared knowledge, shared goals, mutual respect and communication. These outcomes in simulation may be steppingstones towards an improvement of RC within the organization and go below the surface of previously documented benefits of simulation as a training modality. (Rosen et al. 2012; Steinemann et al. 2011; Patterson et al. 2013) Furthermore, the results provide support for application of RC theory to inform the design, delivery and debriefing of simulation activities focused on achieving relational goals within clinical trauma care practice.

For trauma care providers and trauma leaders this data means that simulation should be considered as a tool to build and strengthen relationships between practitioners across traditional boundaries. A dedicated trauma simulation program may offer wide-ranging

opportunities to shape culture and relationships that are difficult to approach using other strategies. Health professionals providing trauma care perceived that trauma simulations affect relationships and culture, and that this translates to real world practice.

For simulation providers, the RC framework can be used as a pillar for guiding the development of translational simulation interventions and structuring debriefing conversations for translational impact. I suggest adopting the recognisable language – shared goals, shared knowledge, and mutual respect - to explore relational fundamentals in debriefing conversations. Simulation providers need to carefully support task realism for all provider roles involved in trauma simulations, including technical task alignment but also create realistic affective experience and team interactions. Consistent with recent literature, the basis of realism was rarely cited by participants as physical resemblance, and more commonly related to functional task alignment. (Hamstra et al. 2014) As such, translational simulation applied to a trauma patient journey with involvement of diverse provider groups presents a design challenge – being able to print an ECG may be a key element of realism for one staff member, while another may require a high degree of realistic stress.

For the researcher, the novel application of the RC theory to analyze the impact of simulation can serve as an example for others interested in examining the role of simulation in affecting relationships and culture at their institution. I found that pairing the narrative surveys with an ethnography to be uniquely informative in understanding the role of simulation within the overall trauma service; I would encourage consideration of this embedded approach for simulation scholars exploring the impact of an in situ simulation program. As with many ethnographies, from a simulation perspective I was left with more questions than answers.

Some relate to examining the 'dose' of translational simulation required to have a relational impact, while others centre on understanding the granular elements of simulation design, delivery and debriefing that lead to relational outcomes.

Limitations

The findings I describe and the interventions participants developed reflect the organizational milieu at GCUH and also reflect experiences of individuals motivated to engage in the process. Readers may be able to draw parallels to their experience in trauma, specifically as it relates to application of RC to trauma care, however we suspect that interventions developed will be locally relevant. I encourage focus on methods, not specific results, as it relates to the design of interventions.

There are additional professionals involved in trauma care that were not included in this initial study but whom I recognize the importance of engaging with moving forward such as environmental services personnel, social work, subspecialty surgeons, and interventional radiologists. These individuals play critical roles in the care of trauma patients. Though they did not participate in the survey or formal interviews they were included in participant observation and informal interviews which shaped the development of interventions and further research moving forward.

One significant limitation, as it relates to the interpretation of survey data was the response rate. The response rate of 37% leaves the study at risk for nonresponse bias, and the variability in response rates between groups poses the risk of under-coverage bias. Nonresponse bias could mean that the trauma care providers who chose not to respond to the survey have potentially dramatically different views than those who did respond to the survey.

It is likely that those answering the survey were more interested in trauma care and invested in improving the trauma program at GCUH. These attitudes could certainly affect the relational coordination indices between groups. We achieved high rates of completion from those in the trauma service, ED, and HARU, with lower response rates for other groups despite having a similar recruiting strategy. The provision of trauma care makes up a large proportion of the day to day work of the trauma service, the ED, and HARU while it is a much smaller aspect of the jobs of surgeons, medical imaging, and anesthetists. These groups have distinct individuals who participate more regularly trauma related activities (e.g. anesthetists who take more trauma call) and who were more likely to respond than those who prefer not to take that allocation. Those who responded to the survey from these groups are more likely the providers who regularly engage in trauma though we cannot know with certainty. The survey suffered from under-coverage bias particularly of general surgeons. As such, quantitative data related to how general surgeons perceive their relationships with other specialties is essentially uninterpretable. There were so few general surgeons who answered the survey that the views of the few that did cannot be safely extrapolated to the whole group. However, the perceptions of how providers in other groups perceive their relationships with general surgeons are still reasonable to consider since that data is not dependent on how many surgeons responded. Similarly, there were moderately low response rates from medical imaging and anesthetics. Though the response rates may have affected quantitative RC data specifically, the way that we used this data is particularly important before dismissing it entirely. The quantitative RC data was used to prompt reflection and discussion between groups, rather than as an evaluative or definitive measure of a group's performance. Incomplete data can still prompt meaningful

reflection. Furthermore, data from the narrative aspects of the survey was triangulated with formal interviews and participant-observation.

Next, the respondents answered survey questions related to traumas and trauma simulations after completing the overall RC survey, which included questions focused on their relationships with other trauma providers. This may have primed respondents towards responses focused on relational aspects of care. However, this bias is simply toward the topic of relationships - the extent of positive relational impact and more collaborative culture stands independently.

This was a grass roots study that utilized minimal resources and incurred minimal cost. Throughout the course of the project I received suggestions for proposed interventions, such as providing 24-hour trauma service coverage, that would be likely to improve RC significantly but that were unfortunately far outside the scope of what the core project team could offer. They were not positioned to make significant structural changes. Data related to these larger systems-based suggestions, were shared with institutional leadership. Since doing so, trauma service hours have been extended to include Saturday and Sunday daytime hours. I do not know if this decision was a direct result of the study findings but the narratives and data likely provided additional urgency, context, and impetus for the structural change even if I was not powered to provide it directly.

From a simulation perspective, respondents may have undertaken their simulation experience at any time within the 4 years preceding the survey, and their experience may have been as few as one simulation or as many as 25. These results should therefore be regarded as a review of the program, rather than any one specific simulation activity. The most significant

limitation of this work is that the effects of any such simulation program will be dependent on a number of factors including local context, pre-existing relationships, design, and delivery. The findings I present are local to GCUH and may not translate to other programs already in existence or developed in the future. The findings show simulation driven movement towards positive relational outcomes but the opposite could also occur under different circumstances. I hope that simulation educators will apply the method, not just focus on results, in an effort to thoughtfully consider the effect of their local programs on culture and relationships.

Future Directions

RC Research

We were the first RC partners to use the additional survey feature to simultaneously collect narrative data alongside the standard quantitative data used to calculate RC metrics for quality improvement purposes. I found the perspective offered by these qualitative responses to be particularly informative into how participants experience RC in their day-to-day work. This data provided granularity and generated specific examples that served to contextualize the seemingly abstract numbers that are the traditional output of the RC metric analysis. I suspect that the inclusion of qualitative data increased engagement with the process – as stories often do - and am confident that it provided participants valuable insights while they designed interventions to improve trauma practice. Our qualitative approach, which also included participant-observation and interviews, was certainly time consuming and may not be feasible for all groups participating in RC quality improvement processes. Individual groups will have to

weigh the potential value of qualitative data (and methods of collection) with the increased

burden to the process.

Trauma at GCUH and Patient-Centred Outcomes

From a trauma team performance perspective, the core project team plans to build on

the work of Blakeney et al., at one year out they plan to remeasure RC between the groups of

trauma care providers. (Blakeney et al. 2018) At that time, we will also compare relevant

trauma-specific clinical indices (time to CT, time to operating theatre, mortality). Also stemming

from this work are several projects evaluating specific community designed interventions.

These studies are largely being led by participants turned collaborators. Local decision makers

and educators are using the results of this study to inform decision making and shape

simulation and team training exercises.

While higher measures of RC metrics have been associated with better patient

outcomes in cross-section, no studies to date have demonstrated improvement in patient

outcomes as a direct result of an RC quality improvement process. Though this is a logical next

step and what we plan to study, the core project team and I see these outcomes as secondary

to the potential benefits the process of undertaking a collaborative ethnography has offered

the community in terms of reflective practice across boundaries and empowerment of

providers to consider how they might do their work better, together. It is challenging to

quantify the impact of this process over a specific timeline. How long does it take relationships

between providers evolve? How long does it take to generate a culture of improvement and

how long does that take to impact patient care? What aspects of the patient experience can

we measure? Which are important? What other metrics, such as provider experience, are important to consider in defining success? How has this work impacted decisions that seemingly fall outside the scope of the developed interventions? How can we separate the impact of a year of collective reflection and action from other factors that directly impact trauma outcomes (i.e. funding increases)? These are challenging questions worthy of further consideration.

Simulation

This study opens a new path of inquiry into understanding that simulation not only impacts team performance of tasks (which previous lines of scholarship have focused on) but that it also has the potential to shape team relationships, team affect, and culture that underlie that performance. (Petrosoniak et al. 2018; Steinemann et al. 2011) To my knowledge we are the first group to demonstrate the potential value of simulation in this regard. My findings suggest that RC theory can be used as a tool to explore relationships between groups in simulation through focusing on shared goals, shared knowledge, and mutual respect. RC theory can inform the design, delivery, and debrief of simulation cases. In fact, at GCUH simulation facilitators have started using RC theory to inform their practice by incorporating discussions about shared goals, shared knowledge, and mutual respect as relevant. We have just started to unravel the potential relational effects of a routine in situ simulation program which we wish to explore further and extend beyond trauma. As mentioned earlier in this chapter there is a great deal yet to learn including an understanding of which aspects of the simulation, which design choices, and what "dose" of simulation are necessary for maximizing relational outcomes.

Team Performance

Future research to explore the application of RC theory to other high acuity patient presentations such as deteriorating patients on hospital wards or teams involved in obstetrical emergencies is of interest to me and other members of the core project team. Given that the framework was helpful to prompt reflection in the acute setting of trauma I anticipate that there will be value in using it as a tool in similar but somewhat different circumstances. This study has also prompted further interest in a number of aspects of team performance including team briefings, after action reviews, and developing psychological safety in practice. Aspects of this work have contributed to a recent proposal to the Board of the hospital for a "Team Performance Strategy." Members of the research team designed and presented this idea to the Board of Directors of GCUH. If accepted, this will be a collaboration between the simulation service, quality improvement service, professionalism team, and an academic partnership with a local university with the aim of prioritizing, optimizing, and further understanding team performance within the hospital. If formally endorsed, this strategy will position real-world team performance as a key focus for the hospital in the years to come.

CHAPTER 7 CONCLUSIONS AND PERSONAL REFLECTIONS

One commonly used phrase in the trauma education world with an unknown attribution is, *"trauma is easy, trauma teams are hard."* This declaration quite accurately and succinctly summarizes my findings and my personal reflections on this work.

Conclusions

RC is one framework that is helpful for understanding the coordination of complex trauma work in a way that goes beyond task execution and crisis resource management. Shared goals, shared knowledge, and mutual respect in the context of communication that is timely, accurate, frequent and problem solving based is critical for teams in this setting. In the trauma setting, the team briefing was identified as a particularly important moment for setting the foundations for high degrees of RC for a specific trauma case. At a higher level, through collaborative engagement of clinicians spanning organizational boundaries, relational aspects of care can be considered and directly targeted in a collective quality improvement process.

An established trauma simulation program can have a profound impact on the relational aspects of care and the development of a collaborative culture. The RC framework – shared knowledge, shared goals, and mutual respect in the context of high-quality communication– can provide a common language for simulation educators to design and debrief simulation exercises that aim to have a translational impact. Simulation educators should be deliberate about the foundational team relationship and organizational culture outcomes of the simulation programs they develop.

I encourage individuals, teams and health care leaders to consider relationship-based quality improvement strategies, including translational simulation and the application of RC theory, in efforts to improve care for patients with complex, interdependent journeys.

Personal Reflections

This year, spent embedded as a researcher in the emergency department, has shaped my identity as an anthropologist, as an emergency physician and as an educator. As an anthropologist, I have practiced specific skills related to negotiating access, project design, project management, interviewing, organizing data, analyzing data, writing field notes, and writing papers. As an emergency physician I have had the advantage of identifying practices that will shape the way I care for patients and the team ranging from soft words spoken to a patient or their family, to delivering a structured team briefing, to prioritizing after-action reviews, to adopting specific leadership practices. I will steal liberally some of the words and actions from people I admired in action. Throughout the course of participant-observation, I was reminded of the importance of building social capital to facilitate work as an emergency physician and will continue to make efforts to build that capital in whatever departments I find myself working in. As an educator I have mostly been exposed to what is possible. Introduction to education that is focused on real-world team performance, rather than the development of individual skill or knowledge, will shape my trajectory as an educator in hospitals. I find this refocus exciting and feel it is a vitally important shift in perspective.

There are many more abstract lessons that cross each of these roles -anthropologist, emergency physician, and educator. The lessons relate to the benefits of practicing curiosity

about each other and ourselves. The opportunity to speak to and learn from individuals around how they perceive their roles, their work, and our collective responsibility was a privilege that prompted me to reflect on my own positioning in trauma care, emergency medicine, and healthcare more broadly. I am tremendously grateful for that opportunity.

Altogether, however, I have mostly been humbled. I have been humbled by how overwhelmingly good trauma care providers are at their jobs. The work is capricious, and the execution is life and death. Despite obvious stressors, trauma teams arrive and do their job. Every time. I observed, some cases go more smoothly than others but I have come to realize throughout this study that I have been working to dissect great from exceptional. The desire, efforts, and energy of trauma care providers to be exceptional has left me in awe of a group of providers who are actively in the pursuit of excellence. Surely, they will find it together then remain driven, always searching for ways to become even just one percent better.

APPENDIX A

SIMULATION CASE

3rd trimester pregnant trauma

Patient Details

Name	PMHx
Peta Armstrong	G3P2
Age/Sex	33/40
33 F	Otherwise well. Uncomplicated pregnancy

HPC	Meds	All
Restrained driver in high speed MVA at Coomera. Car rolled and hit barrier at high speed. One other occupant (5 yo) airlifted to QCH	nil	nil
	SHx	

Name	Scenario Role	Prop List
Participants 1	ED consultant	Clothes - maternity top and slacks
2	ED registrar and PHOs	**Drugs**
	Midwife +/-obstetrician (#71554)	Infusion and induction drugs
		Tranexamic acid
		Blood products 4 units o neg
		Cryoppt 10 units
		Platelets one bag
	QAS, Trauma nurse	
	Trauma fellow/ surgeon Anaesthetics	**ECGs/Xrays**
		CXR/ Pelvis – small pneumothroax
		USS –signs abruption
		CTG
		vBG x2
		ROTEM x 2
	??Paeds notified	

Initial Setup

Trauma activation - Participants prepare for arrival of severely injured pregnant female

"33/40 Head, chest and abdo injuries. Significant PV bleeding" BP initially responsive. Currently 95/55, HR 120. GCS 12 combative"

Obvious trauma to R side of head. Abrasions across chest and abdomen and limbs. Gravid abdomen. Pelvic binder low
PV bleeding

Stage	Patient Status	Scenario Management	
		Operator:	Expected Participant Actions:
1.	*Preparation*	**Nil**	Team prepares. Roles allocated, obstetrics and paeds contacted
2.	*Handover/ Arrival*	**HR 120. BP 95/55 Moaning, localizing to pain. Obvious external HI**	Handover from QAS, Monitoring. Assessment. Wedge.
3.	Comprehensive assessment,	**HR 125, BP 95/40, EtCO2 32, sats 97% (poor trace)**	Radiology, including FAST/ USS. CXR/ Pelvis ROTEM CTG – foetal distress/ late decelerations ? hypertonic saline and blood products initiated
4.	Unconscious Foetal distress	**HR 125, BP 95/40, sats 97% FH 90**	RSI Decision-making re OT for LSCS
5.	Intubated. Foetal distress	**HR 115 BP 105/60**	Post ETT cares Further secondary survey Prep for T/F to OT
6.		**Scenario finish**	

Debrief Guide		
Index	Trigger event:	Teaching Points:
	Handover/ Complex team work	**Assessment of severely injured woman** **Communication between multiple players.** **Relationships with 'ocaasional' trauma team members**
	Pregnancy in trauma	**Practical considerations** **Teams involved and roles** **Midwives and obstetricians in the trauma room**
	Foetal distress	**CTG monitoring/ USS** **Decision-making and prioritization**

APPENDIX B

SURVEY

Part A: Relational Coordination (not included due to copyright considerations)

Part B: Experience in Trauma

1. Describe your role on the trauma team.
2. Describe a trauma activation that went well, what made it so? Please maintain patient anonymity.
3. Describe a trauma activation that went poorly, what made it so? Please maintain patient anonymity.

*we recognize that this question may bring up some challenging emotions and thoughts. If needed, please contact the employee assistance program available 24/7 at _____ and/or your manager or a colleague to discuss further.

4. Are there weaknesses in our system or relationships that could be improved?

Part C: Experience in Simulation

1. Have you participated in 'in situ' trauma sims at GCUH?
2. How did the in situ simulation experience compare to your participation in real trauma activations?
3. Did you find value in performing in situ simulation? Why, why not?
4. How does the facilitated debrief after trauma simulation affect your experience of in situ trauma simulations?
5. What changes (if any) have occurred in your individual or team practice as a result of in situ trauma simulation at GCUH?
6. How would you change the in situ simulation program?

APPENDIX C

INTERVIEW GUIDE

*please note that the interview questions were adapted based on initial qualitative survey data and who is being interviewed.

Thank you for joining me today. We will be covering questions about your role on the trauma team, the activities of the trauma team, and your experiences with in situ simulation. This interview will be recorded. Afterwards it will be transcribed and the original recording destroyed. In the transcribed version your identity will be kept anonymous. Do you have any questions before we get started?

General
- Tell me about your role on the trauma team
- Tell me about a trauma activation that went well
- Tell me about a trauma activation that went poorly
- What motivated you to join the trauma team?

Shared Knowledge
- Tell me about the preparation you have to be on the trauma team?
- How do you learn about your role on the trauma team?
- How does the trauma team share knowledge?
- Tell me about the educational activities of the trauma team?
- What do you think is the ideal way to acquire and maintain the knowledge/skills you need to be a member of the trauma team?

Shared Goals
- During a trauma activation how are goals defined?
- Do you contribute to defining care goals? Are you aware of what they are?
- Describe a situation when there have been competing goals?
- How is conflict about patient care goals resolved?
- How do you think goals should be defined?

Mutual Respect
- Tell me about the members' roles? How did you learn about them? (run through other roles on the trauma team)
- Do you think others on the team know your role?
- Do you feel respected on the team?
- Tell me about a time there was conflict on the trauma team? How was it resolved?
- How do you think we could cultivate mutual respect amongst trauma team members?

Communication
- Tell me about trauma team communication?
  - Describe the handover process. What goes well? What could be improved?

- o Tell me about communication in the resuscitation bay. What goes well? What could be improved?
- o Tell me about communication between the ED and other care areas (OR, imaging). What goes well? What could be improved?
- What are the challenges in communicating with other trauma team members?
- How do you manage challenges in communication?

Simulation
- Tell me about your experience with the GCUH in situ trauma simulations.
    - o How many
    - o When
    - o Types of cases
    - o How did the in situ simulation experience compare to your response to real trauma activations?
- Did you find value in performing in situ simulation? Why, why not?
- What types of cases or crisis resource management scenarios would you like to see covered next?

APPENDIX D

"OneTeam Practice" MENTAL REHEARSAL TRAINING VIDEO

This training video was created to support the "OneTeam Practice" community developed intervention to improve team briefings. These team mental rehearsals now take place every morning in the resuscitation section of the ED. The video is accessible by clicking here or the image below.

Gold Coast Emergency Departments

OneTeam practice- Thinking ahead in resus
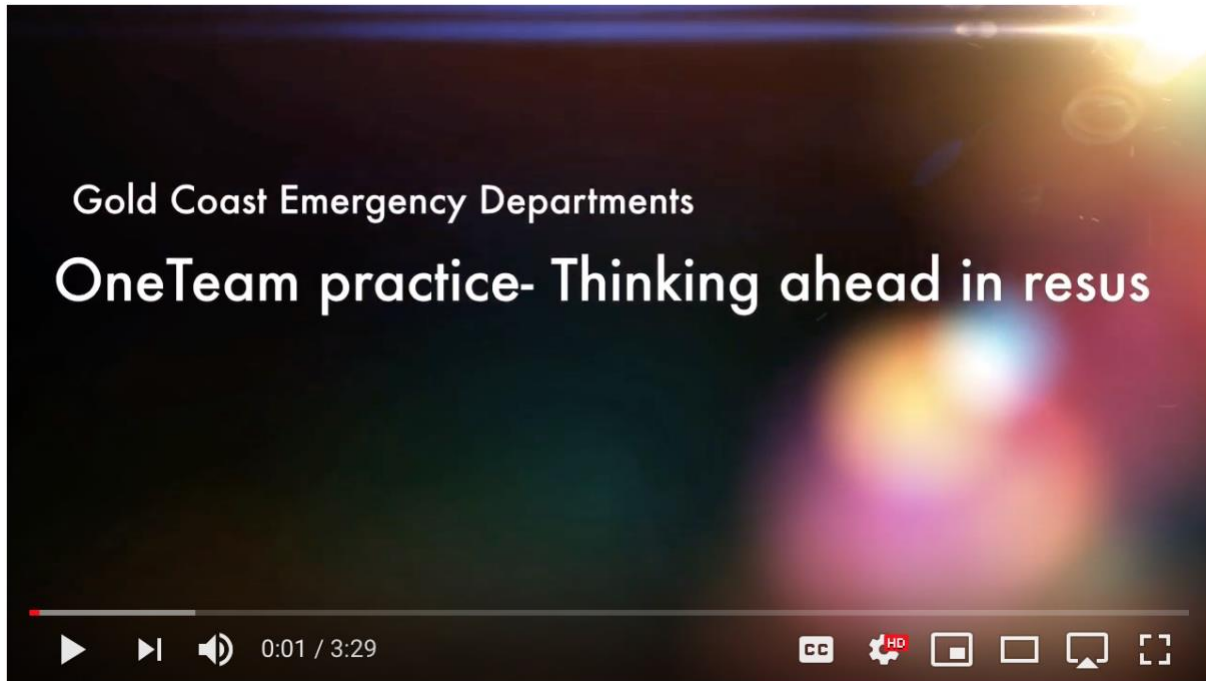
https://www.youtube.com/watch?v=wo_VPXVkbAA&t=99s

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