

Responding to Disaster: Resilience Engineering and Shared Leadership in Coping with Unexpected

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ABSTRACT

The magnitude 6.3 Christchurch earthquake struck the city at 12:51 pm on Tuesday, 22 February 2011. Christchurch Hospital sustained damage following the earthquake which severely strained the hospital's ability to function at normal capacity. Three acute medical wards had to be evacuated immediately after the earthquake and relocated to an older person's health hospital.

This insight paper makes the unique contribution to the field of resilience by demonstrating the practical application and positive impact of the Resilience Engineering and shared leadership to team performance in one of the relocated acute medical wards during the initial two years following the earthquake. This paper which is still work in progress was developed from the experiences and reflections of the author, who was a charge nurse manager of one of the relocated wards and led a nursing team during the earthquake, evacuation, and relocation.

Keywords

Resilience Engineering, Shared leadership, Christchurch earthquake, Acute medicine

INTRODUCTION

The Canterbury region hosts New Zealand's second largest city, Christchurch. While there are seven hospitals within the city, only one of these is a tertiary-level, acute-admitting facility with emergency department services. The other hospitals specialize in rehabilitation, mental health, non-acute medical and surgical services (Richardson and Ardagh, 2013).

The magnitude 6.3 Christchurch earthquake struck the city at 12:51 pm on Tuesday, 22 February 2011.

This earthquake heavily impacted the Canterbury region's healthcare system. Christchurch Hospital sustained damage following the earthquake which severely strained the hospital's ability to function at normal capacity. Due to water damage from leaking roof tanks, the top two floors of the 'Riverside' hospital building (including three adult medical wards) were evacuated immediately after the earthquake and relocated to an older person's health hospital. Relocating these wards was a significant challenge for the entire general medical service.

This insight paper aims to demonstrate the practical application and positive contribution of the Resilient Engineering (RE) model (Hollnagel, 2012) to sustained nursing performance in one of the relocated wards during the initial two years following the earthquake. The Resilience Engineering (RE) movement was founded by innovative academics and practitioners who have decades of experience in investigating and transforming work systems, and have an understanding of how human systems function as individuals and organizations. Resilience engineering (Hollnagel, Woods and Leveson, 2006) focuses on work systems as an instance of complex adaptive systems. In particular, it studies how the performance of systems is affected by disruptions and seeks to understand how the characteristics of these systems make them more prone to success or failure in their respective environments. The field borrows concepts and results from a variety of other fields related to the study of complexity. In return, resilience engineering aims at contributing to the study and improvement of work systems, as well as to the development of knowledge about complex adaptive systems.

The team complimented the RE model with shared leadership. Shared leadership in this particular case is defined as a system of management/leadership that involves all staff in the decision-making processes. Although not a novel invention, the concept of shared leadership has only recently been applied in the context of acute healthcare (St. Pierre et al., 2011).

Currently, the role of leadership in creating resilient organizations is little understood. Some say that leadership is irrelevant, and that it is money that drives decisions. However, this may be because leadership is often expressed as a noun, or more simply, the linear associations within and across organizational boundaries depicted in organizational charts. Preliminary findings from research on resilience following the Canterbury earthquakes indicate that adaptive resilience, that is, active responding in the face of crises, requires shared leadership (Lee et al., 2013). Shared leadership approaches have been demonstrated to lead to better outcomes than individual leadership in a variety of contexts, and are considered to be particularly useful in situations of complexity (Knox, 2013). Collective leadership means everyone is taking responsibility for the success of the organization as a whole – not just for their jobs or work area. This contrasts with traditional control-based approaches to leadership, which have focused on developing individual capability while neglecting the need for developing collective capability or embedding the development of leaders within the context of the organization they are working in (West et al., 2014).

This insight paper which is still work in progress was developed from the experiences and reflections of the author, who was a charge nurse manager in an adult medical ward during the Christchurch earthquake. He led a nursing team for two years after evacuation and relocation to new premises at a hospital for the health of older people. As has been mentioned before, shared leadership does not constitute a part of the Resilient Health Care approach. Instead, it has been shown to positively impact team resilience in acute clinical settings in the context of the evolving crisis.

BACKGROUND

Department of general and internal medicine of Christchurch Hospital has close links with other internal medical specialties including health care of the elderly.

On a day of the earthquake, three acute medical wards were evacuated and permanently closed in the Riverside building of Christchurch Hospital as the result of the post-earthquake decision to limit inpatient occupancy of floors without horizontal evacuation options. These wards were moved to temporary accommodation at the older person's health hospital- The Princess Margaret Hospital (TPMH). Two medical wards remained on Christchurch's hospital campus. This split of the acute services has had a significant impact on models of care and delivery of service within general medicine.

Ward 29's team of nursing and support staff which is described in this insight paper were the first to relocate. At the time, this was a 27 bedded acute general medical ward. The team included Charge Nurse Manager (CNM), thirty one registered nurses, ten healthcare assistants, and three clerical staff. Relocation took place within a week of the earthquake and involved complex planning and intricate execution, compounded by ongoing seismic activity. The team had to operate under tight time constraints and were expected to become fully operational with new admissions within three days of relocation. For two months the team remained the only acute general medical team at TPMH premises. Due to a lack of acute medical beds at Christchurch hospital, two remaining medical wards were relocated to TPMH later on to form a small cluster of acute medical services based at TPMH.

In these wards, for more than two years medical and nursing teams continued to provide acute medical care to a diverse population under severe conditions where they coped with complex clinical and operational challenges and continuous seismic activity. These challenges required all teams to develop and maintain a high level of resilience. Coping with these challenges and trying to find solutions was not an easy task and it required developing a framework for response. The author became familiar with the initial concept of resilience engineering in 2011. The main foundations of the resilience engineering which defined system capabilities to monitor, to respond, to anticipate and to learn provided an excellent framework to allow development of sustained response in the complex and ever-changing environment. The nursing team has not been specially trained on the Resilient Engineering model. However, four core capabilities of the resilient system were integrated into daily performance and activities of the team on the ward. Initially, staff developed the capability to respond by recognizing the fact that this new situation of evolving crisis requires innovative and 'out of box solutions.' By developing and embracing every opportunity to learn, the team acquired the capability to monitor the situation carefully and also plan for anticipated response. Eventually, the nursing team on the ward developed high adaptive capability which resulted in sustained resilient performance.

Over recent years, interest has grown within management and organizational studies in alternative models of leadership in which leadership is not limited to the formally appointed leader. Particular interest has been directed to models of shared leadership. In the context of the team response, a shared leadership approach was used to identify strategies for solving problems and to provide answers to complex clinical and organizational challenges. In general, a shared leadership approach comprises two principal components: formal and informal leadership. The main characteristics of a formal leadership role included decision-making responsibility, influence, and authority. Informal leaders, on the other hand, have influence and informal authority without possessing any formal title. Over a few months from the relocation, many informal leaders within the nursing team emerged and stepped up to provide support for other team members. Integrating a shared leadership model provided a solid base for improved communication and shared decision making. It assisted in developing a structured response to high-stress levels and improved the ability of the team to cope with ongoing uncertainty.

DISCUSSION

Resilience can be defined as the ability of the health care system (clinic, ward, a hospital a county) to adjust its functioning prior to, during, or following events (changes, disturbances, and opportunities), and thereby sustain required operations under both expected and unexpected conditions (Hollnagel et al, 2015).

Hollnagel (2009) proposed a list of four capabilities that enable and promote resilient performance. These include:

- Capability to respond. A system must respond appropriately in real time.
- Capability to monitor. An ongoing search to identify threats and opportunities.
- Capability to anticipate. A forward-looking approach, anticipating what could happen.
- Capability to learn. A multi-level learning process is evaluating what went wrong and what went right.

It is important to note that the nursing team on the ward has not been formally trained on Resilient Engineering model and it has not been formally introduced. As soon as the author got exposed to the concept of four capabilities of the resilient performance, he adopted and integrated these capabilities into the daily activities of the team. These core capabilities provided a foundation and framework for the team's actions. This model has not been formally evaluated given high complexity and protraction of the event. However, on a subjective level it was evident that when daily activities are built and developed around these four core capabilities, it provided structure to develop high adaptive capacity, team cohesion, and mutual support.

The ward space the team moved into lacked proper infrastructure but within a short period IT systems were operating, acute admitting medical teams were formed, and modified policies and protocols were agreed on that reflected required operational changes. Setting up proper information systems proved to be a challenge. After a quick installation of hardware, IT support team developed and installed required patient management and tracking systems. It required reconfiguration of existing systems to make sure all clinical information is registered, recorded and available. This process required strong leadership and prompt communication between IT management, operations management, and clinical teams. Following relocation, a core model of care on the ward has been adopted to reflect changes and the team started receiving patients directly from the community via GP referrals, bypassing Emergency Department. This new process required the development of new software to allow monitoring, management and clinical risk assessment of new admissions. Prompt development and integration of existing and new information systems proved to be one of the critical components of providing a sustained response to the evolving critical event. Strong leadership was vital in maintaining communication, linking between team and departments and sharing accountability in decision making.

Capability to respond

Initially, the Christchurch earthquake required a quick response from all the team's members.

All beds on Ward 29 were occupied, and some of our patients required complex acute care. Because of ongoing aftershocks, staff could not stand unsupported and although there was no structural damage, the physical environment of the ward was significantly compromised. While providing care to patients, the staff on the ward had to manage their stress, fear of the unknown and concerns about their families and relatives. It should be noted that the team had no prior training in responding to a crisis event of this type and scale. Initially, part of the response was based on self-organizing behavior and leadership. During that day the response focussed on three main things: firstly patient safety and care, secondly the safety of the environment, and finally preparing for possible evacuation.

Leadership played an essential part in the response. New leadership structures quickly were established including shared leadership where informal leaders and members of medical teams and other senior members of nursing teams cooperated and coordinated in a shared decision-making process.

The situation became more challenging after Ward 29 was relocated. The variety of complex problems faced while establishing and running the fully operational and viable acute medical ward required quick solutions and 'out of box' thinking. To sustain resilience performance over time the team was up-skilled and trained.

As an example, following relocation a decision was made to develop the new model of care which will allow new patients to get admitted to the ward directly from general practices bypassing triage in the emergency department. Nursing staff on the ward have been promptly trained in advanced assessment skills, clinical emergency response and clinical communication. Some patients arrived with complex clinical conditions and staff needed to respond quickly often improvising and developing non-standard solutions. As a part of the assessment, some patients required analysis of blood gases sample. TPMH did not have a blood gas analyzer, and the team was looking for a solution. Eventually, local taxi company was contracted to provide quick transport support in taking blood gas samples to the main hospital across town to complete testing within the required time frame.

Capability to monitor

'Capability to monitor' was one of the key contributing factors in creating the robust and sustained response of the team. After relocating, it was essential to monitor many threats and identify suitable opportunities. First of all, they had to monitor indicators related to clinical performance to ensure that they were providing safe and timely care. Situations they faced and had to cope with were unusual and required continuous input. At the same time, it was vital to monitor how the staff was coping with the pressure and ongoing challenges. For example, as soon as Charge Nurse Manager identified staff who were struggling or found it difficult to cope he immediately offered one on one support, debrief or engagement with regular staff support services. Some staff members could not function appropriately following the initial earthquake and had to go through the lengthy and complicated process of mental health rehabilitation to allow them to return to the baseline functioning.

Proactive monitoring of signs of stress, fatigue, and anxiety early helped to create an open and supportive environment which in turn contributed to the overall teams' resilience. Staff had a wide range of options with regards to where and how to seek help and support. Also, given the evolving nature of the event and ongoing aftershocks, the team had to continuously monitor their physical environment to identify and report any potential damage.

Capability to anticipate

As soon as the team established robust mechanisms to monitor the physical environment, the safety of patient care, and a well-being of staff, they started developing their capability to anticipate. The purpose of looking for what may potentially happen was to identify possible future events and changes in the environment that could have affected the team's ability to function. They had regular staff meetings and debriefed sessions in smaller groups. These discussions contributed to their vision of what potentially might happen and the team's risk awareness improved.

Capability to learn

The capability to respond depends on the capability to monitor, in the sense that the timing and precision of responses can be improved by effective monitoring. However, the capability to respond and the capability to monitor both depend on the capability to learn (Hollnagel, 2015).

Developing a robust and comprehensive learning structure was one of the main objectives of the team.

Given the complexity of circumstances and a wide range of unique challenges conventional learning tools known as single-loop learning could not provide the required outcomes. Single loop learning focusses on establishing rigid strategies, policies, and procedures and then prompting people to spend their time detecting and correcting deviations from the rules.

Therefore, the team had to adopt a double-loop approach to learning where they were encouraged to develop creative and critical thinking. Research confirms that double loop learning is critical to the success of teams, especially during times of rapid change. For example, as soon as the ward started admitting patients directly from the community, staff identified the need to acquire advanced clinical skills in assessing complex patients,

identifying deteriorating patients early and communicating any clinical concerns to medical teams. This set of skills became of critical importance after hours when the number of available medical teams were reduced. To provide staff with excellent opportunity to learn these advanced skills and to encourage critical thinking a team of nurse educators together with charge nurse manager developed a comprehensive learning programme which focused on developing of technical skills combined with components to develop the ability to think out of the box and be creative in providing a clinical solution. For example, how would you manage difficult airway in a complex patient during a night time when the specialist team is not available. This particular challenge and staff engagement allowed to develop an innovative solution and engage excellent ambulance staff to be called to the ward in a case of an emergency which was not an accepted practice before that.

To achieve the desired outcomes, the team needed enough opportunities to learn. Staff was encouraged to share their experiences in different ways. Teaching sessions were run for small groups that encouraged personal reflections and specific attention to debriefing processes.

Everything the team did turn into learning processes with many opportunities to translate what they had learned into practice.

Shared leadership-Acute medical ward

At the time of the earthquake and following relocation, the Ward 29 team quickly adopted a shared leadership approach to decision making and management. At a very early stage, they had an active group of emergent leaders. An emergent leader is someone who is not designated as a leader but emerges as an informal leader of the group by exerting influence on group processes and group goal achievement.

As an example, in 2005 Hurricane Katrina created a situation where the capacity of formal leaders to handle the situation was overwhelmed. It created a definite void in the leadership structure. To fill this void, individuals stepped up to assist others, and informal leadership capabilities came to the fore.

In contrast to Hurricane Katrina, Ward 29 staff were motivated to step up and extend themselves during the crisis in Christchurch by a desire to support their team at many levels to keep things going in a very challenging time. Shared decision making and engaging formal and informal leadership groups within the team during the response contributed to the team's overall resilience. Genuinely shared leadership was based on mutual trust and open interaction at multiple levels within the team. One of our main learnings from this process of engagement with informal leaders was that:

Successful performance in a crisis provides an opportunity for informal leaders to step up.

Support for informal leaders begins with understanding how they approach different tasks during a crisis.

The team had the ability and right tools to assist informal leaders in creating a positive and motivating environment. Informal leaders in the team needed to know that their positive attitude and creative contributions were of great value to the team and organization. Recognising efforts and new opportunities can be one of the most highly valued forms of reward. Informal leaders were an essential component in responding to the challenges that Ward 29 had to cope with and their contribution to the successful performance of the team cannot be underestimated. Collaboration, trust and a high level of management support contributed to the ability of the staff to exercise informal leadership.

CONCLUSION

The purpose of this insight paper was to discuss the contribution of a Resilient Health Care model and its concepts of responding, monitoring, learning, and anticipating to the sustained resilient performance of the nursing team at one of the medical wards of Christchurch Hospital over the period of three years following Christchurch earthquake. In particular, this insight paper focussed on the capability to learn as a primary contributing factor to the resilience continuum and to explore the link between shared leadership and an overall team's resilience.

Taking RE model as a framework for creating resilience in complex and unexpected environment proved to be a very positive experience which created many learnings and prompted the team to develop sustained resilience at personal, interpersonal and professional levels.

On reflection, integrating four core resilient abilities into daily practice helped our team to develop high adaptive capacity and cohesion. It promoted a safe environment to express ideas and feel supported during very challenging times. Shared leadership was one of the critical components which helped to turn crisis into opportunity. This is probably one of the most significant learnings we can take from our experience with RE and

shared leadership as a framework for the response. By giving the staff the opportunity to step up, feel supported, sharing the lead, pushing for creativity and innovative solutions our team managed to turn this complex and evolving crisis compounded by personal and social stress into one big learning opportunity. It went well beyond acquiring the technical skill. We learned a great deal about ourselves, our strengths, weaknesses, and limitations.

Our team came out of this unique experience feeling much more confident and stronger with better ability to cope and face unexpectedly.

Working on this insight paper prompted the author to explore possible application of Resilient Engineering in the healthcare environment, taking it as a foundation principle of developing resilient health care in the context of complex adaptive systems. This transformed onto Ph.D. research which will be submitted to the conference colloquium.

REFERENCES

- Hollnagel, E., (2012), *"FRAM: The practical resonance analysis method. Modeling complex socio-technical systems"*, Aldershot, UK: Ashgate.
- Hollnagel, E., (2009). *The four cornerstones of resilience engineering*. In: Nemeth, C. P., Hollnagel, E. & Dekker, S. (Eds.), *Preparation and restoration* (p. 117-134). Aldershot, UK: Ashgate.
- Hollnagel, E., Woods, D., Leveson, N., (2006) *Resilience engineering: concepts and precepts*. Ashgate Publishing, Aldershot
- Hollnagel, E., (2015) *Disaster Management, Control and Resilience*. In: Masys, A., (Ed), *Disaster Management: Enabling Resilience*, Springer International Publishing, Switzerland.
- Knox Clarke, P. (2013). *Who's in charge here? A literature review on approaches to leadership in humanitarian operations*. ALNAP/ODI: London
- Lee, A. V., Vargo, J., & Seville, E. (2013). Developing a Tool to Measure and Compare Organizations' Resilience. *Natural hazards review*, 14(1), 29-41.
- St. Pierre., Hofinger, G., Buerschaper, C., Simon, R., (2011) *"Crisis Management in Acute Care Settings: Human Factors, Team psychology, and Patients Safety in a High Stakes Environment"*, Springer, London
- West, M., Eckert, R., Steward, K., Passmore, B., (2014) *Developing Collective Leadership for Healthcare* Kings Fund, London.