

Evaluating multidisciplinary health care teams: taking the crisis out of CRM

Gigi Sutton

Abstract

High-reliability organisations are those, such as within the aviation industry, which operate in complex, hazardous environments and yet despite this are able to balance safety and effectiveness. Crew resource management (CRM) training is used to improve the non-technical skills of aviation crews and other high-reliability teams. To date, CRM within the health sector has been restricted to use with “crisis teams” and “crisis events”. The purpose of this discussion paper is to examine the application of CRM to acute, ward-based multidisciplinary health care teams and more broadly to argue for the repositioning of health-based CRM to address effective everyday function, of which “crisis events” form just one part. It is argued that CRM methodology could be applied to evaluate ward-based health care teams and design non-technical skills training to increase their efficacy, promote better patient outcomes, and facilitate a range of positive personal and organisational level outcomes.

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ALTHOUGH CONSIDERABLE WORK has been undertaken within other industries, a sound theoretical basis for team work in the health care sector is still emerging. Group structures persist within the workplace because they improve the working environment of employees and because results obtained⁵ and decisions made⁷ within the group context are often superior to those of

What is known about the topic?

Crew resource management (CRM) training programs emerged in the 1980s to improve the non-technical skills of aviation crews¹ and other high-reliability teams by addressing skills which do not relate directly to clinical or psychomotor skills, but to cognitive and interpersonal skills that impact on team processes. The earliest adaptation of *crew* to *crisis* resource management within the field of health focused on high-reliability teams working within “crisis” units of intensive care, operating rooms and emergency rooms.^{2,3} To date, application of CRM has not extended to health care teams operating outside a “crisis” environment.

What does this paper add?

This discussion paper identifies a gap in team evaluation and training methodology, and positions CRM as a meaningful framework to guide the development of assessment and training tools for use with multidisciplinary ward-based health care teams, hereafter referred to as ward teams. Secondly, the paper compares and contrasts ward teams and “crisis” teams and highlights the need to develop domain-specific evaluation tools for acute, non-crisis health care teams. Finally, I assert the need for *all* health care teams to focus on the acquisition of non-technical skills required for effective everyday function beyond the time-limited crisis.

What are the implications for practitioners?

To improve the effectiveness of ward teams, change agents need to develop a better understanding of the way in which team effectiveness can be operationalised within acute health care team settings by drawing on behavioural marker methodology and integrating it with existing input–process–output models^{4,5,6} of team processes. Behavioural marker tools should be employed to observe and assess team effectiveness in ward teams and test a model that examines theoretically linked antecedents and consequences of situational awareness, decision making, clinical planning, execution of management tasks, teamwork and cooperation, and effective interpersonal behaviours with clinical outcome measures. An understanding of these relationships could then be used to design team-based interventions and improve the non-technical skills required for health care teams to operate more effectively within a high-reliability environment.

Gigi Sutton, BOccThy(Hons), MBA, PhD, Manager, Team Effectiveness
Clinical Practice Improvement Centre, Queensland Health, Brisbane, QLD.

Correspondence: Dr Gigi Sutton, Clinical Practice Improvement Centre, Queensland Health, C/- SDC, Royal Brisbane Hospital, Lvl 5, Blk 6, Herston Road, Herston, Brisbane, QLD 4029. gigi_sutton@health.qld.gov.au

individuals.⁸ In a review of 400 health care teams, the United Kingdom National Health Service was able to show the death rate in hospitals to be significantly and negatively associated with the percentage of staff working in teams.⁹ More recently, effective interdisciplinary peer interaction has been associated with lower than expected morbidity and mortality within a surgical setting.¹⁰ Recognised outcomes of functional health care teams are the reduction of staff stress levels,^{9,11} and high levels of practical and emotional support.⁹ At a more strategic level, teams can be viewed as an efficient way of linking organisational goals with more immediate concerns over service delivery.⁷

The writing of this paper was driven by three questions:

- Does crew resource management (CRM) present a meaningful framework to guide the development of assessment and training tools for use with ward teams?
- Can domain-specific CRM behavioural marker tools be developed to discriminate between high- and low-functioning ward teams?
- Is there a need to extend health care-based CRM programs beyond “crisis events” to promote effective team function every day?

Multidisciplinary health care teams

Team composition

Although more than 50 interpretations of the term multidisciplinary are recorded in the literature,¹² the label cannot convey more than a crude measure of the extent to which professionals work in a coordinated way when providing care to the one patient or patient group. For the purposes of this paper, the term multidisciplinary will refer to a health care team comprised of health professionals drawn from at least three different health disciplines and not from medical and surgical subspecialties alone. While acknowledging the role and potential impact of administration staff, ancillary staff such as porters, ward staff and volunteers, as well as patients and their carers, these participants in the experience of

health care are not viewed as part of the core multidisciplinary health care team.

Professionally diverse multidisciplinary teams develop in response to an increasingly complex environment.¹³⁻¹⁵ Team composition and the process and quality of work within health care teams have been positively associated with the quality of patient care and innovation.¹⁴ Diversity with respect to age, educational level, status and non-industry work experience has been shown to result in higher turnover rates from teams,¹⁴ yet a moderately diverse team is required to avoid mere replication of individual effort.⁵ While, intuitively, team preselection to promote well-balanced teams appears preferable to naturally occurring groups,^{16,17} this rarely occurs in the workplace. Health care teams, for example, are increasingly multidisciplinary in nature, and thus are associated with wide diversity with respect to gender, economic, political and ideological differences.¹⁷

Communication

Effective multidisciplinary teams have been described as producing a broad range of quality improvements: increased patient confidence due to reliance on a broad team opinion; continuity of care; application of clinical management protocols; active and continuous audit of protocol design; enhanced communication and cross fertilisation of clinical ideas because of increased opportunity for team discussion; informal sharing of knowledge; effective resolution of resource management dilemmas; and an increased sense of partnership, friendship and support.¹⁸ Fundamental to these outcomes is effective communication. Primary health care teams that have regular meetings have been shown to experience higher levels of innovation as a result of improved communication, a shared understanding of the work to be completed, and development of appropriate processes.⁹

Communication within teams requires not just the delivery of information but also receipt and comprehension of the interchange.¹⁹ Therefore teams need to share a common language and philosophy of care,²⁰ which becomes increasingly more complex as the multidisciplinary team

expands. More broadly, collaborative relationships require a mutual valuing of each other's contribution, the recognition of separate and combined spheres of responsibility, and a focus on shared goals.¹⁵

Communication within health care teams is inevitably complicated by the team size and complexity²¹ and is fundamentally linked to status,^{22,23} roles,²⁴ perceived skill base²⁵ and value systems²⁶ which are often aligned to professional identity.¹² Where individuals belong to a professional group and multidisciplinary team, their joint membership may more clearly identify their unique contributions to a collaborative effort, or may present a source of conflict.¹² Lingard and colleagues²⁷ were the first to categorise communication among the multiple disciplines working within the operating theatre. They noted observable patterns of team communication in the operating theatre where conflict arose over themes of time, safety and sterility, resources, roles, and situations. Greater understanding of this dynamic interchange can be used to target improved patient safety through design of appropriate interventions.

Ward-based teams

As in aviation cockpit crews, the capacity to know and understand team members and improve¹⁹ and evolve¹⁵ multidisciplinary team functioning with longevity is not always possible. Many medical and surgical teams form and dissolve rapidly, preventing them from moving through the maturational stages of "forming, storming, norming and performing".²⁸ Team relationships are frequently established as clinicians rotate through a unit,²⁹ and daily, as care is relinquished to changing shifts of health professionals.¹⁵ It is for these reasons that some work in this area has focused on the individual level of analysis.⁶

Despite the need for effective communication in multidisciplinary health care teams, traditional communication tools such as case conferences, interdisciplinary rounds,³⁰ and discharge planning meetings³¹ are often poorly attended or not attended at all by doctors, leaving nurses to take command, sometimes by default rather than by

design. Time limitations are often cited as the reason for non-attendance at such planning meetings, however the underlying cause may be an absence of a safety culture that values open communication and holds the team in high regard. In lieu of face-to-face contact, individual professionals from a variety of disciplines are left to record their observations and interventions as a chronological written communication to the next professional.³² Where multidisciplinary teams are unable to meet regularly face-to-face, patients, families and health care providers endure increased communication demands.²⁰ This is exacerbated in ward-based teams where much of the clinical work is performed in isolation from other members of the team.

Not only do professionals from different disciplines take on different roles within a health care team, they also require, and use, different information as a basis for care delivery.²⁰ For a team to work effectively, individual members need to understand the contribution of each member and how and why they practise as they do.³³ This source of conflict is exacerbated in ward teams where the distribution of work is less clear and role ambiguity more likely. The divergent and competing cultures among the range of health professionals that often constitute a modern health care team³⁴ spawn competing professional goals³⁵ which prompt nursing, medical²¹ and other health professionals to prioritise their work independently. Although the origins of discrepant attitudes towards clinical teamwork are not fully understood, fundamental differences in nurse-physician culture, status or authority, gender, training, and patient care responsibilities exist and are likely to affect attitudes.³⁶ The importance of this apparent dissonance with respect to perceived roles and motivators among health care professionals is the increased likelihood for a misinterpretation of communication,²⁰ shown to be a common cause of preventable disability or death.³⁷ Furthermore, medical students and doctors are often selected for their high confidence¹¹ and trained to be independent. Medical graduates tend to function autonomously as a result of their traditional training which emphasises an individ-

ual orientation to care giving and installation of norms that place less value on gaining and assessing team skills.³⁶

Even with the increasing recognition of the importance of teams within the health care environment,³⁸ a meaningful theoretical framework for the assessment and training of non-crisis health care teams has not emerged. The dominant approach can be best described as an input–process–output model.⁵ This normative model of group functioning provides a framework for identification of desirable attributes and skills that will promote optimal team effectiveness. Individual input or resource variables (such as self-knowledge, trust, commitment and flexibility) combine with team process variables (such as coordination, communication, cohesion, decision making, conflict management, social relationships and performance feedback) to determine team effectiveness.³⁸ In general terms, input–output research has shown that the relationships within groups are largely dependent upon the task being performed by the group,⁵ and that few findings are useful in the creation and maintenance of effective work teams. Despite the inherent fluidity of membership in health care teams, many attempts to develop observational measures of performance have focused on the team rather than the individual level. This reflects both the limitations of observational tools to attribute ratings to individual team members,³⁹ and attempts to characterise the performance of the whole team over and above individuals' levels of performance.⁴⁰

Crisis resource management

High-reliability organisations and crisis resource management

High-reliability organisations are those, such as within the aviation industry, nuclear and offshore oil and gas industry, which operate in complex environments and yet despite this are able to balance effectiveness and safety.⁴¹ Temporary aviation teams provide a useful parallel to crisis medical teams, such as those that occur in the operating theatre and within resuscitation

teams.⁴² These specialised health teams operate as high-reliability teams by demonstrating a number of desirable team behaviours consistently over time, while their members work under high levels of stress. These behaviours include the sharing and exchange of information;²⁴ a willingness to review and back up other team members' performance; deference to functional expertise irrespective of seniority; reluctance to simplify complex events towards the norm; and implementation of self-corrective processes which include constructive feedback.⁴¹

CRM training programs emerged in the 1980s as a response to the identification of non-technical skills as frequent contributors to unsafe flight conditions⁴² and aircraft failures. This approach to safety argues that human error is inevitable and that by focusing on training in teamwork skills, error avoidance, and early error detection, negative consequences can be minimised.²⁴ Aviation CRM programs have evolved from a social psychology perspective⁴³ which embodies a move away from a concentration on individual skill level to a broader focus encompassing team and organisational levels.⁴³ CRM training has been used to improve the non-technical skills of aviation crews¹ and other high-reliability teams by addressing skills which do not relate directly to clinical or psychomotor skills, but with cognitive and interpersonal skills that may impact on team processes.

Although the development of non-technical skills is generally not covered in health care curricula,^{44,45} the health care industry has sought to adapt the experience gained from the aviation industry to identify and measure threats to patient safety in a systematic way.⁴⁵ From within the health care sector, CRM has been viewed as a method of improving communication and addressing hierarchy-dominated problem solving through team-centered decision making, thereby promoting healthier outcomes.⁴⁶ In comparison to the field of health, safety has been afforded high priority in the aviation industry for a number of reasons. Firstly, nearly all aviation accidents involve a measure of human error and are preventable.⁴⁷ Secondly, serious incidents

often result in highly visible adverse outcomes,³⁵ including staff injury and significant financial loss to the organisation; and, importantly, many recipients of health care have already been, or will be, harmed as result of the disease process that causes them to seek health care, and thus the disentangling of morbidity and mortality causality within the field of health is less clear.^{48,49}

Application of CRM beyond the “crisis”

As in the field of aviation,⁵⁰ CRM courses (known within health as *crisis* resource management) have been well received by participating health professionals. The earliest adaptation of *crew* to *crisis* resource management within the field of health focused on high-reliability teams working within crisis units of intensive care, operating rooms and emergency rooms.^{2,3} The non-technical skill requirements of anaesthetists, for example, are similar to those of a cockpit crew, including high intensity at task initiation and completion, monitoring, and a rapid response to critical situations.³⁷ CRM training methodologies have also been applied to neonatal resuscitation,^{51,52} emergency departments⁵³ and surgical teams.^{54,55}

With anaesthesiology leading the introduction of CRM, training programs have typically comprised “didactic components, group exercises and discussions, and full mission simulations and debriefs”.³ (p. 178) Programs such as ACRM³ (Anesthesia Crisis Resource Management) differ from aviation CRM projects in two key ways: firstly, a reliance on the simulation of crisis events rather than team-interface issues; and a tailoring of the course to a subgroup of the full team and the anaesthetic aspects of the operation.⁵⁰ This represents somewhat of a departure from aviation CRM programs that focus on addressing team interface issues. Thus, an application of CRM to the everyday function of ward teams would signal a return to a focus on teamwork where interpersonal and organisational difficulties can be dealt with under normal circumstances.⁵⁰ Likewise, there is an unidentified need to upskill so called “crisis” teams in the non-technical skills that are demanded by their environment at times when delivery of care is predictable and routine. Fur-

thermore, much of the work undertaken by so called “crisis teams” is under far greater control than is suggested by this nomenclature. Thus the classification of teams into crisis and non-crisis in the context of non-technical skills obscures the more generalised need to examine performance in this area. Without the focus of a “crisis event” the fundamental role of communication and interpersonal skills in effective team functioning is laid bare for all teams, despite the perception of a heightened level of risk associated with so called “crisis” teams such as those operating in intensive care, emergency and surgical settings.

Ward teams are not devoid of the evolution or cascade of problems resulting in adverse outcomes, which have previously been described in high-reliability “crisis” health care teams.⁴⁹ CRM methodology could be extended to multidisciplinary health care teams working within high-reliability organisations, yet outside of the so-called crisis environment well documented within anaesthetics, surgery, intensive care and emergency department domains, to provide a clear understanding of non-technical skills necessary for effective performance. In order for CRM to prove an effective tool in health care, it must be tailored to specific target groups.^{33,52} A number of aviation bodies have developed resource management skill sets which have guided the development of observational tools, though not all are in the public domain. Within the health sphere, the NOTSS (Non-Technical Skills for Surgeons) provides an influential model.^{55,56}

Behavioural marker systems

Domain-specific behavioural marker systems have been employed to develop a structured list of non-technical skills for use with a defined group of professionals.⁵⁴ Behavioural markers are observable, non-technical team or individual behaviours, often structured into a set of categories, which can be used to enable performance measurement, identify positive examples of performance, give performance feedback at individual, group and organisational levels,⁵⁷ and assess the effect of training interventions.⁵² Team effectiveness can best be viewed as a multisystem

concept that reflects individual, team and organisational aspects over time; with measurable outputs of performance evaluated by others.⁵⁸ Behavioural markers provide a necessary first step in promoting team performance as they identify job-specific skills, provide a common language for investigation, and serve to clarify high and low performance against a required skill set.⁴⁴ Development of behavioural markers is ideally derived from a variety of data sources such as accident investigations, confidential incident reporting systems, incident analysis, similar studies, task analysis, interviews, surveys, focus groups and ethnographies.⁵⁷

As with aviation crews, “crisis” health care teams are collocated, with their primary clinical responsibilities executed utilising standardised procedures and protocols, and generally led by a physician or surgeon.²¹ In comparison, ward teams, such as those operating in tertiary hospital medical units, can face additional communication barriers due to a broader range of contributing health professionals, reduced opportunities for whole-of-team communication, absence of debriefing activities, and an absence of accepted leadership roles. These differences illustrate the need to develop domain-specific evaluation tools.

While recent projects have extended the application of CRM within health care,^{51,52} its application to date has been limited to high-reliability health care teams operating within “crisis” environments. This paper seeks to highlight the opportunity to extend the application of CRM methodology into the arena of acute ward-based multidisciplinary health care teams through the initial establishment, and subsequent validation, of a tailored taxonomy of behavioural markers.

Summary and conclusion

As health care organisations begin to challenge the traditional hierarchical structures that promote individualised decision making and embrace a move towards valued team health care, a new set of non-technical skills are increasingly demanded of the modern health care professional. With a growing cultural acceptance of the

need to invest in the development of non-technical skills, the opportunity exists for the development of a theoretically grounded and practically tested methodology for the assessment of existing acute multidisciplinary health care teams. I argue that the acquisition of non-technical skills is equally important for all health care teams irrespective of the likelihood of crisis events. “Crisis” health care teams which have to date been the focus of CRM interventions (eg, intensive care unit, emergency department, theatre) spend more time working together under predictable or routine conditions than during crisis events. Furthermore, I assert that teams that learn to communicate and function effectively during routine activities are better equipped to perform well during crisis events.

Experience gained from high-reliability organisations outside the health sector has provided a set of well developed principles for application within specific health care settings, in order to improve team performance, reduce error, and promote achievement of individual, work-unit and organisational goals. Development of methodologies that move beyond the identification of behavioural markers and assessment of team output are only just emerging. In conclusion, it is recommended that future research in this area seeks to:

- develop a better understanding of the way in which team effectiveness can be operationalised within acute, ward-based health care teams by drawing on the behavioural marker methodology and integrating it with input–process–output models^{4,6} of team processes;
- develop a behavioural marker tool that can be utilised to observe and assess team effectiveness in ward-based multidisciplinary health care teams;
- test a model that examines theoretically linked antecedents and consequences of situational awareness, decision making, clinical planning, execution of management tasks, teamwork and cooperation, and effective interpersonal behaviours;
- design interventions that can be used to improve the non-technical skill required for

health care teams to operate more effectively within a high-reliability environment.

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Competing interests

The author declares that she has no competing interests.

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