The Extent and Nature of the Literature on Interprofessional Teamwork in the Trauma Setting: A Scoping Review

Interprofessional teamworking

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INTRODUCTION

The importance of interdisciplinary teams in ensuring effective primary healthcare was recognized as far back as 1978 by the World Health Organisation (WHO). Over a decade ago, two separate reports, each published by the Institute of Medicine (IOM), focused on the importance of collaborative practice and interdisciplinary education in healthcare. Crossing the Quality Chasm: A New health System for the 21st Century emphasized the importance of collaboration and interdisciplinary training in the effective coordination of care. Patient safety and collaboration across disciplines was highlighted in To Err is Human: Building a Safer Health System.

Interprofessional teamwork is achieved through interactive effort between all those professionals involved. There is a high level of communication, mutual planning, collective decisions and shared responsibility. Everyone involved in the process take everyone’s contribution into consideration. Factors that influence interprofessional team performance include the size and psychological composition of the group (group structure), what happens when the group work together (group processes or dynamics) and how the group is lead (e.g. by the team leader or supervisor). These factors are known as human factors and are of major relevance to patient safety.

In the 1980’s, the Department of Defence developed human factor training, or crew resource management (CRM), to increase the safety of air operations in the military. In the United States (US), CRM has been situated in all branches of the military and in commercial aviation.
has been adapted for use within healthcare teams in a number of settings. However, despite an emphasis over the last decade on team training and the implementation of team behaviour,\textsuperscript{2-3} and, more recently, the well documented benefits of interprofessional education and interprofessional collaborative practice,\textsuperscript{9} communication failure between healthcare team members remains a frequent cause of patient harm.\textsuperscript{10} It is evident that 70-80\% of healthcare errors are caused by human factors associated with poor team communication and understanding.\textsuperscript{7} These errors can lead to negative health outcomes, and reduced quality and safety of care (Brock). Improving communication can reduce these errors by as much as 50\% (Xyrichis & Ream 2008). However, despite the correlation between improved teamwork and lower patient mortality (West et al 2002, Wheelan et al 2003), there remains a lack of collaboration across healthcare teams (Giddings and Williamson 2007) and this is most evident in the trauma setting (Healthcare Commission 2007).

The trauma setting involves the management of complex patients by specialized teams in a dynamic environment. Communication, cooperation and coordination are vital for effective care. This paper presents the findings of a scoping review designed to identify the extent and nature of the literature on interprofessional teamworking in the trauma setting. Scoping reviews are becoming increasingly used by researchers to review health research evidence.\textsuperscript{11-12} They provide a structured approach to the collection and organisation of key background information and a means to develop a snapshot or picture of the existing evidence base.\textsuperscript{13}

**Methods**
The following sources were searched for results of interprofessional team working in the trauma setting published in peer-reviewed journals from January 2000 to April 2013: Medline (via OVID) using keywords and MeSH in OVID, PubMed via NCBI using MeSH, and CINAHL (figure 1 shows the combination of search terms and study selection process). Articles in English were considered. A ‘hand search’ was conducted by reviewing the reference lists of relevant articles. Eligible articles included in the review described the organization of trauma teams, team composition and structure, and evaluations of team work interventions.

RESULTS

Studies were been both descriptive and evaluative (see Tables 1 & 2) and can be categorized into 3 main areas: (i) descriptions of the organization of trauma teams; (ii) descriptions of team composition and structure; (iii) evaluation of team work interventions. Within each area a number of themes were identified. Each of these themes is discussed below.

Descriptions of the organization of trauma teams

Interactions between team members

Four studies, 14-17 used qualitative methods to explore interactions between team members. Teams were described as dynamic/fluid and involving 7 stages (many of which occur in a parallel fashion) on a continuum from coordinated independent behaviors through to coordinated interdependent behaviors. 14 Stages ebb and flow depending on patient need. 14 Professional independence, although at times limiting interprofessional collaboration, enabled individuals to
work cohesively together under pressure. In situations where team members were unknown to one another, the co-ordination of activities within a professional group contributed to team efficiency and performance.  

Teams were found to be primarily ad hoc in nature. The changing dynamics of a team was seen to influence its adaptive capacity. For example, high turnover and short term involvement of team members hindered team performance. The ability to anticipate the needs of team members, adaptive capacity, the ability of the physician to create a good working environment, work space, team familiarity with procedures, and the right mix of technical competency were all factors identified as important for effective team working. Organizational processes and management had a potentially negative influence on team work. Valued commodities (including technical skills and knowledge, equipment, clinical territory) were identified as those that form the basis of negotiation or exchange in interprofessional interactions and facilitated collaboration.

Leadership

Four studies have used qualitative methods to explore how leadership influences team working. The role of the trauma team leader has been described as pivotal for effective team function having responsibility for trauma team members and the direction of all trauma team activity. Sakran et al demonstrated a positive relationship between team efficiency and leadership perception amongst team members. Teams directed by surgeons perceived as having low leadership ability, took significantly longer to complete the key steps in initial trauma patient evaluation. Team leaders who had positive effects on performance, were described as
encouraging, motivating team members through positive behavior and feedback. Leaders who
used power and authority had negative effects on performance.\textsuperscript{20} Five leadership structures have
been identified during trauma resuscitation\textsuperscript{19} ranging from intradisciplinary leadership: solo
decision-making to cross-disciplinary leadership: shared decision making; collaborative model.
Where leadership was intra-disciplinary and decisions were made by a single team leader,
information exchange and team work were facilitated as team members had a clear
understanding of who was the team leader. However, negative effects included increased
likelihood of performing unnecessary procedures. By contrast, cross disciplinary leadership and
collaborative decision making had positive effects on overall team performance. Resuscitation
events ended with positive feelings shared between leaders and team members and conflicts were
less likely to occur.

**Descriptions of team composition and structure**

*Team size*

Two studies,\textsuperscript{22-23} have examined the effect of surgical team size on team performance. A
retrospective case review of general laparoscopic procedures (n=399) undertaken over a 2 year
period\textsuperscript{22} identified that although anesthesiologists and surgeons normally stayed for the entire
surgery, nurses often shifted their duties due to breaks and shift changes. Most procedures were
assisted by 2 scrub nurses working in succession. However, nearly 25\% of the procedures were
assisted by between 3-5 nurses. The majority of procedures were also attended by 2 circulating
nurses working in quick succession. However, nearly 25\% of the procedures were attended by 3
circulating nurses. In extraordinary long procedures (5\%), 4 circulating nurses attended. The
authors argue that complete involvement with a procedure enables a surgeon and anesthesiologist to develop a comprehensive shared mental model regarding tasks and goals. High turnover and short term involvement of other team members requires better communication strategies to keep them updated with the current state of procedures. They argue that high turnover hinders team performance and leads to distraction and loss of focus. Their results confirm that when team size was increased, the procedure time (PT) was prolonged, independent of other factors including surgical complexity. Adding 1 other team member to a surgical team predicts a 15.4 minute increase in PT. Recommendations included the need to develop strategies to construct the team inside the operating room (OR) without constantly changing the composition - especially for nurses in a team. Similar work was undertaken by Zheng et al,\textsuperscript{23} who reviewed the records of 640 procedures. These researchers identified that a change in one team member was associated with a 7 minute increase in PT. They emphasize the importance of maintaining the stability of core team members and the implementation of measures to reinforce the quality of communication among members when role changes occur.

Core teams

Two studies \textsuperscript{24-25} have used social network analysis to explore operating room staffing of general surgery and neurosurgical procedures. Creswick et al \textsuperscript{24} reported that despite the emergency department (ED) often being construed as one team, communication can be better understood in terms of individual professional groups. Individuals in this study were found to rely heavily on their own professional group to solve work related problems. Also using social network analysis, Anderson and Talsma\textsuperscript{25} explored staffing in the OR. Their findings demonstrated that the longer
the case, the more likely it was to be staffed with core team members. Furthermore, cases that started later in the day, were less likely to be staffed by core team members and longer cases were more likely to start earlier in the day. The longer the case, the more core members were involved. Anaesthesia residents and registered nurse (RN) anesthetists were not members of core groups. RNs accounted for two to three times the percentage of each core group membership. The authors argue that on the basis of their results, that core team members appear to be assigned to work on the longer and more complex procedures.

**Evaluation of teamwork interventions**

**Activities in practice**

Seven studies, \(^{26-32}\) comprised interventions which involved both didactic instruction and activities in practice (i.e. simulation, \(^{30-32}\) coaching, \(^{26-32}\) team self-review/reporting system, \(^{27-28}\) and group training. \(^{29}\) An array of topics (attitude to safety, team climate, team performance, roles and responsibilities, situation awareness, co-operation, debriefing), were covered during didactic instruction. CRM formed the basis of interventions in 3 studies. \(^{26,29,21}\) Training in practice involved both intact \(^{26-29}\) and adhoc teams i.e. put together for the purpose of the research. \(^{30-32}\) Outcomes measured included attitude to safety, frequency of briefings, dimensions of team skills, \(^{26}\) team climate, \(^{27-28}\) teamwork, clinical timing and outcome data, \(^{29-31}\) teamwork and communication, \(^{30}\) evaluation of learning experience. \(^{32}\) Findings were generally positive. Only 2 studies, \(^{28-29}\) reported on the long term effect of the intervention. Meyer et al \(^{29}\) reported significant improvement in team performance and perceptions of team work and significant
decrease in clinical timings at 12 months. Mean ‘teamwork’ climate scores were found by Bleakley et al\textsuperscript{28} to improve incrementally and significantly over a 4 year period.

\textit{The classroom}

Five studies,\textsuperscript{33-37} comprised of interventions delivered in the classroom setting. As well as didactic instruction, 3 of these studies,\textsuperscript{33,34,36} involved participants in simulation. Patient safety, TeamSTEPPS communication skills, roles and responsibility, human factors, briefing and debriefing, were topics included in didactic instruction. CRM formed the basis of interventions in all of these studies. Apart from work by Weaver, interventions were delivered to ad hoc teams. Outcome measures included attitudes,\textsuperscript{33-36} team performance,\textsuperscript{34,36} team function case delays and case scores,\textsuperscript{35} learning behavior.\textsuperscript{37} Findings were generally positive. Only Wolf et al\textsuperscript{35} reported a sustained effect at 24 months.

**DISCUSSION**

Findings from descriptive studies highlight the fluid nature of team processes. Team functioning is described as a continuum from coordinated independent behaviors through to coordinated interdependent behaviors\textsuperscript{14} and dependent upon patient need. High performing teams are said to be familiar with one another’s roles and responsibilities, can anticipate the needs of team members, and have a highly adaptive capacity. Adaptive capacity is affected by staff turnover which in turn can affect team performance and performance time. Trauma team leaders are described as pivotal for the effective coordination of team member contributions. These findings
characterize interprofessional team working where outcomes are accomplished through interactive effort and the contribution of all professionals involved. Interprofessional teams display a high level of communication, mutual planning, collective decision making and shared responsibilities. Everyone involved in the process, must take the contribution of everyone involved, into consideration.

Many of the interventions and outcome measures used in evaluative studies are based on CRM. Didactic instruction in these studies has, to a large extent, focused on roles and responsibilities. Practical training has primarily involved the ad hoc structuring of teams by researchers, trainers and managers put together to work on simulated cases in the practice or classroom environment. Although the effects on outcome measures used have generally been positive, very few studies report on whether or not these effects have been sustained.

**CONCLUSION**

The limitations of the descriptive studies included in this review, is that they describe changes in practitioner’s attitudes, values and perceptions as opposed to changes in behavior and performance or outcomes. Furthermore, several of the studies include small numbers of participants in single location settings and so findings may be different in other areas of trauma care. Evaluative studies have a number of weaknesses including small sample size, short follow-up period, and lack of control. Very few studies use validated measures and provide very little information about what has been observed. Extraneous factors make it difficult to identify a causal relationship between the teamwork intervention and the result.
Medical errors occur primarily due to system failure not the action of an individual. Such errors are grounded in shared activities, involving teamwork and communication, as opposed to profession-specific technical expertise. \(^2\) Therefore in order to improve patient safety, changes in teamwork practice is crucially important. This is reinforced by the findings of descriptive studies reported in this review. Many of the evaluative studies reviewed place a great emphasis on specialized roles and individual tasks and activities. This reflects a multiprofessional model of teamwork as opposed to interprofessional practice. Although it is vital that team members have the knowledge and skills to perform the role tasks, it is also important that research focuses on the interactions and processes rooted within these tasks.

**LIST OF ABBREVIATIONS**

**COMPETING INTERESTS**

The authors declare that they have no competing interests

**AUTHORS CONTRIBUTIONS**

A MC was responsible for the literature searches and writing this article. DD and SN were responsible for critical revisions. All authors read and approved the final manuscript.

**AUTHORS INFORMATION**

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**FIGURES**

**TABLES**