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Team Skills for Safety

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Effective teamwork is crucial for ensuring patient safety within the ICU. In other high-risk industries (see also Manser, Gaba and Lighthall in this issue of **ICU Management**) where teamwork has also been found crucial for safety, special courses have been developed to train the team skills required for maintaining safety. To develop similar training programmes within intensive care, an analysis of the skills required for effective teamwork in the ICU is necessary.

Introduction

The intensive care unit (ICU) is a high-risk environment that requires multidisciplinary teams to cope with rapidly evolving challenges, heavy workloads and intense time pressure. The complexity of the ICU environment renders it particularly prone to errors resulting from failures in teamwork and communication.

This is exemplified in a root-cause analysis of an adverse event where a patient being treated for heart and renal failures suffered an air embolism (resulting in considerable neurological damage) after a large central venous catheter was removed whilst the patient was sitting up (Pronovost et al. 2004). The analysis of the causal factors underlying the incident revealed that the attending doctor, a first-year renal fellow, did not know the proper technique for removing central lines, yet was allowed to perform the procedure unsupervised and without training, with the institution having no system to ensure competency for the procedure, and with the fellow feeling unable to admit his lack of knowledge. Furthermore, a nurse observed the fellow conduct the procedure incorrectly, and could have expressed concern, yet was reluctant to speak up or correct the physician.

In high-risk industries that share similar characteristics to the ICU (e.g. aviation and nuclear power), team working skills are considered especially important for protecting against errors and in enhancing performance, with considerable investment being made in understanding teams and their training requirements (Burke et al. 2004). This has resulted in training programmes being developed to meet the challenge of reducing error through making better use of human resources (Helmreich et al. 1999). Team researchers have demonstrated the importance of team cognition (e.g. shared mental models), as well as interpersonal behaviours and task coordination (Salas et al. 1997). If properly designed, the programmes are based on a training needs analysis that defines the team skills required for a particular environment, as well as the present levels of accomplishment.

In light of evidence demonstrating that a high proportion of medical errors result from failures in team skills such as communication, an Institute of Medicine report encouraged healthcare providers to emulate high-risk industries in the application of human factors research to enhance safety (Kohn et al. 2000). In particular, as the ICU is an environment that requires a high level of cooperation between multidisciplinary team members, it would appear likely that good team working skills are important for reducing error, and thus enhancing patient safety.

Teamwork and Safety in the ICU

A number of studies have published data demonstrating the association between good teamwork and patient safety in the ICU. An examination of ICU critical incident studies, where the causal factors underlying incidents that either harmed or could have harmed patients are identified, reveals that poor team working is frequently associated with occurrences of critical incidents. Team working factors such as poor or inadequate communication, poor supervision, a lack of openness between team members, and not ensuring other team members follow protocol are all

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associated with occurrences of errors and critical incidents (Beckmann et al. 1996; Beckmann et al. 2003; Buckley et al. 1997; Wright et al. 1991).

However critical incident studies can lack a fine-grained analysis of the precise contributory teamwork factors behind incidents, as often the actual role of a particular causal factor in the incident is not described (Fletcher et al. 2002). Observational simulator studies, where the performance of ICU teams is video recorded and later reanalysed, can overcome this. Simulator research based in the ICU has shown that failures in team working, such as a lack of leadership, failures to communicate priorities, not sharing patient status information, and overloading nurses with requests, have a negative impact upon performance and result in the occurrence of errors (Lighthall et al. 2003). Additionally, real-life ICU observational studies have shown communication between nurses and doctors to be associated with a high proportion of errors. Verbal communications between nurses and doctors were observed during relatively few activities and were associated with a high proportion of errors, leading the researchers to conclude that nurses and doctors were not combining their knowledge and skills efficiently.

Finally, research using performance measures and self-reported ratings of teamwork has revealed that higher ratings by ICU staff of interdisciplinary collaboration skills (e.g. communication) are associated with lower risk-adjusted lengths of stay for patients, lower rates of staff turnover and lower rates of patient mortalities (Baggs et al. 1999).

Training Team Working Skills

In other high-risk industries where failures in teamwork have also been shown to be a major source of human error, Crew Resource Management (CRM) training programmes have been developed to meet the challenge of reducing error. These programmes were initially designed by psychologists and pilots to increase the effectiveness of teams through enhancing skills such as communication, leadership and cooperation. CRM courses generally consist of lectures, role plays, discussions, accident analyses, case studies, and video re-enactments of accident scenarios. The team working skills taught on CRM courses can include: assertiveness and speaking up; asking questions; listening; providing appropriate feedback; attending to and observing nonverbal signals; maintaining team focus; supporting other team members; team decision making; resolving conflicts; considering others; and sharing mental models (Flin et al. 2002). In Europe, CRM training is mandated for airline pilots and in the UK their CRM skills are reevaluated during licence checks.

The skills taught on any CRM programme should be based on a framework developed from an empirical analysis of the skill requirements for a specific domain. It is not sufficient to simply take the training materials used in aviation, replace the word 'pilot' with 'doctor', and then apply the materials in intensive care. A CRM course developed for any setting should reflect the specific challenges and needs of that setting (Helmreich & Merritt, 1998). An analysis of skill requirements involves investigating the root-causes of accidents and near misses, analysing performances during normal or emergency operations (e.g. from voice recorders), and researching organizational climate factors that may affect performance. This provides diagnostic data that enables the identification of the key cognitive and interpersonal skills that are relevant for the particular job, thus providing an empirical basis for the training content. To evaluate the subsequent use of the skills, and therefore the effectiveness of a CRM training programme, behavioural marker systems are developed (Flin et al. 2002). These are empirically derived taxonomies of observable requisite non-technical skills for a particular domain. Behavioural marker systems allow trained raters to assess team skills through rating of behaviours known to be indicative of good cognition and team working. Through the use of behavioural marker systems, CRM training in aviation has been shown to result in significant increases in the target skills by flight crews alongside improved attitudes towards the importance of teamwork skills. Behavioural marker systems based on empirically derived taxonomies of non-technical skills have been developed for several high-risk industries, as well as medical domains such as anaesthesia (see table 1) and surgery (Patey et al. In press; Yule et al. 2005). They have also been used to demonstrate that simulator training can enhance anaesthetists' non-technical skills (Yee et al. 2005).

Training Team Skills for the ICU

As the ICU is an environment in which good team working skills are essential for safety and performance, the potential benefits of team training are apparent. However, the ICU is a unique and complex domain that makes specific demands from those who work within it, and thus the precise team skills required for effective team working within the ICU need to be identified. A number of techniques can be employed to identify these skills, including attitudinal surveys, structured interviews, observations of behaviours in real-time and in simulation, and studies of cognition. This process facilitates the development of a skills taxonomy for guiding and structuring the training of those skills. Furthermore, it allows the development of a behavioural marker system which enables the evaluation of team working skills through an observable set of exemplar skills.

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