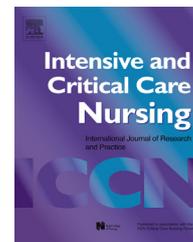




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ORIGINAL ARTICLE

Task management skills and their deficiencies during care delivery in simulated medical emergency situation: A classification



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Summary

Objectives: Our objective was to develop the analysis of task management skills by proposing a framework classifying task management stages and deficiencies. Few studies of non-technical skills have detailed the components of task management skills through behavioural markers, despite their central role in care delivery.

Research methodology/design: A post hoc qualitative behavioural analysis was performed of recordings made of professional training sessions based upon simulated scenarios.

Setting: Four recorded sessions in a high-fidelity simulation setting were observed and recorded. Two scenarios were used (cardiac arrest and respiratory failure), and there were two training sessions per scenario.

Main outcomes measures: Four types of task management deficiencies were identified with regards to task constraints: constraint relaxation, unsatisfied constraints, additional constraints and constraint transgression. Both equipment and space constraints were also identified.

Results: The lack of prerequisite actions when preparing the environment, corequisite actions for equipment and protocol monitoring, or postrequisite actions to restore the environment were associated with task management deficiencies.

Conclusion: Deficiencies in task management behaviours can be identified in simulated as well as actual medical emergency settings. This framework opens perspectives for both training caregivers and designing ergonomic work situations.

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Implications for Clinical Practice

- Through its ability to qualify task management deficiencies, this framework provides elements for guiding task management education.
- Through its ability to qualify task management deficiencies, this framework also provides elements for guiding ergonomic intervention in the medical work environment.

Introduction

In the medical and paramedical fields, it is now accepted that performance involving non-technical skills can significantly affect technical performance, namely the quality of care delivered to the patient (Kemper et al., 2013). Some non-technical skills have been well investigated such as teamwork (Manser, 2009), communication (Spencer et al., 2004) and cognitive activity (Singh et al., 2012). In the set of non-technical skills, task management is a recognised set of skills that involve planning and preparing equipment and other resources as well as adhering to protocols (Mitchell et al., 2013; Flin and Maran, 2004). Despite their central role in nursing and medical activities however, task management skills have attracted little attention.

Human factors studies have emphasised the importance of considering the clinical setting as a work system composed of interactions between people and equipment. These interactions play a key role for safe and efficient care delivery (Carayon and Gürses, 2005; Carayon et al., 2006; Fackler et al., 2009; Sevdalis and Brett, 2009). In particular, some findings have suggested that difficulties in task management during nursing activities contribute to critical incidents. For instance, in a surgery ward, inefficient equipment preparation can produce interruptions during intra-operative procedures that can lead to a range of adverse events (Healey et al., 2008; Undre et al., 2007). Through literature review, Reader et al. (2006) found that task management was the factor that most contributed to the explanation of critical incidents in the intensive care unit (50% of incidents) compared with other non-technical skills such as decision-making, situation awareness and team work. The authors, however, wondered whether this result was not overestimated since technical skills sometimes seemed assimilated into task management during observational analyses.

At a methodological level, behavioural markers of non-technical skills, including task management markers, have been proposed through observation scales such as those for anaesthesia (ANTS, Fletcher et al., 2003), surgeons (NOTSS, Yule et al., 2006), or scrub practitioners (SPLINTS, Mitchell et al., 2013). These observation scales allow each non-technical skill to be rated in work situations through scores based on good or poor performance. Within these scales, task management deficiencies were only generally defined. The rating observers themselves performed the task of naming task management deficiencies empirically, in reference to the specific work situation under investigation. Consequently, any invariant in task management deficiencies cannot be easily elicited to progress in the overall understanding of task management processes.

Our objective is to develop the analysis of task management skills by proposing a framework that allows task management deficiencies to be characterised qualitatively. After outlining this framework, we present the different types of task management deficiencies that were observed through this framework during four sessions of simulated deteriorating patient scenarios involving nurses, nursing auxiliaries and also interns in one of these four sessions. These sessions were part of a professional programme at the Scorff simulation training centre (C3S) Lorient, France, designed to train intensive care unit teams in the treatment of clinical adverse events.

A framework for analysing task management skills

Our framework is based upon an important distinction, made in human factors research, between two notions: task and work domain. Whereas task refers to goal-oriented behaviours involving a goal and a procedure, work domain refers to the objects on which the task is performed and their properties. The work domain is the part of the world transformed through the task fulfilment process (Morineau et al., 2009; Rasmussen, 1986; Vicente, 1999). In this context, the central purpose of clinical technical skills is to act on the work domain, namely to deliver care to the patients, who represent the work domain (Hajdukiewicz et al., 2001; Morineau et al., 2013). Compared with technical skills, non-technical skills are focused on the management of the constraints involved in clinical task performance, such as communicating with other clinicians, sharing a common situational awareness or regulating stress (Reader et al., 2006). In other words, non-technical skills facilitate the deployment of technical skills.

Fig. 1 shows our theoretical framework for clinical task management skills in regard to technical skills. This framework is based upon previous research on the semantics of action in natural settings (Kirsh, 1995; Leinhardt and Greeno, 1986; Norman, 1988; Richard, 1990; Sebillotte, 1995) and upon constraint-based modelling of action planning in artificial intelligence (Sacerdoti, 1977; Smith et al., 1989). The task environment refers to the subset of the surrounding environment composed of means relevant for reaching certain task goals (Kirsh, 1996; Leplat and Hoc, 1983). The task environment is composed of a space in which actions can be performed (e.g., a hospital bedroom) and equipment with which actions can be performed (multi-parameter monitor, syringe, catheter, bed, emergency trolley, etc.) in the context of work protocols caregivers need to follow. Three stages of task management can be distinguished in the course of a given action.

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