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ORIGINAL ARTICLE

Team competence among nurses in an intensive care unit: The feasibility of *in situ* simulation and assessing non-technical skills

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Summary
Objectives: Nursing competence affects quality of care in intensive care units (ICUs). Team competence is particularly important for preventing errors. This paper focuses on the feasibility of using an *in situ* simulation model to explore team competence in the ICU, and on using parts of the Anaesthetists' Non-Technical Skills (ANTS) taxonomy for assessing Non-Technical Skills (NTS) in nursing teams.
Methodology/design: Seventy-two nurses were randomised into two groups and introduced to a new guideline *via* either lecture-based or simulation-based teaching. A preprogrammed patient simulator and a video camera were installed inside the ICU, and a scenario was enacted to simulate the admission of a patient with septic shock. All available facilities in the ICU were used. Two blinded raters evaluated ''Team Working'' and ''Situation Awareness'' *via* video recordings using the ANTS taxonomy.
Results: Due to high activity in the ICU, 54 nurses completed the *in situ* simulation. Assessments of the video recordings revealed moderate agreement between the two raters. Observations revealed issues deviating from expected standards of competence.
Conclusion: In situ simulation may be feasible for assessing competence in ICUs. The ANTS appears to be a promising foundation for developing a team assessment tool for ICUs.
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Implications for Clinical Practice

- The competence of nurses working in intensive care units (ICUs) is important for quality of care.
- *In situ* simulation may be feasible for exploring team competence in the ICU.
- *In situ* simulation may define areas for quality improvement.

Introduction

The complexity of critical illnesses and the need for advanced monitoring and treatment have been shown to strongly influence the incidence of adverse events in critical care (Bion and Heffner, 2004). The single most important indicator of quality in critical care is the patient survival rate, which is the result of a multilayered process composed of individual factors, team factors and system factors (Pronovost et al., 2004).

The competence of nurses working in intensive care units (ICUs) is an important element in this process. Competence is related to knowledge base, skills, attitudes, values and experience (Epstein and Hundert, 2002; Pronovost et al., 2004). Ääri et al. (2008) suggested dividing competence into clinical and professional aspects. Clinical competence relates directly to patient care and involves the principles of nursing care, clinical guidelines and nursing interventions, whereas professional competence relates to the nursing profession in general and consists of ethical activities, decision making, development work and collaboration. Thus, abilities related to working in a team, cooperating and communicating contribute to defining and classifying competence in intensive care (Rosen et al., 2008; Ääri et al., 2008).

The use of *in situ* simulation has been promoted to make simulations more realistic and available (Kobayashi et al., 2008). The obvious advantage of this approach is that participants can operate in a known environment and use the medical equipment with which they are familiar. For example, the actual time spent treating a patient is more realistic with this approach (Kobayashi et al., 2008; Lighthall and Barr, 2007). Additionally, *in situ* simulation using a computerised manikin provides the opportunity to present the same patient scenario several times in a real ICU, which allows *in situ* simulation to serve as a model for monitoring both individual and team competence in action. This approach can also help define elements that can be assessed in the process of improving quality and patient safety in critical care.

Non-technical skills (NTS) are the ability to make decisions and plans (cognitive skills) and to communicate and work in teams (social skills) (Fletcher et al., 2002; Jeffcott and Mackenzie, 2008). Studies have shown that 50—80% of adverse events in critical care are related to NTS (Fletcher et al., 2002; Reader et al., 2006). Although it is difficult to link team performance directly to patient survival, Pronovost et al. (2004) claim that the manner in which existing therapies are delivered is fundamental to improving quality of care in the ICU.

The implementation of new guidelines is a common practice for optimising care (Rivers et al., 2001). Guidelines describe professional standards that can be used to assess competence and quality of care (Cabana et al., 1999). Individually, nurses require high levels of competence, including good NTS, when new patients arrive in the ICU. Teams must utilise common resources to provide patients with high-quality treatment (Pronovost et al., 2004). However, including NTS standards in professional guidelines is difficult because cognitive, mental and social qualities are involved. The Anaesthetists' Non-Technical Skills (ANTS) behavioural marker system was developed and validated by Fletcher et al. (2003). To the best of our knowledge, there is no validated tool to assess NTS in intensive care teams. However, in a literature review, Reader et al. (2006) found that critical incidents in ICUs can be classified using the same four categories used in ANTS: ''Team working'', ''Situation Awareness'', ''Task Management'' and ''Decision Making'' (Fig. 1). Those authors also described a team performance framework for the ICU that mirrored the ANTS taxonomy (Reader et al., 2009).

Miller's pyramid for assessing clinical competence distinguishes between four different levels of competence (''knows'', ''knows how'', ''shows how'' and ''does'') and is widely used in medical education (Norcini, 2003; Wass et al., 2001). The level ''does'' reflects how practitioners act in real life and is, according to Miller, the most accurate way to assess clinical competence (Norcini, 2003). According to this framework, scant information can be gained from assessing experienced intensive care nurses using the three lower levels of the pyramid. In contrast, one must evaluate how nurses perform when they are actually doing their work in a clinical setting and how they use their competencies in action. Professional practice means being able to use knowledge in action (Schön, 1983), and competence should preferably be assessed while nurses are interacting with real patients in the ICU (Norcini, 2003; Wass et al., 2001).

Furthermore, ICU patients are not a homogeneous group, which makes it challenging or nearly impossible to find similar, applicable situations for comparing the competence of nurses on the job. In addition, the lack of assessment tools makes it even more difficult to use competence as a quality indicator in the ICU.

This paper focuses on the feasibility of using an *in situ* simulation model to explore team competence in the ICU, and to assess ''Team Working'' and ''Situation Awareness'' in nursing teams using the ANTS system. The data originate from a randomised trial comparing learning outcomes in two groups of ICU nurses. The educational results will not be discussed in detail in this paper (see discussion section).

Methods

The relevant department management approved the use of the ICU at a university hospital in Norway as a data collection site. Data were collected from January to September 2008, and the study was approved by the Norwegian Social

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