Learning and teaching in clinical practice

Patient safety and technology-driven medication – A qualitative study on how graduate nursing students navigate through complex medication administration

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ABSTRACT

Background: The technology-driven medication process is complex, involving advanced technologies, patient participation and increased safety measures. Medication administration errors are frequently reported, with nurses implicated in 26–38% of in-hospital cases. This points to the need for new ways of educating nursing students in today's medication administration.
Aim: To explore nursing students' experiences and competences with the technology-driven medication administration process.
Methods: 16 pre-graduate nursing students were included in two focus group interviews which were recorded, transcribed and analyzed using the systematic horizontal phenomenological-hermeneutic template methodology.
Results: The interviews uncovered that understanding the technologies; professionalism and patient safety are three crucial elements in the medication process. The students expressed positivity and confidence in using technology, but were fearful of committing serious medication errors. From the nursing students' perspective, experienced nurses deviate from existing guidelines, leaving them feeling isolated in practical learning situations.
Conclusion: Having an unclear nursing role model for the technology-driven medication process, nursing students face difficulties in identifying and adopting best practices. The impact of using technology on the frequency, type and severity of medication errors; the technologies implications on nursing professionalism and the nurses ability to secure patient adherence to the medication process, still remains to be studied.

Background

Medication administration in health care is a dynamic, interdisciplinary and complex process involving several professional competencies, theoretical knowledge, critical reflection, use of advanced technologies and comprehensive patient participation to ensure high performance on patient safety (Leape et al., 2002; Choo et al., 2010; Sulosaari et al., 2011; Wulff et al., 2011; WHO, 2013).

In 1999, The Institute of Medicine (IoM), USA, developed a manifesto entitled "*To Err is Human*" that aimed to increase safety in the health care sector by approaching safety systems to minimize errors occurring at the individual level. This important milestone has reinforced the introduction and development of medical technology to be the primary strategic tool in eliminating errors from prescribing to administration in medication processes (Institute of Medicine, 1999; Hassan et al., 2010; WHO, 2013).

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Alongside, public mandatory reporting systems have been established nation-wide (Institute of Medicine, 1999; Hassan et al., 2010) to provide feedback on health care performance and reinforce learning from errors (Bates and Gawande, 2003). Recent data shows that approximately 5000 cases of medication errors are reported every month in the UK. In US at least 1.5 million people are injured by medication errors every year (Weeks et al., 2013a), leading to potential fatal consequences, prolonged admission, substantial hospital costs and even death (Gurwitz et al., 2005; Page and McKinney, 2007). Comparable findings has been reported by The Danish Association for Patient Safety, which is based on an opportunity for anonymous reporting, showing that 32% of all reported adverse incidents were medication related in 2009 (Danish Association for Patient Safety, 2011).

Empirical studies claim that 5–30% of hospitalized patients will experience harmful or adverse incident (Rothschild et al., 2006; Hicks and Becker, 2006; Elliott and Liu, 2010). Furthermore, it has been revealed that medication errors are the most prevalent nursing error type recorded (Weeks et al., 2013a), implicated in 26–38% of medication errors in hospitalized patients (Leape et al., 2002; Bates, 2007).

Errors may occur at several points along the continuum, e.g. being due to a professional's lack of knowledge of pharmacology, kinetics and dynamics, calculation skills or not using available supportive technology as i.e. Personal Device Assistant (PDA)/Barcode scanner and the Electronic Patient Medication (EPM) (King, 2004b; Richardson et al., 2012; Weeks et al., 2013b). These electronic equipment's are intended to verify the patient's identity by using barcode scanner and check whether the dispensed drug is consistent with the doctor's prescription during medication administration (Lisby et al., 2005). The overall rationale for applying such technologies into clinical practice are to strengthen implementation, use and safety with respect to the so-called "five right" principle, i.e. "right" patient receives "right" medication at the "right" dosage and at the "right" time via the "right" route (Eisenhauer et al., 2007; Folkmann and Rankin, 2010).

Though surveillance and awareness of medication errors in almost a decade (Fowler et al., 2009), errors worldwide and in Denmark are still frequent reported including: patient not receiving medication; receiving wrong dosage or form of medication; receiving medication at the wrong time or via wrong route of administration (Digital Professional Medication Reference, 2013; Lisby et al., 2005; NPSA, 2009).

Consequently, the medication process is a tremendous educational challenge in the ongoing qualifications of nurses and nursing students and in particular, when targeting discontinuities between the educational and practice sectors (Gregory et al., 2007; Meechan et al., 2011; Sabin et al., 2013; Weeks et al., 2013b; Wright, 2009). Findings from a recent systematic review reveal that simulation-enhanced clinical experiences may decrease medication errors (Shearer, 2013), although some researchers have questioned it's superiority for nursing educational praxis regarding medication safety (Blum and Parcells, 2012).

A 20-year program entitled "The Authentic World", researchers have identified three core competences in safe medication: a conceptual-, calculation- and a technical measurement competence. The computer based authentic assessment program focuses on how nurses develop medication dosage calculation problem-solving skills, which brings new knowledge about how nurses are prone to make medication errors (Weeks et al., 2013b).

Inspired by simulated learning processes and with the aim to improve patient safety by increasing medication competencies at our institution, Hvidovre Hospital, in Denmark, we developed a 2½-day intensive training program in medication administration for pre-graduate nursing students. The training combined theoretical teaching and use of technology (EPM and PDA) in simulated clinical practice in skill laboratories.

The current qualitative study explores how pre-graduate nursing students experience and perceive a complex technology-driven medication process and the interrelation with trained staff, when adopting acquired skills in this crucial area of patient care and safety.

Setting

The current study was carried out at Hvidovre Hospital, a University Hospital in Capital Region of Denmark, accredited since 2002 by the International Joint Commission and in 2012 by the Danish Quality Model Program for Hospitals. Since 2006, the Capitol Region's hospitals use the EPM with the associated device PDA (Danish Association for Patient Safety, 2005).

Ethical considerations

According to the Regional Scientific Committee of the Capital Region of Copenhagen, interviews and questionnaires must only be notified if included human biological material is collected, why the present qualitative study is not under its jurisdiction. The hospital management of Hvidovre Hospital was informed in advance and approved the study.

The respondents were informed in writing about the study and that participation was voluntary and would not influence the evaluation of their clinical stay. Interviews were anonymously transcript and recording tapes immediately deleted.

Research design

The study was designed as a qualitative investigation and evaluation of a medication-training program for nursing students and carried out as two focus groups each interviewed twice with a total 16 pre-graduate nurses. Qualitative analyses were based on a phenomenological-hermeneutic approach (King, 2004a).

Methods

Description of the medication training program

The medication training program combined theoretical teaching by tutors, pharmacists and physicians with the use of EPM and PDA in clinical simulation situations in skill laboratories and workstations set up by a clinical nurse specialist and tutors. The theoretical part of the medication training was certified with a multiple-choice test. Clinical simulation training was combined with debriefings to enhance the students' learning experience. In the mandatory activity, the clinical tutor support the students in transferring the newly acquired medication administration skills into actions, in clinical practice.

An overview of the medication training program and the research study evaluation is illustrated in Fig. 1.

Respondent selection

65 nursing students participated in the training program during spring, 2012. 62 students (95%) completed the training. Respondents were strategically selected according to age and specialty in order to obtain the broadest possible representation (Patton, 1990) within a population of 20 students. Two focus groups of 8–10 students each were formed. The focus groups were interviewed twice. First round occurred immediately following participation in the medication training (baseline). The second interview