Supervising nursing students in a technology-driven medication administration process in a hospital setting: a systematic review protocol

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Abstract

Objective: The objective of this review is to identify, describe and synthesize the experiences of nurse supervisors and the factors that influence the supervision of pre-graduate nursing students in undertaking technology-driven medication administration in hospital settings. The current review seeks to answer the following questions:

1. What factors do nurse supervisors identify as influential in the supervision of pre-graduate nursing students in undertaking technology-driven medication administration in hospital settings and how do they influence supervision?
2. What factors identified by nurse supervisors are understood to characterize a "good supervisor"?

Keywords: Nursing education; nursing student; patient safety; supervision; technology-driven medication

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% in hospital cases.¹⁻³ Recent data show that approximately 5000 cases of medication errors are reported every month in the United Kingdom. In the United States, at least 1.5 million people are injured by medication errors every year, leading to prolonged admission, substantial hospital costs and even death.¹⁴⁻⁵

Technology-driven medication administration in a hospital setting consists of using a personal device assistant/barcode scanner and the Electronic Patient Medication System. This electronic equipment is intended to verify the patient’s identity by using a barcode scanner and checking whether the dispensed drug is consistent with the doctor’s prescription during medication administration.⁶

Findings from a recent systematic review reveal that simulation-enhanced clinical practices may decrease medication errors,⁷ although some researchers have questioned their superiority for nursing educational praxis regarding medication safety.⁸⁻¹⁰ A few studies report that nursing students are involved in medication errors because of knowledge deficits, inexperience and factors within the organization itself, like busyness.⁹¹⁰

According to the World Health Organisation,¹¹ the importance of patient safety has considerable attention in health care worldwide.¹⁰ The use of technology to increase patient safety during medication prescription and administration is an example of several strategic initiatives that need to be evaluated and further developed. In medication prescription and administration, computerized physician order entry has been shown, in some studies, to decrease the frequency of serious medication error rate.¹²

A qualitative study revealed two central findings identified from the perspective of pre-graduate nursing students, that the correct use of medication-driven technology and professional competency are the most important prerequisites for optimizing patient safety and that good role models in clinical practice are crucial to influence nursing students to adopt best practice in relation to medication administration.¹³ This highlights the need for new ways of educating nursing students and for more attention on how nursing students are supervised and educated in...
today’s medication administration in clinical settings.

Registered nurses and nursing students are involved in a medication administration process and working under current legislations. Worldwide, it is found that nursing students are only authorized to administer restricted and controlled medications if they are under the personal supervision of an authorized person, who is employed in a relevant occupation, including a registered nurse.\(^{14,15}\) Also registered nurses and nursing students are expected to comply with what is commonly known as the “five rights” — “checking the right drug, right dose, right route, right patient and at the right time.”\(^{16,110}\) In the medication administration field, the amount of “rights” varies, sometimes including a sixth right, “for the right reason”, although studies have revealed that approximately one-third (29\%) of student nurses disagree that registered nurses follow the six rights when administering medications\(^{17}\) and that nursing students often experience a lack of or inappropriate supervision in clinical practice.\(^{13,17–19}\)

The medication process presents a tremendous educational challenge for the ongoing qualifications of nurses and nursing students and in particular when targeting discontinuities between the educational and practice sectors.\(^9,20–23\) Both Donaldson and Carter\(^24\) and Cruess et al.\(^23\) state that pregraduate nursing students cannot necessarily identify supervisors who know about or can describe the best practices and that several of those who act as supervisors are unaware of their own behavior as role models or are not aware of strategies to use for training in clinical practice. Over several studies, Reid-Searl et al.\(^\) have explored nursing students’ experiences of administering medication and appropriate supervision in clinical settings.\(^14,17\) These authors have also studied the attitudes, opinions and experiences of registered nurses in relation to the supervision of undergraduate nursing students during administration of medications in the healthcare setting.\(^25,26\) A study carried out at the University Hospital, Hvidovre Hospital, Denmark, indicates that supervisors/role models should be more aware of the important function they have in the practice field.\(^13\) As a result of having an unclear nursing supervisor for the technology-driven medication process, nursing students face difficulties in identifying and adopting best practice.\(^13\) Supervisors are used as educators for nursing students in a clinical hospital setting, and mentor and role model are synonymous.\(^26,27\)

Due to the complex medication-driven technology process, medication errors, patient safety, nursing students’ lack of competency and registered nurses lacking appropriate supervisor skills within the medication administration process, there is a demand for identifying challenges with supervision in clinical practice. Challenges are the factors that supervising registered nurses’ may believe are important to establish a systematic supervision for nursing students while working in clinical practice. The systematic supervision should follow all the clinical legal requirements and rules for the technology-driven medication process.

An initial search of CINAHL, the JBI Database of Systematic Reviews and Implementation Reports, DARE, PubMed, Cochrane Library and PROSPERO showed that no systematic review exists on this topic.

Inclusion criteria

Types of participants

The current review will consider studies that include registered nurses who work as supervisors for final year undergraduate nursing students in a hospital setting.

Phenomena of interest

The current review will consider studies that investigate factors that influence the supervision of pregraduate nursing students in technology-driven medication administration. Factors that may be identified in the experiences of the participants may include physical environments, relationships between supervisors and pre-graduate nursing students, organizational factors and the use of technology.

Context

The current systematic review will consider studies within any hospital setting. These hospital settings may include but will not be limited to surgical wards, medical wards, outpatient clinics or emergency rooms.

Types of studies

The qualitative component of the review will consider studies that focus on qualitative data including, but not limited to, designs such as phenomenology,
grounded theory, ethnography, action research and feminist research.

Search strategy
The search strategy aims to find both published and unpublished studies. A four-step search strategy will be utilized in this review. An initial limited search of MEDLINE (PubMed) and CINAHL will be undertaken followed by analysis of the text words contained in the title and abstract, and of the index terms used to describe the articles. A second search, using all identified keywords and index terms, will then be undertaken across all included databases. Third, the reference list of all identified reports and articles will be searched for additional studies. Fourth, names of key authors have been searched and found in the literature. Studies published in English and Scandinavian languages (Danish, Swedish and Norwegian) will be considered for inclusion in this review. Only studies published after 2000 will be included in this review as technology-driven medication administration in hospital settings was implemented in early 2000 according to The Institute of Medicine (USA) following the publication of the seminal work, “To Err is Human”.28

The databases to be searched include:
- MEDLINE
- EMBASE
- CINAHL
- ERIC
- PsychINFO
- ProQuest
- SWEMED+

Supplementary OpenGrey and Google Scholar will be searched.

Initial keywords to be used will be: Undergraduate nursing students; pre-graduate nursing students; nursing students; nursing education; Supervisor; supervisors; role-model; role-models; mentor; mentors; supervision; Medication administration; technology driven medication; patient safety; medication safety; Clinical education and hospital setting.

Assessment of methodological quality
Qualitative papers selected for retrieval will be assessed by two independent reviewers for methodological validity prior to inclusion in the review using standardized critical appraisal instruments from the Joanna Briggs Institute Qualitative Assessment and Review Instrument (JBI-QARI) (Appendix I). Any disagreements that arise between the reviewers will be resolved through discussion or with a third reviewer.

Data extraction
Qualitative data will be extracted from papers included in the review using the standardized data extraction tool from JBI-QARI (Appendix II). The data extracted will include specific details about the phenomena of interest, populations, study methods and outcomes of significance to the review question and specific objectives.

Data synthesis
Qualitative research findings will, where possible, be pooled using JBI-QARI. This will involve the aggregation or synthesis of findings to generate a set of statements that represent that aggregation, through assembling the findings rated according to their quality, and categorizing these findings on the basis of similarity in meaning. These categories are then subjected to a meta-synthesis to produce a single comprehensive set of synthesized findings that can be used as a basis for evidence-based practice.

References
Appendix I: Appraisal instruments

**JBI QARI Critical Appraisal Checklist for Interpretive & Critical Research**

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
<th>Unclear</th>
<th>Not Applicable</th>
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<td>1. Is there congruity between the stated philosophical perspective and the research methodology?</td>
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<td>2. Is there congruity between the research methodology and the research question or objectives?</td>
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<td>3. Is there congruity between the research methodology and the methods used to collect data?</td>
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<td>4. Is there congruity between the research methodology and the representation and analysis of data?</td>
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<td>5. Is there congruity between the research methodology and the interpretation of results?</td>
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<td>6. Is there a statement locating the researcher culturally or theoretically?</td>
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<td>7. Is the influence of the researcher on the research, and vice-versa, addressed?</td>
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<td>8. Are participants, and their voices, adequately represented?</td>
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<td>9. Is the research ethical according to current criteria or, for recent studies, and is there evidence of ethical approval by an appropriate body?</td>
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<td>10. Do the conclusions drawn in the research report flow from the analysis, or interpretation, of the data?</td>
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Overall appraisal: [ ] Include [ ] Exclude [ ] Seek further info. [ ]

Comments (including reason for exclusion)

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________________________________________________________________________
Appendix II: Data extraction instruments

**JBI QARI Data Extraction Form for Interpretive & Critical Research**

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<thead>
<tr>
<th>Reviewer</th>
<th>Date</th>
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<tbody>
<tr>
<td>Author</td>
<td>Year</td>
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<td>Journal</td>
<td>Record Number</td>
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**Study Description**

Methodology

Method

Phenomena of Interest

Setting

Geographical

Cultural

Participants

Data analysis

Authors Conclusions

Comments

Complete: Yes [ ] No [ ]