



Featured Article

Use of Simulation to Develop a Medication Administration Safety Assessment Tool

Lori Goodstone, MS, RN*, Michael S. Goodstone, PhD

Farmingdale State College, Farmingdale, NY 11735, USA

KEYWORDS

medication-related errors;
medication administration competency;
rights of medication administration;
human patient simulators;
checklist;
performance-based measure;
clinical competency;
content validity;
interrater reliability

Abstract

Background: This pilot study describes the use of human patient simulation (HPS) to develop a performance-based competency measure of medication administration safety.

Method: The instrument was developed using a content-validity approach and pilot tested through independent raters ($n = 4$) evaluating student nurse research participant ($n = 14$) performance in the HPS. Rating accuracy was evaluated using three HPS-based standard performances.

Results: Using four raters, interrater reliability was 0.83 to 0.90, Cronbach's alpha was 0.90, and the rating accuracy averaged 95%.

Conclusions: HPS provides unique features to facilitate development of performance-based clinical measures. These include an ability to test the measure on both high-consequence behaviors (such as medication errors) and "standard" performances with predetermined errors.

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Introduction

The use of human patient simulators (HPS) to advance nursing students from novice to advanced beginner is well documented in the nursing and related health care literature. HPS provides students the opportunity to gain and apply knowledge, practice complex skills, develop critical thinking skills, increase confidence, and decrease anxiety (Harder, 2009; Rhodes & Curran, 2005). An important goal in health care is to develop evaluation techniques that can measure performance in settings that accurately reflect clinical practice (Boulet et al., 2003). In addition to its established educational attributes, the simulation lab can

also provide nurse researchers a unique environment to develop reliable and valid performance-based measures of clinical competency that can be used in both the simulation lab and actual clinical settings. This article describes the use of HPS in the development and testing of the medication administration safety assessment tool (MASAT), which measures medication administration safety competence based on the rights of medication administration, an evidence-based protocol.

Medication-Related Errors and the Rights of Medication Administration Protocol

Public awareness of the impact of medication-related errors was heightened in 2000 when the Institute of Medicine

* Corresponding author: goodstl@farmingdale.edu (L. Goodstone).

published a report titled “To Err Is Human: Building a Safer Health System.” The report identified medication-related errors as a threat to patient safety. Approximately 7,000 patients die each year from complications directly related to medication errors. Annual health care costs related to medication errors in 2006

were estimated at \$3.5 billion (Elliot & Liu, 2010). The most common types of medication errors that result in patient death are wrong dose (40.9%), wrong drug (16%), and wrong administration route (9.5%) (Hughes & Blegen, 2008).

As a result of the high incidence of medication-related errors, hospitals and other health care—related facilities have instituted many policies and procedures to help prevent medication errors. One of the most familiar procedures to nurses is the rights of medication administration: the right patient, the right drug, the right dose, the right route, and the right time (George, Henneman, & Tasota, 2010). Other rights have been added and include right documentation and the indication for drug

administration (Elliot & Liu, 2010).

Adherence to the rights of medication administration has been reported by the Institute for Safe Medication Practice to be a worthwhile tool to facilitate safe medication administration. The Institute for Safe Medication Practice advocates that system processes should be in place to achieve safe medication administration and the five rights are the goal for attaining positive outcomes (George et al., 2010).

Simulation Lab: Incubating Skills and Performance Measures

High-fidelity patient simulators are used in nursing curricula with the belief that the simulated situation provides practice, facilitating the transfer of learning to related real-life challenges (Ravert, 2008). It is crucial to bridge the gap that exists between what students learn in the classroom and in their clinical practice; HPS provides a pedagogic link between science and education (Jeffries, 2008; Madhavan, 2006). Simulation allows the learner to

acquire the competencies necessary to practice in a real-world environment without the real-world risks. Medication administration is a complex skill that requires many steps to ensure accuracy and prevent errors. Simulation provides the opportunity for students to practice complex skills in a low-risk environment.

The same features unique to the simulation environment provide an opportunity for nurse educators and researchers to use HPS to develop reliable and valid performance-based measures of clinical competency. Development of a performance-based measure requires data collection over a full range of subject performance. The instrument needs to be tested in its ability to measure competent as well as below-standard performance. With regard to clinical behavior such as medication administration, this would be virtually impossible without the use of simulation. It would not be ethical for the individual using the instrument in a clinical setting to allow a student to continue administering medication once it appeared that a mistake was imminent or had in fact occurred, yet correcting the potential error would preclude the ability to collect the full range of data. It is expected that those students who are administering medication in the clinical setting have already achieved a level of competency where errors would be infrequent and difficult to capture in typical field tryouts of the new instrument. HPS provides the opportunity to test the instrument with students who are still at the fundamental level where performance errors may be more common. This provides a realistic test of the instrument on a range of competent and below-standard nursing performance that would not be practical in a clinical setting. In addition, HPS allows the researcher to prepare scenarios of varying levels of clinical competency, videotape the scenarios, and test the instrument in its ability to accurately detect predetermined errors that are built in to these standard performances.

It is important to note that the current research is designed to develop a measure of clinical performance and demonstrate a model for the use of HPS in the development of related measures. Although the resulting instrument may be useful as a measure for assessing specific HPS learning outcomes, this is only one of many potential uses of a reliable and valid measure of clinical performance. Measurement of performance outcomes is important in actual as well as simulated clinical settings with both student and practicing nurses. Further, there appears to be strong consensus that additional psychometrically sound measures of clinical performance are needed.

Need for Clinical Performance Measures

Although the nursing education literature stresses the need for learning outcome measures, clinical performance measures may also be an important part of employee feedback and training, performance appraisal, and program

Key Points

- This pilot study describes the use of human patient simulation to develop a performance-based competency measure of medication administration safety.
- Human patient simulation provides unique features to facilitate development of performance-based clinical measures through inclusion of high-consequence behavior that could not be sampled in the clinical environment.
- Reliable and valid performance-based measures are needed in nursing education to establish clinical competency.

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