



Development of a simulation-based assessment to evaluate the clinical competencies of Korean nursing students☆



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ARTICLE INFO

Article history:

Accepted 21 August 2015

Keywords:

Asthma
Diabetes
Global rating scale
Nursing students
Simulation

SUMMARY

Objectives: To describe a simulation-based assessment (SBA) to evaluate the clinical competencies of nursing students in children's health and to compare its results with grade point average (GPA), self-efficacy, topic-specific knowledge, and self-reported clinical competency using the Six-D Scale.

Methods: This cross-sectional, descriptive study recruited nursing students from a children's health clinical practicum. Students were assigned to either an asthma ($n = 55$) or a type 1 diabetes ($n = 48$) care scenario conducted on a high-fidelity simulator. Clinical competencies were assessed using the global rating scale (GRS) and a checklist.

Results: Data on 103 students were analyzed. The SBA-GRS indicated that 64.6%–87.3% of students passed. The SBA-GRS showed a statistically significant positive association with the SBA checklist in both the asthma ($\rho = .763, p < .001$) and the type 1 diabetes ($\rho = .475, p = .001$) group. In the asthma group, the SBA-GRS and checklist showed statistically significant associations with GPA ($\rho = .413, p = .002$ vs. $r = .508, p < .001$) and the Six-D Scale ($\rho = .266, p = .049$ vs. $r = .352, p = .008$); in the diabetes group, only the SBA checklist showed a statistically significant association with self-efficacy ($r = .339, p = .018$) and the Six-D Scale ($r = .373, p = .009$). Four groups by SBA-GRS had statistically significant differences in scores on the SBA checklist in both groups ($F = 25.757, p < .001$ in the asthma group; $F = 4.790, p = .006$ in the diabetes group) and GPA only in the asthma groups ($F = 6.095, p < .001$).

Conclusion: SBA was found to be feasible for nursing students. The GRS and checklist were reasonably correlated with other evaluation methods of student competency, but correlations were better with easier scenarios.

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Introduction

The assessment of clinical competency has always been a key component of clinical education for health professionals. In addition to traditional methods such as written tests and clinical observations, direct evaluation methods conducted in standard environments have attracted the attention of nursing educators. For example, objective structured clinical examination (OSCE) has been widely used in many health professions programs, including nursing. OSCE has been shown to be reliable and valid in assessing medical students (Dong et al., 2014), nursing students (Mitchell et al., 2009), and postgraduate professionals (Schoenmakers & Wens, 2014). However, adapting OSCE can be

problematic, particularly when resources are limited. OSCE requires multiple clinical scenarios and space, equipment, supplies, standardized patients, and trained examiners to evaluate multiple observations of individual students (McIlroy et al., 2002). Because these requirements are so expensive (Palese et al., 2012), OSCE is not available in many Korean nursing programs.

Nonetheless, standardized objective assessment of clinical competency is still an important part of nursing education, and simulation-based assessment (SBA) could be a useful alternative. Not only has simulation been widely used for the clinical education of nursing students and nurses but it has also been used to assess the clinical competencies of surgeons (Jaffer et al., 2015), medical residents (Burns et al., 2013; Fehr et al., 2011), and nurse anesthetists (Henrichs et al., 2009). Compared with OSCE, SBA also has unique benefits for student evaluation: its operating costs are smaller, it is less demanding of examiners, and it provides students with almost unlimited opportunities to practice.

The most commonly used evaluation tool in OSCE or SBA of students is the checklist. A checklist consists of a series of items that are usually rated dichotomously: 1 ("performed") or 0 ("not performed"). It

☆ This study was supported by the Basic Science Research Program of the National Research Foundation of Korea and funded by the Ministry of Education, Science, and Technology (2011-0009627).

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facilitates a thorough assessment of inexperienced examinees at every stage of performance. In addition, educators often use checklist results to advise students how they performed on individual items. However, checklists are not always the best option. They are case-specific evaluation tools, and their items are scenario-dependent, which is highly demanding for both developers and examiners. Furthermore, previous studies have concluded that checklists make it difficult to evaluate higher levels of performance such as integrity, prioritization, and efficiency (Hodges & McIlroy, 2003).

The global rating scale (GRS) can also be used to assess clinical competency. The GRS typically requires examiners to rate the overall performance of examinees based on expert judgment and often uses only a few items, on occasions even a single item (Hodges & McIlroy, 2003). Global rating scales have several benefits over checklists: They are easily scored, allow greater flexibility in judgment, take less time to administer, and provide a better means of assessing improvements, from the novice to the expert level (Kim et al., 2009). In addition, the GRS seems to capture aspects (e.g., empathy, communication, and short and effective skills) that are not well-addressed in textbooks but are usually found in clinical experts. Moreover, a well-developed GRS affords examiners the opportunity to test examinees in real clinical settings.

In SBA, either the GRS or checklist can be used to assess student competencies. Ilgen et al. (2015) recently reported that both methods had good reliability and validity when used with SBA (Ilgen et al., 2015). However, the evidence is still limited, particularly in nursing education. The association between these two methods and other types of assessment of student competencies during nursing programs is lacking. For example, grade point average (GPA), self-efficacy, knowledge of the target topic, and self-reported competency, as determined by the Six-Dimension Scale of Nursing Performance (Six-D Scale), have been used in previous studies of OSCE of students (Eftekhar et al., 2012; Park et al., 2013), but these have rarely been investigated in conjunction with SBA.

This study, therefore, was undertaken to develop an SBA for nursing students and to compare the efficacy of a GRS and a checklist to measure student competency with other methods of evaluation. We were particularly interested in children's health. The clinical practicum of nursing education for children has been made difficult by a decreasing number of clients and clinical placements. This means that students have fewer opportunities to practice nursing care, and educators are more pressured to ensure that students can perform well in real care situations. For these reasons, children's health is one area where simulation is widely used for the clinical education of nursing students (Hayden, 2010). For this study, we selected asthma and type 1 diabetes, two chronic health conditions that are common in children. Our specific aims were (1) to describe the development of an SBA using a GRS and checklist to assess the clinical competencies of nursing students for children with asthma or diabetes and (2) to compare SBA results with different types of competency tests such as GPA, self-efficacy, knowledge of the topics, and the Six-D Scale.

Methods

Study Design and Participants

This was a descriptive, cross-sectional study. Data were collected from March 2012 to June 2013. The study participants were conveniently recruited from a group of fourth year nursing students who were participating in a clinical practicum on children's health in a university located in Incheon, South Korea.

Development of SBA Modules for Asthma and Type 1 Diabetes

Two SBA modules, one for asthma and the other for type 1 diabetes, were developed by a focus group, which included two nursing faculty

and two nursing researchers in children's health and nursing simulation education. After the modules had been drafted, they were reviewed by clinicians (i.e., a pediatrician, a clinical nurse specialist, and a nurse manager in a pediatric department) and subsequently revised based on their feedback.

Scenarios on asthma and diabetes were developed with two levels of difficulty to evaluate their effect on study outcomes. The principals of both scenarios were young teenagers. The asthma scenario involved a teenager who visited an emergency department with shortness of breath; the diabetes scenario involved an inpatient with a cold who was admitted for high blood sugar. The diabetes scenario was the more difficult scenario because the module presented at least two nursing problems (i.e., high blood sugar and dehydration), while the asthma scenario involved only an acute exacerbation of asthma.

Both modules comprised a planning phase (15 min), a simulation performance phase (15 min), and a documentation/survey completion phase (15 min). Each student performed one of two scenarios on the first day of the 5-day practicum. The scenario was given alternatively among the two scenarios per week. Students were provided with written information that included a summary of each scenario, the physician's order, medication administration records, nursing records, drug information, and a list of actions that the students were required to perform. These actions included assessment, interventions, health promotion counseling, and presentation of an appropriate professional attitude. After students had finished planning, they proceeded to the simulation phase. While an operator controlled the simulator, an examiner observed the students through a one-way mirror and recorded their performances.

Measurements

We collected data on basic characteristics and six measures of competencies. The basic characteristics consisted of age, gender, experience of simulation, and amount of previous simulation use. The six measures of competencies were SBA-GRS and checklist scores, GPA, knowledge about asthma or diabetes, self-efficacy, and Six-D Scale scores. GPA, the average grade of six semesters, was obtained from the department of nursing. The SBA-GRS and checklist, questionnaires on asthma and diabetes knowledge, and self-efficacy were developed by the focus group and reviewed by clinicians, as described above.

SBA-GRS

Researchers may use 3- to 5-point Likert scales in a GRS (Liddle, 2014). We selected a 4-point Likert scale to avoid examiners selecting, perhaps unconsciously, a middle grade. Based on their performance, students received one of four grades: "very good pass," "clear pass," "borderline pass," and "fail."

SBA Checklist

The asthma scenario checklist comprised five domains (22 items): assessment by interview (7 items), physical examination (4 items), intervention (4 items), health education (2 items), and professional attitude (5 items). Each item was coded either 1 ("correctly performed") or 0 ("not correctly performed"). Domain scores were expressed as percentages of total possible scores. Total checklist scores were defined as the average scores of the five domains, which meant that domains were equally weighted.

The diabetes scenario checklist also consisted of five domains, but it had 23 items: assessment by interview (9 items), physical examination (3 items), intervention (3 items), health education (3 items), and professional attitude (5 items). The same scoring system was applied to this scenario. Inter-rater reliability of the checklists was 0.75 for the asthma scenario and 0.87 for the diabetes scenario.

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