Research Brief

High-Fidelity Patient Simulation Increases Dietetic Students’ Self-Efficacy Prior to Clinical Supervised Practice: A Preliminary Study

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ABSTRACT

Objective: This study examined the effect of high-fidelity patient simulation (HPS) on dietetics students’ self-efficacy before supervised clinical practice.

Methods: This repeated-measures study was conducted during the 2012–2013 academic year. All students in a masters coordinated program cohort (n = 19) participated in an interprofessional HPS experience before clinical supervised practice. The students completed a 4-point self-efficacy scale in which 0 = not at all confident and 3 = fully confident, at 3 time points: before and after the simulation experience and 2 weeks after beginning clinical supervised practice.

Results: Using the Wilcoxon signed-rank test, median confidence level differed before and after the simulation (1.5; interquartile range [IQR] 1.2–1.8; and IQR 1.3–2.0, respectively; P = .03) as well as after the simulation vs during the clinical rotation (2.2; IQR 2.0–2.4; P = .02).

Conclusions and Implications: This study supports the use of HPS with dietetics students in a coordinated program. High-fidelity patient simulation increases dietetics students’ self-efficacy before supervised clinical practice.

Key Words: high-fidelity patient simulation, dietetics students, clinical supervised practice, self-efficacy (J Nutr Educ Behav. 2016;48:563-567.)

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INTRODUCTION

Dietetics students complete science and counseling courses in preparation for supervised clinical practice rotations. However, dietetic students generally receive little exposure to real-life scenarios other than written case studies, computer-based simulations, and, more recently, standardized patients. Because of this limited experience with practical application, students’ self-confidence in their ability to complete a nutrition assessment successfully and work within a clinical setting has been found to be low. Self-efficacy was defined by Bandura as the belief in one’s ability to complete tasks necessary to manage a potential situation. As self-efficacy increases, so does self-confidence. The principle behind the Self-efficacy Theory is that individuals who have high self-efficacy for a particular situation are more likely to want to participate in that situation and less likely to participate in situations in which their self-efficacy is low.

High-fidelity patient simulation (HPS) has been studied in the health care professions, primarily in medicine and nursing. However, few published studies exist using HPS with students in dietetic programs. High-fidelity patient simulators create the most realistic experience by demonstrating human-like characteristics including breathing, talking, and blinking. High-fidelity patient simulation creates real-life scenarios that allow students to demonstrate critical thinking skills, solve problems, and practice what they have learned in a safe environment.

In addition to self-efficacy, HPS is an experience that maps to multiple Competencies for the Registered Dietitian (CRD) set forth by the Accreditation Council for Education in Nutrition and Dietetics (ACEND). ACEND is the Academy of Nutrition and Dietetics’ accrediting agency for education programs, which prepares students for careers as registered dietitian nutritionists or dietetic technicians. As an ACEND accredited program, it is essential that all clinical experiences meet these competencies including CRD 2.8, Apply leadership skills to achieve desired outcomes; CRD 2.10, Establish collaborative relationships with other health professionals and support personnel to deliver effective nutrition services; and CRD 3.1.e, Complete...
documentation that follows professional guidelines, guidelines required by health care systems, and guidelines required by the practice setting. The purpose of this study was to determine whether HPS increases masters Coordinated Dietetic Program (CP) students’ self-efficacy before supervised clinical practice. An additional objective was to evaluate previous exposure to HPS or experience working with patients in a clinical setting to determine their effect on self-efficacy. The main hypothesis was that participation in HPS would result in increased reported self-efficacy scores using a self-efficacy scale, specifically that self-efficacy would improve post-simulation compared with baseline and again 2 weeks after beginning a supervised clinical practice rotation. It was also anticipated that this observation would exist in students with and without prior clinical experience.

METHODS

This repeated-measures study used a self-efficacy scale that was administered to masters CP students at 3 time points: before and after the simulation experience and 2 weeks after beginning their first supervised clinical practice rotation between June, 2012 and May, 2013. The study was approved by the Georgia State University institutional review board. All supervised clinical practice rotations in the clinical setting were delayed until after the simulation experience. However, this did not control for prior experience working with patients.

Participants and Recruitment

Study participants were a convenience sample of students enrolled in a masters CP. Students were eligible to participate if they began the CP during the 2012–2013 academic year (n = 19). Students were given the opportunity to participate in an HPS before their supervised clinical practice rotations. No student had previous exposure to HPS. The investigators distributed a recruitment flyer during a scheduled CP student meeting and explained the general purpose of the study. A Georgia State University Institutional Review Board-approved informed consent form was reviewed with each student who wanted to participate. Students were informed that there would be no consequences if they did not participate in the study, and they received no financial compensation or other incentives for participation.

Survey Instrument

Because no known validated self-efficacy instruments exist for dietetic students, a self-efficacy scale (SES) was developed for dietetic students. The SES is consistent with Bandura’s guide to constructing self-efficacy scales in that it maintained student confidentiality to reduce social-evaluative concerns, included a 4-point scale that ranged from not at all to fully confident, and mapped to competencies identified in the ACEND 2012 CRD guide that need to be accomplished to be successful. A panel of 17 registered dietitians completed content validation of 16 questions. The registered dietitians were recruited via email and consisted of clinical instructors, preceptors, previous masters CP dietetic students, and colleagues within the Department of Nutrition. No compensation was provided. Each of the 16 questions on the SES was evaluated to determine whether it met the following criteria: (1) relevance to the CRD, and (2) clarity and easily understood. In the validation process each reviewer rated each question as high, medium, or low for each criterion. Each question was reviewed and revised once. Four of the 16 questions were subsequently divided into 2 questions. Therefore, the final scale included 20 questions that focused on self-efficacy in clinical dietetic practice. For each question, students were required to select 1 of 4 responses: 0 = not at all confident; 1 = somewhat confident; 2 = mostly confident; and 3 = fully confident (see Supplementary Material).

Procedures

Once the researchers obtained signed consent, students were assigned a unique identification number and asked to complete a demographic information form to describe their age and gender. Each student was asked to respond to 2 questions: (1) Have you previously used high-fidelity simulation? If yes, please explain; and (2) Do you have any experience working with patients in a clinical setting? If yes, please explain. Prior experience was defined as paid work experience as a registered dietetic technician, completion of an undergraduate clinical practicum, or volunteer experience that involved working with patients in a clinical setting. The study sample was later subdivided by simulation or patient experience in the analyses to address potential bias owing to previous clinical experience. The HPS experience occurred on the campus of an urban university in a simulation laboratory. The simulation laboratory resembled a treatment setting comparable to a hospital room equipped with a life-sized, computer-controlled mannequin (SimMan 3G, Laerdal Medical, Stavanger, Norway). There were 19 simulation groups that included 2 nursing students and 1 dietetic student. Each group was led by the same 3 faculty members (2 nutrition and 1 nursing). Before the start of the activity, each dietetic student was given the 20-question SES and verbal instructions on how to complete the scale. Students individually completed the interprofessional HPS experience that was based on a patient with multiple comorbidities who had experienced a trauma. In the simulation scenario, the dietitian was consulted for making nutrition recommendations for advancing the patient’s diet from nothing by mouth. Each dietetic student was required to sign a confidentiality statement so that details about the experience would not be shared with other students before their participation. The HPS activity took approximately 15 minutes to complete and was followed by a debriefing session led by the 3 faculty members. During the debriefing session the faculty members asked the students to describe what they thought went well during the simulation and what could have been done better. Each dietetics student was given the SES for a second time immediately after completion of the simulation experience but before the debriefing session. Two weeks after beginning the initial 6-week hospital-based, supervised clinical practice rotation, dietetics students completed the SES for a third time, after completing their first patient care assignment.
Data Analysis

Demographic and potential bias data were described using frequency statistics. The confidence level for each participant at each time point (before the simulation, after the simulation, and during clinical rotation) was calculated by summing the scores for all survey questions and dividing them by the total number of questions. Self-efficacy survey scores were based on an ordinal scale. Therefore, the researchers used the Wilcoxon signed-rank test to examine the difference in median confidence level before and after the simulation experience as well as the difference between the confidence level after simulation and during the supervised clinical practice rotation. This analysis was conducted for the entire cohort and after subdivision by previous patient experience. Multiple regression analysis was used to evaluate the effect of independent variables including age, previous patient care experience, and confidence level before simulation on self-efficacy after simulation. Internal consistency (reliability) was determined using Cronbach alpha (.94). All data analyses were conducted using SPSS (version 23, SPSS, Inc, Chicago, IL, 2015). $P < .05$ was significant.

RESULTS

All 19 masters CP students who enrolled during the 2012–2013 academic year agreed to participate in the study. The HPS mapped to multiple ACEND competencies including CRD 2.8, 2.10, and 3.1.e. The majority of the population was female (95%) and Caucasian (79%), median age 26 years (range, 22–49 years). No students had previously participated in a simulation experience and approximately half (58%) had no prior patient care experience.

A statistically significant increase in the median confidence level before the simulation (1.5; interquartile range [IQR] 1.2–1.8) and after the simulation (1.5; IQR 1.3–2.0) was observed ($P = .03$) as well as after the simulation vs during the supervised clinical practice rotation (2.2; IQR 2.0–2.4; $P = .002$) (Table 1). After subdividing the population by the existence of previous patient care experience, the confidence level before and immediately after the simulation did not differ significantly in either group. However, for those without experience, confidence after the simulation vs during the supervised clinical practice rotation remained statistically significant (1.6; IQR 1.4–1.9 vs 2.3; IQR 2.1–2.4, respectively; $P < .003$). Regression analysis revealed that only the confidence level before the simulation predicted confidence after the simulation (Table 2). The most common comments provided by students who completed the evaluation questions included the value of the debriefing session as well as experience gained by communicating with another member of the health care team and the patient (Table 3).

DISCUSSION

This research measured the impact of HPS on self-efficacy with dietetics students in a masters CP. The results indicated that an HPS experience is effective in increasing self-efficacy before clinical rotation regardless of whether the student had prior patient care experience. Researchers who incorporated HPS into medical school education reported that features such as repetitive practice, provision of feedback, and curriculum integration were important components of simulation-based education. When used in nursing education, HPS was shown to improve reported self-efficacy with patient communication and self-confidence with medication administration. Factors related to improved nursing student satisfaction and self-confidence after a simulation experience included having clear objectives and a challenging problem to solve.

The results of this study were similar to those of 2 studies using HPS conducted with students in other health care disciplines. Cardozo and...
Table 3. Student Responses to Simulation Evaluation Questions

<table>
<thead>
<tr>
<th>Question</th>
<th>Students, n</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>What was the most beneficial aspect of the simulation?</td>
<td>6</td>
<td>The debriefing session</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Being able to communicate with the nurses</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Speaking with the patient</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>The experience lessened my anxiety about going into my clinical rotation</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Understanding my role in the patient’s hospital stay</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Being able to apply concepts to a real life situation</td>
</tr>
<tr>
<td>What would you change or do differently with regard to the simulation?</td>
<td>2</td>
<td>Include a demonstration on how to complete the medical nutrition therapy form</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Provide more direction on what information needs to be communicated to the nursing staff</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>I would have provided more information to the nurses</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>I would have spoken specifically about the patient’s diabetes control</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>View mock interviews</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>I would also try to stay on track and get all the information from the patient that I needed</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>I would talk more slowly and do more reflective listening</td>
</tr>
<tr>
<td>Additional comments</td>
<td>1</td>
<td>The simulation was helpful in determining what to discuss with a patient in a short time</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>This was good exposure to a realistic clinical setting</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Feedback will be helpful in a real hospital</td>
</tr>
</tbody>
</table>

Hood compared reported self-efficacy with nursing students using a 10-item psychometric scale in a study before and after HPS that was provided at the beginning and again at the conclusion of a course. Reported self-efficacy was high before any simulation exposure, declined slightly after the first HPS experience, and then increased at the third and fourth time points. Bambini et al. compared reported self-efficacy using a survey that the researchers developed for nursing students during the initial clinical course before and after a simulation experience. A significant increase in the overall reported self-efficacy score was observed after the simulation. Potential confounding factors including student age and previous experience with patients did not affect the results, which was consistent with the findings of the current study.

Holthaus et al. conducted an investigation of the effect of an interprofessional simulation experience on dietetics students' perception of teamwork and decision making, understanding the roles of health care professionals, and self-efficacy in patient care. Students completed a questionnaire developed by the research team and a modified Readiness for Interprofessional Learning Scale questionnaire. The authors reported a statistically significant increase after the simulation in students' understanding of the roles of other practitioners and confidence in providing care for a patient who was receiving ventilation (P < .05). The current study did not examine dietetics students' perception of teamwork but instead focused on self-efficacy. The results from both studies were consistent in that students reported greater confidence in their clinical skills after the simulation experience.

Dietetics education programs have continued to struggle with securing preceptors and supervised practice locations. In a recent report on the need to incorporate simulation in dietetics education, the Academy of Nutrition and Dietetics stated the advantages of simulation experiences, including student-centered feedback, a reduction in unnecessary patient risk, development of critical thinking skills, promotion of effective teamwork, and the development of student confidence. High-fidelity patient simulation can supplement supervised practice experiences and meet required accreditation competencies. All simulation experiences should begin with an overview session in which learning objectives are discussed, and should include realistic scenarios that begin simply and increase in complexity and then end with evaluation and debriefing. High-fidelity patient simulation is expensive and not all nutrition programs have access to the equipment. However, compared with other types of simulation, HPS is the most realistic and has been shown to result in better student training outcomes.

This study had several limitations. The sample size was small because only current masters CP students were included. Another limitation of this study was the lack of a control group of students who did or did not participate in HPS. Overall self-efficacy and the association between students' self-efficacy and subsequent clinical performance were not evaluated. Although self-efficacy evaluation tools exist, there are no known validated self-efficacy tools related to dietetics practice. A final limitation of this study was the time between the second and third survey time points. Students were placed into the supervised clinical practice rotation in groups of 3–4 students. The time to the third survey varied from 4 to 18 weeks, which may have introduced some recall bias.

IMPlications FOR RESEARCH AND PRACTICE

This study examined the effectiveness of HPS in nutrition education using an SES. High-fidelity patient simulation can improve self-efficacy and supplement...
supervised practice experiences. The HPS experience exposed students to an environment similar to the hospital setting and allowed them to apply what they had learned throughout their didactic education. Future research should include further evaluation of the SES in a larger population of dietetic students as well as use of a control group to evaluate the effectiveness of HPS more fully in improving self-efficacy before clinical practice. In addition, future research should examine the number of HPS experiences needed for students to feel fully prepared for clinical rotations.

SUPPLEMENTARY DATA

Supplementary data related to this article can be found at https://dx.doi.org/10.1016/j.jneb.2016.05.013.

REFERENCES

CONFLICT OF INTEREST

The authors have not stated any conflicts of interest.