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Faculty Development for the Use of High-Fidelity Patient Simulation: A Systematic Review

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The use of high-fidelity patient simulation in the education of health professionals has been available for almost 20 years. Much of what has been written about this teaching tool has concentrated on the satisfaction of students and faculty, attitudes of students and faculty toward high-fidelity patient simulation (HFPS), how to measure student outcomes, and how to debrief or provide appropriate feedback (Nehring & Lashley, 2009). In general, faculty support the use of simulation. In comparison, much less has been focused on faculty development using HFPS. A review of the literature found emphasis on barriers and incentives for faculty, the need to increase faculty skills and competencies, the need to identify key faculty, and examples of faculty development programs. The purpose of this systematic review was to identify research focusing on faculty development in the use of HFPS. Opportunities for future research and practice as a result of this systematic review will be discussed.

Background

The literature on faculty development in the use of HFPS is divided into the following themes: incentives, barriers, the need for a faculty champion for simulation or a simulation coordinator, faculty skills and competencies, and examples of faculty development programs. Each of these themes will be discussed in more detail.

Based on experience and the literature on simulation in the education of health professional students, the following incentives have been identified: release time, resource sharing, salary adjustments, funds for professional development, and funds for equipment and its maintenance (Berkowitz, Peyre, & Johnson, 2011; Conrad, Guhle, Brown, Chronister, & Ross-Alaolmolki, 2011; Hyland & Hawkins, 2009; Keefe, 2012). The process of reaching competence in using HFPS takes time and requires a learning curve. Professional development can be formal or informal. Frequent forms of such development include training by the manufacturer of the HFPS or consultants, participation in conferences, and the use of organizational resources (Berkowitz et al., 2011; Hyland & Hawkins, 2009).

Barriers have also been identified through personal experience and as recorded in the literature and include: (a) lack of time to devote to the learning needed to be successful with HFPS, (b) lack of time and expertise in developing and implementing patient scenarios, (c) lack of resources and knowledge about HFPS, (d) lack of space, (e) not knowing how to use HFPS with a large number of students when only a few students can participate at one time, (f) lack of technical expertise, and (g) lack of standardization for how to implement this teaching adjunct (Bentley, 2012; Berkowitz et al., 2011; Blazeck, 2011; Conrad et al., 2011; Kamerer, 2012; Leigh & Hurst, 2008; Monti, Wren, Haas, & Lupien, 1998). Kamerer (2012) and Leigh and Hurst (2008) specifically discuss the fear that faculty experience when told they will need to use simulation in their teaching. Blazeck (2011) goes so far as to name this fear “simulation anxiety syndrome.”

Many authors have written about the need for key faculty or simulation champions to be named in order to facilitate faculty development in the use of HFPS. Leigh and Hurst (2008) discussed the need for a simulation coordinator who oversees the administration of the HFPS but also the development of the faculty. They state that there should be different levels of faculty involvement from faculty who do not participate in simulation but support it to those who involve their students in simulation on a regular basis. Keefe (2012) divided faculty into those

that were aware and supported simulation, those that used HFPS occasionally, and those that were dedicated to the use of HFPS. In fact, she described the efforts at their university to develop videos, mock scenarios, contests, and tours to interest an interprofessional audience. Jeffries (2008) suggested that the simulation champions can keep a resource library of publications and educational materials, maintain a resource directory of finished scenarios, develop an orientation program for faculty, keep a list of teaching tips, and develop a website for discussion and a source of needed resources. Leigh and Hurst (2008) added that the faculty champion should assist faculty in their writing and implementation of scenarios, add realism to the scenarios, write grants, conduct research and present findings, and work collaboratively with the HFPS manufacturers and vendors. Chow and Naik (2008) discussed the training of simulation coordinators. Developing a simulation team or a Simulation Interest Group has also been discussed (Conrad et al., 2011; Hyland & Hawkins, 2009; Jeffries, 2008; Kamerer, 2012; Meakim & Wahl, 2007). It has also been suggested that support from outside staff, such as librarians and a technology director, would help in the realism and comprehensiveness of the scenario and its implementation (Griffin-Sobel et al., 2010). Senger, Stapleton, and Gorski (2012) used nurses from neighboring health systems to assist the faculty in the development, implementation, and evaluation of the scenarios with students, and Conrad and colleagues (2011) used graduate teaching assistants.

Faculty skills and competencies needed for successful implementation of HFPS in the curriculum is primarily mentioned as a barrier. The use of this equipment is daunting and requires the faculty member to be proficient in the knowledge of the condition being illustrated, including pathophysiology and pharmacology, skill in running the equipment, ability to meet objectives and teach in settings that constantly change based on the students involved (i.e., no two scenarios are run exactly the same), debriefing techniques, and evaluation of each scenario for changes and improvements. Often the attention on faculty knowledge and skills can be more focused than in the clinical setting (Garrett, MacPhee, & Jackson, 2010; Nehring, Ellis, & Lashley, 2001). Young and Shellenbarger (2012) discussed the use of HFPS as part of the orientation and ongoing professional development of new faculty as well as nurse educator students. Not only skills in teaching and evaluation could be taught, but also safety and quality standards (Shellenbarger & Edwards, 2012). Keefe (2012) emphasized the need to use HFPS in the development of faculty from novice to expert and stated that faculty development in the use of HFPS required coaching, reflection, modeling, scaffolding, articulation, and exploration. In a formal attempt to begin the work of standardization, the International Nursing Association for Clinical Simulation and Learning (Howard, 2011; INASCL Board of Directors, 2011) published the first set of *Standards of Best Practice: Simulation* which includes a section on simulation facilitators.

Finally, a number of partnerships, consortia, and organizational initiatives have been described that have facilitated faculty development in the use of HFPS. Jeffries (2008) first discussed the STEP program or “simulations take educator preparation.” With collaboration between the National League for Nursing (NLN) and Laerdal several initiatives took place in recent years that aided many faculty in their development of skills and competencies in using HFPS. The STEP program provided standardized resources, assistance in the development of simulation teams, and a train-the-trainer approach. A year later, this partnership produced the Simulation Innovation Resource Center (SIRC), a website, which supports many resources to assist the development of a simulation program, including nine modules for faculty development, a

discussion forum, announcements of grants, and an annotated bibliography of simulation publications (Jeffries, 2009; Smith, 2009).

A few years ago, funding was available in Texas for regional partnerships in simulation. These regional partnerships have been described in detail as to their efforts at a needs assessment, faculty development as a result of the needs assessment, and evaluation of these efforts (Bentley & Seaback, 2011; Coleman et al, 2011; Satin, Chen, & Cohen, 2010; Waxman & Telles, 2009; Williams, 2010). Other efforts at faculty development have also been described and have involved internal and external training, train-the-trainer models, and various periods of time (Baily, Bar-on, Yucha, & Snyder, 2013; Bentley, 2012; Berkowitz et al., 2011; Blazeck, 2011; Conrad et al., 2011; Dieckmann & Rall, 2008; Garrett et al., 2010; Halstead, et al., 2011; Jeffries et al., 2013; Kardong-Edgren, Willhaus, Bennett, & Hayden, 2012; Keefe, 2012; Krautscheid, Kaakinen, & Rains Warner, 2008; Senger et al., 2012; Shellenbarger & Edwards, 2012; Starkweather & Kardong-Edgren, 2008; Vollmer, Monk, & Heinrichs, 2008). For several years within the past decade, the Bureau of Health Professions, Health Resources and Services Association provided funding for nursing programs for the development of simulation, informatics, and telehealth knowledge and skills for nursing faculty (e.g., Jansen, Berry, Brenner, Johnson, & Larson, 2010).

Ways to assist faculty to overcome hesitations to learn the use of HFPS have been described in the literature. More recently, examples of faculty development from the program level, to the regional, and international levels have been described. What is not known is how this literature compares to the research literature on faculty development in the use of HFPS. The purpose of this study was to complete a systematic review of the research literature on faculty development in the use of HFPS.

Method

In order to identify research studies involving faculty development in the use of HFPS, CINAHL, Nursing and Allied Health Collection: Comprehensive, OVID Medline, Science Direct, PubMed, Scopus, and ProQuest Dissertation/Theses databases were searched using the terms *high-fidelity patient simulation* and *faculty development. Simulation* was not used alone as a term as this term is too broad and would identify too many publications not pertinent to this study. The time interval was 1995 to 2013 as 1995 represents the beginning of the use of HFPS. All publications identified were in the English language. Additional research studies were identified and obtained from the reference lists of those studies originally found.

A total of 1,258 publications were initially identified from the search of these terms. After an evaluation of the abstracts and/or publications by two of the authors, 90 research publications were identified that included one or more of the search terms. These 90 publications were reviewed for the presence of a research study that examined any elements of faculty development in the use of HFPS. Inclusion criteria included research involving (a) a needs assessment of factors that would influence faculty development in the use of HFPS, (b) a faculty development program, (c) the evaluation of faculty development in the use of HFPS, and/or (d) a dissertation or thesis. Exclusion criteria included (a) the publication was not a report of research or (b) the publication was an abstract.

After elimination of duplicate references, a total of 17 publications emerged from the databases from a review by two authors. An additional eight research studies were selected from the reference lists of the literature identified regarding faculty development in the use of HFPS. When there was disagreement, discussion ensued until consensus was reached. A total of 18 articles, five dissertations, and two theses (n=25) met the criteria for this systematic review (see Table 1).

Results

This section will begin with an analysis of the sample characteristics of the studies identified for this systematic review. The sample characteristics will include a discussion of the geographic location of the studies, the participants, and the settings. An analysis of the methodologies used will be divided by the research design and the methods used to conduct the studies. The final area will be a discussion of the themes which emerged from the findings of these studies.

Sample Characteristics

Geographic location. Of the 25 studies under review, 20 studies were from the United States and five studies were international. Three studies were from Canada (Akhtar-Danesh, Baxter, Valaitis, Stanyon, & Sproul, 2009; Davidson & Rourke, 2012; Harder, Ross, & Paul, 2012), one was from England (Dowie & Phillips, 2011), and one from Australia (Miller & Bull, 2013). Nehring and Lashley (2004) used a national and international sample. National samples were obtained in three studies (Davis, 2012; Duvall, 2012; Hanberg, 2008), a regional sample in one study (Nguyen, Zierler, & Nguyen, 2011), state samples in three studies (Adamson, 2010; Atkinson, 2008; Fountain, 2011), part of a state in one study (Howard, Englert, Kameg, & Perozzi, 2011), a city sample in one study (Bray, Schwartz, Weeks, & Kardong-Edgren, 2009), and in a singular nursing program in five studies (Farina, 2007; Feingold, Caladuce, & Killen, 2004; Jones & Hegge, 2007, 2008; King, Moseley, Hindenlang, & Kuritz, 2008).

Sample. In all studies, the sample was a convenience sample, although one study referred to the sample as purposive (Petersen, 2008). Only two studies had an interprofessional sample (Bray et al., 2009; Nehring & Lashley, 2004), and all studies concerned nursing but the two interprofessional studies. One study had a sample of administrators, faculty, and staff and it was unknown whether all were nurses (Anderson, et al., 2012). The remaining studies had either a mixed sample of nursing faculty from diploma, associate's degree, baccalaureate, or graduate programs (Ashtar-Danesh et al., 2009; Duvall, 2012; Fountain, 2011; Hanberg, 2008; Jansen et al., 2010; Jansen, et al., 2009; Nguyen et al., 2011; Petersen, 2008), baccalaureate only (Davidson & Rourke, 2012; Davis, 2012; Feingold et al., 2004; Harder et al., 2012; Howard et al., 2011; Jones, et al., 2012; Jones & Hegge, 2007, 2008; Miller & Bull, 2013), associate's degree only (Adamson, 2010; Atkinson, 2008; Farina, 2007; King et al., 2008), and lecturers from a British nursing program (Dowie & Phillips, 2011).

Setting. Conferences or workshops were the location for five studies (Anderson et al., 2012; Jansen et al., 2010; Jansen et al., 2009; Jones et al., 2012; Petersen, 2008). Community forums in one city were conducted to obtain the research objectives in one study (Bray et al., 2009) and the site of the nursing program was the setting for two studies (Harder et al., 2012; Miller & Bull, 2013).

Table 1. Faculty High-Fidelity Simulation Development Studies (n=25)

Study	Sample/Setting	Methods	Purpose	Significant/Major Findings
Adamson (2010)	11 Deans/Directors from associate degree nursing (ADN) programs in the selected Western state agreed to allow participation. 24 faculty completed this study.	After receiving approval by the dean or director of an ADN program in a selected Western state to seek faculty participation, faculty at that school were asked to complete a web-based survey in both phases of this study.	The purpose of the study was two-fold. The first was to identify the current use of simulation including cost, resources, faculty training and use at the institution. The second was to describe the experiences of faculty with simulation and to identify any potential barriers.	Findings included: *There was not a relationship between the costs of the simulation equipment and the amount of time dedicated to the use of simulation in a program. *Integration barriers were identified by faculty as: lack of time, lack of support, and lack of appropriate equipment. *Facilitators included appropriate training, faculty motivation and initiative, peer and administrative support, and adequate simulation lab space and equipment. *Recommended incentives included workload release for learning about the simulator, developing scenarios, and implementing the scenarios; training as needed; and additional resources such as equipment, funding, and technical support.
Akhtar-Danesh, Baxter, Valaitis, Stanyon, & Sproul (2009) (Canada)	A convenience sample of 28 nursing faculty from 17 university and college/university collaborative nursing programs in Ontario, Canada assisted in the q-sorting.	Prior to the q-sorting by the study participants, faculty and students who had experience in simulation, developed 104 statements about the use of simulation in nursing education. These statements were categorized into six areas: access/reach, comfort and ease with	To identify the perceptions of nursing faculty towards the use of simulation throughout Ontario, Canada	*The four categories of faculty were: positive enthusiasts, traditionalists, help seekers, and supporters. *Positive enthusiasts were characterized by the feeling that simulation provided great potential for learning and enhanced clinical experiences. They did not feel that space and equipment limitations posed a challenge or that scheduling problems could not be overcome. *Supporters strongly believed that simulation enhanced learning in clinical situations, that it facilitated critical thinking, and that students adapted to the care of patients

Study	Sample/Setting	Methods	Purpose	Significant/Major Findings
		the equipment, communication, teaching and learning, technical features, and the set-up and training on the use of the technology. These statements were then reduced to 43. Using q-sorting on the 43 statements which represented the six categories, four categories of faculty representing attitudes, skills, and training were identified.		much better after time in simulation. These faculty did not have problems with scheduling and felt that simulation could provide realistic situations. *Traditionalists believed that simulation can enhance learning but is not a replacement for clinical experiences. These faculty do not feel that simulation prepares the student to care for actual patients, especially in regards to communication skills and caring for people in the community. These faculty also felt that there was rather a need for more faculty to help with simulation. *Help seekers were those faculty that felt that additional faculty development with simulation was needed as was a repository of scenarios. They stressed the need for more faculty in simulation and that simulation was time-intensive and affected their workloads. They did disagree that the hardest part of simulation is developing scenarios and felt that additional mannequins were needed to meet all of their needs. *All groups felt that simulation provided opportunities to illustrate situations and conditions that could not be seen in their clinical settings. The respondents general disagreed with the feeling that they did not have enough mannequins, that simulation costs go up the more that you use it, and students can learn prioritization with simulation. They were also neutral about whether simulation influenced confidence in their students.
Anderson, Bond, Homes, and Cason (2012)	Convenience sample of 58 individuals who attended the 8th Annual International Nursing Simulation/Learning Resource Centers Conference (2009).	Participants completed a survey tool entitled *Acquisition of Simulation Skills* (AOSS). The survey consisted of five major questions and several	To identify and describe how participants rated their expertise with simulation skills, how they gained their simulation skills, and methods that most	*The majority of participants (95%) were using simulation while only 69% were using packaged scenarios. *Respondents learned about simulation through workshops (95%), working with someone experienced in the use of simulation (88%), observing someone experienced in the use of simulation (90%), reading the literature on

Study	Sample/Setting	Methods	Purpose	Significant/Major Findings
		subsections.	helped them to learn their simulation skills. Secondary purpose was to identify faculty development initiatives for gaining simulation skills.	simulation (90%), and trial and error (81%). *The most frequent way of learning was practice with feedback from someone experienced in the use of simulation (52%). *Majority of respondents reported no formal faculty development plan. Of the respondents, 26% indicated a formal faculty development program was in place at their institution. Primary components of the program: reference materials, continuing education workshops, and on-site workshops. *Majority felt "proficient" in being able to link simulation experiences to course objectives/unit objectives/running simulation programs/managing a simulation experience/debriefing. *Greater than 50% of respondents felt proficient in designing scenarios and about 33% felt proficient in programming them. The authors suggest the use of a simulator coordinator or technician.
Atkinson (2008)	A total of 90 faculty who teach in associate degree nursing programs in a northwest state participated in this study. Faculty from all associate degree nursing programs in this state were invited to participate.	The written survey consisted of 14 closed-ended and 4 open-ended questions, and 9 four-point Likert questions.	To identify faculty views regarding high-fidelity patient simulation and support needs for implementation of such technology.	Major findings included: *5.6% of respondents received workload release for scenario development. *62% received workload release for supervising the simulation lab. *26% of respondents reported having a simulation coordinator. *Seven themes emerged related to HPS strengths and these are listed in order of frequency–"safety, supplement for

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				clinical, critical thinking, realism, safe learning, teamwork, and exposure to rare events" *Two major weaknesses were buy-in and cost. Buy-in was exemplified by realism, student reactions, support from faculty and administrators, and integration in the curriculum. Cost was explained by time to learn, develop, and implement simulation; costs of training and faculty practice time; costs of additional faculty or staff to assist with the scenarios; costs for equipment; costs of technical support; and costs for developing and maintaining the simulation lab space. *The majority of faculty either strongly agreed or agreed (total of 87.6%) that simulation was an appropriate teaching tool. *Faculty responded to a question about what was needed for successful implementation of simulation. Seven themes resulted from this question: 1) Training (22.9%) 2) Staff support (19%) 3) Time (18%) 4) Faculty compensation (14%) 5) Buy –in (12.3%) 6) Overall cost (7.3%) 7) Technical support (6.7%) *On another Likert-type scale question, 50% of faculty indicated that they felt there was inadequate support for

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				HPS implementation, and 32% indicated that more support would equate to more use of simulation.
Bray, Schwartz, Weeks, & Kardong-Edgren (2009)	45 participants at community forums provided by the university to enhance knowledge and understanding of patient simulation. Disciplines represented were dentistry, emergency responders, exercise science, hearing and speech sciences, nursing, pharmacy, and physical therapy.	The survey was developed by the authors to ascertain instructional uses of simulation for teaching, skill assessment, and practice as well as concern with common barriers. A three-point scale was used for the first category and a four-point scale for the second. Additional open-ended questions were asked in regards to the major themes above.	To explore the attitudes of health sciences faculty and health care providers not employed by the university about the integration of simulation into the curriculum.	Major findings included: *95% strongly agreed or agreed that simulation was needed in the curriculum. *There was strong agreement that simulation could support assessment, practice, and teaching of medical procedures, evaluation of the patient, interprofessional team activities, credentialing (e.g. ACLS training), and medication management. *Major barriers identified for using simulation were cost and faculty development. Moderate barriers were increased workloads and administrative support for faculty time to learn and prepare for such teaching.
Davidson & Rourke (2012) (Canada)	44 part-time BSN clinical nursing instructors participated in this study.	All part-time nursing faculty were invited to participate in an online survey to assess learning needs. Four questions were specific to simulation and will be highlighted here. The survey consisted of 53 Likert-style questions.	To describe the knowledge and skills part-time nursing faculty need during orientation to succeed as clinical instructors.	*Results specific to simulation were that orientation should include information about the simulation equipment and available resources, as well as the role and responsibilities of clinical nursing faculty with the use of simulation.
Davis (2012)	A national convenience sample of 139 undergraduate nursing faculty. Inclusion criteria included faculty	Participants completed five instruments online which measured demographic and simulator use in nursing	To explore what faculty and student factors and teaching practices predict faculty use of high-fidelity patient	Highlighted findings involving faculty only were: *Faculty were moderately comfortable using high-fidelity

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	who are full- or part-time, taught an undergraduate clinical course within the past year, are a registered nurse, and have access to the use of a high-fidelity patient simulator.	program, faculty comfort levels with simulators, sense of efficacy with meeting student outcomes using simulation, faculty confidence using simulators, faculty perceptions regarding student readiness for and achieving learning outcomes using simulation, and faculty perception of current clinical sites.	simulation and faculty satisfaction with learning outcomes in students.	patient simulators. *Faculty were moderately comfortable in teaching with simulation. *75% (n=105) of the respondents stated that there was a simulation coordinator at their school. *There was variability in faculty to student ratios in simulation with as little as 1:2 to 1:130. *Four themes resulted from the open-ended questions: providing a safe environment, a positive part of curriculum, enjoy teaching with simulation, and mixed blessing. Subthemes included experience and student responses. Specific comments regarding faculty development included time to learn to use simulation (education and practice time – formal or informal), uncertainty/confidence with the technology, time to schedule, time to plan appropriate scenarios and full simulation experience, time effect on workload, choice to use or not use simulation, and administrative, peer, and manufacturer support.
Dowie & Phillips (2011) (England)	A convenience sample of 20 faculty members within one British nursing program. Faculty consisted of lecturers teaching in the nursing and midwifery program.	A questionnaire was designed with 5 open-ended questions that addressed simulation use, confidence in using simulation, views regarding proficiency in simulation, and whether they felt simulation was of benefit to students.	To identify how the nursing faculty in one nursing program view high fidelity simulation use.	*90% of respondents use simulation, yet only 40% felt confident in the use of simulation and 35% felt prepared to use simulation. *80% of respondents indicated that a faculty module on simulation would assist in boosting their confidence with simulation as a teaching method. * All respondents noted that simulation was beneficial for student learning. *The authors suggest that faculty development with simulation needs to be comprehensive and not left to the manufacturer to provide training or only having a few key

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				faculty delivering education with the use of simulation. They suggest a simulation blog for idea and concept sharing within the College of Nursing, peer simulation support groups, simulation certification, use of national simulation resources, and encouraging faculty to stay clinically relevant.
Duvall (2012)	662 nursing faculty from associate and baccalaureate programs completed this online survey.	Participants completed an online survey that consisted of demographic questions, the *Revised Motivation at Work Survey* (R-MAWS) and the *Technical Readiness Index* (TRI). 600 nursing programs were randomly identified to participate and were chosen to represent all regions of the country. The invitation was sent to deans and the deans were asked to share with faculty.	To explore the perspectives of nursing faculty on the use of high-fidelity patient simulation, motivational factors that influence use of simulation, and readiness to use simulation.	Findings included: *Levels of training in simulation varied: on the job (39.4%), formal training (26.7%), self-taught (11.2%), and no training (18.5%). *Faculty new to simulation were less motivated, innovative, or ready to use technology than faculty who considered themselves experts. Suggests need for mentors. *Faculty are motivated by pleasure and value that they receive from work. *Major barriers identified were lack of time, expense, lack of faculty development, and lack of research proving this technology to be efficacious. *Benefits included the ability to increase student confidence and self-esteem, safe environment, means to teach critical thinking, clinical reasoning, communication, and working in teams.
Farina (2007)	Six nursing faculty from an associate degree nursing program participated in this study. A convenience sample was used.	Semi-structured interviews were conducted with the six faculty. The intent of the interviews was to ascertain the faculty's baseline understanding of the use of simulation.	To explore the simulation implementation and knowledge needs of faculty in one associate degree nursing program. A secondary purpose was to design a	*Faculty educational needs included knowledge of the technology, mannequin capabilities, needed equipment for running a scenario, how to design and program a scenario, and troubleshooting. *From the interviews, the author was able to construct a guide for the faculty to use for successful implementation of simulation. The guide contained information on writing

Study	Sample/Setting	Methods	Purpose	Significant/Major Findings
		The interview guide included questions on the teaching strategies used by the faculty in the classroom and in clinical, knowledge of simulation, use of simulation in the faculty's teaching assignment, and what supports are needed for simulation implementation.	Simulation Assistance Guide from the findings of the qualitative study.	scenarios, strategies for use in simulation, and instructions on running the simulators.
Feingold, Calaluce, & Kallen (2004)	Participants included all senior baccalaureate nursing students enrolled in Advanced Acute Care of the Adult for two consecutive terms of one academic year. There were 50 students in the fall semester and 47 students in the spring semester. Only 28 (56%) of those in the fall semester completed the survey and only 37 (78.7%) of those in the spring semester completed the survey. Four faculty also participated and are the basis of this reporting.	Students in two different semesters participated in two simulation experiences and then completed a post-intervention quantitative survey which measured realism, transfer of skills to clinical setting, and value of the experience. Four faculty who also participated in the simulation completed surveys. Their survey consisted of the same factors plus resources.	To identify nursing student and faculty perceptions about the use of human patient simulation in nursing education.	*The only finding related to faculty opinions of the use of simulation was that they felt they needed additional preparation time and that the support they received to use this technology was inadequate and influenced degree of use. Student data will not be reported.
Fountain	86 nursing faculty from diploma, associate, and	Data collection consisted of three	To identify factors which facilitate or	Consensus statements for BSN respondents related to

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(2011)	baccalaureate programs in Texas. By round three, only 48 faculty responded.	rounds. The first round consisted of demographic questions and two qualitative questions that asked about factors that facilitate or hinder simulation use. Round two consisted of Likert-type questions and round three asked respondents to rank order the items. The theory of Diffusion of Innovation in Health Care (Cain & Mittman, 2002) was used for evaluation of the Delphi survey findings. Consensus was only found for the BSN respondents.	hinder the use of simulation in undergraduate nursing faculty in Texas.	faculty included: *the need for a simulation coordinator, *dedicated simulation laboratory staff, *adequate space, *supportive leadership, and *sharing resources. Additional consensus statements for panel members at schools without simulation related to faculty needs included: *faculty shortages, and * ability to use simulation with large numbers of students. There were significant differences between panel members from BSN and ADN programs on the following items: *sharing of resources, *administrative support, *equipment, and *adequate space.
Hanberg (2008)	All faculty teaching in an associate or baccalaureate nursing program in which simulation was known to be used were	Funk's (1991) BARRIERS instrument was modified for use in this study. This tool has four subscales that examine characteristics	To determine the correlation between faculty characteristics and their perceived barriers to the use of	Findings included: *The characteristics of the innovation (knowledge of the technology and its ability to influence student outcomes) are the greatest barrier to simulation integration.

Study	Sample/Setting	Methods	Purpose	Significant/Major Findings
	solicited to take part in this study. The final sample was 323 faculty.	of the adopter, communication, innovation, and organization. The tool was found to be valid and reliable. The modified tool has 42 items which use a four-point Likert scale.	simulation.	*Level of fidelity, simulation experience, degree program, and role in nursing program were significantly negatively correlated with adaptor and innovation barrier factors. *The barrier factors of organization and communication were influenced by highest degree earned, level of simulation experience, available funds for simulation, academic institution, and university status. *There were significant negative correlations between primary teaching responsibility, age, and simulation experience with faculty willingness to adopt and values, skills and awareness of research.
Harder, Ross, & Paul (2012) (Canada)	22 faculty from two BSN nursing programs participated in this study.	Faculty participated through either an interview with observation of that faculty conducting a simulation session or a focus group. Twenty faculty participated in the focus group and the remaining two in the interview and observation session.	To describe instructor comfort levels in the use of simulation.	*The major finding of this study was that participants did not feel comfortable in the use of simulation, citing such words as “unqualified,” “inadequate,” and “uncertain.” Resources, such as the use of a simulation operator were noted as helpful. *Participants also desired greater preparation and knowledge about learning theories and teaching strategies that have been successful in the use of simulation. It was also noted that those faculty who felt prepared and confident in their simulation skills did a better job than those who did not.
Howard, Englert, Kameg, & Perozzi (2011)	151 students and 6 faculty in one private undergraduate nursing program in western Pennsylvania participated in this study.	Students completed an evaluation survey and faculty participated in a focus group, although two faculty could not attend the focus group and answered questions by email.	To evaluate faculty and student perceptions about the use of simulation after simulation was integrated into an undergraduate nursing curriculum.	Only faculty findings will be discussed. *Obstacles to simulation use included: time to learn the technology, inexperience with simulation technology, time to schedule student groups, lack of space, appropriate groupings of students for maximal learning, and difficulty replicating realism. *Suggestions for improvement included the use of a simulation coordinator who would identify appropriate

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				scenarios, identify where simulation should fit into curriculum, run the simulation experience, and train faculty to use simulation. In addition, there should be technical support, adequate dedicated simulation space, use of one-way mirrors, use of room scheduling programs, and substituting simulation for clinical experiences as needed.
Jansen, Berry, Brenner, Johnson, & Larson (2010)	A convenience sample of 25 nursing faculty members from associate and baccalaureate nursing programs in Wisconsin who participated in the Wisconsin Technology Enhanced Collaborative Nursing Education (WI-TECNE) project participated in Phase 1 and 11 participated in Phase 2.	The collaborative, state-wide intervention in Year 2 of this project consisted of videoconferences, a workshop, and online discussion boards. Content for these activities included types of simulation and their uses, integrating simulation into the curriculum, budget, faculty intent, collaborations, understanding simulation as pedagogy, designing a scenario, and debriefing. On the second day of the workshop, teams designed a simulation experience with a scenario, discussed working with large student groups, evaluating simulation, reviewed a videotaped simulation experience, incorporating diversity, and reviewing legal and	To evaluate a state-wide collaborative project that provided instruction to associate degree and baccalaureate degree nursing faculty on the design and implementation of simulation for online and face-to-face use.	Results included: *Pre- and post-intervention survey results showed no statistically significant findings, but there was a slight trend towards greater feelings of comfort, interest, and perceptions of usefulness. *Obstacles in Phase 1 were lack of time, scheduling of the lab, training needs, feeling that simulation did not apply to their courses, large class sizes, and lack of equipment and space. *By Phase 2, only 3 obstacles remained: lack of time, lack of equipment and space, and managing large class sizes.

Study	Sample/Setting	Methods	Purpose	Significant/Major Findings
		ethical issues. The pre- and post-intervention survey was completed online and measured interest and usefulness of simulation. Demographic and 10 closed-ended and 1 open-ended question composed the survey.		
Jansen, Johnson, Larson, Berry, & Brenner (2009)	A convenience sample of 25 nursing faculty from universities and technical colleges in Wisconsin who participate in the Wisconsin Technology Enhanced Collaborative Nursing Education (WI-TECNE) project.	An online survey was developed and delivered to the respondents and consisted of 8 closed-ended and one open-ended question.	To identify barriers to faculty use of simulation in associate and baccalaureate degree nursing programs.	72% of the respondents were using simulation. *The major barriers identified by respondents as inhibiting faculty use of simulation were in order: time, training, not applicable/attitudes (buy-in), lack of equipment and space/lab scheduling, funding, staffing, and engaging the full student group while only a few are using simulation. *A sample of proposed solutions from the authors include: involvement of community nurses and retired faculty, faculty retreats, one-to-one training from coordinator and faculty, placing a faculty with simulation experience on the curriculum committee, having students from different levels together in simulation, and ask students to critique scenarios.
Jones, Fahrenwald, & Ficek (2012)	11 BSN faculty who participated in the Summer Simulation Training Fellowship program.	The authors designed the survey, *Faculty Attitudes and Intent to Use Related to the Human Patient Simulator*, for use in this study. 24 LIkert-style questions were used to assess attitude,	To examine the effectiveness of a summer faculty development program focused on simulation, specifically undergraduate faculty attitudes, perceived behavior control,	Findings included: *66% had simulation training and 75% had used a simulator to teach. *Attitudes changed more positively from pre to post-test, although not significantly. Specifically, respondents did significantly feel that they were competent and comfortable

Study	Sample/Setting	Methods	Purpose	Significant/Major Findings
		subjective norms (motivation to use simulation), perceived behavioral control (teaching with simulation), and intention to use simulation. The two-day program consisted of an overview of the program, an overview of simulation, simulation as pedagogy, self-reflection and debriefing, elements of a scenario, reviewing a full simulation session, integrating simulation into the curriculum, student learning outcomes, developing and implementing a scenario in a small group, evaluation of these scenarios, and implementing simulation.	subjective norms, and desire to use simulation.	in using simulation and that simulation was effective in teaching nursing. *There was statistical significance in the item referring to peer pressure to simulation. *Perceived behavioral control increased, although not significantly. Respondents did state that they would like the use of an instructor's guide to simulation and needed extra preparation time. *Intent to use simulation increased at the post-test, although not significantly. *78% of respondents stated that they would use simulation in the next year.
Jones & Hegge (2007)	Convenience sample of 75 full-time and part-time faculty members at one mid-western university BSN program	A survey tool was used that included five parts: demographic questions, open-ended questions about perceived comfort using simulation and what the respondent	To describe the level of comfort of faculty members about to begin using simulation for teaching and evaluating BSN students. The secondary purpose was the identification of	Findings included: *Faculty were not comfortable using simulation as a teaching tool for active learning, to give feedback, promote high expectations, or to teach skills. *Faculty were also not comfortable using simulation for

Study	Sample/Setting	Methods	Purpose	Significant/Major Findings
		could teach using simulation, 14 questions using a 5 point Likert scale) to measure comfort levels with using simulation, needed release time, and another Likert scale to measure needed support systems. Content and validity was established using 3 simulation experts.	support systems chosen by faculty that would assist them in becoming more comfortable using simulation.	skill evaluation or to replace lab hours. *Assistant professors were more comfortable with simulation than were instructors. *Faculty who felt comfortable using simulation were also comfortable evaluating skills in students. *Faculty noted that the most important support systems were the use of a simulation specialist, demonstrations, and workshops dedicated to simulation use.
Jones & Hegge (2008)	29 faculty members from a Midwestern BSN program.	A survey was designed and mailed to participants to obtain data on demographics, perceived level of simulation expertise, identification of skills and course where simulation could be used, comfort level in use of simulation, and perceived time to design, deliver, and evaluate use of simulation.	To estimate time needed to design, deliver, and evaluate the use of a simulation in a nursing program.	Findings included: *No significant differences between comfort level and employment status or years of teaching experience. *55.2% of respondents felt that .50 FTE would be needed to design the use of simulation in their course (3.4% felt 1 FTE was needed). *44.8% also felt that it would take .50 FTE to implement simulation in their course (6.9% felt 1 FTE was needed). *60.7% felt that .25 FTE was needed for evaluation purposes (3.6% felt 1 FTE was needed).
King, Moseley, Hindenlang, & Kuritz (2008)	Convenience sample of 34 nurse faculty from a large associate degree nursing program in SE US. 15 faculty participated in Phase 2.	The study was divided into two phases. In the first phase, a 47-item qualitative survey was completed to determine faculty attitudes, perceived behavior	To identify barriers to faculty use of simulation in a large associate degree nursing program.	Findings for Phase 1 included: *27% of respondents had simulation training and 65% had used a high-fidelity simulator with nursing students. *82% of respondents said that administrators desired simulation use and 45% said that peers wanted them to

Study	Sample/Setting	Methods	Purpose	Significant/Major Findings
		control, subjective norms, and intention to use simulation based on Ajzen's (1991) Theory of Planned Behavior. The second phase involved an educational intervention and its effect on the factors in phase 1. Pre- and post-intervention surveys were completed.		employ simulation. *94% of respondents felt that experience with simulation would increase confidence and proficiency. *82% of respondents felt that simulation was hard to learn. *94% of respondents felt that their skills would improve if they could participate in an education program. *Faculty did indicate intent to use simulation. *Qualitative data included the need for more education, more time, support in learning to operate and use with students, and desired hands-on training and printed guidelines. Findings from Phase 2 included: *73% of participants had not had training in simulation and 80% had never attended an educational program. *67% of respondents had used simulation. *Attitudes increased towards the use and value of simulation. *There was a significant finding related to peer pressure to use simulation. *Participants felt that simulation required a lot of time and they did intend to use simulation in the future. Each of these items were significant. *Attitude was found to be the largest predictor of intent to use.

Study	Sample/Setting	Methods	Purpose	Significant/Major Findings
Miller & Bull (2013) (Australia)	Seven nursing faculty from one university in Australia participated. All faculty taught courses that could or do use simulation. Six of the seven faculty had some training on simulation.	Semi-structured interviews were completed. Questions focused on insights and attitudes regarding the use of simulation in nursing education as well as personal experiences with simulation.	To describe the attitudes, experiences, and opinions of nursing faculty in a regional nursing program in Australia.	*Three themes arose from the data: academic adaptation, getting political, and simulation as a separate part of academia. *Academic adaptation involved concerns with realism and moving all of the students through simulation in a timely way. Faculty were concerned that their knowledge and skills would be put into question by students and peers, especially if videotaping was done of the scenario. There was also concern that a biomedical, rather than a nursing model would be used. *Getting political involved feeling pressure from administration to use simulation, that simulation could be a "fad" and that it was being used to compete against other nursing programs and that simulation did not represent quality, and that they were being asked to use simulation throughout the curriculum without consideration about where it could best be used. Faculty did acknowledge the investment and potential of simulation. *Simulation as a separate part of the curriculum represented the views that its role in nursing education was still to be determined, a feeling of "wait and see." There was also the feeling that since few faculty were using it, that there was a feeling that there was an "exclusive club." These faculty felt that they needed much more time to work with the mannequins before they could justify its use.
Nguyen, Zierler, & Nguyen (2011)	193 nursing faculty members from all levels of nursing education in Western US participated.	All nursing faculty from western US nursing programs were asked to participate in an online survey. Questions in the survey requested information on demographics, teaching characteristics,	To identify faculty use, knowledge, and educational needs related to simulation, telehealth, distance learning, and informatics. [Only simulation will be	Findings included: *70% of respondents identified themselves as novices or advanced beginners in the use of simulation. *69% of respondents reported a need for education in simulation.

Study	Sample/Setting	Methods	Purpose	Significant/Major Findings
		use of the four technologies, perceived skills and knowledge needed to be proficient in each technology, and educational needs to improve knowledge and skills.	highlighted.]	*The availability of simulation training was significantly associated with greater use of simulation. *Knowledge of simulation was significantly associated with administrative support.
Nehring & Lashley (2004)	A purposive sample of 34 schools of nursing and 6 simulation centers using Medical Education TechnoIogies, Inc. (METI) simulators.	All nursing program and simulation center clients of METI were asked to participate in this international survey. The survey consisted of 37 closed and open questions. Only the questions pertaining to faculty time and use will be included.	To examine simulation use (courses and faculty time), faculty and staff training, simulation use for evaluation, continuing education uses, additional uses, and student opinions.	Results of the questions pertaining to faculty use and time included: *The majority of respondents (93.8%) had 25% or less of their faculty involved in simulation. *25 respondents (75.8%) indicated that they had a simulation coordinator who was neither a nursing faculty member (65.4%), a non-nursing faculty member (15.4%), a staff member within the nursing program (11.5%), and a non-nursing program staff member (7.7%). *The simulation coordinator usually had a part-time workload release. *94% of the respondents did not offer extra funding. *Three respondents offered release time and two respondents gave extra perks. *20% of the respondents reported faculty satisfaction with simulation. *58.1% of the respondents noted that their faculty were receptive to simulation, but 5 respondents said that their faculty felt that simulation was only useful for specific courses.

Study	Sample/Setting	Methods	Purpose	Significant/Major Findings
				*Barriers to simulation included: fear of the technology, fear of change, fear that technology too sophisticated, fear that student level was not high enough to use simulation, time needed to learn simulation, and the small number of students who can use simulation at one time.
Petersen (2008)	A purposive sample of 169 nurses was acquired from nurses attending two different nursing conferences; one conference specific to simulation and the other was a review session for the Certified Nurse Educator (CNE) Examination.	Participants completed the Technology Readiness Index (TRI) while attending one of the conferences. This tool had internal and construct validity. Responses followed a Likert scale.	To list readiness factors which affect the use of high-fidelity patient simulators by nursing faculty.	Findings included: *A significant difference was found between the group that had developed scenarios and the factor of optimism. There were no significant differences between the development of scenarios and innovation, insecurity, and discomfort. *Negative correlations were found between optimism and years teaching, innovation and years teaching, and innovation and age.

Methodology

Design types. All but four of the studies used descriptive designs (see Table 2). One study had two designs, a descriptive qualitative design in phase one and a quasi-experimental design in phase two (King et al., 2008). The other three, non-descriptive designs were all quasi-experimental (Feingold et al., 2004; Jansen et al., 2010; Jones et al., 2012). The descriptive designs included a cross-sectional design (n=1), qualitative design (n=6), quantitative design (n=9), and mixed methods design (n=6).

Table 2. Comparison of Research Designs (n=25)

Type of Research Design	Study
Delphi survey technique	Fountain (2011)
Descriptive, cross-sectional survey design	Nguyen et al. (2011)
Descriptive, qualitative study	Adamson (2010); Farina (2007); Howard et al. (2011); Jansen et al. (2009); King et al. (2008; phase 1); Miller & Bull (2013)
Descriptive, quantitative study	Anderson et al. (2012); Bray et al. (2009); Davidson & Rourke (2012); Dowie & Phillips (2011); Duvall (2012); Jones & Hegge (2007, 2008); Petersen (2008)
Descriptive, mixed-method survey design	Atkinson (2008); Davis (2012); Nehring & Lashley (2004)
Focused ethnographic study	Harder et al. (2012)
Non-experimental correlational design	Hanberg (2008)
Q-sort methodology	Akhtar-Danesh et al. (2009)
Quasi-experimental	Feingold et al. (2004); Jansen et al. (2010); Jones et al. (2012); King et al. (2008; phase 2)

Methods. The predominant method for data collection was surveys (n=16, see Table 2). In addition to these studies, one study used the Delphi survey technique (Fountain, 2011) and one study used Q–sort methodology (Akhtar-Danesh et al., 2009). Other methods used were interviews (Farina, 2007; Harder et al., 2012; Howard et al., 2011; Miller & Bull, 2013), interventions (i.e., simulation development programs) with evaluation surveys (Feingold et al., 2004; Jansen et al., 2010; Jones et al., 2012; King et al., 2008), and focus groups (Harder et al., 2012; Howard et al., 2011). Psychometric data was not reported for the surveys in seven studies (Adamson, 2010; Atkinson, 2008; Dowie & Phillips, 2011; Farina, 2007; Feingold et al., 2004;

Jansen et al., 2010; Jansen et al., 2009), although Atkinson (2008) stated that the survey was reviewed by faculty experienced in simulation.

Themes. Five themes emerged from the results of the studies reviewed: (a) strengths of using HFPS, (b) faculty incentives, (c) barriers to using HFPS, (d) need for a faculty champion and/or simulation coordinator, and (e) faculty development in the use of HFPS. Each of these themes will be described in more detail.

Strengths of using HFPS. In general, HFPS was found to be an appropriate teaching tool (Atkinson, 2008; Bray, Schwartz et al., 2009; Dowie & Phillips, 2011; Jones, et al., 2012; Miller & Bull, 2013). The use of HFPS in nursing curriculums also provided much strength. In particular, participants noted that HFPS provided a safe environment in which to apply knowledge and practice nursing skills (including medication management), opportunities to teach communication and critical thinking, opportunities to teach and practice teamwork in the care of patients, and opportunities for credentialing (Atkinson, 2008; Bray, Schwartz et al., 2009; Duvall, 2012).

Incentives for Faculty. A number of incentives were identified by the participants in these studies. These included: (a) having a positive attitude (King et al., 2008; Nehring & Lashley, 2004); (b) receiving workload release for learning simulation, implementing simulation, and having a simulation coordinator (Adamson, 2010; Atkinson, 2008; Jones & Hegge, 2008); (c) learning how to develop and implement scenarios for specific courses (Adamson, 2010; Howard et al., 2011); (d) being able to attend training in the use of HFPS, e.g., conferences, demonstrations, guidebooks, one-to-one training, retreats, and workshops (Adamson, 2010; Atkinson, 2008; Dowie & Phillips, 2011; Harder et al., 2012; Howard et al., 2011; Jansen et al., 2009; Jones et al., 2012; Jones & Hegge, 2007; King et al., 2008; Nguyen et al., 2011); (e) providing supports for faculty, e.g., faculty clinical updates, national resources, simulation blog, and simulation interest group (Dowie & Phillips, 2011); (f) providing faculty mentors for simulation (Duvall, 2012); (g) providing needed equipment (Adamson, 2010); (h) providing technical support (Adamson, 2010; Atkinson, 2008; Howard et al., 2011); (i) providing staff support (Fountain, 2011; Harder et al., 2012); (j) compensating faculty (Atkinson, 2008); (k) providing adequate simulation space and environmental supports, e.g., one-way mirrors) (Atkinson, 2008; Fountain, 2011; Howard et al., 2011); (l) providing administrative support (Fountain, 2011; Nguyen et al., 2011); (m) involving retired faculty and nurses from the community (Jansen et al., 2009); (n) substituting clinical hours for simulation (Howard et al., 2011); (o) feeling comfortable, ready, and confident in simulation skills (Davis, 2012; Dowie & Phillips, 2011; Harder et al., 2012; Jansen et al., 2010; Jones et al., 2012; Jones & Hegge, 2007; King et al., 2008; Petersen, 2008); and (p) sharing resources and costs (Fountain, 2011).

Barriers. Participants in these studies also listed a number of barriers to HFPS use. These included: (a) lack of time to develop skills and often increased workloads to accommodate learning (Adamson, 2010; Atkinson, 2008; Bray et al., 2009; Duvall, 2012; Feingold et al., 2004; Howard et al., 2011; Jansen et al., 2010; Jansen et al., 2009; Jones et al., 2012; Jones & Hegge, 2008; King et al., 2008; Nehring & Lashley, 2004); (b) lack of administrative support (Adamson, 2010; Atkinson, 2008; Feingold et al., 2004); (c) lack of faculty development (Bray et al., 2009; Duvall, 2012; Hanberg, 2008; Howard et al., 2011; Jansen et al., 2010; Jansen et al., 2009; King et al., 2008); (d) lack of appropriate equipment (Adamson, 2010; Jansen et al., 2010; Jansen et

al., 2009); (e) lack of faculty buy-in, e.g., faculty confidence, fear of the technology, lack of knowledge, and uncertainty of skill level (Atkinson, 2008; Hanburg, 2008; Jansen, et al., 2010; Jansen et al., 2009; King et al., 2008; Miller & Bull, 2013; Nehring & Lashley, 2004); (f) administrative pressure to use HFPS (King et al., 2008; Miller & Bull, 2013); (g) costs, e.g., equipment, faculty, funding, maintaining adequate simulation space, and technical support (Atkinson, 2008; Bray, et al., 2009; Duvall, 2012; Howard et al., 2011; Jansen et al., 2010; Jansen et al., 2009); (h) scheduling problems with the lab (Jansen et al., 2010; Jansen et al., 2009); (i) lack of research evidence of efficacy (Duvall, 2012); (j) faculty shortages (Fountain, 2011; Jansen et al., 2009); (k) problems with realism (Howard et al., 2011; Miller & Bull, 2013); and (l) difficulty getting large numbers of students through simulation (Fountain, 2011; Howard et al., 2011; Jansen et al., 2010; Jansen et al., 2009; Miller & Bull, 2013; Nehring & Lashley, 2004).

Need for Faculty Champion or Simulation Coordinator. The need for a faculty champion or simulation coordinator was stressed in six studies (Anderson et al., 2012; Atkinson, 2008; Davis, 2012; Fountain, 2011; Howard et al., 2011; Jones, & Hegge, 2007). Jansen and colleagues (2009) suggested that a faculty skilled in simulation be placed on the curriculum committee.

Faculty Development. Anderson and colleagues (2012) found that the majority of faculty learned about simulation through workshops, observing experienced faculty, reading the simulation literature, working with experienced faculty, and through trial and error, in that order. Only about one quarter of their sample felt that they had learned through a formal faculty development plan. Almost 70% of their sample also used packaged scenarios. Duvall (2012) in a national sample found that the training levels of faculty varied. Akhtar-Danesh et al. (2009) identified four categories of faculty regarding simulation skills: positive enthusiasts, traditionalists, help seekers, and supporters.

Davidson and Rourke (2012) discussed the need to begin faculty development in simulation during orientation. They suggested that content and demonstration should occur with the simulation equipment, faculty responsibilities and roles should be discussed, and simulation resources identified.

Farina (2007) discussed the development of a simulation guidebook as a result of interviews she conducted with the faculty which whom she works. The guidebook is divided into five areas: information about the technology, simulation equipment, capabilities of the simulators, how to develop and implement scenarios, and troubleshooting the equipment and scenarios.

Three studies described the faculty development interventions that they used (Jansen et al., 2010; Jones et al., 2012; King et al., 2008). Jansen et al. (2010) described faculty development activities that took place in year two of a five-year grant received from the Bureau of Health Professions, Health Resources and Services Administration. In a statewide program, entitled Wisconsin Technology Enhanced Collaborative Nursing Education (WI-TECNE), the authors discussed a train-the-trainer approach to faculty development through brown bag meetings, two workshops, and a web-based simulation resource site. The workshops covered an overview of simulation, logistics, pedagogy, scenario development, and debriefing in the first workshop. The participants applied the knowledge from the first workshop in the second workshop when they were asked to implement the scenario and debrief afterwards. Jones et al. (2012) described the

two day Summer Simulation Training Fellowship program. The first day consisted of presentations on a simulation overview, pedagogy, debriefing, scenario components, and the integration of simulation in the nursing curriculum. The second day consisted of a discussion of student outcomes, scenario development, and logistics. Participants also implemented the scenario they developed and evaluated it afterwards. Finally, in phase two of their study, King et al. (2008) described the one day workshop that they held that included presentations on the history of simulation, how to organize a clinical day using simulation, how to incorporate simulation into didactic and clinical teaching, and participation in a scenario with evaluation afterwards.

Discussion

High-fidelity patient simulation has been used in the education of health professionals for almost 20 years. It is somewhat surprising that the discussion of faculty development using this technology has only appeared in the literature over the past decade. As a result, it is not unusual that so few research studies took place outside of the United States where the mannequins originated. Since less attention has been paid to the faculty conducting the scenarios and debriefing, it is also not surprising the majority of the research on faculty development has been through surveys. In the majority of studies, there were small sample sizes and low response rates to the surveys. The authors expected to find more intervention studies, but the combination of intervention studies (Jansen et al., 2010; Jones et al., 2012; King et al., 2008) and descriptions of faculty development programs in the use of HFPS in the literature (Baily et al., 2013; Bentley, 2012; Blazeck, 2011; Chow & Naik, 2008; Coleman et al., 2011; Conrad et al., 2011; Dieckmann & Rall, 2008; Halstead et al., 2011; Jeffries et al., 2013; Keefe, 2012; Krautscheid, et al., 2008; Starkweather & Kardong-Edgren, 2008; Vollmer et al., 2008; Waxman & Telles, 2009) provide the reader with a starting point to identify elements for a faculty development program on simulation use.

The themes found in the research studies reviewed were similar to those found in the literature. Of note, the incentives and barriers identified in the research literature were more numerous than those found in the literature. Additional incentives identified by the researchers were: (a) developing a positive attitude and comfort (Davis, 2012; Dowie & Phillips, 2011; Harder et al., 2012; Jansen et al., 2010; Jones et al., 2012; Jones & Hegge, 2007; King et al., 2008; Nehring & Lashley, 2004; Petersen, 2008); (b) developing and implementing scenarios (Adamson, 2010; Howard et al., 2011); (c) providing faculty mentors (Duvall, 2012); (d) obtaining equipment and space (Adamson, 2010; Atkinson, 2008; Fountain, 2011; Howard et al., 2011); (e) providing technical and staff support (Adamson, 2010; Atkinson, 2008; Fountain, 2011; Harder et al., 2012; Howard et al., 2011; Jansen et al., 2009); (f) obtaining administrative support (Fountain, 2011; Nguyen et al., 2011); and (j) using simulation to substitute for clinical (Howard et al., 2011). Incentives found in the research and non-research literature included necessary equipment, professional development, release time, resource sharing, and salary adjustments (Adamson, 2010; Atkinson, 2008; Berkowitz et al., 2011; Conrad et al., 2011; Dowie & Phillips, 2011; Harder et al., 2012; Howard et al., 2011; Hyland & Hawkins, 2009; Jansen et al., 2009; Jones et al., 2012; Jones & Hegge, 2007, 2008; Keefe, 2012; King et al., 2008; Nguyen et al., 2011). It is important that the administrator consider implementing one or more these incentives given available resources.

A number of barriers were also identified in the research studies and were not found in the non-research literature: (a) lack of administrative support (Adamson, 2010; Atkinson, 2008; Feingold et al., , 2004); (b) administrative pressure to use simulation (King et al., 2008; Miller & Bull, 2013); (c) need for equipment to produce needed realism (Adamson, 2010; Howard et al., 2011; Jansen et al., 2010; Jansen et al., 2008; Miller & Bull, 2013); (d) scheduling problems with the lab (Jansen et al., 2010; Jansen et al., 2009); (e) faculty shortages (Fountain, 2011; Jansen et al., 2009); and (f) lack of research efficacy for simulation (Duvall, 2012). Kamerer (2012) stated that there is a need for standardization of faculty development in simulation and Berkowitz et al. (2011) stressed the need to develop simulation to the degree that learning in this environment can be transferred to the clinical setting. An example is the National Council of State Boards of Nursing's simulation study (2013) currently being completed which has three goals: (a) to conduct a national survey of simulation use in nursing education for pre-licensure students, (b) to conduct a quasi-experimental study of different percentages of simulation use in exchange for clinical hours, and (c) to conduct a longitudinal study to examine clinical preparation of new nursing graduates through one year post-graduation. It is also imperative that the administrator consider barriers and attempt to alleviate or minimize as many as possible.

The need for faculty champions and/or a simulation coordinator has been spelled out in depth in the literature (e.g., Jeffries, 2008; Keefe, 2012, Leigh & Hurst, 2008). Several suggestions for achieving faculty buy-in were to have a faculty champion be appointed to the curriculum committee (Jansen et al., 2009), use nursing staff from area hospitals (Senger et al., 2012), use librarians and technical staff (Griffin-Sobel et al., 2010), and develop simulation teams or special interest groups (Conrad et al., 2011; Hyland & Hawkins, 2009; Jeffries, 2008; Kamerer, 2012; Meakim & Wahl, 2007).

Finally, several faculty development programs have been described in the research and non-research literature. What is missing is the evaluation of these programs besides satisfaction and knowledge and skills gained on a pre- and post-basis (Berkowitz et al., 2011). Satin et al. (2010) remind the reader that safety concerns, patient acuity, and financial pressures will necessitate competency testing using HFPS. This need will occur at various levels, including pre-license, certification, credentialing, annual skill testing, and re-training. To this end, the American College of Obstetricians and Gynecologists created a Simulations Consortium. Williams (2010) added that hospital privileging requirements and maintenance of certifications will require simulation competency testing. She emphasized that such competency testing will need to be congruent with scopes of practice. Howard (2011) also stated that competency testing using simulation could further influence hiring, termination, and academic progression, and may result in certification programs for individuals conducting the competency testing. The work of the International Nursing Association for Clinical Simulation and Learning to develop *Standards of Best Practice:* Simulation is a first step (Howard, 2011, INASCL Board of Directors, 2011). Jeffries (2008) and Conrad and colleagues (2011) stressed that faculty who become skilled in simulation have an obligation to write and research the use of simulation in health professions education and to be involved in simulation-related organizations.

Limitations of the Study

This is the first study to systematically review the literature on faculty development in the use of HFPS. Several studies did not provide any psychometric discussion of their surveys and the

majority of the studies were surveys. Small sample sizes and low response rates also hampered generalization of many of the studies.

Implications for Future Research

The use of HFPS as an adjunct to didactic and clinical teaching has the goal of improvement in the competence of the learner. Therefore, it is important that further exploration of faculty development programs be done to first identify best practices in such programs. What elements do the programs described in the literature have in common? What information has been gathered as part of the evaluation of these programs? Is there any evaluation conducted weeks or months after the development program? Have plans been made to repeat instruction or provide regularly scheduled updates? Next, do we need to consider competency training and even certification of faculty who teach using high-fidelity patient simulation? Should the faculty development programs be standardized and if so, who should develop and make sure that the curriculum is followed and that quality is inherent? McGaghie, Issenberg, Petrusa, and Scalese (2010) discussed many of these questions and also asked whether there were identified mastery learning models for faculty or instructors using simulation. They emphasized that having experience in the clinical setting was not necessary "a proxy" for expert simulation use. It is essential that evaluation research be done beyond the case study.

Additional research is also needed on faculty incentives and barriers. Do faculty have expectations of what simulation can do for them and their students or are they looking solely for guidance in how to apply it to their courses? Besides knowledge of readiness to use, what else is needed to assist faculty? Keefe (2012) discussed the reality of different levels of faculty support and use. What is the ideal number of faculty to involve in simulation across all faculty in a program? There is much more that can be gained from the exploration of faculty development in the use of HFPS.

Conclusion

The examination of faculty development in the use of HFPS has occurred in the past decade with little research dedicated to this topic. In this systematic review of the research literature, 25 studies were identified. These studies were primarily nursing studies, most of them were conducted in the United States, and used surveys as the design. Major themes were strengths, incentives, barriers, use of faculty champions or a simulation coordinator, and faculty development programs. Additional research is warranted to identify best practices in faculty development programs, evaluate effectiveness of such programs, and to ascertain whether competency testing of faculty or instructors using HFPS is needed.

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