REVIEWS

Developing critical thinking skills in undergraduate nursing students: The potential for strategic management simulations

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Abstract

Critical thinking is a skill required by nurses in order for sound clinical decisions to be made with optimal patient outcomes. Previous nursing education specific strategies, aimed at developing critical thinking, include high-fidelity simulation, case study discussions, concept-mapping, and reflective writing. Post-graduation nurse residency programs have had some success in preparing the new graduate nurse to take on the challenges and demands of the profession. These strategies have had varied success in developing critical thinking skills and are, at times, costly. The purpose of this article is to explore Strategic Management Simulations (SMS) as an educational strategy for enhancing the development of critical thinking skills among undergraduate nursing students. SMS includes assessment, feedback, and training, which are not included in other strategies.

Key words

Critical thinking, Clinical reasoning, Problem-solving assessment, Critical thinking development

1 Introduction

Critical thinking development in nursing students is a topic that continues to challenge nurse educators. A review of the literature identified several teaching strategies that have been employed in an effort to provide students with the skills needed to be able to make sound clinical judgments. Using the search words “critical thinking”, “nursing student”, “education”, and “teaching strategies”, programs and interventions aimed at improving critical thinking skills were reviewed. Thus, this article is a review of the critical thinking strategies of simulation, concept mapping, problem-based learning, and guiding discussions of critical incidents in nursing education. Strategies to facilitate critical thinking development post-graduation will also be discussed, including nurse residency programs and mentoring. The potential for Strategic Management Simulations (SMS), an assessment instrument that has had success in other disciplines, will be presented. This strategy, which includes an assessment, feedback, and training, will be posited as a possible modality that could be added to nursing curricula in the hopes of increasing decision-making and problem-solving skills prior to graduation. This review identifies the challenges in developing critical thinking skills and the potential SMS has to improve this necessary clinical skill among nursing students.

2 The concept of critical thinking

In 2008, the American Association of Colleges of Nursing (AACN) outlined essential skills for the newly graduated nurse. Content within these essentials include scholarship, a working knowledge of health care policy, and professionalism. One competency noted within the document is the ability to "use clinical/critical reasoning to address simple to complex situations" [1].

Many definitions of critical thinking have been suggested. The term is used interchangeably in health care with terms such as clinical reasoning and clinical judgment. Profetto-McGrath [2] defines critical thinking as "an active, ongoing cognitive process of logical reasoning in which the individual methodically explores and analyzes issues, interprets complex ideas, considers all aspects of a situation and/or argument and where appropriate, follows with prudent judgment" (p. 570). Critical thinking skills include analysis, evaluation, inference, deductive and inductive reasoning [3].

In 1990, under the sponsorship of the American Psychological Association (APA), the results of a two-year Delphi project concluded that "ideal critical thinker" is: habitually inquisitive, well-informed, trustful of reason, open-minded, flexible, fair-minded in evaluation, honest in facing personal biases, prudent in making judgments, willing to reconsider, clear about issues, orderly in complex matters, diligent in seeking relevant information, reasonable in the selection of criteria, focused in inquiry, and persistent in seeking results which are as precise as the subject and the circumstances of inquiry permit (p. 345) [4].

Critical thinking, clinical reasoning, and clinical judgment are terms that have been used interchangeably despite their seemingly minute, distinct differences. Clinical reasoning is the *application* of critical thinking to the clinical situation [5]; clinical judgment is "an interpretation or conclusion about a patient's needs, concerns, or health problems, and/or decision to take action (or not), use or modify standard approaches, or improvise new ones as deemed appropriate by the patient's response" (p. 204) [6]. Clinical reasoning is the process used by clinicians to guide their clinical judgments. This type of decision-making goes beyond the clinician's knowledge or domain expertise, but rather is somehow guided by their ability to process through a situation, considering the intricacies of each individual while making a sound decision in the moment. With these definitions in mind, the development of the skill of critical thinking in undergraduate nursing students is a daunting task when one considers the complexities of any healthcare system.

Measuring critical thinking

A variety of methods and instruments are available to assess critical thinking. These include the California Critical Thinking Skills Test (CCTST) and the California Critical Thinking Disposition Inventory (CCTDI), as well as the Watson-Glaser Critical Thinking Appraisal (WGCTA) [2, 7, 8]. The CCTST consists of 34 multiple-choice items which are capable of assessing the critical thinking skills identified in the aforementioned Delphi report. Subscales within the CCTST are analysis, inference, and evaluation. The CCTDI is a 75 Likert-repose instrument which uses seven subscales to identify one's disposition towards critical thinking [8]. The WGCTA uses responses to an 80 item survey to measure the reasoning skills associated with critical thinking [7].

Del Bueno's Performance-Based Development System (PBDS) assesses critical thinking and interpersonal skills ability [9]. PBDS has been used by over 350 U.S. healthcare agencies since 1985 to determine the critical thinking ability of new nurses. The PBDA uses simulated vignettes which require the nurse to respond with an assessment and plan of action. These responses are then determined to be acceptable or unacceptable with respect to the critical thinking ability [9].

Assessment Technologies Institute (ATI's) has developed a Critical Thinking Assessment (CTA) which, when administered longitudinally, determines the amount of critical thinking development that occurs in nursing students [10]. The CTA has limited applicability in research, yet is often used in undergraduate nursing programs to assess and document critical thinking skills [10].

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Self-assessments and perceptions of critical thinking development have been done in a variety of settings to qualitatively measure the construct [11-14]. These assessments have been performed on nursing students, in their final semester, and new graduates, during their first year of practice. These studies describe the critical thinking, from the perspective of the nurse, and provide clinical examples of use and misuse of the skill. Despite the myriad of methods available to assess critical thinking skills, faculty members continue to be challenged in assisting student to attain this skill. The limitations of the present interventions and assessment instruments have resulted in another measurement being considered.

3 Critical thinking interventions

A variety of methods have been employed in nursing education to facilitate the acquisition of critical thinking skills. The use of simulation with high-fidelity mannequins has shown to be an effective teaching strategy for nursing students [19-22]. Other strategies used in nursing education include problem-based learning with case studies [23-26], discussion of critical incidences [27], in-depth clinical experience debriefing [28], as well as reflective writing and concept mapping [23, 29]. For the new graduate nurse, the use of nurse residency programs (NRPs) to extend their orientation period has been used with the goal of facilitating the new nurse's acquisition of those important decision-making skills in the clinical setting [30-34].

3.1 Simulation

Simulation provides a safe, controlled environment, which allows the learner to make mistakes without actually harming a patient. The current literature contains many examples of how simulated clinical activities can assist in the development of critical thinking ability, largely due to the guided debriefing that follows the simulated scenario [21, 22]. The need for intensive faculty training and costs has been identified as barriers. Kneebone and colleagues [21] posit that simulated activities should be a supplement to live clinical activities so that learning can also take place in context. Guhde concluded that simulation can safely allow a student to fail, yet learn from those errors so as to apply those lessons to the live clinical setting [20].

The use of role-playing in simulated activities has been somewhat effective in enhancing critical thinking ability. When students find themselves in the role of the patient or family member, they can gain important insights and perspectives. Research by Ertmer and associates [19] allowed 164 nursing students to play different roles in a simulated scenario (family member, patient, primary nurse, or unlicensed personnel), and concluded that despite effective reflections, these students still reported a lack of confidence in their decision-making ability, even commenting on feeling "panicked" and "not knowing what to do" in the situation.

Students who participated in a simulated clinical activity during their final semester were then expected to resolve a healthcare dilemma as a discussion group. Results of the CTA, obtained prior to and after the activity, revealed no significant differences in critical thinking ability [10]. Interview data from this study reflect that these students felt the simulated activity helped them feel more prepared for the live clinical setting but they did not believe that the experience enhanced their critical thinking ability. Mann concluded that since it is simply not plausible to teach students all the content that they might need in the health care setting, perhaps a better strategy might be to provide a guiding framework that could help them to develop their critical thinking ability [10].

3.2 Problem-based learning

The use of problem-based learning has been used for decades in nursing education with some degree of effectiveness in teaching sound clinical reasoning [23]. Actual patient cases can be presented in the classroom or clinical setting and analyzed to determine the best course of action that should be taken in the care of that patient. Theoretically then, when the student is exposed to a similar situation in the future, they would be able to critically think through it and make an appropriate clinical judgment. A study that focused on the use of problem-based learning found that this strategy was an effective means of teaching students how to critically think through a patient situation, thus promoting active learning.

Popil identified that this strategy was infrequently used among nurse educators, most likely because of the time-consuming nature of the teaching strategy and the need for faculty to be confident in their ability to guide students through the cases [25].

Systematic reviews of problem-based learning studies conclude although students report improved confidence in their decision-making ability after discussion of cases, conclusive evidence that this strategy is effective is not apparent [24, 26]. The necessity for students to be self-aware of their own behavioral, environmental, and metacognitive influences on higher order thinking skills along with consistency among faculty were identified as barriers to this teaching strategy. Randomized control trials are needed to determine the effectiveness of this teaching strategy.

3.3 Critical incident discussions, reflective writing and concept mapping

A discussion of critical incidences that occur in the live clinical setting is another strategy for teaching critical thinking. Nurse educators often use real-life situations that occurred during an acute-care clinical rotation as a means of dialogue at the end of the clinical day. The use of a "post-conference" at the end of the clinical day provides time to reflect on these situations. This type of reflection can be very relevant for the student who was personally involved, but could be limited in relevance for their classmates [27].

The attitudes and beliefs of the educator play an important role when debriefing or post-conference activities are provided. These discussions need to be student-driven which allows these individuals to come to their own conclusions while being gently led by an experienced faculty member. Research has demonstrated that if an instructor is not experienced or knowledgeable about nursing education trends and critical thinking, they will be ineffective in facilitating the acquisition of that skill [28]. Reflective writing has been used to allow the learner to assess their practice and explore reactions; concept mapping helps the student identify relationships among systems and make new connections to future exposures in the health care setting [23]. Results of a study done by Wahl and Thompson demonstrate that the use of concept mapping is valuable to new nurses as a part of orientation [29]. Assessment of problem recognition, clinical decision-making, prioritization, clinical implementation, and reflection, done before and after the 12-week orientation, along with the use of concept mapping, improved clinical decision making skills.

When an outcome of reflection or post-conference is incorrect, coaching, if done by an experienced instructor, has the ability to redirect a student while preserving their self-esteem confidence [35]. In addition to coaching, capturing a teachable moment, and using this to reinforce content, enhances critical thinking skills. In short, the teaching of critical thinking and sound clinical decision-making does not occur in isolation [36].

3.4 Nurse Residency Programs (NRPs)

Tanner cites several recent publications including the Institutes of Medicine's (IOM's) *The Future of Nursing: Leading Change, Advancing Health* and the *Carnegie Foundation for the Advancement of Teaching*, suggesting a change is occurring in the workplace environments for new nurses [32]. While many new graduate nurses begin their careers in acute care settings, many of them migrate to non-acute care settings such as ambulatory clinics, long-term care, schools and public health in a relatively short time from graduation. These community-based settings call for a highly skilled nurse, one who is capable of independent thought and sound clinical reasoning. NRPs keep the new graduate with a preceptor for an extended period of time [32]. This model is an excellent way for new nurses to increase their skill levels, yet these programs are costly. In 2010, Greene determined that $150,000 to $1,000,000 is being spent annually by U.S. hospitals to orient new nurses utilizing the NRP model [31]. Not providing NRPs result in an estimated $18 million in turnover costs. Trepanier and associates estimate that turnover costs can be decreased to just under $3 million, if NRPs are provided [34]. Welding and colleagues report a retention rate of 95.6% in hospitals where NRPs are utilized [37]. Greene suggests that NRPs be mandated, and the cost borne by the federal government, since more and more of patients receiving inpatient care are Medicare-aged [31]. Overall, researchers seem to agree that more research is needed to determine the success and

financial effectiveness of NRPs. The use of different tools to evaluate the effectiveness of the extended training makes it difficult to make comparable conclusions [38].

4 Implications for the profession

Despite nurse educator efforts to provide active learning environments with the goal of facilitating the acquisition of critical thinking skills, the research is highly suggestive in reporting that these new graduates are still not capable of sound clinical judgments. Through questionnaires, surveys and interviews, both quantitative and qualitative research has revealed a pervasive gap in the ability to effectively teach critical thinking skills. One nurse researcher developed a system which assessed the performance of new nurses in the clinical setting. This Performance-Based Development System (PBDS) has been used in more than 350 health care agencies in 46 states to assess nurse's critical thinking ability [9]. What Del Bueno's data reflects was that only 35% of new nurses meet the entry-level expectations for clinical judgment.

Standing [39] performed a longitudinal study with nursing students which captured their thoughts on their acquisition of clinical reasoning skills. Data collected over four years, included interviews, reflective journals, case studies, and critical incident analyses. As nurses, these individuals consistently commented that the prospect of having to "think on their feet" as a new graduate was stressful for them without the "security blanket" of an instructor present. Results from this study articulate that in order to facilitate entry into the workplace, more collaboration is needed between education and health service partners to integrate critical thinking skills throughout the curriculum.

Assessing critical thinking skills while in an academic program was evaluated by Profetto-McGrath [2]. Students completed the California Critical Thinking Skills Test (CCTST) and the California Critical Thinking Disposition Inventory (CCTDI). These results indicate that approximately 38% of students had adequate levels of critical thinking skills and 85.5% had adequate levels of critical thinking disposition. Thus, additional interventions, aimed at developing critical thinking skills are needed.

In addition to the high cost of orientation, limited critical thinking skills threaten patient safety. Clinical competency is estimated to require as little as two to three years and as much as ten years post-graduation from traditional nursing programs [40]. The results of a qualitative study indicate that, in the perspective of preceptors, assessment, interactions and communications, technical/clinical skills, and clinical decision-making were the four areas where competency was critical [41]. These results may be useful as nurse educators develop academic content that translates to the clinical arena.

The development of a competent and confident nurse is a challenge. Many strategies have been employed to create a new graduate who possesses the ability to make sound clinical decisions, requiring critical thinking skills. Each of these strategies have had some success, but all of them seem to fall short of effectively preparing the new graduate for the daunting task at hand when they begin their first job. This leads then to the strategy of costly NRPs and extended orientations. While these efforts have decreased some of the cost of turnover, the expense is nonetheless noteworthy. As mentioned before, no learning is done in isolation. Nursing education is complex and requires multiple layers of strategies to be successful.

5 Strategic Management Simulations (SMS)

SMS has been used since the 1960s as a measurement instrument to determine performance ability in complex situations [15]. This instrument identifies decision-making ability on 25 different parameters of cognitive behavior. The basic premise of the simulated assessment is that it determines the "how vs. what" or, the process used to receive information versus the "what" of the information. Understanding that healthcare personnel are often challenged by situations which contain volatility, uncertainty, complexity, ambiguity, and delayed feedback, or VUCAD, this instrument is designed to determine how the participant thinks and makes decisions in stressful or challenging situation [16]. Cognitive

parameters include activity level, task orientation, initiative, information management, breadth of approach, strategy, and crisis response [17]. Each participant receives a score for each parameter and feedback and training are described that will improve area(s) of deficiency. This instrument has been used in corporate, military, and medicine disciplines, achieving a high level of predictive validity, reliability, and applicability [18].

Strategic Management Simulations (SMS) has been used extensively to test and train higher cognitive functions in persons who occupy professional and leadership positions. Grounded in complexity theory, SMS places the participant in a simulated situation that is challenging and potentially stressful. Complexity theory considers the interaction between a stressful environment and the competency of the responses performed by the participant. It considers the "how" of thinking rather than only focusing on the "what" or specific knowledge at hand. This simulation is not industry-specific, but rather is generic in its approach, allowing for a thorough mapping of the participant's behavior in an out-of-context simulation. The learner is given the opportunity to make decisions about the simulated events that are occurring, each decision creating a new series of events and decision-making possibilities. At the end of the assessment, a mapping of the participant's cognitive ability is revealed. This assessment can then be followed with feedback and training which has been shown in some fields to improve ability by as much as 76% with extensive training [16]. It has been used in many different disciplines, including the U. S. military, corporate America, and medicine, to predict competency in decision-making. SMS assesses decision-making ability based on 25 different characteristics of cognitive thinking. In one study, SMS scores were correlated to faculty ratings of medical residents. Results indicated that SMS does allow for assessment of decision-making abilities in residents. Several of the SMS parameters correlated significantly with faculty ratings, identifying areas of strength and weakness. Recommendations, based on these results, include the need to follow the simulation with focused training to address identified area(s) of weakness [42].

Anecdotal data from those who have worked extensively with SMS, reveal its technological usefulness in the assessment of competence measurement, and even more and uniquely effective for assessment and training when professional task requirements are complex [18]. SMS has yet to undergo evaluation with a specific cohort of nursing students or using research methods. Based on the results of its use with other populations, it appears that SMS may be a worthwhile educational strategy. Adding this assessment into the existing curriculum would provide baseline data describing their cognitive ability. SMS-guided feedback would identify their individual strengths and weaknesses. This feedback identifies areas that could benefit from development, making the group and individual training evidenced-based. SMS experts contend that simply the heightened awareness that comes from this sort of assessment and feedback enhances the subsequent training. Students could then undergo subsequent assessment, upon completion of the curriculum, which would determine if the training improved their critical thinking skills.

The unique design of SMS makes it a compelling model for nursing educators to add to a rigorous curriculum. Results from those who have used the model in other disciplines contend that the distinctive nature of the assessment and feedback, coupled with the subsequent training make this design one that could have legitimate merit in facilitating the acquisition of these essential skills for health care professionals [18]. Thus, SMS appears to have potential to enhance the other teaching strategies reviewed in this article. Nursing educators should consider all strategies in an effort to assist students in becoming aware of their cognitive abilities, capable of using their strengths, and continual development to minimize personal weaknesses.

Today's nurse is required to possess skills and attributes necessary for complex decision-making. Many different teaching strategies have been employed to facilitate undergraduate nursing students in their acquisition of critical thinking skills which aid in making clinical decisions. Many of these techniques have been effective and yet, the research is conclusive that many new nurses are not capable of making sound clinical decisions for their patients. Extended orientations and nurse residencies offer some solutions yet are costly to maintain. With the ultimate goal of patient safety and optimal outcomes, nursing education must be redesigned to accommodate the ever-changing complex settings in which nurses find

themselves. Former attempts at teaching critical thinking have only had minor successes. The addition of SMS along with feedback and training could offer the missing link to the question of how to get students to think like nurses.

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