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# Effectiveness of a Structured Curriculum Focused on Recognition and Response to Acute Patient Deterioration in an Undergraduate BSN Program

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## ABSTRACT

The study purpose was to evaluate the effectiveness of a structured education curriculum with simulation training in educating undergraduate Baccalaureate of Science in Nursing (BSN) students to recognize and respond to patients experiencing acute deterioration as first responders. Researchers have demonstrated a lack of adequate clinical reasoning skills in new graduate nurses is a factor in critical patient incidents. A mixed methods design using a quasi-experimental, repeated measures and a descriptive, qualitative approach was used. A convenience sample of 48 BSN students was recruited. Statistically significant increases were shown in knowledge, self-confidence, and perceptions of teamwork. Six categories emerged from the qualitative data analysis: sources of knowledge, knowledge as a person, knowledge as a group, reasoning under pressure, feelings, real person versus simulation, and values. Nursing educators need to use innovative teaching strategies to ameliorate or even eliminate the theory–practice gap in nursing.



Keywords: Acute deterioration, curriculum, simulation, clinical skills


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# EFFECTIVENESS OF A STRUCTURED CURRICULUM FOCUSED ON RECOGNITION AND RESPONSE TO ACUTE PATIENT DETERIORATION IN AN UNDERGRADUATE BSN PROGRAM

## INTRODUCTION

Today's nursing practice environment is complex and dynamic often producing unpredictable situations. Hospitals are providing care to patients with complex health issues who are at a higher risk for experiencing an acute patient deterioration (APD) event (Bright et al. 2004). The majority of APD events occur on medical-surgical (MS) units (Peters & Boyde 2007). Medical-surgical nurses are frequently the first to recognize and respond to these events (Gombotz et al. 2006). Therefore, MS nurses are instrumental in initiating first line treatment and emergency referrals.

## BACKGROUND

Early warning signs often precede APD events (Kause et al. 2004), but research indicates that patients with early warning signs are not always identified and/or addressed in a timely manner (Thompson et al. 2008). Failure to recognize and respond appropriately to APD involves multiple factors that are complex. Some factors include lack of knowledge/skills, not monitoring vital signs (VSS), failure to seek assistance, inadequate communication, and lack of role clarity (National Patient Safety Agency 2007).

A range of organizational, cultural, and individual factors influence nurses' decisions to call for assistance during APD events. Nurses may feel uncertain about calling for help for fear of making a wrong decision (Cioffi et al. 2006). High workload and complex work environments decreases time for nurses to analyze changes in VSs resulting in delayed responses (Cioffi et al. 2006).

Within nursing education, research has demonstrated a lack of adequate clinical reasoning skills in new graduates is a factor in acute patient deterioration (Cooper et al. 2009; del Bueno 2005; Endacott et al. 2010). del Bueno (2005) found that 70% of new graduates had inadequate critical reasoning skills to safely address APD events. Cooper et al. (2009) found that only 44% of students were able to comprehend and manage APD events. Students vary in their responses to abnormal VSs either by ignoring the sign, intervening, or seeking assistance, but have no rationale for their actions (Endacott et al. 2010).

Evidence supports that a theory-practice gap continues to exist and students in general are not prepared to enter the nursing profession as active practitioners (Benner et al. 2010). Nurse educators need to explore teaching strategies designed to deal with this theory-practice gap. By using innovative strategies that incorporate classroom, skill labs, and simulation, students may link the theoretical aspects of caring for patients with a systematic process for handling APD events in "real life" clinical situations. Therefore, the study purpose was to evaluate the effectiveness of a structured education curriculum with simulation training in educating undergraduate BSN students to recognize and respond to patients experiencing acute deterioration as first responders.

## METHODS

### Design

A mixed methods design was used. The quantitative research was a quasi-experimental, repeated measures design. The quantitative research question was: "What is the effect of a structured education curriculum incorporating simulation training on undergraduate BSN students' levels of self-confidence, knowledge, perceptions of teamwork in acute patient deterioration situations?"

A descriptive, qualitative approach was used to explore and describe the decision-making processes of students' in recognizing and responding to APD events. The qualitative research question was: "What are the paths of thinking and knowing employed by undergraduate BSN students' as they recognize and respond to simulated patients experiencing acute deterioration as first responders?"

## Sample and Setting

The study was conducted in an academic institution located in the Southeastern United States (U.S.). BSN junior and senior level students enrolled in the elective course, *Acute Patient Deterioration,* were recruited. The *APD* course was offered during fall 2011 and spring 2012 semesters. Each course offering had a maximum enrollment of 25 students.

## The Structured Education Curriculum (Intervention)

The APD course was developed by one of the researchers in response to a need that was identified during a competency exercise in our Nursing Leadership course. During the competency exercise, students were presented with clinical scenarios of patients experiencing clinical deterioration events such as chest pain, respiratory distress, and spontaneous pneumothorax. Students were unable to identify the clinical problem, determine the urgency of the problem, state appropriate nursing and medical interventions, and state rationales for actions taken. The APD course was approved through the nursing school's curriculum committee.

The APD course was composed of 45 hours and structured into four components: 1) didactic lectures, 2) skill labs, 3) medium-fidelity simulations as well as three high-fidelity simulations, and 4) facilitator-led guided reflection sessions (GRS). Didactic lectures included information related to APD emergencies, assessment/management of patients with varying deteriorating conditions; communication techniques; and team roles. The focus was to teach

students how to identify signs/symptoms, perform a systematic assessment, initiate early interventions, and rapidly seek help. The ABCDE (Airway, Breathing, Circulation, Disability, Exposure) framework was taught for pre-arrest conditions with incorporation of the CAB (Chest compressions, Airway, Breathing) process for cardiac arrest (Field et al. 2010).

Skill labs focused on the use of emergency equipment and technical skills. Examples include airway adjuncts and emergency crash cart equipment. Technical skills included bag-valve mask (BVM) ventilation, cardiopulmonary resuscitation (CPR), and performing defibrillation.

Medium-fidelity simulations focused on APD scenarios such as respiratory distress, chest pain, opioid overdose, and decreased level of consciousness. In addition, three high-fidelity cardiac arrest simulations were conducted. Students had been introduced and provided an orientation to the medium and high-fidelity simulators in their first nursing course and every subsequent course leading up to APD course.

Guided reflection sessions were conducted after the three high-fidelity simulations. The purpose was to encourage students to reflect on their actions, identify key learning opportunities, facilitate self/team evaluation, and understand decision-making processes (Arafeh et al. 2010).

## Protection of Human Subjects

Ethics approval was obtained from the University's Institutional Review Board. Informed consent was obtained from participants to enroll in the research study as well as consent for video taping during simulation sessions and audio taping during the guided reflection sessions.

## DATA COLLECTION PROCEDURES

### Quantitative Data Collection

A demographic form, Self-confidence scale, Knowledge questionnaire, and Team Emergency Assessment Measure (TEAM) were the data collection instruments (Table 1). Data collection occurred at the beginning of the course, week 6, and at the end of the course. Prior to each high-fidelity cardiac arrest simulation, students completed the Self-confidence scale and the Knowledge questionnaire. After the simulation exercises, students completed the TEAM tool and then took part in a GRS. Figure 1 depicts the symbolic representation of the repeated measures design and completion times of the surveys.

### Qualitative Data Collection

**Guided reflection sessions.** The GRSs were facilitated by three research team members who had received instructions/guidance from an expert qualitative research consultation, using predetermined scripted questions. The GRSs were audio taped to produce verbatim transcripts of the students' decision-making processes. Videotape reviews of the simulations were employed to provide students with a precise portrayal of events in order to allow students time to reflect on actions taken.

## DATA ANALYSIS

### Quantitative Data Analysis

Data were analyzed with descriptive and inferential statistics using SPSS 18.0. One-way repeated measures analysis of variances were conducted to test the effect of the intervention on levels of self-confidence, knowledge, and teamwork perceptions followed by post-hoc Bonferroni adjustment for multiple comparisons to evaluate differences in means. A $p$ value of $\leq .05$ was considered statistically significant.

## Qualitative Data Analysis

Verbatim transcripts of the GRSs served as the data for qualitative analysis. *Microsoft Word© 2010,* was used to number each line of the texts and to sort and manage the data. Analysis of the data was accomplished by using all five research team members and an expert qualitative nurse researcher. The constant comparative method was used to systematically analyze the data developing categories and coding incidents for categories all the while comparing each successive session (Strauss, & Corbin, 1990).

**Trustworthiness.** Trustworthiness was addressed through use of a research team, an expert qualitative researcher who guided and led in the interpretation of the transcripts, and an audit trail. The audit trail consisted of a reflective journal, audiotapes, transcripts, coding decisions, notes, and computer data.

# RESULTS

## Quantitative Results

**Sample.** Forty-eight students participated in the study. The majority of students were female (85.4%) and Caucasian (85.4%). Students ranged in age from 20 to 51 years ($M$=29.98, $SD$=9.41). Thirty nine (81.2%) students were juniors and nine (18.8%) were seniors.

**Self-confidence.** A significant effect was found ($F(2,92)=292.99$, $p < .001$) comparing self-confidence scores. Scores increased significantly from pre ($M$=2.59, $SD$=.52) to mid ($M$=3.96, $SD$=.56, $p < .001$), and again at post-intervention ($M$=4.25, $SD$=.41, $p < .001$) (Table 2).

**Knowledge.** A significant effect was found ($F(2,92)=236.99$, $p < .001$) comparing knowledge scores. Scores increased significantly from pre ($M$=67.00, $SD$=6.66) to mid ($M$=80.62, $SD$=7.34, $p < .001$), and again at post-intervention (M=88.70, $SD$=6.48, $p < .001$).

**TEAM.** A significant effect was found ($F(1.46,65.85)=122.27$, $p < .001$) comparing TEAM scores. Scores increased significantly from pre ($M=1.87$, $SD=.89$) to mid ($M=3.20$, $SD=.56$, $p < .001$), and again at post-intervention ($M=3.76$, $SD=.30$, $p < .001$). In addition, a significant effect was found ($F(1.59,71.40)=131.00$, $p < .001$) comparing global teamwork scores. Scores increased significantly from pre ($M=3.90$, $SD=2.04$) to mid ($M=7.28$, $SD=1.38$, $p < .001$), and again at post-intervention ($M=8.79$, $SD=.91$, $p < .001$).

## Qualitative Results

The qualitative data analysis resulted in the identification of 7 categories and 26 subcategories (Table 3). Categories were developed from common patterns present during the guided reflection sessions. Subcategories were developed from common experiences within each category. Supporting excerpts are displayed in Table 3.

**Sources of knowledge.** Students identified several sources of knowledge in handling APD events. This category was defined as where students learned by observation, participation, or through course work. Prior to the APD course, students gained knowledge from previous clinical experiences, CPR courses, and previous simulation experiences. Clinical experiences brought opportunities for students to see and use emergency equipment in the actual clinical setting. In addition, students were able to observe patients in actual distress during their clinical rotations. Students spoke of knowledge gained through CPR courses, but also stressed the importance of keeping up-to-date and practicing CPR skills. Furthermore, students talked about how previous simulations provided them with knowledge to assess patients.

Students expressed how knowledge learned through the APD course prepared them for APD events. During the APD course, students were able to practice skills to become proficient in performance. Students discussed how the “hands-on” practice allowed them to apply knowledge

learned during lectures. Repeated simulations during the course allowed students to hone their assessment/technical skills and provided an avenue to work as a team.

**Knowledge as a person.** This category was defined as knowledge professed by the individual. Early on three subcategories emerged: I thought I knew, don't know the things to do, and sources of help. Early on, students had misconceptions about how to function in an APD situation. They thought they knew what to do, why it was done, and how to function. Students also initially recognized their personal lack of knowledge and experience. Individuals recognized that something was missing in the routine of following steps or trying to synthesize previous knowledge. They referred to assessment rules, reference points, clinical sheets, guidance from faculty, following steps, and reading the chart as elements they could use to make decisions and act.

There was a dramatic shift in the subcategories revealed in later sessions. Personal knowledge then evolved to: taking on the responsibility, self-reflection, and transition to practice. Students no longer talked about what they didn't know or what specific skills might be needed. They spoke with self-assurance about their newly gained personal knowledge. Knowing how to assess the patient, knowing the signs of APD, and having the skills to act in a swift and decisive manner were reflected in student discussions of their personal knowledge. A major factor was the ability to take on responsibility. Personal knowledge was gained through the process of self-reflection. When examining action, particularly through review of the videotaped simulations, students critiqued themselves and thought out loud about how personal knowledge was actuated. In later GRSs, students spoke about the transfer of personal knowledge into practice. They could visualize themselves as active participants, assessing, calling for help, and initiating life-saving interventions.

**Knowledge as a group.** Knowledge as a group was defined as knowledge shared among group members. This category revealed five subcategories: pieces of the puzzle; should have done something differently; knowing what we should do, just doing it; knowledge of roles; and jelling as a group. Students described the contributions of each other as they were putting together pieces of a puzzle. Students were quick to recognize actions they should have taken.

As students gained knowledge of the key roles needed in an APD situation, they became aware of the order and structure that accompanied the effective achievement of each role. Students grasped the knowledge and learned to jump in and perform. A recurring subcategory in the later simulations was related to group formation and cohesion.

**Reasoning under pressure.** Early on, students recognized that critical thinking skills were essential in all life-saving endeavors. In earlier scenarios, they struggled to assess and implement appropriate measures. With repeated simulations, students noted their ability to consider other factors associated with APD situations.

**Feelings.** Both positive and negative emotions were associated with knowledge, the lack thereof, being observed, and performance. Students expressed feelings that fell into three major subcategories: feeling bad, feeling satisfied, and toward self-confidence. The negative emotions were predominantly expressed early on and the positive emotions emerged in later sessions. A host of emotions became evident through adjectives used by students for feeling bad: dumb, stupid, feeling like a failure, shame, panic, fear, terror, disappointment, and frustration.

The very negative emotions were replaced by the time of the third GRS with statements of feeling satisfied. Feeling satisfied encompassed terms such as feeling much better, having pride, feeling comfortable, being empowered, being efficient, and happy with performance. Feeling satisfied allowed room for future development and improvement. There was not a sense

of perfection or of expertise, but a real contentment with having the knowledge and being able to act appropriately.

A lack of self-confidence in the early GRSs gave way toward self-confidence in the second and third. Students expressed improved confidence and the ability to function in a meaningful and competent way. There was recognition that students were working toward self-confidence as a developmental process.

**Real person versus simulation.** In early sessions, students believed that they would behave differently if it were an actual person with an emergency. For others, that disbelief translated into a lack of sense of urgency in action. As the course continued, the disbelief became less obvious and students began to describe their own sense of investment in the simulation.

Subcategories emerged around an expectation that something was malfunctioning with the equipment: is it us or the machine, expectation of malfunction, and equipment. Although simulation had been part of the curriculum in previous courses, uncertainty remained regarding the capabilities of the mannequins. Several students explained their inaction in the first simulation by describing their unfamiliarity with simulation. Students also had previous experiences where simulation equipment malfunctioned. Questions arose about whether the simulators were performing properly. From discussions about back boards, ambu bags and oxygen, to uses of the AED, students had occasions when even these items did not work as expected.

**Values.** Students identified values that directed thinking and action. Two subcategories emerged: high level of integrity and an appreciation for teamwork. Students described a sense of honor and respect toward the patient. They identified the need to suspend one's own beliefs to acknowledge the wishes of patients. Students identified the bond between nurse and patient. The

potential outcome of an acute deterioration, or the idea of "just letting him die" was a struggle for students. In addition to honoring the autonomy of the patient**,** a sense of teamwork was identified as a value that directed thinking and action.

## DISCUSSION

In keeping with Benner's et al. (2010) call for change, this research study sought to transform the classroom experience into "situated cognition" and action learning that bridges the theory-practice gap by developing a structured education curriculum with simulation training to enhance the skills and knowledge of students in recognizing and responding to APD events. This innovative teaching strategy allowed students to learn the theory aspects related to caring for deteriorating patients, apply "clinical reasoning skills" in a safe simulated environment, practice assessment and intervention skills, and provided an opportunity to practice the role of a professional nurse to prepare for "real world" application.

Consistent with other findings with education programs focusing on APD (Kilday et al. 2012; Sittner et al. 2009), knowledge scores improved significantly as the course progressed. Students brought prior knowledge to the course from other nursing courses, clinical experiences, CPR classes, and previous simulation experiences, although at the beginning of the course, students were unable to synthesize their knowledge in order to assess and intervene in APD situations. Using the ABCDE framework provided students with a structured and comprehensive approach to APD events. Furthermore, the course fostered experiential learning techniques that engaged students in application scenarios which promoted clinical reasoning skills. Students' clinical reasoning skills were enhanced through the structured education curriculum, active engagement in practicing skills, and reflection on performance using video review and guided reflection activities (Ericsson et al. 2007).

As supported in other research (Gordon & Buckley 2009; Steen & Costello 2008), students self-confidence levels increased throughout the course. Students acknowledged that "hands-on" practice was an essential component in gaining confidence. The repetitive practice through skill labs and self-critiquing of skills through video review assisted students in perfecting their performance and techniques. Use of video feedback and reflection techniques provided a more realistic perspective to students in evaluating their own performance and building their self-confidence (Arafeh et al. 2010).

Perceived teamwork during APD simulations improved significantly throughout the course. Previous research also supports this finding (Gordon & Buckley, 2007; Kilday et al., 2012; Sittner et al., 2009). Students learned how team roles in handling APD events impacted the effectiveness and efficiency of the team's performance and the potential impact on patient outcomes. Through repeated simulations and video reflection, students were able to assess their team performance and make improvements in team communication and roles. An unexpected, but positive finding was the value that students began to place on having an effective and supported team in caring for patients. Engaging students in team activities through repetitive skill labs and simulations "opened their eyes" to how essential it is to have good team dynamics and communication.

## LIMITATIONS

The sample was recruited from one BSN program located in the southeastern U.S. Therefore; the study result has limited transference to other populations. There may also have been some cross-talking between students from fall semester to spring semester about the course content, skill labs, and simulation scenarios which may have influenced students' knowledge and performance.

## CONCLUSION

In today's healthcare environment, nurses must be prepared to recognize and respond appropriately to APD events. Early recognition and quick response results in more positive patient outcomes. Results from this study support that structured education curricula with simulation training is effective in preparing BSN students in honing their skills to recognize and respond to APD events. Nursing educators need to use a combination of innovative teaching strategies to not only provide knowledge to students, but also provide opportunities for students to have "hands-on" experiences to synthesize and apply the knowledge they have learned.

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