ORIGINAL RESEARCH

The efficacy of simulation debriefing in developing critical thinking in accelerated baccalaureate nursing students

Debra Wallace [*], Samira Moughrabi

School of Nursing, California State University of Northridge, Northridge, United States

Received: October 27, 2015 **Accepted:** December 22, 2015 **Online Published:** December 30, 2015
DOI: 10.5430/jnep.v6n5p13 **URL:** http://dx.doi.org/10.5430/jnep.v6n5p13

ABSTRACT

Background: Critical thinking is an essential attribute of a nurse. Nursing education which incorporates simulation and debriefing learning activities has an important role to ensure key components of safety and clinical effectiveness are present before nursing students graduate.

Aims and methods: To examine, using Quality and Safety Education for Nurses (QSEN) based rubrics, the relationship between simulation debriefing and critical thinking in nursing students enrolled in an accelerated second degree baccalaureate program.

Results: Univariate Spearman Rho regression showed a significant direct relationship between critical thinking and all five components of debriefing (allowing reflection on student's clinical judgement and approach to patient care; feedback received supportive and constructive; feedback helpful to learning; adequate time given to reflect and discuss clinical performance; and helping understand the rational for the actions and responses to performances). Logistic multivariate regression revealed that only three out of the five debriefing components predicted developing stronger critical thinking skills: allowing reflection on student's clinical judgement and approach to patient care (χ^2 = 34.249, p = .011), adequate time given to reflect and discuss clinical performance (χ^2 = .068, p = .030), and helping understand the rational for the actions and responses to performances (χ^2 = 119.365, p = .001).

Conclusions: Debriefing is an important aspect of simulation which helps enhance critical thinking skills in nursing students and thus should be appropriately addressed in education and research.

Key Words: Simulation, Critical thinking, Simulation debriefing, Nursing students

1. INTRODUCTION

Nurses must maintain a high level of competency and clinical judgment to detect early changes in the patient's status that indicates the need for timely and appropriate intervention. The use of simulation for training nursing students has increased in recent years, along with greater emphasis on critical thinking.[1] Simulation is an action assessment method using a lifelike computerized mannequin that can be programed to respond to real-world inputs. Simulation is a well-established means for students to develop critical thinking skills and acquire competencies to facilitate practice in a real-world environment.[2] Moughrabi and Wallace (2015) describe simulation as a training and feedback strategy where one learns to develop and apply the knowledge and skills to create lifelike circumstances and receive feedback to assist in improving and reining their educational needs.[3] The use

[*]**Correspondence:** Debra Wallace; Email: debra.wallace@csun.edu; Address: School of Nursing, California State University of Northridge, Northridge, United States.

of simulation engages students in learning and allows for increases in students' learning activities independent of faculty. A study by Goodstone *et al.* (2013) revealed simulation can foster a high level of student responsibility in a scenario, something which may not be possible in a traditional clinical setting.[4]

1.1 Specific aims

The aim of this study was to examine, using QSEN-based rubrics, the relationship between simulation debriefing and critical thinking in nursing students enrolled in an accelerated baccalaureate program at a state university in California.

1.2 Literature review

Nursing education has been shown to provide the foundation for developing learning methods to nursing students.[5] Patient simulation is a recommended teaching strategy, helping to bridge the gap between classroom learning and actual clinical experience.[6,7] Simulation, when used as a teaching tool can assess and evaluate a student's skill attainment. It can be structured specifically to the level of a student's knowledge. Thus, its benefits are numerous, as it may improve self-confidence,[8] problem solving skills,[9] clinical performance,[10] and teamwork competencies for students.[11] The use of simulation encourages and has been considered as an opportunity for students to enhance their critical thinking (CT).[12] Though previous studies are limited because they did not provide in-depth information on the working dynamics of debriefing in simulation or on the effects of critical thinking on simulation.

The transition of nursing education and competency in medical surgical nursing should ensure the key components of safety and the ability to problem solve, with the faculty assisting the student in such personal development. In enhancing patient safety, the ability to identify situational and personal factors associated with the risk of error is of great importance, as students need to understand how they can learn from mistakes.[3] Simulation also offers the opportunity for reflection, and to observe the students' clinical abilities independently.[13] By using standardized patients for simulation cases, it provides an interactive learning environment and allows one to measure clinical competency.[14] As there is no harm to patients, the use of simulation can allow students to better focus on patient care. In the implementation of human patient simulation, and to help facilitate for learning, there is a need for research on how nursing students experience the debriefing conducted under different conditions.

The importance of debriefing in simulation has recently gained more attention. Ali, Nisar, and Ghassan (2015) studied debriefing after modular teaching in pre-clinical students. These authors found debriefing to be helpful in allowing students to obtain immediate feedback on their performance and the opportunity to discuss their performance with their instructors, which have positive implication of developing self-directed adult-learning habits.[15] Other authors compared simulation experiences with and without debriefing among nursing students. In this study, students in the simulation-debriefing group showed higher levels of clinical performance competency, self-reflection, and satisfaction with the simulation experience.[16] In another study, the effectiveness of debriefing for Meaningful Learning as a systematic process, on improving clinical reasoning skills was observed. In addition, a positive correlation between clinical reasoning and participants' perception of high-quality debriefing was found. While the evidence of the benefits of debriefing is growing, its relevance to critical thinking remains unclear.[17]

1.3 Critical thinking

Sentinel events commonly occur in acute care settings where new graduate nurses begin their professional careers.[18] These unanticipated occurrences call for the ability of new graduates to think critically and intervene effectively. It is imperative that innovative teaching methods where student nurses are not daunted by patient's safety be employed to support the development of critical thinking and improve performance outcomes.

Numerous scholars have attempted to define the essential attributes of critical thinking. Watson and Glaser (1994) define critical thinking as the ability to recognize the existence of the problem, and apply attitudes and knowledge to logically determine a course of action.[19–21] Others define critical thinking as a process of analyzing, synthesizing, and evaluating information collected through observation, relection, experience, or communication that may lead to a particular belief or action.[22] Based on these definitions, critical thinking appears to have several key elements, including an individual's ability to seek and comprehend relevant information and an association with knowledge, reasoning, cognitive skills, identification, and exploration of alternative frames of reference. Horan (2009) requires the learner to integrate active methods of instruction for critical thinking such as observation of an experienced nurse and hands on practice.[23] The effect of using critical thinking skills by debriefing simulated clinical experiences has been shown to be essential,[24–27] but there are limited studies measuring the effectiveness of this learning.

1.4 Simulation de-briefing

Debriefing is a simulation-based method which can potentially assist in the evaluation and application of critical think-

ing skills. Debriefing is an assessment method based on reflective, verbal responses elicited from revisiting the clinical encounter.[17] The use of debriefing allows students to be engaged in their learning through examination of the scenario and gives a verbal description of proposed actions and rationale.[28] The use of small groups for debriefing may contribute to a more frequently and repeated training, which is considered important for achieving simulation competency. A key to the use of debriefing usually involves reflection, as this is a strategy known to solidify learning.[29] Reflection provides an opportunity to engage one's thinking specifically to experiences and to learn from these experiences. The debriefing process enables participants to review key concepts, evaluate rationales and responses to interventions, gain a more in-depth understanding and appreciation of knowledge, and retain knowledge and skills for future application. A successful debriefing is one in which the participants do most of the talking. The facilitator's role of creating a safe environment for the students to learn and of structuring a seemingly unstructured learning event is paramount to the effectiveness of the debriefing session.[30] Both methods can be used to identify specific deficiencies and provide remediation to ensure safe practice. To date, no researchers have evaluated the relationship between debriefment in simulation on critical thinking. Such information is needed to direct efforts at improving education and practice. Furthermore, the gap existing with the relationship between critical thinking skill and simulated debriefing is unclear, as there are limited studies evaluating such outcomes.

1.5 Theoretical framework

The novice-to-expert model for developing competency skills

Patricia Benner introduced the novice-to-expert model (1984), which conceptualized the framework for understanding skills acquisition by delivering a comprehensive and holistic framework.[31] She identified five qualitatively different levels of perception and performance that nurses may progress through over time: novice, advanced beginner, competent, proficient, and expert. Wallace and Boller (2014) stated that the level of competency representing movement from novice to expert can be evaluated using rubrics beyond the transition-to-practice phase.[32]

Benner's concepts regarding the performance characteristics and learning needs of nursing students with varying levels of clinical competency were incorporated in this study. Studies by Dolansky (2013) have shown that with appropriate training and feedback, the path to expertise can be accelerated.[33] Wallace and Boller's (2014) study has shown that rubrics provide a guide to focus on key areas in skill development for both learners and their mentors, providing a method to document the progress.[32] As new RNs move from novice to expert, rubrics can provide a guide to focus on essential competencies at different levels of skill performance (see Figure 1).

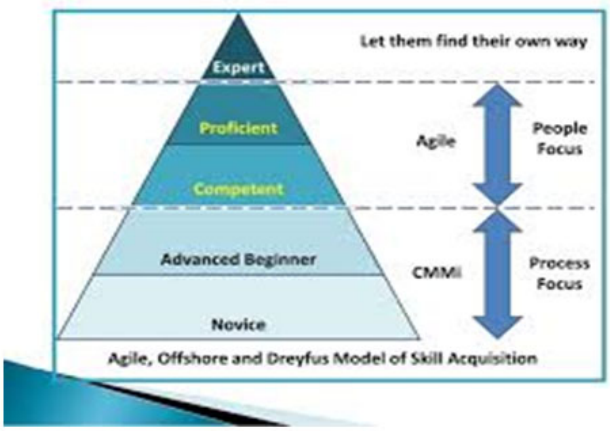

Figure 1. Benners novice to expert theory[31]

2. METHODOLOGY

2.1 Setting and participants

The simulation debriefing exercise was a part of an approved module with structured learning aims and outcomes. Students in the first and second semester are required to participate in the simulation debriefing as a part of their preparation for a medical surgical rotation. For each simulation debriefing, students worked in groups of three and the scenarios ran three times per day. In the simulation, resources such as mock paperwork and electrocardiogram (ECG) and blood results were made available as requested. In addition, skills stations were set up for students to practice in order to develop their levels of confidence. At the end of the simulation and after all simulations were completed, a structured facilitated debriefing session took place and students were asked to answer the following questions: (1) What could this nurse have done when he/she was mildly concerned? (2) What was the symptom that first should have brought action? What might that action have been? Anything else concerning? What was happening physiologically? (3) Was there anything that took you by surprise?

This questionnaire prompted students to answer such questions and explore their understandings of the scenario. It was important during the debriefing process for the team and any observers use positive communication to prevent embarrassment on the part of the students playing the roles. For faculty, this activity provided insight into how the student might approach and/or react to the emergent situation.

2.2 Data collection

The authors developed a checklist using the case flow description of learner actions expected to occur during the simulation. The Simulation Evaluation Survey was developed from the synthesis of literature and was designed to assess the relevance of simulation debriefing and whether simulation helped students develop stronger cognitive and clinical competencies and skills. After a panel of content experts previewed the rubric for relevance and clarity, face validity was established. Assessing content validity is indispensable to validating performance indicators and descriptors representative of the characteristics being measured.[32] For consistency of measurement, one of the investigators (clinical faculty) rated all student debriefing performances according to the simulation grading rubric with answers ranging from 1 (strongly disagree) to 4 (strongly agree). Critical thinking was measured by asking students to rate the following statement using the same response likert scale: "Simulation helped me to develop stronger clinical thinking skills".

2.3 Ethical consideration

Implementation of the study was an end of the semester evaluation as part of a module within the curriculum, and ethical approval was acquired from the Institutional Review Board (IRB) of the university. It was reinforced to all subjects that their participation in completing the simulation evaluations was entirely voluntary and would not in any manner affect their performance evaluation and completion of the courses. All questionnaires were anonymous and maintained confidentiality for the student respondents. They were also assured all answers would remain confidential by instructing them not to include their names on the surveys and because all data would be reported in aggregate.

2.4 Data analysis

Data analysis was performed using the Statistical Package for the Social Sciences (SPSS) 22.0 for Windows. The assumptions for logistic regression, including sample size, multicollinearity, independence of errors, and outliers, were considered and met in this study. According to Vittinghoff and McCulloch (2007), a minimum of 10 subjects per predictor is adequate for logistic regression.[34] In this study, the sample number was 205 and thus adequate for the five debriefing predictors included in the model.

To explore the bivariate relationship between critical thinking and the different components of debriefing, Spearman Rho correlation was conducted. In addition, similar correlations were calculated between the different debriefing components of debriefing to assess for multicollinearity. A bivariate correlation that is equal to or greater than .7 implicates multicollinearity. All values were less than .7 and thus, all five components of debriefing: 1) allowing reflection on student's clinical judgement and approach to patient care; 2) feedback received supportive and constructive; 3) feedback helpful to learning; 4) adequate time given to reflect and discuss clinical performance; and 5) helping understand the rational for the actions and responses to performances showed no multicollinearity (see Table 1).

Table 1. Correlation matrix of study independent variables

	Debriefing & reflection on clinical judgment & approach to patient care	Debriefing feedback was supportive & constructive	Debriefing feedback was helpful to learning	Adequate debriefing time to discuss performance
Debriefing feedback was supportive & constructive	.666 .000*			
Debriefing feedback helpful to learning	.620 .000*	.836 .000*		
Adequate debriefing time to discuss performance	.516 .000*	.599 .000*	.648 .000*	
Debriefing helped understand action rationale	.529 .000*	.587 .000*	.605 .000*	.592 .000*

*$p \leq .05$

3. RESULTS

In the unadjusted bivariate correlation analysis, significant positive associations were observed between critical thinking and all aspects of debriefing (see Table 2). Of the 205 students, 95% (N = 195) agreed that simulation increased their critical thinking. The logistic regression model showed statistical significance, $\chi^2 = 23.330$, $p = .000$, implicating that the model was able to discriminate between subjects who agreed and who did not agree that simulation improved their critical thinking. As shown in Table 4, three of the five debriefing components significantly contributed to the statistical significance of the model: allowing reflection on student's clinical judgement and approach to patient care ($\chi^2 = 34.249$, $p = .011$); adequate time given to reflect and

discuss clinical performance (χ^2 = .068, p = .030); and helping understand the rational for the actions and responses to performances (χ^2 = 119.365, p = .001). Debriefing as "supportive and constructive" and "feedback helpful to learning" showed no statistically significant relationship to the independent variable critical thinking (see Table 4).

Table 2. Bivariate spearman rho correlation of critical thinking & debriefing components

Critical Thinking	Correlation	*p*-value
Debriefing & reflection on clinical judgment & approach to patient care	.266	0.00*
Debriefing feedback was supportive & constructive	.242	.001*
Debriefing feedback helpful to learning	.240	.001*
Adequate debriefing time to discuss performance	.201	.004*
Debriefing helped understand action rationale	.342	.000*

*$p \leq .05$

Table 3. Significance, odds ratio, and ci for critical thinking and debriefing

Variable	Sig	Odds Ratio	95% CI for Odds Ratio	
			Lower	Upper
Debriefing & reflection on clinical judgment & patient care	.011*	34.249	2.245	522.437
Debriefing feedback was supportive & constructive	.123	0.109	0.006	1.826
Debriefing feedback was helpful to learning	.220	5.965	0.343	103.708
Adequate debriefing time to discuss performance	.030*	0.068	0.006	0.769
Debriefing helped understand action rationale	.001*	119.365	7.469	1,907.635

*$p \leq .05$

4. Implications and Recommendations

4.1 Study limitations

The results of this study should be considered within certain limitations. A convenience sample at a single institution was recruited for this study and therefore may only be interpreted within that context. The sample size was small, thus the results should be interpreted with caution and the findings should not be generalized to all nursing education students based on this one study. In addition, the small sample size may explain the near significance results of some study variables that represent higher complex cognitive competencies including developing critical thinking and reflection on clinical judgement and patient care. Therefore, further quantitative and qualitative studies should be employed with larger samples to examine whether simulation is efficient in enhancing these important attributes. Further research with students from different years in the nursing program and different institutions would allow a more thorough study of the simulation occurrences under examination.

4.2 Recommendations

The findings suggest that simulation debriefing has implications for future research, looking at the relationship between critical thinking, clinical judgment and direct patient care outcomes in the hospital setting. Clinical nursing instructors struggle with the problem of how to prepare both competent nurses who can critically think and contribute to positive patient outcomes. It is important for clinical faculty to look at these variables and value how simulation debriefing is perceived as one of the most important phases in simulation. By being a forum for learning and discussion, simulation debriefing provides different viewpoints and suggestions to problem solving, which aid student nurses in developing competency skills and critical thinking. In addition, the findings from the quantitative study may contribute to a greater understanding of how patient simulation experiences impact students' critical thinking abilities. Future research may well include the intent to set up the analysis of quantitative data collected from our student surveys, funding larger demographics, and using reliable and validated tools.

Bio Statement

Debra Wallace, DNP, RN, FNP-BC, serves as part time faculty in the School of Nursing at California State University of Northridge and mentors nursing students at Cal State University Northridge and nurse practitioner at Kaiser Permanente in Santa Clarita, CA.

Dr. Samira Moughrabi, PhD, RN, APRN serves as an Associate Professor in the School of Nursing at California State University of Northridge.

Conflicts of Interest Disclosure

The authors declare that there is no conflict of interest.

REFERENCES

[1] Shin H, Ma H, Park J, *et al.* The Effect of Simulation Courseware on Critical Thinking in Undergraduate Nursing Students: Multi-site Pre-post Study. Nurse Education Today. 2015; 35(4): 537-542. PMid:25549985 http://dx.doi.org/10.1016/j.nedt.2014.12.004

[2] Rauen CA. Using simulation to teach critical thinking skills: You can't just throw the book at them. Critical Care Education. 2001; 13: 93-103.

[3] Moughrabi S, Wallace D. The effectiveness of simulation in advancing quality and safety education for nurses-based competency in accelerated nursing students. Journal of Nursing Education and Practice. 2015; 5(8): 17-25. http://dx.doi.org/10.5430/jnep.v5n8p17

[4] Goodstone L, Goodstone MS, Cino K, *et al.* Effect of Simulation on the Development of Critical Thinking in Associate Degree Nursing Students. Nursing Education Perspectives. 2013; 34(3): 159. http://dx.doi.org/10.5480/1536-5026-34.3.159

[5] Nuraini T, Afifah E, Agustini N, *et al.* Human patient simulation to improve the attitude of the nursing students. Journal of Nursing Education and Practice. 2015; 5(4): 52. http://dx.doi.org/10.5430/jnep.v5n4p52

[6] Barrere C. Teaching future holistic nurses: integrating holism into an undergraduate nursing curriculum. In Holistic Nursing: a handbook for practice. Boston: Jones and Bartlett. 2009; 709-717.

[7] Ravert P. Patient simulator sessions and critical thinking. Journal of Nursing Education. 2008; 47: 557-562. http://dx.doi.org/10.3928/01484834-20081201-06

[8] Sleeper JA, Thompson C. The use of high fidelity simulation to enhance nursing students' therapeutic communication skills. International Journal of Nursing Education Scholarship. 2008; 5(1): 42. PMid:19120033 http://dx.doi.org/10.2202/1548-923X.1555

[9] Larew C, Lessans S. Innovations in clinical simulation: Application of Benner's theory in an interactive patients care simulation. Nursing Education Perspectives. 2006; 27: 16-21. PMid:16613127

[10] Mahardika ZP. The effect of combined simulated patient and manikin for the achievement intravenous cannulation skills. (Unpublished bachelor's thesis). Yogyakarta, Indonesia: Gadjah Mada University; 2012.

[11] Garbee DD, Paige JT, Bonanno LS, *et al.* Effectiveness of teamwork and communication education using an interprofessional high-fidelity human patient simulation critical care code. Journal of Nursing Education and Practice. 2013; 3(3): 1-12. http://dx.doi.org/10.5430/jnep.v3n3p1

[12] Sanford PG. Simulation in nursing education: a review of the research. The qualitative report. Qualitative Report. 2010; 15(4): 1006-11.

[13] Robinson-Smith G, Bradley PK, Meakim C. Evaluating the use of standardized patients in undergraduate psychiatric nursing experiences. Clinical Simulation in Nursing. 2009; 5(6): e203-e211. http://dx.doi.org/10.1016/j.ecns.2009.07.001

[14] Sideras S, McKenzie G, Noone J, *et al.* Making simulation come alive: Standardized patients in undergraduate nursing education. Nursing Education Perspectives. 2013; 34(6): 421. http://dx.doi.org/10.5480/1536-5026-34.6.421

[15] Ali L, Nisar S, Ghassan A. Role of debriefing as a learning tool in simulation based learning for students of preclinical years at the end of two consecutive modules-initial experience. Journal of Ayub Medical College of Abbottabad. 2015; 27(2): 425-429. PMid:26411133

[16] Rayoo EN, Ha EH. The importance of debriefing in simulation-based learning: comparison between debriefing and no debriefing. Computer Informatics Nursing. 2015; 33(12): 538-545. PMid:26587701 http://dx.doi.org/10.1097/CIN.0000000000000194

[17] Dreifuerst KT. Using Debriefing for Meaningful Learning to Foster Development of Clinical Reasoning in Simulation. Journal of Nursing Education. 2012; 51(6): 326-333. PMid:22495923 http://dx.doi.org/10.3928/01484834-20120409-02

[18] Strouse AC. Multidisciplinary simulation centers: Promoting safe practice. Clinical Simulation in Nursing. 2010; 6(4): e139-e142. http://dx.doi.org/10.1016/j.ecns.2009.08.007

[19] Watson G, Glaser EM. Watson-Glaser critical thinking appraisal manual. The Psychological Corporation, New York. Harcourt, Brace & World, Inc.; 1964.

[20] Watson G, Glaser EM. Watson-Glaser critical thinking appraisal manual. The Psychological Corporation, San Antonio, TX; 1980.

[21] Watson G, Glaser EM. Watson-Glaser Critical Thinking Appraisal, Form S manual. San Antonio, TX: The Psychological Corporation; 1994.

[22] Lamartina K, Ward-Smith P. Developing Critical Thinking Skills in Undergraduate Nursing Students: The Potential for Strategic Management Simulations. Journal of Nursing Education and Practice. 2014; 4(9): 155. http://dx.doi.org/10.5430/jnep.v4n9p155

[23] Horan KM. Using the human patient simulator to foster critical thinking in clinical situations. Nursing Education Perspectives. 2009; 30: 28-30. PMid:19331036

[24] Decker S. Integrating guided reflection into simulated learning experiences. New York, NY: National League for Nursing; 2007.

[25] Dreifuerst KT. The essentials of debriefing in simulation learning: A concept analysis. Nursing Education Perspectives. 2009; 30: 109-114. PMid:19476076

[26] Fanning RM, Gaba DM. The role of debriefing in simulation based learning. Simulation in Healthcare. Journal of the Society for Medical Simulation. 2007; 2: 115-125.

[27] Shinnick MA, Woo M, Horwich TB, *et al.* Debriefing: The most important component in simulation? Clinical Simulation in Nursing. 2011; 7: e105-e111. http://dx.doi.org/10.1016/j.ecns.2010.11.005

[28] Tosterud R, Petzäll K, Hedelin B, *et al.* Psychometric Testing of the Norwegian Version of the Questionnaire, Student Satisfaction and Self-confidence in Learning, Used in Simulation. Nurse Education in Practice. 2014; 14(6): 704-708. PMid:25458231 http://dx.doi.org/10.1016/j.nepr.2014.10.004

[29] Cantrell MA. The importance of debriefing in clinical simulations. Clinical Simulation in Nursing. 2008; 4(2): e19-e23. http://dx.doi.org/10.1016/j.ecns.2008.06.006

[30] Billings DM, Halstead JA. Teaching in nursing a guide for faculty (4th ed.). St. Louis, Missouri: Saunders Elsevier; 2012.

[31] Benner P. From Novice to Expert: Excellence and Power in Clinical Nursing Practice. Menlo Park, CA: Addison Wesley; 1984.

[32] Wallace D, Boller J. New nurse practitioner competencies: Skill development and reflective writing rubrics. Journal for Nurse Practitioners. 2014; 10(7): e13-e21. http://dx.doi.org/10.1016/j.nurpra.2014.04.018

[33] Dolansky M, Moore S. Quality and safety education for nurses (QSEN): The key is systems thinking. Online Journal of Issues in Nursing. 2013; 18(3): 71.

[34] Vittinghoff E, McCulloch C. Relaxing the rule of ten events per variable in logistic and cox regression. American Journal of Epidemiology. 2007; 165(6): 710-718. PMid:17182981 http://dx.doi.org/10.1093/aje/kwk052