CRITICAL THINKING IN PATHOPHYSIOLOGY

Heather Swinney

*Eastern New Mexico University, **USA***

E-mail: Michael.Shaughnessy@enmu.edu

ABSTRACT

As failure to rescue and patient safety have been brought to the forefront of health care concerns, so has the awareness that a considerable number of graduate nurses are unable to critically think to make decisions about care and meet objectives (del Bueno, 2005 as cited by Lewis, 2017). There is an abundant amount of information regarding fostering critical thinking in nursing. However, it is evident that developing critical thinking is not enough. An understanding of pathophysiology is essential to success in nursing education. Therefore, it is suggested that critical thinking be encouraged in pathophysiology, generally a prerequisite course, when the foundation for nursing education is being established instead of to waiting to promote critical thinking in nursing curriculum. Additionally, several learning strategies suggestive to promote critical thinking are reviewed.

Keywords: *Critical Thinking, Pathophysiology, Nursing Education*

"Thinking is skilled work. It is not true that we are naturally endowed with the ability to think clearly and logically- without learning how, or without practicing."
A.E. Mander

INTRODUCTION

One concept apparent in education is the desire to help students critically think. Fostering critical thinking in students has been an objective frequently discussed throughout educational literature. Nursing education is no different. Nursing education is confronted with the ongoing challenge of preparing students for a profession that will remain in a constant state of change. The ability to adapt to changes is reliant on the ability to critically think (Webster, 2018). Vildirim, Ozkahraman, and Karabudak (2011) liken critical thinking to the old adage of feeding a man a fish, he eats for one meal; if you teach a man to fish, he feeds

himself for a lifetime. If you merely give students information, they are limited in their ability to think, whereas you teach them to think for themselves, and they will have the skills and abilities to interpret, analyze, and evaluate information to make decisions.

According to Webster (2018) the concern with critical thinking is not that future health care professionals are expected to critically think, rather the integration of critical thinking in educational programs is providing students with the necessary foundation. Even though nursing education fosters critical thinking skills with the expectation of newly graduated nurses to critically think, most employers are finding that graduate nurses are unable to critical think or problem solve (Vildirim et al., 2011). Success in nursing curriculum is dependent on an understanding of pathophysiology, as pathophysiology lays a foundational framework in which nursing knowledge is built on. For this reason, it is recommended that critical thinking be promoted in pathophysiology to further the development of critical thinking and understanding in nursing education. The intent of this paper is to identify what critical thinking is, identify the correlation of pathophysiology to nursing education, in addition to providing suggestions for how to promote critical thinking in pathophysiology.

What is critical thinking?

Before addressing the relationship between pathophysiology and critical thinking or how to promote critical thinking, critical thinking must be defined. Although the concept of critical thinking is well known in educational literature, there is no definitive definition outlining what critical thinking is. Instead a vast array of definitions for the concept exists, however no single definition is collectively used. Some describe critical thinking as a mental process that includes perception, analysis, synthesis, and the evaluation of information to guide an action (Scriven & Paul, n.d. as cited by Papathanasiou, Kleisiaris, Fradelos, Kakou, & Kourkouta, 2014). Furthermore, another consideration of critical thinking presents the process as the analysis of information to judge the merit of its claims (Finn, 2011 as cited by Cooper, 2014). Dias, David, and Vargens (2016), acknowledge that critical thinking is unlike everyday thinking in that critical thinking is based on scientific principles, and method. Very basically, critical thinking is the ability to make a decision based on information gathered in addition to experience (Reilly & Williams, 2017). As a result of a collaborative effort, Delphi Expert Consensus developed a comprehensive definition of critical thinking which states, "Critical thinking is purposeful, self-regulatory judgment which results in interpretation, analysis, evaluation, and inference, as well as an explanation of the evidential, conceptual, methodological consideration upon which that judgment is based…" (Facione, 1990, p. 3 as cited by Webster, 2018).

Why is critical thinking needed in nursing education?

Being able to think critically enables a nurse to take into consideration the circumstances and preferences of the patient, the uncertainty of the situation, and provides the ability to consider alternatives, and contemplatively think to meet patient needs (Benner, Hughes, & Sutphen, 2008). Nurses, even newly graduated nurses, are responsible for a substantial amount of the judgments and decisions that are often complex and focused on meeting diverse patient needs (Levett-Jones et al., 2010). Additionally, it is essential that graduate nurses can critically think in order to make decisions about care, and prevent adverse outcomes. However, less than half of all newly graduated registered nurses were able to meet this objective (del Bueno, 2005 as cited by Lewis, 2017). According to Carvalho, Oliveira-Kumakura, and Morais (2017), "The efficiency of health care is highly dependent on an adequate analysis and synthesis of clinical data and on the quality of the decisions involving risk and benefits of diagnostic tests and treatments" (p. 663).

Shields, Purcell, and Watson (2011) propose that the deterioration of critical thinking in nursing is related to the lowering of standards which often includes the removal of science courses in nursing curriculum. Other literature considers that due to the prevalence of teacher-centered learning focused on providing information, students are ill equipped to problem solve and reason which ultimately affects their practice as a graduate (Kowalcyk, Hackworth, & Case-Smith, 2012). Lack of critical thinking in nurses can lead to failure to rescue, which is essentially is the failure to recognize and address developing complications (Herron, 2017; Mushta, Rush, Anderson, 2017). del Bueno (2005) posits that a probable cause of failure to rescue is related to the lack of application of knowledge in the nursing education curriculum. Additionally, it is suggested that time and continuing education support the development of critical thinking (Zarifsanaiey, Amini, & Saadat, 2016). Due to the crucial importance that critical thinking has in nursing, and the fact that skills take time to master it is suggested that critical thinking should start early in education (Chan, 2013). It is evident that critical thinking in nursing education is not enough.

How does Pathophysiology affect nursing education?

Pathophysiology is the study of conditions that occur as a result of deviations from normal physiological processes (Story, 2015; Saleh, Asi, & Hamed, 2013). Pathophysiology is often a prerequisite course for students pursuing degrees in healthcare related fields like nursing. Comprehension of pathophysiology is essential for students pursuing careers in healthcare as it serves as a foundation in which health related knowledge is constructed upon (Saleh et al., 2013). This fact is reinforced by the American Physiological Society (APS), who supports the teaching of physiology at all levels of education, however identifies undergraduate

physiology education imperative to the development of the "physiology pipeline" that prepares students for successful entry into health science professional programs (Henriksen, Atwater, Delamere, & Dantzler, 2010).

Literature findings indicate that completion of a pathophysiology course is a positive predictor for passing nursing certification examinations, both for undergraduate and graduate nursing students (Silbert-Flagg, Adams, Fava-Hochuli, Budhathoki, & Jordan, 2018). Conversely, Chen et al. (2015) found that even after a semester of a traditional pathophysiology course consisting of lecture and lab manual exercises students were unable to correctly explain pathophysiological processes. This lack of physiological understanding could contribute to the lack of critical thinking in graduate nurses. Without the understanding of a given condition, proper interventions and treatment cannot be provided. Rischer (2018) supports this assumption by suggesting that clinical reasoning and nursing priorities cannot be correctly executed without a proper understanding of pathophysiology. However, Chen et al. (2015) found that with the implementation of student-centered learning activities in a pathophysiology course, students had to think critically and solve problems, thereby retention and comprehension of the information was significantly improved. Additionally, Kowalczyk et al. (2012) proposes that critical thinking is most effective when rooted into subjects previously encountered. Using this conception, if critical thinking regarding conditions was perpetuated in pathophysiology critical thinking in nursing would be more effective. Due to the demand for critical thinking in nursing education as well as the foundational role that pathophysiology provides for nursing education it is apparent that a greater focus should be placed on critical thinking in pathophysiology to improve critical thinking in nursing education.

How can critical thinking be promoted?

A review of literature provided meagre resources regarding critical thinking specific to its promotion in pathophysiology. Therefore, literature reviewed was not limited to critical thinking in pathophysiology, but the promotion of critical thinking in nursing and other allied health professions was included. Of the literature reviewed, student-centered learning activities and active learning strategies were the most prevalently mentioned in fostering the development of critical thinking. However, of the research reviewed a large amount remains unsupported by evidence in part due to the lack of universal definition, and meaning of critical thinking in addition to the lack of appropriate tools applicable to nursing that test critical thinking skills. Furthermore, the educator paradigm is still shifting from knowledge disseminator to knowledge facilitator resulting in educators experimenting with techniques to engage students. Some of these activities and strategies will be reviewed in this paper in order to provide

suggestions for application to pathophysiology to promote critical thinking as a student's ability to critically think is fostered in the classroom (Kowalczyk et al., 2012).

MODELING

Before delving into student-centered learning strategies a vital thought must be addressed. Paul and Elder (2014) propose that students may not be aware of what critical thinking looks like. Additionally, student's lack of cognizance and foundational underpinning of critical thinking posed as an impediment to critical thinking (Chan, 2013). In nursing education a student would not be expected to perform a nursing skill without instruction, therefore critical thinking should not occur without instruction. Furthermore, educators who were not critical thinking themselves could not effectively facilitate critical thinking (Mangena & Chabeli, 2005 as cited by Chan, 2013). In pathophysiology, educators must explicitly role model critical thinking with the intention of emphasizing how to critical think so that students may identify what is expected and begin thinking critically.

CASE STUDIES

One of the discussed probable causes of deficient critical thinking in nursing was the lack of application of knowledge in the nursing curriculum (del Bueno, 2005). Therefore, activities directed at allowing students to apply knowledge acquired in pathophysiology can promote critical thinking that can be further be developed with the nursing curriculum. Benner et al. (2008) suggests that in order for critical thinking to occur, one must have a knowledge base in which they are able to reason and analyze and evaluate evidence. Moreover, experience has the benefits of enhancing decision making abilities, decreasing decisional errors, assists in proper identification of cues, and promotes recognition and action based on information (Benner et al, 2008). A learning activity that enables students to practice cognitive skills to cultivate critical thinking is case studies (Nelson, 2017). Case studies promote development of critical thinking skills by providing students with the opportunity to interpret data or information and apply knowledge that will help identify outcomes and visualize possible solutions (Chan, 2013; Nelson, 2017; Popil, 2011). Case studies provide students will real life situations they may face in their prospective careers (Popil, 2011; Saleh, Asi, & Hamed, 2013). Additionally, case studies allow students to concede that the information learned and applied in pathophysiology will be useful in their potential career (Paul & Elder, 2014).

QUESTIONING

Questioning is another strategy employed to foster critical thinking (Chan, 2013). Paul and Elder (2007) describe critical thinking as the development of an "inner voice of reason" and Socratic questioning as the means to develop the inner voice. One form of questioning used to promote critical thinking is Socratic questioning. The focus of Socratic teaching is to ask probing questions to encourage deeper thinking instead of giving students answers (Paul & Elder, 2014). Socratic questioning is suggested to incite critical thinking through its focus on higher orders of Bloom's taxonomy such as analyzing, evaluating, and creating (Oyler & Romanelli, 2014). Questions focused on the higher orders of Bloom's taxonomy have been found to facilitate student identification of connections between previous learning experiences and new material to promote retention and transfer (Nappi, 2017). In addition to analysis, the discrimination of information, transfer of knowledge, and use of logical reasoning engaged to answer Socratic questions strengthens critical thinking abilities (Nelson, 2017).

Rischer (2018) a nurse educator, proposes that through questions an educator can assist students in the contextualization of information necessary for practice. For instance, asking students how they would define and describe the pathophysiology of a condition in their own words allows students to recognize their own understanding. Furthermore, additional questions are provided allowing students to build on their understanding. For example, a student may be asked what body systems are affected by the condition, or what assessment findings would be expected for the condition. Utilizing questioning as a learning technique promotes a better understanding of information as well as helps identify connections between information. Using questioning can help students correlate concepts in pathophysiology to other classes such as anatomy and physiology. Conversely, this learning strategy could be used in nursing education to assist in correlating pathophysiology to nursing concepts.

GAMING

Despite pathophysiology being foundational to nursing education, it is often a difficult subject to master and engage students in. Gaming is an active learning strategy that can enhance critical thinking, allow for the application of knowledge, in addition to engaging students. According to Royse and Newton (2007) some of the benefits of using gaming in education are that it promotes active learning, encourages critical thinking, increases motivation, and can allow for the application of knowledge. Upon a review of the literature a few games were identified as being utilized in pathophysiology pedagogy. One application of

gaming in pathophysiology is through the utilization of an escape room concept applied to case studies. Instead of getting out of a room, students are trying to get into a locked box secured by various locks. As the students work through each part of the case study they are given a piece of information, provided a puzzle, or a prop such as a triage sheet that once viewed or completed permits students access to more information to help solve the case study (Monaghan & Nicholson, 2017). Through this activity, students have to analyze information, identify causes for the issue, and determine their assumption of what the condition is and why. Moreover, debriefing after the activity allows for more discussion over pathophysiology concepts involved.

A pilot gaming strategy reviewed was "Promote your favorite organ", where students were able to pick their favorite organ and each week develop a creative presentation over their organ that related to some pathophysiologic process of the chosen organ and the topic of the week (Weiss, 2018). Presentations included were poems, songs, raps, and cartoons (Weiss, 2018). The use of a puzzle to teach the cardiac cycle was another reviewed gaming strategy. After a lecture on the cardiac cycle, students were given a checkerboard and pieces of the cardiac cycle to assemble. If the pieces were not organized correctly, educators would provide guided questions to help students determine how to correct their boards. According to Marcondes et al. (2015) over 60% of the students found this activity contributory to their understanding of the cardiac cycle. This activity promoted a better understanding of the cardiac cycle and clarified any student misconceptions (Marcondes et al., 2015).

ROLE PLAY

Similar to gaming, role play is an active learning strategy that engages students in their learning. When students are able to participate in learning and processing of information in meaningful ways their role shifts from passive consumers of information to active producers of knowledge (King 1993; Neary, 2010 as cited by Stevens 2015). In addition to a deeper understanding of content, role play encourages communication and collaboration amongst students (Stevens, 2015). Role play has largely been utilized in simulation where students act out a part. However, the concept of role play can be applied to pathophysiology. Berger (2008) used role play to supplement lecture over endocrinology pathophysiology. Students in groups were assigned a gland and had use role play to demonstration why their assigned gland was the most important while including the normal function, hormones produced and their actions, in addition to the manifestations and causes of hypo function and hyperfunction of the gland (Berger, 2008). Students were creative in their demonstrations including a court case with the

pancreas on trial, a eulogy for the thyroid, and America's Next Top Gland (Berger, 2008). A large majority of the students indicated that the activity was enjoyable and was helpful in their understanding of the glands (Berger, 2008). In order to participate in this activity students had to gain an understanding of the function of the gland and its hormones in order to apply the information creatively.

CONCLUSION

In understanding the impact critical thinking has on student success, and ultimately the professional abilities of an individual, it is important to examine ways to improve critical thinking. This paper explored critical thinking and its relevance, and why critical thinking should be promoted in pathophysiology. Additionally, learning strategies were discussed that could be applied to the teaching of pathophysiology to encourage a deeper understanding. Applying critical thinking to pathophysiology helps address the demand for critical thinking in nurses. Thinking critically in pathophysiology allows for the foundation to be laid in which nursing education will be built upon. By understanding what is occurring in the body, students can effectively analyze information to make decisions regarding interventions and outcomes. The extra time and experience provided through establishing critical thinking skills in pathophysiology could ultimately translate into improved professional outcomes as nurses who are able to critically think are able to work efficiently and prevent adverse outcomes. As the educational paradigm shifts to a more facilitator of learning focus educators, it is up to educators to create learning environments conducive for students to develop critical thinking skills. Educators have the opportunity to foster critical thinking behaviors through the introduction of modelling and learning activities geared to develop critical thinking in pathophysiology in order to provide critical thinking scaffolding for students in future nursing education programs. If we expect graduate nurses to think like nurses, we have to start teaching them how to think before they become nurses.

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