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Exploring the oxygen supply and demand framework as a learning tool in undergraduate nursing education

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ABSTRACT

In nursing education, physiological concepts are typically presented within a body 'systems' framework yet learners are often challenged to apply this knowledge in the holistic and functional manner needed for effective clinical decision-making and safe patient care. A nursing faculty addressed this learning challenge by developing an advanced organizer as a conceptual and integrative learning tool to support learners in diverse learning environments and practice settings. A mixed methods research study was conducted that explored the effectiveness of the Oxygen Supply and Demand Framework as a learning tool in undergraduate nursing education. A pretest/post-test assessment and reflective journal were used to gather data. Findings indicated the Oxygen Supply and Demand Framework guided the development of pattern recognition and thinking processes and supported knowledge development, knowledge application and clinical decision-making. The Oxygen Supply and Demand Framework supports undergraduate students learning to provide safe and effective nursing care.

1. Introduction

In nursing education, teaching and learning of physiological concepts has traditionally been framed within body 'systems'. This approach not only obscures the interrelationships between concepts but also fails to connect this information to the larger context of nursing practice. As a result, learners are often challenged to apply physiological knowledge in a holistic and functional manner required for effective clinical decision-making and patient care. In response to this challenge, a nursing faculty developed a concept map: the Oxygen Supply and Demand Framework (Shackell and Gillespie, 2009).

2. Background

Fragmentation of knowledge in curricula and learning (Dikieson et al., 2008; Huber et al., 2007; McGrath, 2015; Tanner, 2006), as well as the effects of a knowledge explosion (Giddens and Brady, 2007), have been identified as points of concern. As constructivist approaches, integrative and conceptual learning approaches have been proposed as potential solutions to these concerns (Giddens, 2007; McGrath, 2015). Integrative teaching and learning is purported to develop learners' ability "to make, recognize and evaluate connections among disparate concepts" (Huber et al., 2007, p. 46), support knowledge integration (Schwendimann, 2011), and connect learning in one domain (e.g. classroom) to learning in a different domain (e.g. practice) (Richards-Schuster et al., 2014). It is proposed as an essential ingredient for transforming undergraduate nursing education (Benner et al., 2010). Conceptual learning focuses on organizing information in the same way that the mind "organizes facts into ideas" (Giddens, 2007, p. 4). Within conceptual learning approaches, learners build from an accurate understanding of specific anchoring concepts in order to construct new knowledge and achieve meaningful learning (Erickson, 2007).

Concept maps have been noted to support conceptual learning (Giddens et al., 2015), integration of interrelated concepts (Schwendimann, 2011), and meaningful learning (Ausubel, 1960; Pilcher, 2011). Concept maps serve as tools to facilitate holistic organization and synthesis of information. They assist learners to organize and analyze data, validate existing knowledge, establish connections between ideas, and synthesize new knowledge to form a deeper understanding of the whole (Conceicao and Taylor, 2007; Hunter Revell, 2012; Novak, 1991; Pilcher, 2011). When used as an advanced organizer, a concept map builds from familiar foundational concepts, makes explicit the relationships between concepts,

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and provides learners with a structure into which newer, progressively more differentiated concepts can be integrated (Atomatofa, 2013; Cutrer et al., 2011; Nesbit and Adesope, 2006).

The Oxygen Supply and Demand Framework (Fig. 1) is a concept map (Shackell and Gillespie, 2009) that acts as an advanced organizer. It was created by nursing faculty in response to challenges experienced by nurses and nursing students in developing a functional understanding of physiological nursing knowledge that supports effective clinical judgment and safe patient care. The Framework incorporates key physiological concepts that influence the balance between cellular oxygen supply and demand. The functional relevance of oxygen supply and demand balance is indicated under the balance point as end-organ perfusion and cellular oxygenation. The main components (oxygen supply and oxygen demand) are linked to their determinants and influencing factors, making explicit the interrelationships between all concepts and highlighting their complex contributions to oxygen supply and demand balance (Shackell and Gillespie, 2009).

The Framework is intended to support learners' knowledge development and integration, thinking processes and clinical decision-making. By presenting relevant physiological concepts in an explicit and integrated format, the Framework supports learners in identifying and understanding connections among concepts, patient data, and associated nursing actions in patient cases. The Framework has been used in several post-basic specialty nursing programs with positive anecdotal feedback from learners, registered nurses and educators (Gillespie and Shackell, 2009).

To substantiate anecdotal evidence, Gillespie and Shackell (2014) completed a mixed methods research study exploring the effectiveness of the Framework as an educational tool for Registered Nurses (RNs) learning to provide nursing care for acutely ill patients. Study findings indicated that the Framework supported nurses' development of physiologic knowledge and understanding of patients' clinical presentation, as well as their thinking processes and clinical decision-making. Further, participants' reflective journals presented the Framework as a positive influence on nurse agency and patient advocacy, and on their communication within the healthcare team, thus highlighting its potential to enhance nursing practice, patient safety and quality of patient care. In order to understand the effectiveness of the Framework as an educational tool with other learners, the authors repeated the previous study in the undergraduate nursing student population.

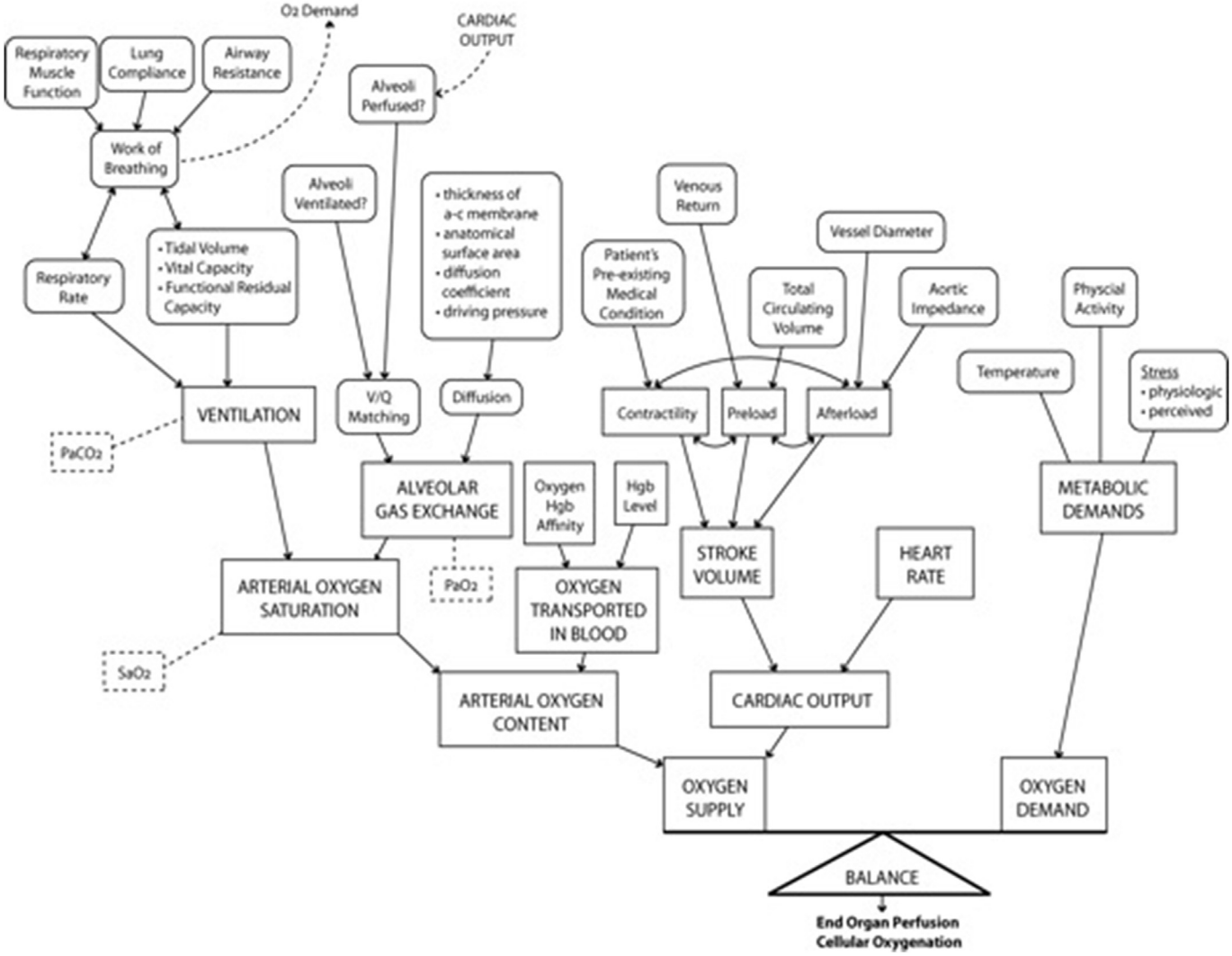

Fig. 1. Oxygen supply and demand framework.
Shackell and Gillespie (2009).