

Assessing progression of clinical reasoning through virtual patients: An exploratory study



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ABSTRACT

To avoid test-driven learning, there have been discussions regarding the use of more formative assessments in health care education to promote students' deep learning. Feedback is important in formative assessment, but many students ignore it; therefore, interventions should be introduced which stimulate them to reflect on the new knowledge.

The aim for this study was to explore if Virtual Patient (VP)-based formative assessments, in connection with self-evaluations, had an impact on postgraduate pediatric nursing students' development of clinical reasoning abilities. Students' self-evaluations served as the basis for measuring progress. Data was analysed using deductive content analysis.

The findings showed a clear progression of the clinical reasoning ability of the students. After the first assessment, the students described feelings of *uncertainty* and that their knowledge gaps were exposed. At the mid-course assessment the awareness of improved clinical reasoning was obvious and the students were *more certain* of knowing how to solve the VP cases. In the final assessment, *self-efficacy* was expressed.

VP-based assessments, in connection with self-evaluations, early in the education resulted in a gain of students' own identification of the concept of clinical reasoning, awareness of what to focus on during clinical practice and visualised expected clinical competence.

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Introduction

This study focuses on postgraduate pediatric nurse students' development of clinical reasoning ability through Virtual Patient (VP) cases in three formative assessments during the first semester in their one year education. Clinical reasoning is a central skill in nursing and has been defined as “the cognitive processes and strategies that nurses use to understand the significance of patient data, to identify and diagnose actual or potential patient problems, to make clinical decisions to assist in problem resolution, and to achieve positive patient outcomes” (Fonteyn and Ritter, 2008, p. 236). In Sweden, before applying for postgraduate Diploma in Specialist Nursing Pediatric care (60 higher education credits

[ECTS]) the students need to have a bachelor's degree in nursing (180 ECTS, three years) and most universities also require registered nurse (RN) experience for at least one year before admission (Ohlén et al., 2011). The postgraduate pediatric nurse educational program includes learning goals such as showing clinical reasoning skills and ability in pediatric care. However, teaching the complexity of clinical reasoning and making it visible for the students is difficult (Delany and Golding, 2014) and measuring these skills in a resource- and cost-efficient manner, as well as following students' development over time, can also be challenging.

Background

Previous studies (Botezatu et al., 2010; Fischer et al., 2005; Forsberg et al., 2011, 2014, 2015) have demonstrated that VPs can be used for assessing clinical reasoning skills. VPs are computer-based simulations of real-life clinical scenarios and are used in different health-care education programs (Ellaway et al., 2008) to train and evaluate clinical reasoning ability. Students can for

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example be offered to encounter a range of (virtual) patient cases that they do not meet in the clinical ward. Most VP systems have common features including an introduction to the case, interview questions, physical examinations, laboratory/imaging tests and possibilities for suggesting diagnosis and treatments, as well as providing feedback to the learner. VP systems are focused on clinical reasoning and could be used as learning activities for developing these skills and for assessment of clinical reasoning ability (Cook and Triola, 2009).

A commonly used expression in this context is that assessment drives learning, but not always in a positive way (Al-Kadri et al., 2012). Assessments should be a learning opportunity. Therefore, discussions on the use of more formative assessment models in health care education have been initiated. Formative assessments may contribute to and stimulate students' deep learning compared to summative assessments (which are more linked to superficial learning) (Al-Kadri et al., 2012). Summative assessments have had a strong focus on assessing whether the student is passing or failing, instead of focusing on whether the tests are beneficial for learning (Koh, 2008).

Today students are expected to take greater responsibility for their own learning. In the late 1970s the University of Maastricht developed progress tests with the purpose of following students' progress over time. The idea of the test was that the students should be assessed as a way to motivate them to study, as opposed to studying for exams. Through the progress test the students received information if they had achieved expected competence, and indicated the area in which they needed to study more. Progress tests seem to provide good opportunities to monitor students' development of knowledge and the key concept is that the test should describe progress (Schuwirth and van der Vleuten, 2012).

Moreover, feedback is important in formative assessments but research show that students ignore much of it, and it seems that some form of intervention is needed to force student to take consideration to the feedback information (Kluger and DeNisi, 1996; van der Vleuten et al., 2010).

The aim for this study was to explore if VP-based formative assessments, in connection with self-evaluations, had an impact on postgraduate pediatric nursing students' development of clinical reasoning abilities and the learners' discovery of their progression.

Research design

The study has a descriptive, qualitative design. The design of the study and the design of the self-evaluations were inspired by Kolb's learning cycle model (Kolb, 1984). Kolb's model described the learning process, which can act as an aid to understand the learning process. In this study the focus is on the process of developing clinical reasoning skills through the use of VPs. The students are actively working with the VP cases and are thus stimulated to achieve an improved clinical reasoning ability, which is in accordance with Kolb's model (Fig. 1).

In the first step the students undergo a concrete experience that forms the basis for further learning. The *Concrete Experience* in this study is based on students' performance in the formative VP-based assessments. In the next step, using the self-evaluation questionnaires, the students reflect upon the concrete experience (*Critical Reflection*) and the proposed solution to the patient case in the feedback section of the VP system. Through reflection the immediate understanding of the first step is processed and related to students' previous cognitive structures. Reflection means that the student can gain actual experience in a deeper way so that they can formulate an understanding of abstract concepts – the third step, *Abstract Conceptualisation* (concluding/learning from the experience). This deep understanding forms the basis for solving

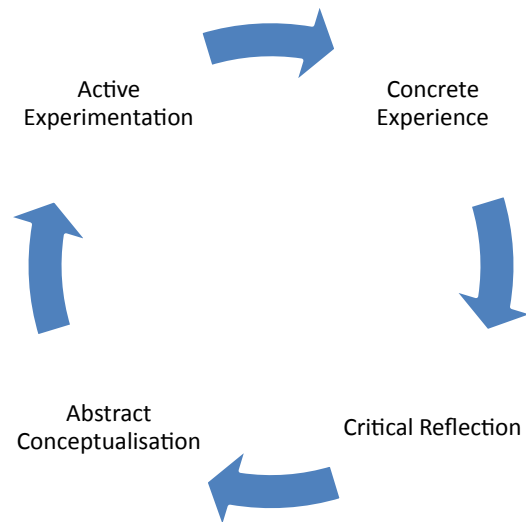


Fig. 1. Kolb's model of learning cycle.

problems (patient related issues) or making decisions. In the last step, *Action and Experiment* (planning/trying out what you have learned) the students are testing the inferences that the deep understanding has given rise to.

The VP-system Web-SP (Web-based Simulation of Patients) was used for the formative assessments. Web-SP was initially developed at Karolinska Institutet (Zary et al., 2006) and used worldwide at several universities in health care educations. After completing a case in Web-SP, the learners receive feedback on what they should have done and what they might have missed, which can stimulate reflection.

Data collection

Data was collected during the period February–June 2013. One class with fourteen pediatric nurse students in postgraduate pediatric nursing care education participated in the study. The informants were all females, and the group had a median age of 29, while the range of ages was 25–45. Before being accepted for the postgraduate pediatric nurse education three of them had worked as nurses in neonatal intensive care, five in pediatric care, and six of them had work experience as nurses in adult care.

During the first semester of the year-long program, the pediatric nurse students performed three formative VP-based assessments. Before the first assessment they received verbal and written information about the formative assessments, the VP system, the self-evaluations and the definition of clinical reasoning. The students also had access to practice VP cases before the assessments, to become acquainted with Web-SP. At a specific day and time, and with a maximum 3 h allowable, the students could choose to perform the assessment at the university or at home.

In order to explore if formative VP-based assessments had an impact on the development of clinical reasoning abilities, the postgraduate pediatric nurse students completed self-evaluations in connection with their work with the VP cases in Web-SP.

The questionnaire asked four questions:

1. What was your learning experience of the completed VP cases? Describe what you perceived as especially difficult, important or interesting?
2. Did you feel confident or uncertain in your clinical reasoning while working with the VP cases?

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