

## Clinical reasoning in nursing, a think-aloud study using virtual patients – A base for an innovative assessment



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### SUMMARY

In health-care education, it is important to assess the competencies that are essential for the professional role. To develop clinical reasoning skills is crucial for nursing practice and therefore an important learning outcome in nursing education programmes. Virtual patients (VPs) are interactive computer simulations of real-life clinical scenarios and have been suggested for use not only for learning, but also for assessment of clinical reasoning. The aim of this study was to investigate how experienced paediatric nurses reason regarding complex VP cases and how they make clinical decisions. The study was also aimed to give information about possible issues that should be assessed in clinical reasoning exams for post-graduate students in diploma specialist paediatric nursing education.

The information from this study is believed to be of high value when developing scoring and grading models for a VP-based examination for the specialist diploma in paediatric nursing education.

Using the think-aloud method, data were collected from 30 RNs working in Swedish paediatric departments, and child or school health-care centres. Content analysis was used to analyse the data.

The results indicate that experienced nurses try to consolidate their *hypotheses* by seeing a pattern and judging the value of signs, symptoms, physical examinations, laboratory tests and radiology. They show high *specific competence* but earlier *experience* of similar cases was also of importance for the decision making. The nurses thought it was an innovative assessment focusing on clinical reasoning and clinical decision making. They thought it was an enjoyable way to be assessed and that all three main issues could be assessed using VPs.

In conclusion, VPs seem to be a possible model for assessing the clinical reasoning process and clinical decision making, but how to score and grade such exams needs further research.

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### Introduction

This study is exploring clinically experienced paediatric nurses' clinical reasoning processes through Virtual patients. Today's health care necessitates the effective use of clinical reasoning, and especially so for complex care situations. The clinical reasoning process is dependent on critical thinking approach and is influenced by attitudes and philosophical perspectives (McCarthy, 2003). Problem solving and communication skills are considered as key components of nursing practice, education and knowledge (Smith Higuchi and Donald, 2002).

Fonteyn and Ritter (2008) argue that nurses' clinical reasoning can be defined as the cognitive processes and strategies used to understand the significance of patient data, as well as to identify and diagnose patient problems. The ability to make clinical decisions is important to achieve positive patient outcomes.

For clinical reasoning, components such as domain-specific knowledge, experience and intuition are essential (Banning, 2008; Simmons et al., 2003). In order to make clinical decisions, nurses need to combine knowledge and experience with collection of data about the patient's situation (Carnevali, 1996). Nurses use thinking strategies like pattern recognition, judging values, providing explanations, forming relationships and drawing conclusions to facilitate clinical reasoning (Simmons et al., 2003; Smith Higuchi and Donald, 2002).

In Sweden, the bachelor's degree in nursing runs for three years (180 higher education credits). Before applying for postgraduate Diploma in Specialist Nursing Paediatric care (60 higher education credits [ECTS], one year), most universities require experience as a registered nurse (RN) for at least six months (Ohlén et al., 2011). The educational program includes learning goals such as shown developed skills and ability to clinical reasoning in paediatric care. This is difficult to assess using traditional methods and today, effective assessment methods of these skills are lacking.

Virtual patients (VPs) are interactive screen-based computer simulations of real-life clinical scenarios for the purpose of health-care and medical training, education or assessment (Ellaway et al., 2008). VPs

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simulate the encounter between a healthcare professional and a patient and most VP systems have common features including an introduction, taking a medical history, physical examinations and laboratory/imaging tests as well as features for suggesting appropriate diagnosis and treatments and a feedback section (Bergin and Fors, 2003; Zary et al., 2006). VPs have been suggested for use not only for learning, but also for assessment of clinical reasoning (Cook and Triola, 2009). The use of VPs for assessment is based on the fact that VP systems are focused on clinical reasoning and have the ability to track in detail every interaction of the user and use that for assessment. However, most previous studies have focused on medical education (Botezatu et al., 2010a,b; Courteille et al., 2008; Gesundheit et al., 2009; Round et al., 2009; Waldmann et al., 2008).

Web-SP (Web-based Simulation of Patients) is a virtual patient system used at several universities worldwide in health-care education and was initially developed at Karolinska Institutet (Zary et al., 2006). Since 2010, Web-SP has also contained a semi-automatic assessment module where the examiner is able to define required/recommended history questions, physical examinations and laboratory/imaging tests to score and grade student performance. However, those “recommended” actions are not visible to the students during the exam (Forsberg et al., 2011).

In health-care education, it is important to assess the competencies that are essential for the professional role, such as clinical reasoning and decision making, in order to prepare for future professional duties. Therefore an exam that intends to assess clinical competence need to among other issues be able to measure a student's ability for clinical reasoning. It is, however, important to note that a nurse needs to have competencies in many areas besides clinical reasoning, like manual skills, performing physical exam procedures etc.

Clinical competence can be described as being in the top of Miller's pyramid (the “does” level (Miller, 1990)). This means that a learner that master clinical reasoning really can perform (“do”) a thorough reasoning process to solve a patient case. However, to assess the total clinical competence, probably a workplace-based exam needs to be applied as indicated by Van der Vleuten et al. (2012). Therefore a VP-based exam can only be a part of a thorough exam to measure all aspects of clinical competence (Fig. 1).

When using VPs for assessment, the examiner can see which history questions, physical exams and laboratory/imaging tests the student has asked for, as well as the priority the student has given to the findings in his/her reasoning process. So a VP-based exam might show more of a student's clinical reasoning skills than a paper-based one (Forsberg et al., 2011). In the justification part of the diagnosis and treatment sections, students must show that they have understood what to do and can explain why they carry out their actions, as well as that they have integrated academic knowledge with the skills required for the profession and the clinical context (Mogensen et al., 2010). This is also possible to assess using VP-based exams, where the user is required to justify all his/her judgements.

A VP-based assessment of clinical reasoning for the diploma in specialist paediatric nursing care education must be based on the real

reasoning processes of experienced paediatric nurses. It is therefore of specific interest to understand the reasoning processes of clinically experienced paediatric nurses solving virtual patient-based cases.

## Aims

The primary aim of this study was to investigate how clinically experienced paediatric nurses through clinical reasoning solve complex VP-based paediatric cases and how they arrived in clinical decisions for the cases. The study was also aimed to give information about how clinical reasoning might be assessed in VP-based exams for post-graduate students in diploma specialist paediatric nursing education.

The information from this study is believed to be of high value when developing a future VP-based examination for the diploma in specialist paediatric nursing care education.

## Methods

### Design

A study with a qualitative descriptive design was set up. The think-aloud (TA) method (Newell and Simon, 1972), which is a method of describing cognitive processes using verbalization, was applied. In this study TA was used in terms of asking the RNs to loudly reveal their thoughts while they encountered and solved the VP cases. TA has proved useful in clinical reasoning research (Simmons et al., 2003).

### Sample

For paediatric nursing care, head nurses and advanced clinical teachers in paediatric wards were contacted. They received verbal information about the study and a cover letter was attached in an e-mail. The head nurses and teachers were asked to suggest appropriate informants and also to suggest a day and time for the experiments. For the child and school health-care centres, the nurses were contacted directly by telephone by the first author and they received the same information as above. If they were interested in participating in the study, they decided on a date, time and place. Inclusion criteria were RN with a Postgraduate Diploma in Specialist Nursing – Paediatric Care and that they had worked for at least one year after postgraduation. Purpose and convenience samples with intention of maximum variation in paediatric care were used. Thirty nurses from three neonatal intensive care wards ( $n = 10$ ), two emergency departments ( $n = 4$ ), four paediatric wards ( $n = 8$ ), three child health-care centres ( $n = 6$ ) and two school health-care centres ( $n = 2$ ) volunteered to participate in the study. The subjects were from five hospitals, three child health-care centres and two school health-care centres in Sweden.

All the participants were women with a median age of 41 years (range 29–55). They had been RNs for a median of 13.5 years (range 6–35) and had experience as paediatric nurses after their postgraduate exam for a median of 8 years (range 0–30). Due to illness and other issues, two nurses needed to be replaced during the sessions. Therefore two of the participating nurses had not had one year of experience since postgraduation. However, they had worked as RNs for 7–8 years and in paediatric wards for 3.5 and 7 years, respectively. In the TA session they were paired with a nurse who met the inclusion criteria.

### Instrument

Realistic VP cases representing different sub-disciplines in paediatrics were created by the first author and implemented in Web-SP. The cases were reviewed by a paediatrician and validated earlier in a pilot study for an assessment (Forsberg et al., 2011). The child and school health-care cases were created by the first author and later on validated by a lecturer in paediatric care. The VP cases in the study represented different patient ages, genders and family constructs.

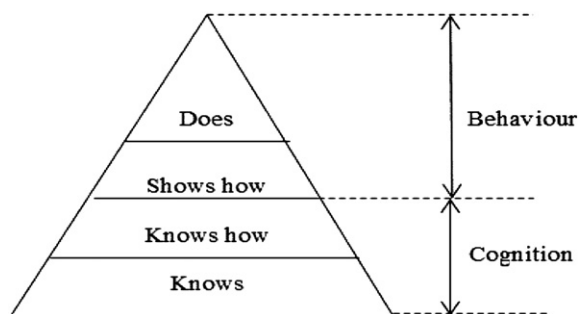


Fig. 1. Miller's pyramid (from Miller, 1990).

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