Original research

Assessing nursing students' knowledge and skills in performing venepuncture and inserting peripheral venous catheters

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ABSTRACT

Venepuncture and the insertion of peripheral venous catheters are common tasks in health care, and training in these procedures is included in nursing programmes. Evidence of nursing students' knowledge and skills in these procedures is limited. The main aim of this study was to assess nursing students' knowledge and skills when performing venepuncture and inserting peripheral venous catheters. Potential associations between level of knowledge and skills, self-training, self-efficacy, and demographic characteristics were also investigated. The assessment was performed by lecturers at a university college in Sweden using the two previously tested instruments "Assess Venepuncture" and "Assess Peripheral Venous Catheter Insertion". Between 81% and 100% of steps were carried out correctly by the students. The step with the highest rating was "Uses gloves", and lowest rating was 'Informs the patients about the possibility of obtaining local anaesthesia'. Significant correlations between degree of self-training and correct performance were found in the group of students who registered their self-training. No associations between demographic characteristics and correct performances were found. Assessing that students have achieved adequate levels of knowledge and skills in these procedures at different levels of the nursing education is of importance to prevent complications and support patient safety.

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1. Introduction

The procedures venepuncture and inserting a peripheral venous catheter are carried out in most health care settings and mostly are performed by registered nurses in Sweden. To carry out these procedures, according to evidence-based guidelines, adequate knowledge and skills are required to prevent complications and guarantee patient safety (O'Grady et al., 2011; Cicolini et al., 2013). To achieve the required and adequate level of competence, students need to learn and practice these procedures as well as be assessed. However, to our knowledge, published research regarding what knowledge and skills nursing students have in executing these tasks is limited.

2. Background

Nursing education in most countries, including Sweden, includes learning both academic and clinical skills. Academic skill emphasizes abilities such as critical thinking and having a scientific approach towards the care of patients. Examples of clinical skills include the ability to identify a patient's need of care, adopting a professional approach when communicating with patients, and practical technical skills (Higher Education Act, SFS, 1992:1434; Higher Education Ordinance, SFS, 1993:100; Bjørk and Kirkevold, 1999). Since nursing education in most European countries became part of the higher education system, constructive alignment, devised by John Biggs (Biggs, 1999), is widely used as a teaching and learning principal. This principle implies that intended learning outcomes, learning activities, and assessment tasks in a course or programme should be properly aligned. In the process of constructive alignment, it is emphasized that students construct and take responsibility for their own learning. What students should know and do is formulated in the intended learning

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outcomes and must be supported by correct use of learning activities and assessment tasks. The teacher's role is to create a learning environment that enhances students' motivation to learn, and to create assessments that mirror the learning outcomes and allow students to demonstrate their attainment of learning outcomes (Biggs, 1999; Biggs and Tang, 2007).

Assessment in the clinical context is often described as a complex task that is problematic due to difficulties in deciding what to assess, who should assess it, and issues around the lack of objective assessment methods (Watson et al., 2002). There is no clear consensus in how clinical assessment can best be achieved (Cant et al., 2013). However, it is important to ensure that students have the required knowledge and skills at the end of each course or programme. Methods of assessment can either be a result of a preceptors' observation of performances during the clinical practice period or based on tests related to clinical practice (Watson et al., 2002). An alternative is Objective Structured Clinical Examinations (OSCE), which were developed for the assessment of medical students but that are also used in nursing programmes (Rushford, 2007; Cant et al., 2013). OSCEs are performance-based assessments where students are observed demonstrating a multitude of clinical procedures (McWilliam and Botwinski, 2012). OSCEs are often performed at Clinical Skills and Simulation Centres at hospitals or universities equipped with simulator training. OSCE assessment has been found to have the advantage of objectivity, as trained observers use predetermined performance checklists (Cant et al., 2013).

Nursing students are required to master multiple task-related skills during their programme of education. Performing venepuncture and inserting a peripheral venous catheter for the administration of fluid or medication are very common tasks in health care settings. Patients who undergo venepuncture or the insertion of a peripheral venous catheter can often perceive considerable procedure-related pain and anxiety (Speirs et al., 2001). They can also be affected by complications such as bleeding, hematoma, infections, thrombophlebitis, and infiltration (Tagalakis et al., 2002; O'Grady et al., 2011). Besides different patient-related factors accounting for peripheral venous catheter related complications, insufficient knowledge of peripheral venous catheter management could also be a reason for this (Cicolini et al., 2013). However, literature on registered nurses' knowledge of venepuncture and peripheral venous catheter insertions is limited. Cicolini et al. (2013) call attention to the risk of knowledge deficits, and this is therefore of special interest in the education of nurses.

There are factors that are of importance for nursing students' success in terms of academic and clinical performance. However, factors that have impact on students' clinical performance are rarely investigated (Pitt et al., 2012). In two systematic reviews about nursing students' achievements in academic performance, it was reported that age does not impact negatively on performance (Pitt et al., 2012; Dante et al., 2013), but male students struggle to remain in nursing programmes (Pitt et al., 2012). Personal attributes, for example self-efficacy, i.e. students' belief in their own abilities to complete tasks and reach goals, seemed to correlate to academic performance (Pitt et al., 2012), and Lauder et al. (2008) found a moderate positive correlation between self-efficacy and self-reported competence. Furthermore, students who taking care of family members or working extra (paid work) during the nursing education were factors found to influence studies negatively (Pitt et al., 2012; Dante et al., 2013).

There is, however, a lack of studies that scrutinize the impact of different demographic factors on clinical performance (Pitt et al., 2012). Deeper knowledge about predictors of clinical performance is clearly needed in order to improve the support individual students need to reach required clinical learning objectives.

The main aim of this study was to assess nursing students' knowledge and skills regarding performing venepuncture and inserting a peripheral venous catheter. An additional aim was to investigate possible associations between students' levels of knowledge and skills in these procedures and self-training, self-efficacy, and demographic characteristics.

3. Methods

The present study has a descriptive correlational design with quantitative data from lecturers' assessments of nursing students' knowledge and skills when performing venepuncture and inserting a peripheral venous catheter as well as data from questionnaires that were distributed to the participants. The study was carried out at a university college in Sweden, where participating students were studying the course Medical Surgical Nursing Care, which takes place during the third semester (second year) of the students' nursing programme. The nine-week course includes clinical practice and theoretical sessions (Fig. 1).

3.1. Participants

A total of 230 students were approached and 209 (91%) participated in the study. Twenty-one students were not included because they dropped out of the programme. Three student groups were consecutively included in 2009 and 2010. During the spring semester of 2009, 66 out of 66 students participated and in the autumn semester 63 out of 71. In 2010, 80 out of 93 students participated in the spring semester.

3.2. Instruments

3.2.1. Demographic questionnaire

A questionnaire including items on demographic characteristics such as age, sex, having children, extent of study allowances, working extra in addition to studying, and external funding was completed (Table 1).

3.2.2. Self-efficacy scale

Self-efficacy was measured by the Swedish version of the General Self-Efficacy Scale originally developed by Schwarzer and Jerusalem (1995). Examples of items are: No 1, "I can always manage to solve difficult problems if I try hard enough" and No 10, "No matter what comes my way, I am usually able to handle it". Items are rated on a four-point Likert scale (ranging from "not at all true" to "completely true"). A higher score indicates a higher level of self-efficacy. The Swedish version of the General Self-Efficacy Scale has revealed one single latent factor and high internal consistency (Löve et al., 2012). Means were calculated as the sum of all answers divided by the total number of items. The Cronbach's alpha value was calculated to estimate the internal consistency and showed a value of 0.87, which is considered as acceptable (Polit and Beck, 2011).

3.2.3. Registration form of self-training

A group of 51 students (one class) recorded occasions of self-training during clinical practice on hospitalized patients and/or on plastic mannequin arms at a Clinical Skills and Simulation Center, prior to the assessment occasion.

3.2.4. Assessment of knowledge and skills

To assess the knowledge and skills of participating students, two previously developed and validated tested instruments were used; Assessment of Venepuncture (Assess VP) and Assessment of Peripheral Venous Catheter Insertion (Assess PVC) (Ahlin et al., 2013),