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Evaluation Tools and Influencing Factors of Clinical Reasoning for Nursing Students

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ABSTRACT

The cultivation of clinical reasoning ability in nursing students is a hot topic of research among nursing educators worldwide. Only by fully understanding the concept of clinical reasoning, accurately assessing its level, and familiarizing themselves with its influencing factors, can nursing educators develop appropriate measures to cultivate and enhance the clinical reasoning ability of nursing students. Through literature review, this article found that there is no unified and clear concept of clinical reasoning internationally, but experts unanimously agree that the three basic conditions that should be met for conducting clinical reasoning are discipline-specific knowledge, multiple types of thinking, and reasoning skills. There are two main types of evaluation tools for nursing students' clinical reasoning ability: self-evaluation tools and peer evaluation tools. Both have their own advantages and disadvantages. The clinical reasoning ability of nursing students is not only influenced by their own factors such as professional knowledge, experience, and thinking patterns, but also by external factors such as teaching methods and teaching environment.

KEYWORDS

Clinical reasoning; Evaluation tool; Influencing factor

1. INTRODUCTION

The failure to identify and respond to patient deterioration is a global issue in the healthcare environment. In nursing education, it is crucial to cultivate the clinical reasoning ability to identify and respond to clinical deterioration. In recent years, academic committees and experts in many countries have proposed that clinical reasoning ability is the core competency that nursing students should possess when they graduate [1-3]. Understanding the concept, evaluation methods and influencing factors of clinical reasoning ability is a prerequisite for nursing educators to take measures to cultivate students' clinical reasoning ability.

2. THE CONCEPT OF CLINICAL REASONING

"Reasoning" is the process of deriving a conclusion from one or more known conditions. For a long time, clinical reasoning (CR) was applied only before physicians made decisions and was considered a cognitive process related to clinical decision making. In 1988 Jennifer cited clinical reasoning to the field of nursing and explained clinical reasoning as: the analytical process of making a nursing diagnosis. This set the stage for the use of clinical reasoning in nursing. Higgs reinterpreted the concept of clinical reasoning for nurses in 2000. He identified clinical reasoning as the cognitive processes and methods used by nurses to learn important information about patients, identify and

diagnose potential nursing problems, and make nursing decisions that result in positive patient responses. Susan argued that clinical reasoning should be viewed as the process of applying knowledge and experience to make decisions in a clinical setting [4]. Mohammadi et al. defined clinical reasoning of nursing student using a conceptual analysis [5]. They believed that the concept of clinical reasoning in nursing is a logical and extensive cognitive process established by integrating potential factors, including professional standards and system requirements. Complex and dynamic nature of clinical situations, meeting the needs and expectations of healthcare, and achieving the goals of nursing education all require discipline-specific knowledge, cognitive perception, critical thinking, learning experience, and students' intuitive abilities at a level not already experienced in this profession. In order to accurately perceive this situation, nursing students with clinical reasoning skills considered this topic, evaluated the validity of the documents, or tested hypotheses by reflecting on and inferring reality through holistic and recursive cognitive processes. In response to this situation, a nursing decision was made and the final approach was chosen. Afterwards, by reflecting on practice and rethinking the clinical reasoning process, nurses can gain new knowledge and develop novel and different perceptions [5].

In conclusion, the concept of CR is still in a constant state of development, and there is no clear definition. But scholars unanimously agree that it is a complex clinical decision-making process that involves discipline-specific knowledge, multiple types of thinking, and reasoning skills. The common attributes of clinical reasoning are gathering information, interpreting information, determining behavior, and using reflection [6].

3. THE EVALUATION TOOLS FOR CLINICAL REASONING

3.1. Nursing Students' Self-evaluation Tools for Clinical Reasoning

Liou developed the Nurses Clinical Reasoning Scale(NCRS) based on the Clinical Reasoning Model [7]. NCRS included 15 items using a Likert 5 point scale. The reliability and validity of the scale were good. Some researchers in Asia used it to evaluate the clinical reasoning ability of nursing students [8-9]. Koivisto JM developed the Clinical Reasoning Skills scale (CRSs) [10]. The CRSs was based on the Clinical Reasoning Cycle by Levett-Jones et al. It included six sub-scales(26 items): collecting information (5 items), processing information (5 items), identifying problems/issues (4 items), establishing goals (4 items), taking action (5 items), and evaluating outcomes (3 items). Items were rated on a 5-Likert scale. The Cronbach Alpha of the CRSs was 0.85~0.92. However, the author did not explain the validity of the scale. Alfayoumi developed a 26-item 5-point Likert type scale to measure students' contextual General CR Behavior [11]. Its areas included antecedents, processes, reasoning patterns, and consequences of CR. The scale has added two culturally sensitive items to reveal students' ability to handle patients or members of opposite sex families. Based on the reasoning theory of Professor Roth, the head of teacher education department of California State University, Seif et al. compiled the Self-Assessment of Clinical Reasoning and Reflection (SACRR) in 2013 [12]. Yu J. et al. translated the SACRR scale into Chinese version and tested its reliability and validity [13]. The scale included four factors: information systematization, problem analysis, truth seeking, and reflective ability. The research results showed that the scale had good reliability and validity, and was suitable for the evaluation of clinical reasoning ability of nursing students.

3.2. Tools and Methods for Teachers to Evaluate the Clinical Reasoning Ability of Nursing Students

Initially, instructors used direct clinical observation to evaluate nursing students’ CR. But clinical observation is often unstructured, biased, and has lower interrater reliability [6]. Through the continuous exploration of researchers, instructors' evaluation methods for clinical reasoning ability

of nursing students are gradually increasing, including Health Sciences Reasoning Test, Outcome Worksheets, Objective Structured Clinical Examination, CR Rubrics and Script Consistency Tests.

3.2.1. Health Sciences Reasoning Test (HSRT)

The HSRT which is a highly valid and reliable instrument used among health sciences students, is not a survey but a test. The test evaluates the CR skills of test-takers in eight sub-scales (analysis, interpretation, inference, evaluation, explanation, induction, deduction, and numeracy) for a total score ranging from 0 to 100 [14]. Although it can effectively evaluate students' knowledge reserves in a short time. However, students choose the correct answers in advance, which is contrary to the complicated and uncertain nursing clinical practice and is not enough to accurately, fully and systematically evaluate the clinical reasoning ability.

3.2.2. Outcome-Present state Test (OPT)

Pesut and Herman proposed the outcome-present state test (OPT) model, which provides students with a clinical reasoning tool for use in complex scenarios. It maps the relationships between the patient’s disease diagnosis and the related nursing issues [15].

3.2.3. Objective Structured Clinical Examination (OSCE)

OSCE can effectively evaluate the process of clinical reasoning of nursing students by directly observing their behaviors and skills in simulated clinical situations. However, the examination procedure is complicated and takes a long time, which brings some pressure to the candidates. Moreover, OSCE needs a lot of manpower, financial resources and material resources, so it is a little difficult to implement [2].

3.2.4. Clinical Reasoning Rubrics

According to different models or procedures, researchers have developed different rubric to measure the clinical reasoning ability of nursing students. A researcher in Korea developed a rubric of clinical reasoning skill through literature review and teacher consensus [16]. The rubric involved 4 stages: collecting data, diagnosing, prioritizing the problem, and planning. These stages directly related to the stages of the nursing process. The rubric described 3 levels of development for each stage, with a possible scoring range of 2 to 10. The validity of the rubric was determined through the review of three nursing teachers. Another Korean researcher Son also developed a rubric of clinical reasoning ability [3]. It was a criteria scale for evaluating students’ performance using Rubric’s key concepts, developed based on the four aspects of the Clinical Judgment Model proposed by Tanner, including noticing, interpreting, responding, and reflecting. It included ten evaluation elements. Each element for the qualitative performance was self evaluated on a 4-point Likert scale, with the total scores ranging from 10 to 40. The higher the total score, the higher the level of clinical reasoning ability. The Cronbach Alpha of this tool was 0.95. In 2023, Iran researchers [17] developed a clinical reasoning rubric based on the nursing process. A seven-step method was used for rubric development. There were eight rubric dimensions, and each dimension contains one phrase. This tool had good reliability and validity.

3.2.5. Script Consistency Tests (SCT)

Script consistency test was originally applied to the evaluation of clinical reasoning ability of medical students, and it was used in clinical medicine, pharmacy, anesthesiology, psychiatry, stomatology and so on. The domain has been effectively verified. At present, the application scope of script consistency test in medical field has been further expanded, covering the training and evaluation of medical students, resident training and continuing medical education. It plays an important role in clinical reasoning teaching and evaluation. The application of script consistency test in nursing field is late, and it is still in the initial stage. Since 2010, nursing educators in the United States, Canada, Britain, Australia, the Philippines and other countries have begun to try to use the script consistency test to cultivate and test the clinical reasoning ability of nursing students. And its effectiveness has

been studied in humanistic care, nursing management, pediatric nursing, clinical deterioration and drug treatment for the elderly [18-20]. In 2014, Dawson et al. developed a script consistency test case covering the humanistic care dimension unique to nursing specialty [16]. And it was used to evaluate nursing students. The results confirmed the reliability and effectiveness of script consistency test in measuring clinical reasoning of nursing students. It is believed that the script consistency test can clearly evaluate and distinguish the clinical reasoning ability of study groups and students. It is also proved that experience is the key factor to develop nursing clinical reasoning. This provides effective evidence for the application of script consistency test in nursing education.

4. THE INFLUENCE FACTORS OF CLINICAL REASONING

4.1. Intrinsic Factors

In the process of clinical reasoning, nursing students should possess three basic conditions: professional knowledge, experience, and formal or informal thinking methods [21]. Firstly, professional knowledge is a fundamental component of clinical reasoning. The richer the knowledge in the field of nursing, the more it can be applied to diagnose existing problems in advance. Then, based on the theoretical foundation and combined with the patient's situation, professional nursing diagnosis is made for the patient, and nursing measures are provided to reduce the occurrence of complications in the patient. Secondly, experience is necessary for developing the clinical reasoning and decision-making abilities of nursing students. When nursing students are able to distinguish and form long-term memories of similar care knowledge for patients, the time of cognitive processes will decrease with increasing experience. The traditional reasoning model based on experience is a cognitive process centered around student nurses. During this process, the student nurse continuously collects and integrates information to make nursing judgments. Research [22] showed that classroom CR experience was independently associated with students' CR clinical use. Thirdly, due to the complexity, urgency, and complexity of nursing work, sometimes in very special situations, nursing students/nurses may use informal thinking methods such as cognitive shortcuts to collect patient information. In addition, nursing students/nurses will also apply formal thinking methods such as induction and deduction. The accuracy of deductive diagnosis is higher than that of nursing diagnosis relying solely on knowledge or experience. Nursing students/nurses with good analytical, intervention, and deductive abilities will also increase the accuracy of diagnosis. In addition, the emotional intelligence, problem-solving ability, and academic self-efficacy [8] of nursing students are positively correlated with their clinical reasoning ability.

4.2. Extrinsic Factors

Teachers and learning environment are external factors that affect the development of clinical reasoning ability among nursing students. The reasoning ability of teachers and the teaching methods and strategies they adopt towards nursing students are closely related to the formation and development of nursing students' clinical reasoning ability. A simple to complex, step-by-step approach would be best suited to teaching clinical reasoning [23]. Besides, researchers found that students could develop clinical reasoning skills in a variety of hospital and community settings. And the students preferred the hospital setting [6]. Clinical practice culture was also independently associated with students' CR clinical use [22].

5. SUMMARY

Although there are many evaluation tools and methods for the clinical reasoning ability of nursing students, there is still no internationally recognized unified evaluation tool. The self-evaluation scale for clinical reasoning ability of nursing students is convenient to operate. However, some researchers

have suggested that the improvement of self-reported clinical reasoning ability does not spontaneously translate into improved clinical reasoning ability in the clinical environment [24], so it cannot guarantee an improvement in patient prognosis. However, the operation of teacher evaluation tools is relatively complex and has the disadvantage of being time-consuming and laborious. We think that clinical reasoning is a complex cognitive and thinking process that requires understanding both the internal perceptions of students and the objective evaluation of teachers. Only by combining these two can the clinical reasoning ability of nursing students be accurately evaluated. When nursing educators cultivate the clinical reasoning ability of nursing students, they should not only consider internal factors such as students' subject knowledge foundations and thinking styles, but also adopt appropriate teaching methods, while placing nursing students in a safe clinical environment or a simulated environment close to clinical practice.

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