



## Chinese version of the clinical learning environment comparison survey: Assessment of reliability and validity



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### ABSTRACT

**Background:** Simulation is recommended as a substitute for clinical practice among nursing students. No current guidelines exist regarding the accurate percentage of simulation hours versus clinical practice hours. Comparing simulation with clinical practice is needed so that both strategies can be optimally combined in nursing education. The 29-item Clinical Learning Environment Comparison Survey (CLECS) is validated to compare the traditional and simulated clinical environment in meeting nursing students' learning needs. This type of tool is not available in China.

**Objectives:** This study aimed to translate and test the psychometric properties of CLECS for Chinese undergraduate nursing students.

**Design:** This is a cross-sectional study.

**Settings:** Two nursing schools in Central and East China.

**Participants:** A total of 179 undergraduate nursing students who had participated in both traditional and high fidelity simulated clinical practice were recruited.

**Methods:** A standard procedure with forward translation, back translation, cultural adaptation and pilot testing was followed to test the Chinese CLECS (C-CLECS). An exploratory factor analysis was used to establish a modified factor structure of C-CLECS; a confirmatory factor analysis verified its construct validity. Reliability of the C-CLECS was estimated using the intraclass correlation coefficients (ICCs) and Cronbach's alpha coefficients.

**Results:** The exploratory factor analyses explained 61.43% and 60.11% of the total variances in traditional and simulated clinical environment. The proposed factor solution of the C-CLECS obtained satisfactory model fit and nesting model between two nursing schools. In the proposed model, ICCs were 0.61 and 0.93, and Cronbach's alpha coefficients were 0.75 and 0.95 in the traditional and simulated clinical environment.

**Conclusions:** The C-CLECS showed satisfactory reliability and validity among Chinese undergraduate nursing students. Further validation of the C-CLECS is needed in a more representative and larger sample. The C-CLECS should be further tested as an effective tool to compare the traditional and simulated clinical practice among Chinese nursing schools.

### 1. Introduction

Simulation is defined as activities that mimic the reality of a clinical environment to demonstrate treatment procedures, decision-making, and critical thinking through various techniques, with a goal of better understanding and managing the situation when it occurs in actual clinical practice (Jeffries and Rogers, 2012). Simulation is expected to fill the gap between classroom and clinical practice by providing authentic scenarios and opportunities for repetition (Cordi et al., 2012).

Previous studies have reported positive outcomes of simulation for gains in knowledge, psychomotor skills, self-efficacy, critical thinking, situation awareness, and perceived clinical satisfaction (Cant and Cooper, 2017). The National League of Nursing has advocated simulation as a necessary teaching approach to prepare students for the demanding roles of professional nursing (Zapko et al., 2018).

It is worth noting that clinical experiences with actual patients form the most important component of nursing clinical education. Simulation is inadequate to copy the complex traditional clinical

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environment with factors influencing students' perception such as clinical staff, patients and caregivers, and nurse mentors (Papp et al., 2003). Additionally, challenges exist in the use of simulation in current nursing education such as the diversity and discrepancies across different educational programs (Cant and Cooper, 2010) and the cost-effectiveness issue when increased funding, resource, and time allocation are required (Al-Ghareeb and Cooper, 2016; Gu et al., 2017).

Nursing schools are responsible for preparing undergraduate students who are qualified for entry-level clinical practice. Nursing educators frequently asked simulation experts how much clinical practice time could be replaced by simulation (Leighton, 2015). To answer this question, it is necessary to evaluate the exact advantages and disadvantages of simulation compared with clinical practice in preparing nursing students for the real healthcare service. Until now, few studies have been conducted to compare them in terms of process evaluation and outcome evaluation (Cant and Cooper, 2017, 2010) especially when lacking reliable and valid tools.

The Clinical Learning Environment Comparison Survey (CLECS) is developed to compare the traditional and simulated clinical environment (Leighton, 2015). This tool can help determine which clinical environment (traditional versus simulated) is preferred by students to meet their learning needs. This tool allows nursing educators to be better informed about how to integrate simulation into nursing curriculums (Leighton, 2015). Consequently, a clinical education guideline could be established to combine the traditional clinical practice with simulation in an optimal way.

Simulation is becoming a crucial strategy for nursing educators in China. China is facing substantial challenges in delivering high-quality care to meet the emerging health needs and high patient expectations (Yip and Hsiao, 2014). Due to the deterioration of the relationships between healthcare providers and patients (Anonymous, 2014) and patients' higher acuity (Zhan et al., 2014), it is challenging to find adequate opportunities for hands-on experience for nursing students in clinical practice. Sun (2016) reported that 80% of nursing students experienced rejections from patients when performing intravenous injection. Simulation serves an ideal substitute for the traditional clinical environment by providing a safe and realistic environment, selected and sophisticated scenarios, immediate reflections and feedback.

An increasing number of nursing schools in China are adopting the simulation as a teaching strategy in nursing education. Since the first simulation study published in 2009, > 60 nursing studies on simulation have been published in China. At present, 21 universities with undergraduate nursing programs have adopted the simulation in nursing education. No practice guideline on simulation from the Nursing in Chinese Ministry of Education or other associated institutions has prohibited further development and evaluation of simulation in nursing education in China. Due to lack of valid tools, Chinese nursing educators often use self-designed simulation questionnaires without rigorous report on their reliability and validity (Zhan et al., 2014). Therefore, the purpose of this study was to transculturally translate the CLECS into Chinese and test its reliability and validity among Chinese undergraduate nursing students.

## 2. Methods

### 2.1. Design

A cross-sectional study design was used.

### 2.2. Participants and Setting

This study used a convenience sampling method. We recruited undergraduate nursing students from two nursing schools in Central and East China. Eligible participants had to be undergraduate nursing students who experienced both high fidelity simulation and traditional clinical practice. The clinical practice should meet the accreditation

standards of baccalaureate nursing program in China (Jiang, 2014). Both nursing schools had similar mode of qualified clinical practice (Jiang, 2014), where students participated in the direct care of patients under supervision of licensed registered nurses. The clinical practice environment and contents were similar including: medical, surgical, pediatrics, and obstetrics departments at local tertiary hospitals. Students were required to spend one month in each department for rotation. The school in Central China scheduled two days per week for clinical practice, meaning students spent eight days in total for each department; the school in East China scheduled clinical practice in a continuous way.

In both schools, high fidelity simulation was used for clinical experience (Doolen et al., 2016; Hayden et al., 2014). High fidelity simulation includes a computerized full-body mannequin programmed to provide verbal cues and realistic physiologic responses (e.g., lung sounds, vital signs, and electrocardiogram) to students' actions. Both schools had simulation practical courses when students were in clinical rotation where they practised in small groups (6–8 students per group). The nursing school in Central China scheduled simulation practices for surgical, medical and pediatrics departments; the nursing school in East China scheduled only for medical departments. For departments with simulation, one day per week was allocated for simulation instead of clinical practice. In both nursing schools, high fidelity simulation process was similar including: designing a scenario, establishing measurable objectives, preparation of environment, high fidelity manikins, prebriefing, running and recording the simulation, and debriefing (INACSL Standards Committee, 2016). The simulated clinical environment was comparable between two schools including: the ward layout, beds, machines, supplements, and high fidelity manikins.

### 2.3. Instrument

The demographic questionnaire and the Chinese version of the CLECS (C-CLECS) were used. The amount of student simulation and clinical practice experience was recorded according to the teaching schedules.

The CLECS was developed to determine what learning needs of undergraduate students were perceived to have been met better in a traditional clinical environment than in a simulated clinical environment and vice versa (Leighton, 2015). The CLECS consists of 29 items representing six subscales: communication, nursing process, holism, critical thinking, self-efficacy, and teaching-learning dyad. For each item, two scores are separately given for traditional and simulated clinical environment using the 5-point Likert scale from 0 (not applicable) to 4 (well met). The higher the score, the better student learning needs are met in a certain environment. The CLECS has excellent reliability with Cronbach's coefficients of 0.96 and 0.97 for the traditional and simulated clinical environment (Leighton, 2015).

There is no Chinese version of CLECS available. After permission was obtained from the original author, the CLECS was translated into Chinese based on the standardized guidelines including: forward translation, back translation, cultural adaptation, and pilot testing (Beaton et al., 2000). The forward translation was independently performed by two bilingual senior nursing lecturers. One translator was aware of the concepts being examined in CLECS while the other one was not. These two translators combined their translations and ensured that the initial Chinese CLECS (C-CLECS) linguistically and culturally matched with the English version. Then, two other bilingual translators, blinded to the original CLECS, translated the initial C-CLECS back into English. One back translator is an associate professor majoring in linguistics and the other one is a senior nursing lecturer. By comparing the back translated CLECS with the original English version, the initial C-CLECS was further modified based on the consensus from these four translators. Then, one associate professor, one senior lecturer, one nursing postgraduate, and one English instructor majoring in linguistics were invited to evaluate each item and give their opinions on the

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