

RESEARCH ARTICLE

Critical thinking abilities among newly graduated nurses: A cross-sectional survey study in China

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Abstract

Aim: The aim of this study is to describe critical thinking dispositions among newly graduated nurses with different educational background in China and to explore related factors.

Design: A cross-sectional questionnaire survey.

Methods: The data were collected using the Chinese Version of Critical Thinking Dispositions Inventory (CTDI-CV). Overall, 588 newly graduated nurses finally completed the survey. Spearman and Pearson's correlation coefficients were used to examine the correlation between the CDTI-CV and nurses' general characteristics.

Results: In terms of open-mindedness, analysis and inquisitiveness subscales, significant differences were found among nurses based on three educational level. When dichotomizing total CTDI scores into high and low, nearly 80% of the respondents fell into low score group. Pressure from workplace was high for 68.4% of them. Significant correlation was found among the new graduated nurses' critical thinking ability and their age, education level, reading habit and attitude towards nursing profession.

KEYWORDS

critical thinking abilities, CTDI-CV, newly graduated nurses

1 | INTRODUCTION

Critical thinking (CT) is a high-level thinking method and form, individuals can flexibly use their existing knowledge and experience to identify and analyse problems (Paul, 2014), so as to make reasonable

judgements and correct choices in complex situations (Hsieh & Hsu, 2013). Related to nursing knowledge, CT is defined as an essential skill to find problems, analyse problems (Andreou et al., 2014) and provide flexible and evidence-based nursing interventions in clinical practices (Lake & McInnes, 2012).

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2 | BACKGROUND

The medical delivery system is changing rapidly because of an aging population, and increases in the number of patients with advanced diseases result in diverse and high-level health needs. To satisfy these needs in the context of such changes (Andreou et al., 2014; Atakro et al., 2019; Kakemam et al., 2019), the Institute of Medicine specified Evidence-Based Practice (EBP) as a core competence for all professional healthcare providers (Bigbee & Mixon, 2013), which by 2020 aims to apply evidence that is accurate, timely and supported by the latest clinical research to 90% of all clinical decisions. In the EBP process, healthcare providers are not just simple agents, but thinkers with expertise who search for and evaluate evidence to solve problems that emerge in clinical practice, subsequently making decisions to provide optimum treatment and intervention. In this process, critical thinking is vital.

Due to the population aging, complicated changes in diseases, developments in health technology, and the burden of long-term non-communicable diseases (Lee et al., 2016), healthcare providers must possess skills such as critical thinking, independence and creativity, so that they can identify solutions to problems based on quick and accurate analyses in complex patient situations (Abas et al., 2018). Also, in order to maintain sufficient human resources of care, a greater proportion of new graduate nurses are routinely employed in many hospitals (Cheng et al., 2014). Furthermore, these new graduates are expected to have adequate competence at time of graduating to profession to be able to guarantee patient safety and quality of care (Kajander-Unkuri et al., 2021; Orujlu & Hemmati Maslakkpak, 2017). Thus, critical thinking skills becomes vital for new nurses to be able to search for and evaluate evidence to solve clinical problems that emerge in practice, subsequently making correct decisions to provide optimum intervention (Lake & McInnes, 2012). In addition, critical thinking can also improve patient outcomes by using evidence-based practice in nursing work (Kim et al., 2018). More importantly, critical thinking is considered to be a core program outcome in nursing education (Ludin, 2018).

In general, new graduate nurses enter clinical practice experience through a transition period of approximately 2 years (Ludin, 2018). However, because of shortness of nurse workforce in healthcare settings, new hired graduate nurses are required to take responsibilities to observe and provide direct care for patients (Nguyen & Liu, 2021) with limited supervision or guidance that allows them fitting into the new environment (Lea & Cruickshank, 2015). Due to limited clinical technological skills and professional competence (Duchscher, 2009), newly graduate nurses may be less developed in the critical thinking skills (Nursing Executive Center, 2008), which is crucial to quality of care and patient's safety (Chen et al., 2021). Study indicated that new graduated nurses have difficulty recognizing changes and deterioration in patients' conditions due to lacking a holistic approach (Willman et al., 2021). New nurses have also expressed that patients with multiple diagnoses were outside their scope of expertise and patients who experience a sudden deterioration in their condition are challenging (Greenway et al., 2019). Studies indicated that new

graduate nurses have less judgement ability on doctors' orders (Bigbee & Mixon, 2013), and those took part in the health care for 1 year were the main responsible group for 43.8% of nursing errors (Dyab et al., 2018). This may mainly due to lacking of critical thinking ability among them. Nursing interventions and decision-making processes in complex patient situations need to include professional judgement based on experience in addition to the use of nursing care plans and guidelines (Zhang et al., 2013), therefore, new graduated nurses' competence assessment is a key issue for all stakeholders in health care—nursing professionals, managers, educators and policy-makers. Currently, most studies about CT were conducted among new graduate nurses with bachelor's degree (Pu et al., 2019), however, when nurses with different education background first enter the clinical workplace, it creates a barrier for their critical thinking ability development in the theory-practice transition process.

In China, the nursing workforce includes Diploma, Associate, Bachelor and Masters level prepared registered nurses (RN). It has been identified that new graduated nurses performed worst on critical thinking aptitude (Xie et al., 2021; Zhang et al., 2013). In 2016, National Health Commission of the P.R.C formulated "the Training Program for New Nurses (Trial Implementation)", and medical institutions were required to establish training system, formulate the training program for new nurses (Liu et al., 2016). Since studies indicated that nurses with higher educational background have stronger positive critical thinking ability and can better meet the needs of nursing care (Liu et al., 2016). Meanwhile, organizational orientation for new nurses were identified as factors influencing their competency deployment (Xie et al., 2021), it is urgent to evaluate CT ability of new nurses with different educational level, so as to formulate training program accordingly. Currently, less published studies examined critical thinking dispositions of new graduated nurses with different education level in China. Thus, our aim is to conduct a comparative study of the critical thinking dispositions and skills of new graduated nurses with diploma, 3-year associate degree and 4-year baccalaureate, and to find out what's the effect factors. The answer of this question would not only be important globally but also at the national level, because this answer might help us to develop orientation program for newly licensed registered nurses.

3 | METHODS

3.1 | Study design

A cross-sectional questionnaire survey was used in the study, the STROBE checklist was used in reporting this study (see File S1).

3.2 | Setting and participants

The study population were newly graduated nurses. These participants should follow: (1) having graduated from an accredited nursing programme in the last 18 months; (2) had been hired in a

medical institution as a registered nurse; (3) successful completion of the National Council Licence Examination and (4) agreement to attend the survey. The one on holiday or resigned during data collection were excluded. The personal information (i.e., name, telephone number, email, etc) of new graduates majoring nursing were obtained from a facility which organized the recruitment interview. To keep the return-to sender mail rate, all email addresses were tested prior by sending mail to each participant. Once they replied back, one of the researcher will send consent form and consequently send the questionnaire to each participant. If no replying received in 10 days, another researcher will make a call to participants. This process continued until the recommended number of potential respondents was obtained. All nurses ($n = 650$) who had responded after reminders received an online questionnaire.

3.3 | Instrument

One questionnaire contain two parts was used. The first part of the questionnaire consisted of questions on demographic data (i.e., age, gender, the educational level, habit of reading professional literature, pressure from workplace and attitude towards the nursing profession). The second part of the questionnaire was the Chinese Version of Critical Thinking Dispositions Inventory (CTDI-CV) that translated by Peng et al. (2004) from California Critical Thinking Dispositions Inventory (Searing & Kooker, 2016). The CTDI-CV was used to measure the key theoretical aspects of the overall dispositional dimension of critical thinking. This scale consists of 70 questions in seven sub-scales, each with 10 items, The seven sub-scales are open-mindedness, analyticity, cognition, maturity, truth-seeking, systematicity, inquisitiveness and self-confidence.

The instrument uses a 6-point Likert scale in which 1 = strongly agree and 6 = strongly disagree. Total scores range between 70 and 420, with marks above 350 indicating a strong disposition and 280–350 positive inclination, whereas 210–279 indicating an ambivalent and below 210 strong opposition. The subscale scores range from 10 to 60, with strong disposition above 50 and positive inclination 40–50, and ambivalent 30–39 and strong opposition below 30. In Peng et al.'s study, the Cronbach's 0.90. The questionnaire of the content validity index (CVI) and content validity ratio (CVR) of experts were calculated (Huang et al., 2021).

3.4 | Procedure

A pilot study among a small group of students who did not participate in the main study was conducted to ensure the questionnaire was clear. In the main study, the researcher sent the new nurses self-report questionnaires after they were agreed to participate the survey, and they were told to be free to withdraw from the study without any penalty, and their responses would be kept confidential. The length of time spent with each participant was about 1 week.

The general information which including choosing nursing as the first major, reading professional literature, published articles, attitude towards nursing profession for new graduated nurse in the different educational level were computed. Pressure from workplace were reported based on their clinical practices experiences.

3.5 | Data analysis

SPSS19.0 and Amos 21.0 were used to analyse the reliability and validity of the questionnaire. Factor analysis was used to test the structure validity. Content validity index (CVI) and content validity ratio (CVR) were used to analyse the content validity. The internal correlation was tested by Pearson correlation coefficient. Cronbach's coefficient and mean item correlation coefficient (MIIC) were used to test the reliability of the questionnaire.

The SPSS Version 19.0 was used for the data analyses, and descriptive statistics were used to analyse participants' general characteristics. A one-way ANOVA was used to compare the sub-scales and total scores of CDTI-CV among new graduated students. Moreover, the Spearman and Pearson's correlation coefficients were used to examine the correlation between the students' scores in CDTI-CV and their age, gender, the educational level, habit of reading professional literature, pressure from workplace and attitude towards the nursing profession. The level of significance was considered <0.05 .

4 | RESULTS

4.1 | Reliability and validity of the questionnaire

The results showed that $CVI = 0.912$, the range of CVI of each item was 0.866–1.00, $CVR = 0.858$. The Pearson correlation coefficient between each factor was 0.412–0.483, and the correlation coefficient between each factor and the total score of the scale was 0.621–0.787.

The total Cronbach's coefficient of the questionnaire was 0.938, the MIIC value of the questionnaire was 0.291.

4.2 | Participants' general characteristics

The 650 questionnaires were delivered and 588 were returned with response rate of 90.4%. Among them, 39.8% were graduated with BSN, 41.8% with AND and 18.4% DIP. The mean age was 20.85 ± 1.80 years with 65.3% of them were between 21 and 25 years old. About reading professional literature, nearly all (91.2%) read it sometimes, and only 7.1% published articles. The pressure from workplace was high for 68.4% of them, which were 74.4%, 63.4% and 66.7% for new nurses with BSN, AND and DIP, respectively. For attitude towards the nursing profession, 55.5% reported that they are interested while 40.8% moderately and 3.7% uninterested, respectively. In terms of new graduates with BSN, 43.6%

were interested in nursing profession, while 48.7% moderately interested (Table 1).

4.3 | New graduated nurses' CTDI

A one-way ANOVA was used to compare the sub-scales and total scores of CTDI among BSN, ADN and DIP nurses. There were significant differences among the three groups on the total score ($F = 5.132, p = 0.006$). Follow-up univariate analyses of variance with LSD revealed the following. There were no statistically significant differences between ADN and DIP students in all mean scores of CTDI. However, BSN students scored significantly higher than the other two groups on the total score and three of the seven sub-scales on CTDI. Significant differences were found among educational level in terms of their mean scores for the open-mindedness (BSN vs. DIP, $p = 0.028$), analyticity (BSN vs. ADN, $p < 0.001$; BSN vs. DIP, $p = 0.003$) and inquisitiveness (BSN vs. ADN, $p = 0.047$). Among the seven sub-scales, analyticity (41.12 ± 5.65), inquisitiveness (40.07 ± 7.64) and maturity (40.63 ± 7.24) had the highest scores, followed by open-mindedness (39.79 ± 6.46), systematicity (37.51 ± 5.73), truth-seeking (36.48 ± 6.16) and self-confidence (35.87 ± 6.52). These data are described in Table 2.

When dichotomizing total CTDI scores into high (i.e., strong disposition and positive inclination) and low (i.e., ambivalent and strong opposition towards critical thinking), nearly 80% of the respondents fell into low score group (i.e., 279 or lower), while approximately one-fifth (27%) fell into the high score group (i.e., 280 or higher). No respondents reported strong opposition (Figure 1).

4.4 | Correlations between general characteristics and CTDI

To examine the linkage between abilities to think critically and general characteristics, the Pearson correlation test was performed between sub-scales, total score of CTDI and the general characteristics in terms of age, gender, educational level, reading professional literature, published articles, pressure from workplace, attitude towards nursing profession. Significant correlation was found between nurses' total critical thinking ability and their age ($r = 0.18, p = 0.001$), especially in sub-scales including truth-seeking ($r = 0.15, p = 0.009$), open-mindedness ($r = 0.15, p = 0.009$), analyticity ($r = 0.13, p = 0.01$), systematicity ($r = 0.14, p = 0.01$) and maturity ($r = 0.16, p = 0.006$), educational level ($r = 0.15, p = 0.006$) especially in sub-scales of open-mindedness ($r = 0.13, p = 0.02$), analyticity

Variables	Total (N = 588) %	DIP (n = 108) %	ADN (n = 246) %	BSN (n = 234) %
Reading professional literature				
Never	5.1	5.6	2.4	7.7
Sometimes	91.2	88.9	95.1	88.0
Always	3.7	5.6	2.4	4.3
Gender				
Male	1.0	5.6	0.0	0.0
Female	99.0	103.7	100.0	100.0
Age (years)				
>18	7.1	27.8	4.9	0.0
18-20	27.6	50.0	34.1	10.3
21-25	65.3	22.3	61.0	89.7
Published articles				
No	92.9	100.0	90.2	92.3
Yes	7.1	0.0	9.8	7.7
Pressure from workplace				
High	68.4	66.7	63.4	74.4
Moderate	30.6	27.8	36.6	25.6
Low	1.0	5.6	0.0	0.0
Attitude towards Nursing Profession				
Interest	55.5	55.6	65.9	43.6
Moderate	40.8	44.4	31.7	48.7
Uninterest	3.7	0.0	2.4	7.7

TABLE 1 General characteristics (N = 588)

Abbreviations: AND, Associate degree in Nursing; BSN, Bachelor of Science in Nursing; DIP, Diploma in Nursing.

TABLE 2 Critical thinking dispositions among student of different educational level (n = 588)

CCTDI Scores	Total		DIP		ADN		BSN		F	p	LSD ($p < 0.05$)
	Mean \pm SD	Mean \pm SD	Mean \pm SD	Mean \pm SD	Mean \pm SD	Mean \pm SD	Mean \pm SD				
Total scores	271.46 \pm 25.65	266.33 \pm 23.61	267.34 \pm 23.36	277.25 \pm 26.87	5.132	0.006*	BSN>ADN				
Subscales											
Truth-seeking	36.48 \pm 6.16	36.78 \pm 6.99	35.71 \pm 5.84	37.16 \pm 6.09	1.746	0.176	BSN>DIP				
Open-mindedness	39.79 \pm 6.46	38.28 \pm 6.07	39.67 \pm 6.05	40.62 \pm 6.98	2.469	0.086	BSN>ADN, DIP				
Analyticity	41.12 \pm 5.65	40.11 \pm 5.21	39.91 \pm 6.18	42.85 \pm 4.81	9.658	<0.001*	BSN>ADN, DIP				
Systematicity	37.51 \pm 5.73	37.83 \pm 8.33	37.56 \pm 5.19	37.31 \pm 4.82	0.162	0.850					
CT self-confidence	35.87 \pm 6.52	35.39 \pm 7.59	35.37 \pm 5.74	66.62 \pm 6.76	1.278	0.280	BSN>ADN				
Inquisitiveness	40.07 \pm 7.64	39.61 \pm 8.23	39.22 \pm 6.63	41.18 \pm 8.28	2.105	0.124					
Maturity	40.63 \pm 7.24	40.33 \pm 5.84	39.90 \pm 7.62	41.53 \pm 7.39	1.573	0.209					

Abbreviations: AND, Associate degree in Nursing; BSN, Bachelor of Science in Nursing; DIP, Diploma in Nursing.

*Significant at the 0.05 level.

($r = 0.23, p < 0.001$) and maturity ($r = 0.14, p = 0.01$). Whether reading professional literature ($r = 0.19, p = 0.001$), especially in analyticity ($r = 0.22, p < 0.001$) and inquisitiveness ($r = 0.16, p = 0.004$). New nurses who were interested in nursing exhibited stronger critical thinking disposition than those who were not ($r = 0.20, p < 0.001$), especially in truth-seeking ($r = 0.20, p < 0.001$) and open-mindedness ($r = 0.16, p = 0.004$) (Table 3).

5 | DISCUSSION

Critical thinking skills are essential for nurses to provide safe and efficient nursing care (Chen et al., 2019), which also increase the initiative of nursing work (Zuriguél-Pérez et al., 2018). Because of the ongoing nursing shortage and the increasing acuity of patients, new graduate nurses must master both psychomotor and critical thinking skills rapidly at the time of commencing employment (Theisen & Sandau, 2013). However, in cord with other studies (Ip et al., 2000; Wangenstein et al., 2010), the majority of areas of CTDI in current study showed negative disposition, which may not keep up well with the purpose of the joint competence requirements and therefore insufficient supporting workforce mobility in the common labour market. These may be presumably ascribed to the dissimilarities in the organization of nursing education (e.g., universities, universities of applied sciences, nursing schools, polytechnic institutes). Kajander-Unkuri et al. (2021) also found that nursing students taking different degree programmes hold varying views about their competence (Kajander-Unkuri et al., 2021). It is suggested that schools of nursing should add communication strategies to their curriculum that focusing on critical thinking, clinical reasoning and simulation scenarios and including situation-specific skills such as end-of-life scenarios (Theisen & Sandau, 2013). Further research should focus on clinical reasoning and evaluation of measurement tools for new graduates.

The main finding of this study is that among the seven sub-scales of CTDI, new graduated nurses showed higher results on the sub-scales of analyticity, inquisitiveness and maturity. However, they showed weaker performance on the sub-scales of truth-seeking. This was consisted with Pu et al. (2019) which assessed critical thinking disposition of undergraduate students from top medical universities in Beijing (297.72) (Pu et al., 2019). These may due to the traditional large-classroom teaching methods and the bashfulness of the Chinese culture. In Chinese traditional teaching, high scores corresponding to standardized answers are taken as the main indicators to test students' learning effects, making students more dependent on standard answers, thus showing initiative, enthusiasm with thinking and objectivity are declining.

Professional confidence is an essential trait for new graduate nurses to possess so as to provide quality patient care in complex hospital setting. However, many new graduates are entering the workforce without it not only in our study, but also in others (Ortiz, 2016). These may because the frequent negative reports of medical accidents or negative influence of failure experience, and the potential lack of proficiency among nurses in both their clinical skills and

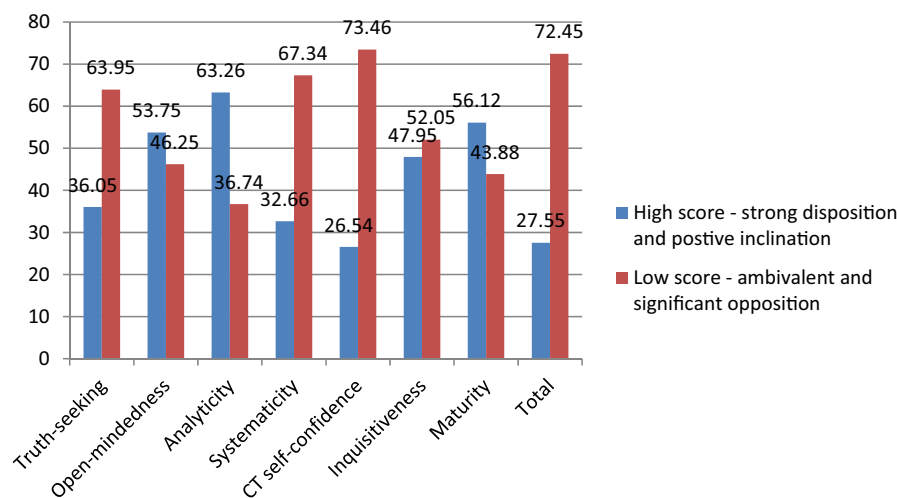


FIGURE 1 Critical thinking dispositions among newly graduated nurses in China ($n = 588$). Percent of respondents (y-axis) with high and low scores for subscales and total score (x-axis) are shown graphically.

critical thinking abilities (Greenway et al., 2019). Nevertheless, the increased occurrence of nursing errors, and the episodes of adverse events witnessed/experienced by new nurses (Stevanin et al., 2015). New nursing graduates have revealed that they perceive a gap between theory and practice with reference to their education and the real workplace setting (Jung et al., 2017). Monaghan (2015) found the theory-practice gap begins during pre-registration education (Monaghan, 2015). As such, There is an urgent need to reform nursing curricula, collaboration between universities and practice setting is essential to improve the environment in which nursing students learn the clinical skills. Pre-clinical orientation, distributing and clarifying clinical learning objectives should be offered to students, and frequent visits and supervision of students in clinical area may improve student learning experience in clinical placement (Gemuhay et al., 2019). A well-designed supportive orientation program including workshops, reflective activities (Raymond et al., 2018), support from colleague and environment are needed for new nurse as it not only provides direction for clinical practice (Menard & Maas, 2019) but also flexible enough to meet the individual nurse's needs when problems arise (Jung et al., 2017), meanwhile it also enable the graduate to understand the required level of clinical practice and feel confident in asking for support and thus promoting the retention of graduates for the future nursing workforce (Wardrop et al., 2019).

We also found factors being positively related to new graduated nurses' critical thinking competence level. It is apparent that new nurses with bachelor's degree scored higher on open-mindedness, analyticity and inquisitiveness. However, Fero et al. (2009) study showed that new graduate nurses with different education background showed the same difficulties in meeting job expectations and struggled to make and implement independent nursing interventions (Fero et al., 2009). Although the increasing in institutions offering first degree program in nursing, university education remains problematic with many disparities in the nursing program currently being offered in different university. Identified problems that run simultaneously with the present tertiary school curriculum unqualified and poorly trained teachers, inadequate facilities and dilapidated instructional materials. This study suggests that majority

of newly graduated nurses with different education background had requirements of training regard improving their critical thinking ability during their clinical practices. Case studies with videotaped vignettes may use to help facilitate the development of critical thinking skills in new graduate nurses (Hooper, 2014).

Reading professional literature was related to critical thinking competence level. This link has not been investigated often but a connection between the two has been shown (Xie et al., 2014). The process of reading scientific research papers is actually a good thinking training process and could be used as a teaching strategies for fostering critical thinking ability (Chen & Lin, 2003). Undergraduate students can be guided to read original scientific papers so as to cultivate their critical thinking ability (Xie et al., 2014). The students indicated that group discussions and the narrative comments of facilitators contributed the most to develop critical thinking. The correlation between utility judgement and one's pre-class reading behaviour was statistically significant (Chen & Lin, 2003). In this aspect, it would be worthwhile to give more attention to demonstration, guided practice and interaction with others through discussion and feedback will induce more desired learning behaviour to develop critical thinking.

Being interested in nursing profession has also been recognized previously as a factor related to competence in terms of critical thinking ability (Willman et al., 2021). Those with positive perception of the nursing profession may have a nursing career plan for the future, which can benefit nursing students by its influence on in-depth approach to learning and professional development (Kim & Shin, 2020). Therefore, it would be useful to explore in detail the competence outcomes for students by including or not including intensive career planning in the curriculum. (Kajander-Unkuri et al., 2021). When new graduate nurses move from the school environment to the work setting, they experience conflicts due to the inconsistent roles, values and nursing abilities they learned from the school and various clinical sites. Many nurses experience a reality shock when they participate in clinical practice (Jung et al., 2017). This was revealed in our study as pressure from workplace was high for 68.4% of them. Stresses that new graduates face are related to a lack of competence including

should establish different pre-job training modes for new nurses by considering the personality traits of new nurses to meet the needs of nurses with different abilities, so as to improve their enthusiasm and participation in learning. At the same time, they should be provided with an environment support where they can read literature and attending discussion activities freely to help them improve their critical thinking ability.

Future research should examine the changing trend of the critical thinking ability of newly graduated nurses during clinical practice and explore whether different types of training program have different effects on critical thinking competency.

7 | RELEVANCE TO CLINICAL PRACTICE

Understanding critical thinking abilities among newly hired graduate nurses and its effectiveness factors can assist nurse managers to understand what types of on-the-job continuing education workshops should be provided to new nurses to help enhance their critical thinking abilities.

AUTHOR CONTRIBUTIONS

ZJX, WJC and WY designed the study; YYH, WJC, ZYY and DZH performed data collection; WJC and YYH conducted the data analysis; ZJX and WDP wrote the first draft; ZJX and WJC commented on all the drafts; SYF, YYH and WY revised the paper; SYF and WY provided the funding support for this study; All authors read and approved the final manuscript.

All authors have agreed on the final version and meet at least one of the following criteria [recommended by the ICMJE (<http://www.icmje.org/recommendations/>)]:

- substantial contributions to conception and design, acquisition of data or analysis and interpretation of data;
- drafting the article or revising it critically for important intellectual content.

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CONFLICT OF INTEREST

The author(s) declare(s) that there is no conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

ETHICAL APPROVAL

This study was approved by Gansu Provincial Hospital's Ethic Commission (2018-106). All participants were informed about the purpose and design of this research, and that their participation was voluntary.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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