Journal of Multidisciplinary Healthcare

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ORIGINAL RESEARCH

Revision and Psychometric Testing of the Delirium Care Self-Efficacy Scale for ICU Nurses

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Objective: The aim of this study is to culturally adapt the Traditional Chinese version of the Delirium Care Self-Efficacy Scale for ICU Nurses (DCSE-I), originally developed in Taiwan, for use in mainland China and to assess its reliability and validity.

Methods: The revised scale underwent cross-cultural adaptation following expert consultations and a pilot survey. To evaluate its reliability and validity, a survey was conducted among 284 ICU nurses from eight tertiary hospitals in Chongqing.

Results: The Chinese version of the DCSE-I demonstrated strong internal consistency, with an overall Cronbach's α coefficient of 0.934. The item-level content validity index (I-CVI) values ranged from 0.800 to 1.000, and the scale-level content validity index/average (S-CVI/Ave) was 0.923. The split-half reliability was 0.861, while the test-retest reliability reached 0.954. Exploratory factor analysis identified two factors with a cumulative variance contribution rate of 65.522%. These two dimensions were labeled "Confidence in Delirium Assessment" and "Confidence in Delirium Management".

Conclusion: The Chinese version of the DCSE-I is appropriate for the cultural context of mainland China and exhibits strong reliability and validity.

Keywords: cultural adaptation, delirium care self-efficacy, ICU nurses, reliability, validity

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Introduction

Intensive Care Unit (ICU) delirium is an acute cognitive dysfunction syndrome that occurs in patients in ICU, characterized by sudden or fluctuating changes in consciousness, impaired attention, disorganized thinking, and foggy awareness.[1,2] Patients who experience delirium may face outcomes such as cognitive decline and an increased risk of developing dementia.[3,4] As primary caregivers, ICU nurses play a crucial role in preventing delirium and improving patient outcomes.[5] Effective delirium care in the ICU requires nurses to confidently assess delirium symptoms, identify risk factors, implement preventive measures, and intervene early to reduce the likelihood of subsequent complications. Self-efficacy determines a nurse's ability to respond to sudden symptoms of delirium. For example, nurses with high self-efficacy are more inclined to actively optimize the ICU environment and provide emotional support through the participation of family members, thereby reducing patients' confusion and restless behaviors and lowering the risk of complications.[6] Consequently, enhancing ICU nurses' confidence in delirium care and strengthening their self-efficacy is essential. Evaluating ICU nurses' self-efficacy can help assess their confidence in managing delirium symptoms and caring for patients experiencing delirium. The theory of self-efficacy was first proposed by the American psychologist Albert Bandura.[7] Self-efficacy refers to an individual's confidence and belief in their ability to perform specific tasks, manage certain situations, or achieve particular goals.[7] It is a concept in the field of psychology, which can influence the outcome of behavior by regulating it in certain situations.Although numerous scales are available to assess nurses' overall self-efficacy in clinical care, Bandura argued that self-efficacy is domain-specific, meaning its assessment content varies across different fields.[7] The evaluation of nurses' self-efficacy in delirium care will directly affect their delirium care behaviors, thereby influencing the clinical outcomes of patients. Thus, targeted delirium care education can be carried out, nurses' mastery of relevant knowledge of delirium care can be strengthened, their self-efficacy can be

Received: 24 March 2025
Accepted: 2 July 2025
Published: 5 August 2025

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enhanced, and thereby the quality of delirium care can be improved and the clinical outcomes of patients can be improved. Currently, no measurement tool exists in mainland China to evaluate ICU nurses' self-efficacy in delirium care. In 2021, Professor Yu-Ling Zhang et al in Taiwan developed the Delirium Care Self-Efficacy Scale for ICU Nurses (DCSE-I) based on Bandura's self-efficacy theory to evaluate the self-efficacy of ICU nurses in delirium care, the items of this scale are moderate, highly operable and have good reliability and validity.[8] The aim of this study was to revise the DCSE-I, adapt it culturally, and assess the reliability and validity of the adapted Simplified Chinese version. The revised scale offers a reliable tool for evaluating ICU nurses' self-efficacy in delirium care within mainland China.

Participants and Methods

Study Participants

A convenience sampling method was employed from May to June 2023 to select ICU nurses from eight tertiary hospitals in Chongqing for the survey. The inclusion criteria were as follows: age ≥ 18 years, ICU nurses with a valid nursing practice license, a minimum of one year of ICU work experience, and nurses who provided informed consent. The exclusion criteria were nurses from other hospitals who come to our hospital for further study, nurses undergoing standardized training, or internships. The study consists of 26 entries, the sample size requirement was based on the necessity of 5 to 10 times the number of scale items, the sample size should be 130 to 260, with an additional 10 to 20% to account for invalid samples.[9] Thus, the minimum required sample size ranged from 143 to 312. The final valid sample consisted of 284 participants, including 235 females (82.75%) and 49 males (17.25%). The study received approval from the hospital ethics committee (Ethics No.: CZLS2022254-A).

Methods

Introduction to the DCSE-I

The DCSE-I, developed by Chang et al in 2021, is based on the self-efficacy theory proposed by American psychologist Albert Bandura.[8] It was created to assess the self-efficacy of ICU nurses in the areas of delirium care and symptom management. The Traditional Chinese version of the Delirium Care Self-Efficacy Scale comprises 13 items across two dimensions: 7 items assessing "Confidence in Delirium Assessment", which gauges nurses' confidence in evaluating delirium in patients, and 6 items assessing "Confidence in Delirium Management", which measures nurses' confidence in managing delirium care. The scale employs a 5-point Likert scoring method, with responses ranging from "not confident at all" to "very confident", scored from 1 to 5, where higher scores reflect stronger self-efficacy in delirium care. The content validity index (CVI) for the scale was 0.98, and the overall Cronbach's α was 0.94, with subscales ranging from 0.86 to 0.92. The scale has been validated on a large sample in Taiwan, demonstrating good reliability and validity.

Scale Revision Methods

Scale Revision

Initially, an Email was sent to Professor Yu-Ling Zhang to request permission, which was subsequently granted. Two graduate nursing students made linguistic adjustments to the Traditional Chinese version of the scale used in Taiwan, modifying the word order to ensure that the Simplified Chinese version reflected both the original scale's intent and the linguistic habits of mainland China. This led to the creation of the first draft of the Simplified Chinese version of the DCSE-I scale.

Cultural Adaptation

Ten experts participated in consultations, including 2 clinical medicine experts, 6 clinical nursing experts, and 2 nursing education experts. The experts' qualifications included: 1 expert with a sub-senior professional title, 5 with senior professional titles, 3 with bachelor's degrees, 5 with master's degrees, and 2 with doctoral degrees. Regarding their experience, 1 expert had 31 to 40 years of work experience, 3 had 21 to 30 years, and 6 had 10 to 20 years. In terms of age, 1 expert was 51 to 60 years old, 4 were aged 41 to 50, and 5 were aged 31 to 40. Among the experts, 7 were female and 3 were male. Pilot Survey: A convenience sampling method was employed to select 20 ICU nurses from a tertiary hospital in Chongqing for the pilot survey, based on the inclusion and exclusion criteria. The research team asked

participants whether they found any items unclear or difficult to understand and collected their feedback. All participants reported that the scale was easy to understand, with clear and accurate language that suited the linguistic and cultural context of mainland China. As a result, no further revisions were necessary, and the Simplified Chinese version of the DCSE-I was finalized.

Data Collection

Survey Tools

The survey tools consisted of a general information questionnaire and the Chinese version of the DCSE-I scale. The general information questionnaire includes gender, age, educational background, professional title, position, length of service, years of working in the ICU, form of employment, whether one is an ICU specialist nurse, grade of the hospital where one is located, type of hospital where one is located, intensive care unit where one is located, and whether one has received training related to delirium knowledge before.

Survey Method

This study conducted the investigation through "Wenjuanxing" (Questionnaire Star). Before distributing the electronic "Wenjuanxing" (Questionnaire Star), the researchers were reviewed and approved by the ethics committee of the investigated hospital and obtained the consent and support of the director of the nursing department of the corresponding hospital. Before the investigation, the researchers sent the electronic "Wenjuanxing" (Questionnaire Star) to the head nurses of each hospital. The head nurses sent the "Wenjuanxing" (Questionnaire Star), the research purpose and the criteria for the included subjects to the WeChat group of the department. The nurses filled out the questionnaire voluntarily. At the beginning of the questionnaire, a unified notice was set up, informing the purpose of the survey, the filling method and the precautions for filling. All nurses filled out the questionnaire anonymously and independently. If nurses encounter difficulties in filling in the content, such as not understanding it, the researchers will provide explanations. To avoid duplicate filling, the questionnaire can only be filled out once on the same account and the same device. To ensure the complete collection of the questionnaire, each question has been set as a required field. A total of 325 questionnaires were retrieved. After eliminating 41 invalid questionnaires, 284 questionnaires were finally retrieved, with an effective recovery rate of 87.38%.

Statistical Methods

SPSS 26.0 software was employed for statistical analysis in this study. Descriptive statistics for the general demographic data of ICU nurses were expressed as mean ± standard deviation, frequency, and composition ratio. Homogeneity tests and the critical ratio method were applied for item selection on the scale.[9–12] Reliability was assessed using Cronbach's α coefficient, split-half coefficient, and test-retest reliability.[13] Validity was evaluated through exploratory factor analysis, content validity index, and construct validity.[13–15]

Item Analysis

The critical ratio method and correlation coefficient method were applied to analyze each item. Items with a critical ratio < 3.0 and $p > 0.05$ were excluded.[14,15]

Validity Test

The scale's validity was assessed following both construct and content validity. Ten experts were invited to evaluate the content validity, the Likert 4 scoring method was adopted, with 1 point being very irrelevant, 2 points being irrelevant, 3 points being relevant, and 4 points being very relevant. Each item of the scale was scored.With evaluation metrics including the scale-level content validity index (S-CVI/Ave) and the item-level content validity index (I-CVI).[14,15] I-CVI is the number of experts rated 3 or 4 divided by the total number of experts, and S-CVI is the proportion of the number of items rated 3 or 4 in the total number of items.When I-CVI≥0.78, uniform S-CVI (S-CVI/UA) ≥0.80, and average S-CVI (S-CVI/Ave) ≥0.90, it indicates that the content validity of this scale is good. Construct validity was assessed using exploratory factor analysis, with evaluation criteria stating that items would be retained if the cumulative variance

 https://doi.org/10.2147/JMDH.S530177

contribution rate of common factors exceeded 50%, and the loading value for each item on one common factor was greater than 0.400, while the loading values on other factors remained relatively low.[14]

Reliability Test

In this study, reliability was assessed using Cronbach's α coefficient, test-retest reliability, and split-half reliability. Two weeks after the initial survey, 20 ICU nurses from the total sample were surveyed again. The test-retest reliability was evaluated by examining the correlation between the results of the two evaluations.[14]

Results

Research Subject Characteristics

Of the 284 study participants, consisted of 49 (17.25%) were male, 235 (82.75%) were female, 30 (10.56%) were aged ≤ 25 years, 182 (64.09%) were aged 26–35 years, 72 (25.35%) were≥36 years. Other general information is shown in Table 1.

Table 1 Characteristics of Participants (n=284)

Characteristics		**n**	**%**
Gender	Female	235	82.75
	Male	49	17.25
Age group (years)	≤25	30	10.56
	26~35	182	64.09
	≥36	72	25.35
Educational qualification	Specialized	41	14.44
	Bachelor's degree and above	243	85.56
Title	Nurse	61	21.49
	Senior nurse	124	43.65
	Supervisory Nurse and above	99	34.86
Designation	Nurse	238	83.81
	Charge nurse	46	16.19
Duration of overall work experience (years)	≤5	88	30.99
	≥6	196	69.01
Duration of ICU work experience (years)	≤5	117	41.20
	≥6	167	58.80
Type of employment	Authorized	54	19.01
	Contractual	230	80.99
Whether a specialized ICU nurse	Yes	139	48.94
	No	145	51.06

(*Continued*)

Table 1 (Continued).

Characteristics		n	%
Hospital level (tier)	Tertiary	250	88.03
	Secondary	34	11.97
Hospital type	General Hospital	104	36.62
	Specialized Hospital	180	63.38
ICU type	Comprehensive ICU	264	92.96
	Specialized ICU	20	7.04
Whether underwent training on delirium	Yes	210	73.94
	No	74	26.06

The Outcome of Cultural Adaptation

Based on the feedback provided by experts, the following changes were made: Some experts indicated that the term "病患 (patients)" did not align with Chinese cultural norms. After discussion, it was changed to "患者" (patients). Items 7, 8, and 10 were revised to improve word order and expression, better aligning with Chinese language habits. Some experts noted that the term "低活力型谵妄" (low-energy delirium) is more commonly used in China, leading to the change of the term "低反应谵妄" (low-response delirium) in items 1 and 6. In item 4, "思考混乱" (confusion in thinking) was revised to "思维紊乱" (disorganized thinking) to better reflect clinical terminology. After these changes, the final revised version of the Simplified Chinese DCSE-I scale was produced.

Item Analysis

The critical ratios for each item in the scale were calculated, demonstrating that all items were statistically significant ($p < 0.05$). Pearson correlation analysis demonstrated that the correlation coefficients between the total score of the Chinese version of the DCSE-I scale and the scores of each item ranged from 0.649 to 0.818 ($p < 0.01$), confirming that all items were retained in the scale.

Validity Analysis

Content Validity

Items rated 1 or 2 by experts were categorized as "irrelevant", while those rated 3 or 4 were categorized as "relevant." The I-CVI of the simplified Chinese version of the DCSE-I ranged from 0.800 to 1.000, and the S-CVI/Ave was 0.923, demonstrating the high content validity of the scale.

Construct Validity

Exploratory factor analysis was performed to evaluate the construct validity of the DCSE-I. The results demonstrated a KMO value of 0.931 and Bartlett's test of sphericity $\chi^2 = 1554.507$ ($p < 0.001$), confirming the scale's suitability for factor analysis. Through principal component analysis and varimax orthogonal rotation, two common factors with eigenvalues exceeding 1 were extracted, with a cumulative variance contribution rate of 65.522%. All item factor loadings exceeded 0.5.[16] Items 4, 5, and 7 had factor loadings greater than 0.5 on both factors; however, after considering their contribution to the overall scale measurement, the research team chose to retain these items and categorize them according to the factor with the higher loading. Consequently, the scale maintained two dimensions—Delirium Assessment Confidence (7 items: 1, 2, 3, 4, 5, 6, 7) and Delirium Management Confidence (6 items: 8, 9, 10, 11, 12, 13)—comprising a total of 13 items, consistent with the original scale (Table 2).

Table 2 Component Matrix After Factor Rotation for the DCSE-I Scale (n = 284)

Item	Delirium Management Confidence	Delirium Assessment Confidence
12. I can communicate and explain to the patient before performing nursing operations.	0.832	0.080
9. I am confident in minimizing the patient's physical discomfort.	0.827	0.275
13. I can proactively search for information related to delirium treatment and care.	0.765	0.347
8. I can provide orientation for patients regarding time and environment during nursing care.	0.745	0.418
10. I am confident in maintaining the patient in a comfortable and quiet environment.	0.730	0.352
11. I can discuss with doctors how to use medication to help patients with sleep disorders maintain sleep quality.	0.682	0.303
1. I can differentiate between hypoactive delirium and depression.	0.117	0.795
6. I can identify symptoms of hypoactive delirium in patients.	0.196	0.743
2. I can assess whether the patient has attention disorders.	0.309	0.716
3. I can identify if the patient is over-sedated.	0.462	0.649
5. I can assess whether the patient has orientation disorders.	0.554	0.620
4. I can assess whether the patient has disorganized thinking.	0.583	0.614
7. I am clear on when to assess the consciousness of patients using sedatives.	0.503	0.521
Eigenvalue	4.775	3.743
Variance contribution rate (%)	36.731	28.791
Cumulative variance contribution rate (%)	36.731	65.522

Note: Adapted from Aust Crit Care, 36(4), Chang YL, Hsieh MJ, Chang YC, Yeh SL, Chen SW, Tsai YF. Self-efficacy of caring for patients in the intensive care unit with delirium: development and validation of a scale for intensive care unit nurses. .449–454, copyright 2023, with permission from Elsevier.[8]

Table 3 Reliability Analysis of the DCSE-I Scale (n = 284)

Item	Cronbach's α Coefficient	Split-Half Reliability	Test-Retest Reliability
Total scale	0.934	0.861	0.954
Delirium assessment confidence	0.887	0.881	0.910
Delirium management confidence	0.908	0.882	0.935

Reliability Analysis

Table 3 presents the Cronbach's α coefficient, split-half reliability, and test-retest reliability for the Chinese version of the DCSE-I and its dimensions.

Discussion

The Scale Demonstrates Good Validity

The validity of a research tool refers to its ability to measure a specific psychological or behavioral trait.[17] The Chinese version of the DCSE-I scale was assessed by using both construct validity and content validity in this study. Content validity can be influenced by the number of experts involved in the evaluation. When the number of experts is ≥ 6, an I-CVI ≥ 0.780 and an S-CVI/Ave ≥ 0.900, these values are considered indicators of good content validity.[14] In this study, 10 experts were involved, most of whom held doctoral degrees, senior professional titles, and extensive clinical or teaching experience, ensuring the rationality of the scale revisions and the authority of the expert consultation results. The findings revealed that the overall S-CVI/Ave value of the scale was 0.923, and the I-CVI ranged from 0.800 to 1.000, with all indicators meeting the evaluation criteria, demonstrating that the scale has strong content validity and effectively reflects ICU nurses' self-efficacy in delirium care. Items 4 ("I can assess whether the patient has cognitive confusion"), 5

("I can assess whether the patient has orientation disorders"), and 7 ("I can clearly identify the timing for assessing consciousness in patients using sedatives") exhibited cross-loadings on both factors. It is noted that the nurses still lack the ability to assess whether patients have cognitive impairments, whether they have orientation disorders, and whether they can clearly recognize patients who have been administered sedatives. Moreover, they also have insufficient skills in determining the time when patients' consciousness can be assessed. However, based on their clinical knowledge of the scale and its overall expression, nursing experts determined that these items were essential in reflecting nurses' confidence in delirium assessment and recommended retaining all items. Construct validity reflects how well the structure of the scale aligns with the theoretical framework, and factor analysis is the most commonly used method for this assessment.[18] In this study, exploratory factor analysis extracted two common factors with eigenvalues greater than 1, with a cumulative variance contribution rate of 65.522%. The factor loadings of the items on their respective factors ranged from 0.521 to 0.832, indicating good construct validity. In conclusion, the Chinese version of the DCSE-I scale demonstrates good validity.

The Scale Demonstrates Good Reliability

The reliability of a scale is typically assessed through internal consistency, split-half reliability, and test-retest reliability, which evaluates the stability and dependability of the scale. Cronbach's α value ranges from 0 to 1. A Cronbach's α value below 0.6 indicates insufficient internal consistency; a value between 0.7 and 0.8 indicates good reliability, while a value between 0.8 and 0.9 indicates high reliability.[13] Split-half reliability measures the correlation between the two parts of the measurement tool.[13] Test-retest reliability evaluates the scale's stability over time.[13,18] In this study, the overall Cronbach's α coefficient of the Chinese version of the DCSE-I was 0.934, with Cronbach's α values for each dimension ranging from 0.887 to 0.908. The split-half reliability was 0.861, and the test-retest reliability was 0.954, demonstrating that the Chinese version of the DCSE-I has excellent internal consistency, high reliability, and can serve as a dependable tool for assessing the self-efficacy of ICU nurses in delirium care in China.

Application and Significance of the Scale

The Chinese version of the DCSE-I comprises two dimensions and 13 items. The moderate number of items ensures that the scale is easily understood by ICU nurses, while its robust operability allows for a comprehensive and objective evaluation of ICU nurses' self-efficacy in delirium care. A total of 325 questionnaires were distributed, and 284 valid responses were obtained, resulting in an effective response rate of 87.38%, demonstrating good feasibility of the scale. Establishing interventions to enhance nurses' self-efficacy based on reliable self-efficacy measurements is crucial.[19] The use of self-efficacy measurements has become increasingly prevalent, extending from clinical topics and educational research to organizational studies.[20–22] The revised Chinese version of the DCSE-I can be used to assess the current state of self-efficacy in delirium care among ICU nurses in China. It also helps to identify areas of weakness in delirium care among ICU nurses, providing a valuable foundation for researchers to develop intervention programs aimed at improving self-efficacy.

Limitations

The study has some limitations.The use of convenience sampling may limit the representativeness of the sample. Future research should aim to optimize the sampling method by considering a broader and more stratified approach to further validate the scale's reliability and applicability. The subjects investigated in this study were all from the intensive care unit of hospitals in Chongqing. There is a possibility of insufficient representativeness. Further promotion and verification are still needed among medical institutions of different regions and different levels.It is performed only exploratory factor analysis (EFA),a confirmatory factor analysis (CFA) would further strengthen the evidence for construct validity. It is suggested that CFA be used in future research.

Conclusion

The DCSE-I was introduced as a tool in this study to assess the self-efficacy of ICU nurses in delirium care in mainland China through scale revision, pilot testing, and on-site questionnaire surveys. The scale consists of two dimensions and

13 items, demonstrating strong reliability and validity while preserving the characteristics of the original scale. With a moderate number of items and clear expressions, the scale was well-received by participants, making it suitable for evaluating ICU nurses' self-efficacy in delirium care in China. By understanding the current status and influencing factors of ICU nurses' self-efficacy in delirium care, managers can implement effective interventions to enhance their self-efficacy in this area.

Abbreviations

ICU, Intensive Care Unit; ICU delirium, Intensive Care Unit delirium; SE, Self-Efficacy; DCSE-I, Delirium Care Self-Efficacy Scale for ICU nurses; S-CVI/Ave, scale-level content validity index/average; I-CVI, item-level content validity index.

Data Sharing Statement

All data generated or analysed during this study are included in this article. Further enquiries can be directed to the corresponding author.

Ethics Approval and Consent to Participate

The study was conducted in accordance with the Declaration of Helsinki (as was revised in 2013). The study was approved by Ethics Committee of Chongqing University Cancer Hospital (No.CZLS2022254-A). Written informed consent was obtained from all participants.

Acknowledgments

We are particularly grateful to all the people who have given us help on our article.

Funding

Technology innovation project of Science and Technology Bureau of Shapingba District, Chongqing (No. 2024116).

Disclosure

The authors declare that they have no competing interests in this work.

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