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By Yanan Li, Lu Wang, Zhiping Chu & Xiumei Yang

Nanjing Medical University

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DEVELOPMENT OF KNOWLEDGE ATTITUDE PRACTICE QUESTIONNAIRE ON ORAL NUTRITION SUPPLEMENT AMONG NURSES IN ONCOLOGY DEPARTMENT AND ITS RELIABILITY AND VALIDITY TEST

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Conclusion: The questionnaire on knowledge-attitude-practice of oral nutrition supplement knowledge among oncology nurses has good reliability and validity. It can be used as an evaluation tool for the level of knowledge-attitude-practice of oral nutrition supplement knowledge of oncology nurses.

Keywords: nurses; oral nutritional supplements; knowledge-attitude-practice; reliability; validity.

INTRODUCTION

Cancer patients often suffer different degrees of malnutrition, which affect the function of body tissues and organs, resulting in a decrease in the patient's tolerance to treatment and the curative effect of tumor treatment, thereby affecting the quality of life and prognosis of patients [1]. Therefore, for cancer patients, nutritional therapy is an essential part of comprehensive cancer therapy. Oral nutritional supplements (ONS) are formulas (foods) for special medical purposes that are ingested orally to supplement insufficient daily diet, and meet the body's nutritional needs by providing nutrients such as carbohydrates, proteins, and fats [2]], is the

Author α σ ρ : Nursing department, The Second Affiliated Hospital of Nanjing Medical University, Nanjing 210000, China.

Author ω : Pancreatic center, The Second Affiliated Hospital of Nanjing Medical University, Nanjing 210000, China.
e-mail: zyz781021@126.com

preferred way of nutritional therapy for patients with normal gastrointestinal function and able to eat orally [3]. ONS can improve the nutritional status of cancer patients, prevent malnutrition and its complications, and enhance anti-tumor efficacy [4]. As the nurses who are most closely contacted during the inpatient treatment of cancer patients, their cognitive and behavioral levels of ONS will affect the patient's compliance with ONS and the effect of nutritional therapy [5]. An evaluation tool for ONS knowledge, belief, and behavior by nurses. Therefore, by compiling a questionnaire on ONS knowledge, belief, and behavior of oncology nurses and testing its reliability and validity, this study provides an evaluation tool for evaluating the status quo of ONS knowledge, belief, and behavior among oncology nurses, and provides targeted training programs and scientific management strategies.

I. RESEARCH METHODOLOGY

Compile the ONS Knowledge, Credit and Action Questionnaire

a) *Setting up a research group*

The research group consisted of 6 members who were familiar with the research contents, including 2 chief physicians of the oncology department, 2 deputy chief nurses and 2 nursing master students. The members of the group are responsible for the formulation of the initial items of the questionnaire, carrying out inquiries from Delphi experts, pre-investigation of the initial questionnaire, and data collection, arrangement and analysis.

b) *Compile the initial item pool of the questionnaire*

This study is based on the knowledge, belief, and action model [6]. The research team discussed the major and difficult issues related to ONS in cancer patients, followed the best evidence for the implementation and management of ONS in patients with malignant tumors summarized by Zhu Yunxia et al. The initial item pool for the questionnaire. The formed questionnaire item pool includes a total of 51 items, including 12 knowledge dimensions, 16 belief dimensions, and 23 behavior dimensions, mainly

covering ONS pre-use assessment, scope of application, formulation selection, risk assessment, efficacy evaluation, and health education.

c) *Delphi expert correspondence*

i. *Develop an expert letter questionnaire*

The Expert Letter Questionnaire consists of 4 parts. The first part is the preface, including the background, purpose, significance and filling requirements of the questionnaire; the second part is the basic information of the expert, mainly including the expert's age, education, work field, working years, professional title and position, etc.; the third part For the "Oncology Nurses ONS Knowledge, Attitude and Action Questionnaire Item Evaluation Form", experts are required to use the Likert 5-point scoring method to evaluate the importance of each item, "1-5 points" respectively indicate "not important", "not very important", and "generally important" "More important" and "Very important", and set up "Item Modification Opinion Column" and "Add Item Column" for experts to fill in their opinions and suggestions; the fourth part is the self-assessment form for the degree of authority of experts, including the expert's familiarity with the content and Judgment is based on two aspects.

ii. *Selection of correspondence experts*

Expert selection criteria: high academic level in the field of ONS; engaged in oncology related work for ≥ 10 years; bachelor degree or above; intermediate or above professional title; actively participate in and support this research. A total of 15 experts were invited to participate in the letter inquiries, aged 36-51 (44.07 ± 4.59) years old; education: 9 undergraduates (60%), 6 masters (40%); working years 10-31 (19.93 ± 6.44) Year; Professional Title: 1 Intermediate Professional Title (6.67%), 14 Senior Professional Title (93.33%); Position: 5 Clinical Nursing (33.33%); 9 Nursing Management (60%); 1 Nursing Education (6.67%).

d) *Item revisions*

Questionnaires are distributed and returned by means of electronic communication. A total of 2 rounds of expert correspondence were conducted in this study, and the effective recovery rates of the questionnaires in both rounds were 100%, indicating that the experts were highly motivated and attached great importance to this research; the authoritative coefficients of the experts in the 2 rounds of correspondence were 0.893 and 0.921, both > 0.7 , indicating that the degree of authority of experts is high, and the results of letter inquiry are reliable; the Kendall coordination coefficients of the two rounds of expert letter inquiry are 0.135 and 0.149 respectively ($P < 0.001$). After the two rounds of correspondence, the average value of each item was 4.06 to 5.00, and the coefficient of variation was 0 to 0.18, indicating that the experts had basically reached

an agreement and no further correspondence was required.

Taking the item importance evaluation average score < 3.5 and the coefficient of variation > 0.25 as the criteria for item deletion [9], the research team revised the items based on expert opinions. After the first round of inquiries, the research team made the following changes: delete "A4: I think oncology nurses should have the relevant knowledge and skills of ONS"; delete "P12: I will provide patients with different types and flavors of ONS preparations", to guide patients to choose appropriate ONS preparations"; merge "A6: I think oncology nurses play an important role in improving the efficacy of ONS in patients" and "A7: I think oncology nurses should pay attention to the treatment and care of ONS in cancer patients" as "A17: I think oncology nurses should pay attention to the treatment and care of ONS in cancer patients and play an important role"; will "A11: I think oncology nurses should accurately identify the adverse reactions after ONS, such as gastrointestinal intolerance symptoms, elevated blood sugar, etc." "A12: I think oncology nurses should be proficient in the preventive measures and correct treatment methods for adverse reactions after ONS" merged into "A18: I think oncology nurses should accurately identify adverse reactions after ONS, and take appropriate measures." "K13: When the NRS-2002 score is greater than how many points need to formulate a nutrition plan"; replace "P2: For patients with abnormal screening, I will use appropriate evaluation tools to conduct a comprehensive evaluation of the patients, Objective and quantitative assessment of nutritional intake, nutritional impact symptoms, muscle mass, physical condition, and degree of systemic inflammation" is revised to "For patients with abnormal screening, I will use appropriate assessment tools to conduct a comprehensive nutritional status assessment of the patient Evaluation"; Amend "P13: I will add different kinds of condiments (such as juice, vegetable juice, honey, milk and salt, etc.) to the ONS agent according to the patient's dietary habits and preferences" to "I will Underlying diseases, dietary habits and preferences, adding different kinds of condiments (such as juice, vegetable juice, honey, milk, and salt, etc.) to ONS agents". "P23: When the patient's dietary intake reaches the recommended daily dietary intake and maintains good nutritional status, I will instruct the patient to discontinue ONS reasonably" to "When the patient's dietary intake reaches the recommended daily dietary intake and maintains good nutritional status" I will instruct patients to gradually stop ONS when their nutritional status is not sufficient, and instruct them to use ONS in a timely manner when dietary intake is insufficient." After the second round of inquiries, the experts did not put forward new opinions, and the final initial questionnaire included 48 items, including 13

items in the knowledge dimension, 13 items in the belief dimension, and 22 items in the behavior dimension.

e) *Reliability and validity test of the questionnaire*

i. *Research objects*

Convenience sampling method was used to select nurses in the oncology department of five tertiary hospitals in Jiangsu Province as the research objects from March to April 2022. Inclusion criteria: Qualified as a nurse practitioner and engaged in front-line clinical work; working time in the oncology department ≥ 1 year; voluntary participation in this study. Exclusion criteria: rotation, advanced study, practice nurses; those who are not at work due to illness, affairs, maternity leave, etc. According to the sample size of 5 to 10 times the number of items [9], the minimum sample size is 240 cases, and considering the dropout rate of 10%, this study finally included 270 subjects.

The questionnaires were collected by 2 uniformly trained research team members. The data is collected in the form of questionnaire stars, and the purpose, meaning and precautions of this questionnaire survey are introduced to the research subjects with a unified guide language; in order to avoid omissions, all items are set as mandatory items; in order to avoid invalid questionnaires, the research object with the same user and IP address can only be filled in once. After the questionnaire was collected, it was exported to excel, checked by two people, and the unqualified data were deleted.

ii. *Project Analysis*

a. *Discrimination analysis method*

The critical ratio decision value (CR) was used to test the discriminative degree and discriminating ability of the questionnaire. The questionnaire total scores of the research subjects were sorted from high to low, and the top 27% of the total scores were in the high group, and the last 27% were in the low group. The differences in the scores of each item between the two groups were compared, and the items with $CR < 3$ and no statistically significant difference were deleted [10].

b. *Correlation coefficient analysis method*

By calculating the correlation coefficient of each item with the overall questionnaire and the scores of each dimension, the representativeness of each item is reflected, and the homogeneity of each item with the overall questionnaire and each dimension is judged. Items with a correlation coefficient < 0.40 with the overall questionnaire or the dimension to which it belongs are deleted [11].

c. *Internal consistency reliability analysis method*

Calculate the Cronbach's α coefficient of the overall questionnaire and each dimension, and then calculate the Cronbach's α coefficient of the overall questionnaire and each dimension after deleting each

item. If the Cronbach's α coefficient of the questionnaire increases after removing an item, delete the item [9].

iii. *Validity analysis*

a. *Construct validity*

The construct validity of the questionnaire was tested by exploratory factor analysis and confirmatory factor analysis. Exploratory factor analysis: It is suitable for sampling appropriateness value (KMO) > 0.6 and the Bartlett sphericity test has a statistically significant difference ($P < 0.05$). Contribution rate $> 40\%$; use the orthogonal rotation to maximize the variance to obtain the component matrix, and delete the entries with factor loading values < 0.40 [12]. Confirmatory factor analysis: using the maximum likelihood method for analysis; using the ratio of chi-square degrees of freedom (χ^2/df), root mean square error of approximation (RMSEA), incremental fit index (IFI), comparative fit index (CFI), Parsimony Adjustment Fit Index (PCFI), Goodness of Fit Index (GFI), Normative Fit Index (PNFI) and other results to analyze the rationality of the questionnaire structure; the reference standards for each index are $\chi^2/df < 5.0$, RMSEA < 0.10 , IFI > 0.90 , CFI > 0.90 , PCFI > 0.50 , GFI > 0.90 , PNFI > 0.50 [13].

b. *Content Validity*

The 15 experts who originally participated in the Delphi letter inquiries were invited to evaluate the content validity of the revised questionnaire, using the Likert 4-point scoring method, with "1-4 points" indicating "very irrelevant", "irrelevant", "relevant", "very relevant". The content validity of the questionnaire was tested by the item-level content validity index (I-CVI) and the scale-level mean content validity index (S-CVI). It is generally believed that I-CVI > 0.78 and S-CVI > 0.9 indicate good content validity [14].

iv. *Reliability Analysis*

The Cronbach's α coefficient was used to analyze the internal consistency reliability of the overall questionnaire and each dimension, and the Cronbach's α coefficient was generally required to be > 0.80 ; the questionnaire filling results of 50 oncology nurses were re-collected after 2 weeks, and the correlation between the two questionnaire scores was tested. The test-retest reliability of the questionnaire generally requires a test-retest reliability > 0.70 [11].

f) *Statistical methods*

Double check and input data, SPSS 23.0 and Amos 23.0 were used for statistical analysis. Use mean and standard deviation, frequency and composition ratio to describe the general data of the research object; use two independent sample t test, Pearson correlation coefficient and Cronbach's alpha coefficient method to analyze items and screen items of the questionnaire; use exploratory factor analysis and confirmatory Factor analysis was used to test the construct validity of the questionnaire; I-CVI and S-CVI were used to test the

content validity of the questionnaire; Cronbach's alpha coefficient and test-retest reliability coefficient were used to test the reliability of the questionnaire. $P < 0.05$ was considered to be statistically significant.

II. RESULTS

a) General information on nurses

A total of 265 valid questionnaires were collected in this study. All of the 265 nurses in the oncology department were female; age ranged from 22 to 49 (33.52 ± 6.80) years; education: 22 (8.30%) junior college, 236 undergraduate (89.06%), and 7 master (2.64%); work in oncology 2-18 (11.31 ± 6.37) years; professional title: 74 (27.92%) with primary professional title, 165 (62.26%) with intermediate professional title, 26 (9.81%) with senior professional title; 32 (12.07%) of specialist oncology nurses; 109 cases (41.13%) had participated in ONS-related knowledge and skills training.

b) Project Analysis Results

i. Discrimination analysis method

After the total score of the questionnaire was sorted from low to high, the total score of the 72nd and 193rd subjects was the critical value, and the total score ≤ 134 was divided into the low group, and the total score ≥ 183 was divided into the high group. There was no significant difference in the items K3 ($CR = 1.025$), K4 ($CR = 2.673$), and K11 ($CR = 1.628$) between the two groups ($P > 0.05$). These three items were deleted. The CR values of the remaining items ranged from 4.366 to 12.758 with $P < 0.05$.

ii. Correlation coefficient analysis method

The correlation coefficients of items K3, K4, K11 and the overall questionnaire are 0.108, 0.366 and 0.136, respectively, and the correlation coefficients with their knowledge dimensions are 0.215, 0.377 and 0.283, all < 0.40 , indicating that these three items are homogeneous with the questionnaire. Poor performance, consider deleting it. The correlation coefficients of the remaining items with the overall questionnaire ranged from 0.514 to 0.882, and the

correlation coefficients with their knowledge, belief and behavior dimensions were 0.543 to 0.717, 0.577 to 0.748, and 0.754 to 0.893, respectively.

iii. Internal consistency reliability analysis method

The Cronbach's alpha coefficients of the questionnaire population, knowledge dimension, belief dimension and behavior dimension were 0.958, 0.862, 0.942 and 0.972, respectively. After removing a certain item, the Cronbach's alpha coefficients of the questionnaire population, knowledge dimension, belief dimension and behavior dimension were 0.765~0.911, 0.711~0.817, 0.793~0.887 and 0.823~0.925, respectively. None of the Cronbach's alpha coefficients increased, indicating that each item made a greater contribution to the internal consistency of the questionnaire, and no item was deleted.

c) Validity analysis results

i. Construct validity

a. Exploratory factor analysis

In this study, $KMO = 0.821$, and the Bartlett test of sphericity was statistically significant ($\chi^2 = 9427.980$, $P < 0.001$), which was suitable for factor analysis. Factor loadings of 0.337 and 0.289 for entries K2 and K5, respectively, were removed after the variance-maximizing orthogonal rotation. After the entry was deleted, the second exploratory factor analysis was performed, $KMO = 0.830$, and the difference was statistically significant ($\chi^2 = 4910.303$, $P < 0.001$); 5 common factors with eigenvalues > 1 were extracted, and the cumulative variance contribution rate Among the five common factors, common factors 1 and 2 are classified as behavior dimensions, common factors 3 and 5 are classified as belief dimensions, and common factor 4 is classified as knowledge dimension, which is basically consistent with knowledge. The theoretical framework of Xinxing. The final questionnaire includes 43 items, including 8 items in the knowledge dimension, 13 items in the belief dimension, and 22 items in the behavior dimension. See *Table 1* for details. The results of the exploratory factor analysis are shown in *Table 2*.

Table 1: Items of ONS Knowledge, Attitude and Action Questionnaire for Oncology Nurses.

Questionnaire Entries for Dimensions
Knowledge
K1: For cancer patients with normal gastrointestinal function, the preferred way to receive enteral nutrition is
K6: When the oral intake of tumor patients during the perioperative period is less than the recommended target calories and protein, ONS should be given before surgery
K7: Symptoms of oral enteral nutrition intolerance mainly include
K8: The highest goal of nutritional support treatment for cancer patients is
The principles of K9: ONS include
K10: Before the implementation of ONS, in addition to fully assessing the nutritional status of the patient, a comprehensive assessment of the patient's general condition should be carried out, including
K12: When taking ONS for patients with oral mucositis, what ways can be used to reduce the pain caused by ONS stimulation of the mucous membrane?

K13: When the NRS2002 score is greater than the number of points, a nutrition plan needs to be developed.
Attitude A1: I am interested in ONS-related knowledge and skills
A2: I wish to receive professional training in ONS-related knowledge and skills
A3: I think oncology nurses should pay attention to patients' nutritional intake, nutritional impact symptoms, physical conditions and laboratory inspection indicators, etc., and use appropriate scales to screen patients for nutritional risk and comprehensively assess nutritional status.
A5: I think ONS can help improve the nutritional status of cancer patients and even play an irreplaceable role in prolonging survival
A8: I think the ONS standardized management process should be developed
A9: I think oncology nurses should be proficient in methods to improve patients' acceptance of ONS preparations
A10: I think oncology nurses should be proficient in the formulation, energy density and preparation method of ONS preparations
A13: I think oncology nurses should strengthen nutrition guidance and education for patients, mainly including the purpose and significance of ONS, preparation and drinking methods, prevention and treatment measures for adverse reactions, etc.
A14: I think nutrition education should run through the whole process, explain the profound things in a simple way, be familiar and understandable, and reinforce it regularly
A15: I think oncology nurses should regularly evaluate the efficacy of ONS. The evaluation indicators mainly include the patient's body weight, BMI, albumin, prealbumin and other laboratory test indicators
A16: I believe that nurses in the oncology department should strengthen the follow-up of patients with ONS, focusing on the implementation of the ONS treatment plan, the compliance of energy intake and the difficulties encountered in the implementation of ONS, and provide guidance during follow-up
A17: I think oncology nurses should pay attention to the treatment and care of ONS in cancer patients and play an important role
A18: I think oncology nurses should accurately identify adverse reactions after ONS and take appropriate preventive and treatment measures.
Action P1: I will learn the knowledge and skills of ONS through various means (such as academic lectures, skills training and literature retrieval, etc.)
P2: I will use an appropriate scale for nutritional risk screening of cancer patients
P3: For patients with abnormal screening, I will use appropriate assessment tools to conduct a comprehensive assessment of the patient's nutritional status
P4: For cancer patients who are malnourished or at risk of nutrition, I will first give them intensive nutrition education
P5: For cancer patients who are malnourished or at nutritional risk, when oral feeding cannot meet their nutritional needs, I will give ONS as soon as possible
P6: ONS is my first choice for enteral nutrition support for cancer patients with normal gastrointestinal tract function
P7: For tumor patients who cannot eat normally for more than 5 days for elective surgery, I will encourage and guide their ONS before surgery
P8: Before implementing ONS, I will inform patients of the nutritional assessment results and educate the purpose and significance of ONS, help them identify existing or potential nutritional problems, and improve patients and their caregivers' awareness and acceptance of the importance of ONS
P9: Before implementing ONS, I will encourage patients to participate in the setting of nutritional treatment goals
P10: I will follow a step-by-step principle to guide cancer patients on ONS
P11: For tumor patients with gastrointestinal symptoms such as loss of appetite, nausea and vomiting, I will first give appropriate symptomatic treatment as prescribed by the doctor
P13: I will add different kinds of condiments (such as juice, vegetable juice, honey, milk and salt, etc.) to the ONS agent according to the patient's underlying disease, eating habits and preferences
P14: During the implementation of ONS, I will give patients and their families adequate nutritional guidance and education, mainly including the concentration, temperature and method of preparation; drinking method of preparation; target dosage of preparation; prevention and treatment of adverse reactions method etc.
P15: I will adopt personalized, easy-to-understand, and easy-to-operate nutrition education methods and approaches according to the patient's age, education level, and psychological status.
P16: When patients encounter difficulties or questions during the ONS process, I will give timely guidance and help
P17: I will deal with the patient's gastrointestinal intolerance, abnormal blood sugar and other adverse reactions by appropriately adjusting the concentration, temperature, dosage and drinking method of ONS, and selecting special preparations.
P18: If the patient's gastrointestinal intolerance symptoms cannot be relieved by properly adjusting the concentration, temperature, dosage and drinking method of ONS, I will suspend ONS first, and the doctor or nutritionist will change the type of ONS preparation
P19: For tumor patients with severe malnutrition, major surgery, and postoperative radiotherapy and chemotherapy, I will guide the patients to continue ONS for 2 weeks to several months after discharge, and continue to pay attention to the nutritional status of the patients
P20: I would encourage ONS users to record their daily ONS usage in a diary or table, including the time and amount of ONS usage, adverse reactions and possible causes, diet, etc.
P21: I will follow up on ONS users regularly, focusing on the implementation of the ONS treatment plan, the energy intake standard and the difficulties encountered in the implementation of ONS, and give guidance during the follow-up



P22: I will regularly evaluate the nutritional status of ONS users, including body weight, BMI, albumin, prealbumin and other laboratory test indicators

P23: When the dietary intake of the patient reaches the recommended amount of the daily diet and maintains a good nutritional status, I will guide the patient to gradually discontinue ONS; when the dietary intake is insufficient, I will guide the patient to use ONS in time.

Table 2: Exploratory factor analysis of ONS Knowledge, Attitude and Action Questionnaire for 265 oncology nurses

Questionnaire items	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
P10	0.861	-	-	-	-
P2	0.860	-	-	-	-
P8	0.850	-	-	-	-
P5	0.850	-	-	-	-
P9	0.838	-	-	-	-
P3	0.835	-	-	-	-
P6	0.815	-	-	-	-
P7	0.812	-	-	-	-
P11	0.809	-	-	-	-
P4	0.804	-	-	-	-
P1	0.724	-	-	-	-
P15	0.543	-	-	-	-
P19	-	0.832	-	-	-
P18	-	0.806	-	-	-
P20	-	0.793	-	-	-
P17	-	0.777	-	-	-
P21	-	0.771	-	-	-
P22	-	0.771	-	-	-
P16	-	0.612	-	-	-
P23	-	0.595	-	-	-
P13	-	0.558	-	-	-
P14	-	0.545	-	-	-
A1	-	-	0.935	-	-
A17	-	-	0.926	-	-
A2	-	-	0.921	-	-
A3	-	-	0.913	-	-
A5	-	-	0.909	-	-
A16	-	-	0.854	-	-
A14	-	-	0.801	-	-
A15	-	-	0.611	-	-
K1	-	-	-	0.883	-
K6	-	-	-	0.881	-
K13	-	-	-	0.874	-
K7	-	-	-	0.794	-
K9	-	-	-	0.727	-
K10	-	-	-	0.702	-
K8	-	-	-	0.589	-
K12	-	-	-	0.511	-
A13	-	-	-	-	0.816
A18	-	-	-	-	0.752
A8	-	-	-	-	0.694
A9	-	-	-	-	0.627
A10	-	-	-	-	0.548
Dimension	behavioral dimension	behavioral dimension	belief dimension	knowledge dimension	belief dimension
Cumulative contribution rate (%)	25.127	48.730	64.848	73.856	81.087

Note: Please refer to Table 1 for the explanation of the questionnaire items; K: knowledge dimension item; A: belief dimension item; P: behavior dimension item; common factor 4 is classified as knowledge dimension; common factors 3 and 5 are classified as belief dimension; common factor 1, 2 is classified as behavior dimension; -: blank item

b. *Confirmatory factor analysis*

The fitting results of the questionnaire model are: $\chi^2/df=3.494$, $RMSEA=0.098$, $IFI=0.914$, $CFI=0.914$, $PCFI=0.797$, $GFI=0.922$, $PNFI=0.753$.

ii. *Content Validity*

The I-CVI of each item of the questionnaire was 0.832-1.000; the overall S-CVI of the questionnaire was 0.914; the S-CVI of the knowledge dimension, belief dimension and behavior dimension of the questionnaire were 0.903, 0.911 and 0.925, respectively.

d) *Reliability Analysis Results*

The Cronbach's alpha coefficients of the overall questionnaire, knowledge dimension, belief dimension and behavior dimension were 0.958, 0.862, 0.942 and 0.972, respectively; the test-retest reliability of the overall questionnaire, knowledge dimension, belief dimension and behavior dimension were 0.978, 0.761, 0.962, 0.985, respectively.

e) *Final Questionnaire of ONS Knowledge, Attitude and Practice of Oncology Nurses*

The final questionnaire consists of 43 items, including 8 items in the knowledge dimension, including 3 multiple-choice questions and 5 multiple-choice questions. A correct answer to a multiple-choice question is worth 1 point, a wrong answer is 0 points, and a multiple-choice question is answered correctly. 1 option Score 1 point, wrong answer is 0 point, the scoring range is 0~4 points; there are 13 items in the belief dimension, using Likert 5-point scoring method, "1~5 points" respectively means "strongly disagree" and "disagree" "Not sure", "agree", "strongly agree", the scoring range is 1-5 points; there are 22 items in the behavior dimension, using the Likert 5-point scoring method, "1-5 points" represent "never" and "occasionally" respectively "Sometimes", "Often" and "Always" on a scale of 1 to 5. The overall score of the questionnaire ranged from 35 to 198, with higher scores indicating better knowledge, beliefs and behaviors of ONS nurses.

III. DISCUSSION

a) *It is of great significance to compile the ONS Knowledge, Attitude and Action Questionnaire for Oncology Nurses*

Rational nutritional support has significant benefits in remission, quality of life and prognosis of cancer patients [15]. ONS is a safe, convenient, cost-effective and effective nutritional treatment measure. The European society for clinical nutrition and metabolism (ESPEN)[16], the Chinese society for parenteral nutrition and enteral nutrition, (CSPEN) [17] both recommend ONS as the first choice for nutritional therapy. The intake of ONS requires the active cooperation of patients, and its efficacy depends on the patient's compliance [7]. Nursing staff are the main contacts of patients during hospitalization and play a key role in the implementation

and management of ONS. Expert consensus [5] pointed out that insufficient attention and non-standard implementation of ONS by nursing staff will reduce patients' compliance with ONS and affect the treatment effect. Nursing staff should be proficient in the implementation of ONS and translate it into practical actions, which is conducive to improving patients' compliance with ONS and enhancing its efficacy. Good behavior is based on correct knowledge and positive attitudes and beliefs [18]. Understanding the current status of oncology nurses' knowledge, beliefs, and behaviors about ONS can help improve their clinical execution. Therefore, it is very necessary to compile relevant questionnaires to provide a reliable evaluation tool for a comprehensive and objective understanding of oncology nurses' knowledge, belief, and behavior level of ONS, and to provide a basis for targeted training and management decisions.

b) *The scientific preparation process of the ONS questionnaire for oncology nurses*

Based on the theory of knowledge, belief, and action, this study constructed an initial item pool of the questionnaire according to relevant domestic and foreign literature, covering ONS pre-use assessment, scope of application, formulation selection, use risk assessment, efficacy evaluation, and health education. The relevant content of ONS is comprehensively included to ensure the standardization of the questionnaire items. This study adopts the Delphi method to invite clinical nursing, nursing management and nursing education experts with high academic level, solid theoretical foundation and rich clinical experience in the field of ONS to revise the initial item pool of the questionnaire; The recovery rate is 100%, and the authoritative coefficients of the experts in the two rounds of correspondence are 0.893 and 0.921 respectively, indicating that the experts have high enthusiasm and authority, and can make professional judgments and make valuable suggestions for each item, which ensures that the experts are highly motivated and authoritative. The rigor of the letter inquiry process and the reliability of the letter inquiry results; the research team revised and improved the questionnaire according to expert opinions, which ensured the rationality of the questionnaire items. In this study, statistical methods such as discrimination analysis method, correlation coefficient analysis method and internal consistency reliability analysis method were used to screen the questionnaire items, try to avoid the deviation caused by the selection of items by a single method, and ensure the representativeness and reliability of the questionnaire items. Sensitivity. In this study, the questionnaire was pre-investigated to test its reliability and validity, which ensured the stability and validity of the structure and content of the questionnaire.

c) *The ONS Knowledge, Attitude and Action Questionnaire for Oncology Nurses has good reliability and validity*

Reliability reflects the consistency of evaluation tools, that is, whether the evaluation tools can stably evaluate the measured variables. The overall Cronbach's α coefficient of the questionnaire prepared in this study was 0.958, and the Cronbach's α coefficient of each dimension was 0.862-0.972, all >0.80 , indicating that the questionnaire had good internal consistency. The test-retest reliability of this study was 0.978, and the test-retest reliability of each dimension was 0.761-0.985, all >0.70 , indicating that the questionnaire has good stability and consistency across time. Validity refers to the degree to which the assessment tool reflects the expected research concept, that is, the correctness and validity of the questionnaire [12]. After 2 rounds of exploratory factor analysis, this study extracted 5 common factors, the cumulative variance contribution rate was greater than 40%, and the factor loading of each item was greater than 0.4, indicating that the questionnaire was basically consistent with the theoretical structure of the questionnaire; the confirmatory factor analysis results showed that $\chi^2/df < 5.00$, RMSEA < 0.10 , IFI, CFI, GFI are > 0.90 , PCFI, PNFI are > 0.50 , all fitting indicators are in the acceptable range, indicating that the model fits well. The above results show that the questionnaire has good construct validity. The overall S-CVI of the questionnaire in this study is 0.914, the S-CVI of each dimension is 0.903-0.925, all > 0.90 ; the I-CVI of each item is 0.832-1.000, all > 0.78 , indicating that the content of this questionnaire can reflect the current status of ONS knowledge, belief, and behavior among nurses in the oncology department has good content validity.

IV. CONCLUSION

The ONS knowledge, belief, and behavior questionnaire for oncology nurses prepared in this study has good reliability and validity. It can be used as a scientific tool to assess the current status of ONS knowledge, belief, and behavior of oncology nurses, and provides a theoretical basis for carrying out targeted training programs and formulating scientific management strategies. Due to limited conditions, this study only investigated five tertiary first-class hospitals in Jiangsu Province, and the generalizability of the questionnaire was limited. In the future, the sample size will be increased and expanded to hospitals in multiple regions and levels to further verify and improve the questionnaire.

Data Availability

The experimental data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declared that they have no conflicts of interest regarding this work.

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