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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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## Abstract

To develop a questionnaire on oncology nurses' knowledge-attitude-practice towards oral nutrition supplementation, and to test its reliability and validity. Methods: Based on literature review and Delphi expert correspondence, the initial questionnaire was constructed on the basis of knowledge-attitude-practice mode. A total of 265 oncology nurses from 5 tertiary care hospitals in Jiangsu Province were selected by convenience sampling method for pre-survey to test the reliability and validity of the questionnaire and form the final version. Results: The questionnaire included three dimensions: knowledge, attitude and practice, with a total of 43 items; exploratory factor analysis extracted a total of five common factors, with a cumulative variance contribution rate of 81.087

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*Index terms*— nurses; oral nutritional supplements; knowledge-attitude-practice; reliability; validity.

## 1 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 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.

## 2 I.

## 3 Research Methodology

## 4 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, preinvestigation of the initial questionnaire, and data collection, arrangement and analysis.

### 5 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.

### 6 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 ( $44.07\pm 4.59$ ) years old; education: 9 undergraduates (60%), 6 masters (40%); working years 10-31 ( $19.93\pm 6.44$ ) 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%).

### 7 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,

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102 the experts did not put forward new opinions, and the final initial questionnaire included 48 items, including 13  
103 items in the knowledge dimension, 13 items in the belief dimension, and 22 items in the behavior dimension.

## 104 **8 e) Reliability and validity test of the questionnaire i. Research** 105 **objects**

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

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

119 ii. Project Analysis

## 120 **9 a. Discrimination analysis method**

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

## 126 **10 b. Correlation coefficient analysis method**

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

## 131 **11 c. Internal consistency reliability analysis method**

132 Calculate the Cronbach's  $\alpha$  coefficient of the overall questionnaire and each dimension, and then calculate the  
133 Cronbach's  $\alpha$  coefficient of the overall questionnaire and each dimension after deleting each item. If the Cronbach's  
134  $\alpha$  coefficient of the questionnaire increases after removing an item, delete the item [9].

## 135 **12 iii. Validity analysis a. Construct validity**

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

## 146 **13 b. Content Validity**

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

## 152 **14 iv. Reliability Analysis**

153 The Cronbach's  $\alpha$  coefficient was used to analyze the internal consistency reliability of the overall questionnaire  
154 and each dimension, and the Cronbach's  $\alpha$  coefficient was generally required to be  $> 0.80$ ; the questionnaire filling

155 results of 50 oncology nurses were re-collected after 2 weeks, and the correlation between the two questionnaire  
156 scores was tested. The test-retest reliability of the questionnaire generally requires a testretest reliability > 0.70  
157 [11].

### 158 15 f) Statistical methods

159 Double check and input data, SPSS 23.0 and Amos 23.0 were used for statistical analysis. Use mean and  
160 standard deviation, frequency and composition ratio to describe the general data of the research object; use two  
161 independent sample t test, Pearson correlation coefficient and Cronbach's alpha coefficient method to analyze  
162 items and screen items of the questionnaire; use exploratory factor analysis and confirmatory Factor analysis  
163 was used to test the construct validity of the questionnaire; I-CVI and S-CVI were used to test the content  
164 validity of the questionnaire; Cronbach's alpha coefficient and test-retest reliability coefficient were used to test  
165 the reliability of the questionnaire.  $P < 0.05$  was considered to be statistically significant.

### 166 16 II.

### 167 17 Results

#### 168 18 a) General information on nurses

169 A total of 265 valid questionnaires were collected in this study. ??ll

#### 170 19 b) Project Analysis Results

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

#### 176 20 ii. Correlation coefficient analysis method

177 The correlation coefficients of items K3, K4, K11 and the overall questionnaire are 0.108, 0.366 and 0.136,  
178 respectively, and the correlation coefficients with their knowledge dimensions are 0.215, 0.377 and 0.283, all  
179  $< 0.40$ , indicating that these three items are homogeneous with the questionnaire. Poor performance, consider  
180 deleting it. The correlation coefficients of the remaining items with the overall questionnaire ranged from 0.514 to  
181 0.882, and the correlation coefficients with their knowledge, belief and behavior dimensions were 0.543 to 0.717,  
182 0.577 to 0.748, and 0.754 to 0.893, respectively.

#### 183 21 iii. Internal consistency reliability analysis method

184 The Cronbach's alpha coefficients of the questionnaire population, knowledge dimension, belief dimension and  
185 behavior dimension were 0.958, 0.862, 0.942 and 0.972, respectively. After removing a certain item, the  
186 Cronbach's alpha coefficients of the questionnaire population, knowledge dimension, belief dimension and behavior  
187 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  
188 alpha coefficients increased, indicating that each item made a greater contribution to the internal consistency of  
189 the questionnaire, and no item was deleted.

#### 190 22 c) Validity analysis results

##### 191 23 i. Construct validity a. Exploratory factor analysis

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

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

204 Questionnaire Entries for Dimensions Knowledge K1: For cancer patients with normal gastrointestinal  
205 function, the preferred way to receive enteral nutrition is K6: When the oral intake of tumor patients during the  
206 perioperative period is less than the recommended target calories and protein, ONS should be given before surgery

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207 K7: Symptoms of oral enteral nutrition intolerance mainly include K8: The highest goal of nutritional support  
208 treatment for cancer patients is The principles of K9: ONS include K10: Before the implementation of ONS,  
209 in addition to fully assessing the nutritional status of the patient, a comprehensive assessment of the patient's  
210 general condition should be carried out, including K12: When taking ONS for patients with oral mucositis, what  
211 ways can be used to reduce the pain caused by ONS stimulation of the mucous membrane? K13: When the  
212 NRS2002 score is greater than the number of points, a nutrition plan needs to be developed. Attitude A1: I  
213 am interested in ONS-related knowledge and skills A2: I wish to receive professional training in ONS-related  
214 knowledge and skills A3: I think oncology nurses should pay attention to patients' nutritional intake, nutritional  
215 impact symptoms, physical conditions and laboratory inspection indicators, etc., and use appropriate scales to  
216 screen patients for nutritional risk and comprehensively assess nutritional status. A5: I think ONS can help  
217 improve the nutritional status of cancer patients and even play an irreplaceable role in prolonging survival A8:  
218 I think the ONS standardized management process should be developed A9: I think oncology nurses should  
219 be proficient in methods to improve patients' acceptance of ONS preparations A10: I think oncology nurses  
220 should be proficient in the formulation, energy density and preparation method of ONS preparations A13: I  
221 think oncology nurses should strengthen nutrition guidance and education for patients, mainly including the  
222 purpose and significance of ONS, preparation and drinking methods, prevention and treatment measures for  
223 adverse reactions, etc. A14: I think nutrition education should run through the whole process, explain the  
224 profound things in a simple way, be familiar and understandable, and reinforce it regularly A15: I think oncology  
225 nurses should regularly evaluate the efficacy of ONS. The evaluation indicators mainly include the patient's body  
226 weight, BMI, albumin, prealbumin and other laboratory test indicators A16: I believe that nurses in the oncology  
227 department should strengthen the follow-up of patients with ONS, focusing on the implementation of the ONS  
228 treatment plan, the compliance of energy intake and the difficulties encountered in the implementation of ONS,  
229 and provide guidance during follow-up A17: I think oncology nurses should pay attention to the treatment and  
230 care of ONS in cancer patients and play an important role A18: I think oncology nurses should accurately identify  
231 adverse reactions after ONS and take appropriate preventive and treatment measures. Action P1: I will learn  
232 the knowledge and skills of ONS through various means (such as academic lectures, skills training and literature  
233 retrieval, etc.) P2: I will use an appropriate scale for nutritional risk screening of cancer patients P3: For patients  
234 with abnormal screening, I will use appropriate assessment tools to conduct a comprehensive assessment of the  
235 patient's nutritional status P4: For cancer patients who are malnourished or at risk of nutrition, I will first give  
236 them intensive nutrition education P5: For cancer patients who are malnourished or at nutritional risk, when oral  
237 feeding cannot meet their nutritional needs, I will give ONS as soon as possible P6: ONS is my first choice for  
238 enteral nutrition support for cancer patients with normal gastrointestinal tract function P7: For tumor patients  
239 who cannot eat normally for more than 5 days for elective surgery, I will encourage and guide their ONS before  
240 surgery P8: Before implementing ONS, I will inform patients of the nutritional assessment results and educate  
241 the purpose and significance of ONS, help them identify existing or potential nutritional problems, and improve  
242 patients and their caregivers' awareness and acceptance of the importance of ONS P9: Before implementing  
243 ONS, I will encourage patients to participate in the setting of nutritional treatment goals P10: I will follow a  
244 step-by-step principle to guide cancer patients on ONS P11: For tumor patients with gastrointestinal symptoms  
245 such as loss of appetite, nausea and vomiting, I will first give appropriate symptomatic treatment as prescribed  
246 by the doctor P13: I will add different kinds of condiments (such as juice, vegetable juice, honey, milk and salt,  
247 etc.) to the ONS agent according to the patient's underlying disease, eating habits and preferences P14: During  
248 the implementation of ONS, I will give patients and their families adequate nutritional guidance and education,  
249 mainly including the concentration, temperature and method of preparation; drinking method of preparation;  
250 target dosage of preparation; prevention and treatment of adverse reactions method etc. P15: I will adopt  
251 personalized, easy-to-understand, and easy-to-operate nutrition education methods and approaches according  
252 to the patient's age, education level, and psychological status. P16: When patients encounter difficulties or  
253 questions during the ONS process, I will give timely guidance and help P17: I will deal with the patient's  
254 gastrointestinal intolerance, abnormal blood sugar and other adverse reactions by appropriately adjusting the  
255 concentration, temperature, dosage and drinking method of ONS, and selecting special preparations. P18: If  
256 the patient's gastrointestinal intolerance symptoms cannot be relieved by properly adjusting the concentration,  
257 temperature, dosage and drinking method of ONS, I will suspend ONS first, and the doctor or nutritionist will  
258 change the type of ONS preparation P19: For tumor patients with severe malnutrition, major surgery, and  
259 postoperative radiotherapy and chemotherapy, I will guide the patients to continue ONS for 2 weeks to several  
260 months after discharge, and continue to pay attention to the nutritional status of the patients P20: I would  
261 encourage ONS users to record their daily ONS usage in a diary or table, including the time and amount of ONS  
262 usage, adverse reactions and possible causes, diet, etc. P21: I will follow up on ONS users regularly, focusing on  
263 the implementation of the ONS treatment plan, the energy intake standard and the difficulties encountered in  
264 the implementation of ONS, and give guidance during the follow-up P22: I will regularly evaluate the nutritional  
265 status of ONS users, including body weight, BMI, albumin, prealbumin and other laboratory test indicators P23:  
266 When the dietary intake of the patient reaches the recommended amount of the daily diet and maintains a good  
267 nutritional status, I will guide the patient to gradually discontinue ONS; when the dietary intake is insufficient,  
268 I will guide the patient to use ONS in time. - - - P2 0.860 - - - - P8 0.850 - - - - P5 0.850 - - - - P9 0.838 - - - -  
269 P3 0.835 - - - - P6 0.815 - - - - P7 0.812 - - - - P11 0.809 - - - - P4 0.804 - - - - P1 0.724 - - - - P15 0.543 - - - -

## 29 B) THE SCIENTIFIC PREPARATION PROCESS OF THE ONS QUESTIONNAIRE FOR ONCOLOGY NURSES

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270 P19 - 0.832 --- P18 - 0.806 --- P20 - 0.793 --- P17 - 0.777 --- P21 - 0.771 --- P22 - 0.771 --- P16 - 0.612 -  
271 -- P23 - 0.595 --- P13 - 0.558 --- P14 - 0.545 --- A1 -- 0.935 -- A17 -- 0.926 -- A2 -- 0.921 -- A3 -- 0.913  
272 -- A5 -- 0.909 -- A16 -- 0.854 -- A14 -- 0.801 -- A15 -- 0.611 --- -- 0.883 - K6 --- 0.881 - K13 --- 0.874  
273 - K7 --- 0.794 - K9 --- 0.727 - K10 --- 0.702 - K8 --- 0.589 - K12 --- 0.511 - A13 --- 0.816 A18 ---  
274 0.752 A8 --- 0.694 A9 --- 0.

### 24 ii. Content Validity

275  
276 The I-CVI of each item of the questionnaire was 0.832-1.000; the overall S-CVI of the questionnaire was 0.914;  
277 the S-CVI of the knowledge dimension, belief dimension and behavior dimension of the questionnaire were 0.903,  
278 0.911 and 0.925, respectively.

### 25 d) Reliability Analysis Results

279  
280 The Cronbach's alpha coefficients of the overall questionnaire, knowledge dimension, belief dimension and  
281 behavior dimension were 0.958, 0.862, 0.942 and 0.972, respectively; the test-retest reliability of the overall  
282 questionnaire, knowledge dimension, belief dimension and behavior dimension were 0.978, 0.761, 0.962, 0.985,  
283 respectively.

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

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285  
286 The final questionnaire consists of 43 items, including 8 items in the knowledge dimension, including 3 multiple-  
287 choice questions and 5 multiple-choice questions. A correct answer to a multiple-choice question is worth 1  
288 point, a wrong answer is 0 points, and a multiple-choice question is answered correctly. 1 option Score 1 point,  
289 wrong answer is 0 point, the scoring range is 0-4 points; there are 13 items in the belief dimension, using Likert  
290 5-point scoring method, "1-5 points" respectively means "strongly disagree" and "disagree" "Not sure", "agree",  
291 "strongly agree", the scoring range is 1-5 points; there are 22 items in the behavior dimension, using the Likert  
292 5-point scoring method, "1-5 points" represent "never" and "occasionally" respectively "Sometimes", "Often"  
293 and "Always" on a scale of 1 to 5. The overall score of the questionnaire ranged from 35 to 198, with higher  
294 scores indicating better knowledge, beliefs and behaviors of ONS nurses.

### 27 III.

### 28 Discussion

295  
296  
297 a) It is of great significance to compile the ONS Knowledge, Attitude and Action Questionnaire for Oncology  
298 Nurses Rational nutritional support has significant benefits in remission, quality of life and prognosis of cancer  
299 patients [15]. ONS is a safe, convenient, costeffective and effective nutritional treatment measure. The European  
300 society for clinical nutrition and metabolism (ESPEN) [16], the Chinese society for parenteral nutrition and  
301 enteral nutrition, CSPEN) [17] both recommend ONS as the first choice for nutritional therapy. The intake  
302 of ONS requires the active cooperation of patients, and its efficacy depends on the patient's compliance [7].  
303 Nursing staff are the main contacts of patients during hospitalization and play a key role in the implementation  
304 and management of ONS. Expert consensus [5] pointed out that insufficient attention and non-standard  
305 implementation of ONS by nursing staff will reduce patients' compliance with ONS and affect the treatment  
306 effect. Nursing staff should be proficient in the implementation of ONS and translate it into practical actions,  
307 which is conducive to improving patients' compliance with ONS and enhancing its efficacy. Good behavior is  
308 based on correct knowledge and positive attitudes and beliefs [18]. Understanding the current status of oncology  
309 nurses' knowledge, beliefs, and behaviors about ONS can help improve their clinical execution. Therefore, it is  
310 very necessary to compile relevant questionnaires to provide a reliable evaluation tool for a comprehensive and  
311 objective understanding of oncology nurses' knowledge, belief, and behavior level of ONS, and to provide a basis  
312 for targeted training and management decisions.

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

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314  
315 Based on the theory of knowledge, belief, and action, this study constructed an initial item pool of the  
316 questionnaire according to relevant domestic and foreign literature, covering ONS pre-use assessment, scope  
317 of application, formulation selection, use risk assessment, efficacy evaluation, and health education. The relevant  
318 content of ONS is comprehensively included to ensure the standardization of the questionnaire items. This  
319 study adopts the Delphi method to invite clinical nursing, nursing management and nursing education experts  
320 with high academic level, solid theoretical foundation and rich clinical experience in the field of ONS to revise  
321 the initial item pool of the questionnaire; The recovery rate is 100%, and the authoritative coefficients of the  
322 experts in the two rounds of correspondence are 0.893 and 0.921 respectively, indicating that the experts have  
323 high enthusiasm and authority, and can make professional judgments and make valuable suggestions for each

324 item, which ensures that the experts are highly motivated and authoritative. The rigor of the letter inquiry  
 325 process and the reliability of the letter inquiry results; the research team revised and improved the questionnaire  
 326 according to expert opinions, which ensured the rationality of the questionnaire items. In this study, statistical  
 327 methods such as discrimination analysis method, correlation coefficient analysis method and internal consistency  
 328 reliability analysis method were used to screen the questionnaire items, try to avoid the deviation caused by the  
 329 selection of items by a single method, and ensure the representativeness and reliability of the questionnaire items.  
 330 Sensitivity. In this study, the questionnaire was pre-investigated to test its reliability and validity, which ensured  
 331 the stability and validity of the structure and content of the questionnaire.

332 c) The ONS Knowledge, Attitude and Action Questionnaire for Oncology Nurses has good reliability and  
 333 validity Reliability reflects the consistency of evaluation tools, that is, whether the evaluation tools can stably  
 334 evaluate the measured variables. The overall Cronbach's  $\alpha$  coefficient of the questionnaire prepared in this study  
 335 was 0.958, and the Cronbach's  $\alpha$  coefficient of each dimension was 0.862-0.972, all  $>0.80$ , indicating that the  
 336 questionnaire had good internal consistency. The test-retest reliability of this study was 0.978, and the test-retest  
 337 reliability of each dimension was 0.761-0.985, all  $>0.70$ , indicating that the questionnaire has good stability and  
 338 consistency across time. Validity refers to the degree to which the assessment tool reflects the expected research  
 339 concept, that is, the correctness and validity of the questionnaire [12]. After 2 rounds of exploratory factor  
 340 analysis, this study extracted 5 common factors, the cumulative variance contribution rate was greater than  
 341 40%, and the factor loading of each item was greater than 0.4, indicating that the questionnaire was basically  
 342 consistent with the theoretical structure of the questionnaire; the confirmatory factor analysis results showed  
 343 that  $\chi^2/df < 5.00$ , RMSEA  $< 0.10$ , IFI, CFI, GFI are  $> 0.90$ , PCFI, PNFI are  $> 0.50$ , all fitting indicators  
 344 are in the acceptable range, indicating that the model fits well. The above results show that the questionnaire  
 345 has good construct validity. The overall S-CVI of the questionnaire in this study is 0.914, the S-CVI of each  
 346 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  
 347 of this questionnaire can reflect the The current status of ONS knowledge, belief, and behavior among nurses in  
 348 the oncology department has good content validity.

349 IV.

### 350 30 Conclusion

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

### 2

Questionnaire items	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
P10	0.861	-			

Figure 1: Table 2 :

357





358 .1 Data Availability

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

361 .2 Conflicts of Interest

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

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## 30 CONCLUSION

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