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Construction of Quality Assessment Indicator System for Respiratory Rehabilitation Nursing

Hui Wang¹, Shaoyu Mou^{1,*}, Chunyan Diao², Yanqiong Zhao², Lian Xiang³

¹School of Nursing, Chongqing Medical University, Chongqing 400016, China;

²Rehabilitation Branch, Affiliated Hospital of Chongqing Three Gorges Medical College, Wanzhou 404120, China;

³Rehabilitation Branch, Chongqing Three Gorges Central Hospital, Wanzhou, 404000, China.

ABSTRACT

Objective: In order to provide an effective method for the comprehensive and scientific evaluation of respiratory rehabilitation nursing, a nursing quality evaluation index system for respiratory rehabilitation was constructed. **Methods:** Based on the theory of structure-process-outcome three-dimensional quality model, indexes and weights of respiratory rehabilitation nursing quality evaluation at all levels were determined by using literature review, semi-structured interviews, Delphi method, and Analytic Hierarchy Process. **Results:** The response rates of the two rounds consultation were 100% and 93% respectively, and the authority coefficients of experts are 0.872 and 0.922. The coordination coefficients of expert opinions were 0.583, 0.498, 0.407 for the first, second and third-level respectively. The significance test value P was less than 0.01. The final indicator system is constructed with 3 first-level indicators, 9 second-level indicators, and 46 third-level indicators. **Conclusion:** The constructed respiratory rehabilitation nursing quality evaluation index system is not only reliable, scientific, comprehensive, and but also with outstanding specialty characteristics. It provides an effective strategy to improve respiratory rehabilitation nursing quality.

Keywords: Respiratory Rehabilitation; Nursing Quality; Delphi Technique; Quality Evaluation

*Correspondence to Author:

Shaoyu Mou

School of Nursing, Chongqing Medical University, Chongqing 400016, China;

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1. Introduction

The incidence of lung diseases such as chronic obstructive pulmonary disease, lung cancer, bronchial asthma, and diffuse interstitial fibrosis has increased significantly in adults in China¹, posing serious threats to human health and life. Respiratory rehabilitation, as a crucial means to treat these diseases, is of great significance^{2,3}. Including sports, psychological education, knowledge education, elimination of predisposing causes, etc., respiratory rehabilitation is an integrated, individualized, non-drug management measure, based on comprehensive assessment of patient health status, and aimed to improve respiratory symptoms or to prevent various factors that can cause and/or aggravate respiratory symptoms⁴. A large number of studies have proven that respiratory rehabilitation can relieve symptoms, improve patients' life quality, and reduce the readmission rate, and standardized nursing is an important factor to ensure respiratory rehabilitation effect^{5,6}. To scientifically and effectively evaluate and continuously improve the nursing quality, researches shall be conducted on the evaluation standards and tools (Existing studies on respiratory rehabilitation mainly focus on treatment effectiveness evaluation and intervention methods). Based on the three-dimensional quality structure model of "structure-process-results" proposed by the renown American scholar Avedis Donabedian⁷. Based on literature review, semi-structured interviews, Delphi method, and analytic hierarchy process, this study builds a set of scientific quality assessment indicator system, providing reference for objective and comprehensive evaluation and standardization of respiratory rehabilitation nursing.

2. Method

2.1 Expert Questionnaire

Based on the three-dimensional quality structure model of "structure-process -result", and by referring to related literature and documents, such as the Implementation Rules for Hospital Accreditation Standards (General Edition 2018) and the Practices for Commonly Used Rehabilitation Techniques (2012), a research team composing of 1 chief physician and 1 head nurse of respiratory medicine, 1 head nurse and 2 nurses of respiratory rehabilitation, 1 postgraduate tutor of nursing, and 1 postgraduate formulated items of evaluation indicators and semi-structured expert interview outlines. Five veteran doctors, nurses, and experts were selected to conduct and summarize the semi-structured interviews.

Based on the literature research, the results of the expert interviews, and the actual needs of the patients, an expert questionnaire was compiled for the first-round survey, including 3 primary indicators, 8 secondary indicators, and 46 tertiary indicators. the questionnaire consists of four parts: (1) introduction: research content, purpose, time, and relevant explanation; (2) basic information of experts: gender, age, education, title, department, length of rehabilitation work; (3) Quality assessment indicator system adopting Likert 5-level scoring method for each item: very important (5 points), important (4 points), average (3 points), unimportant (2 points), very unimportant (1 point). Each item has reserved an expert comment column; (4) Expert judgment basis: practical experience, theoretical analysis, information from domestic and foreign counterparts, intuition; influence degree of the judgment basis: great, medium and little; Expert familiarity with indicators: very familiar (1.0 points), familiar (0.8 points), average (0.6 points), unfamiliar (0.4 points), and very unfamiliar (0.2 points)⁸.

2.2 Subject of expert questionnaire

A total of 31 experts (doctors and nurses of respiratory rehabilitation, and nursing managers) from Beijing, Sichuan, Chongqing, Hubei, and other regions are selected, according to the following criteria of authoritativeness, representativeness and enthusiasm: (1) Bachelor degree or above; (2) At least medium-grade professional title; (3) At least 10- year work experience in the respiratory department, rehabilitation department or nursing management position. All experts gave their informed consent and participated voluntarily in the study.

2.3 Assessment indicators

During the two-round survey (15 days for each round), the expert questionnaires were delivered through on-site distribution and E-mail distribution. After having sorted and analyzed the results of the first-round questionnaire, and listened to expert feedbacks, the research team modified and adjusted the indicator items, and sent out the second-round questionnaires. The indicators retention criteria: mean importance > 3.5, and the coefficient of variation <0.25⁹.

2.4 Weight value of items

The analytic hierarchy process is used in this study, to determine the weights of indicators at all levels. A hierarchical structure model was established, based on Delphi method, with the quality assessment of respiratory rehabilitation nursing as the top-level (target level), the primary indicators and the secondary indicators as the middle level (criterion level or indicator level), and the tertiary indicators as the bottom level (measures level). The Saaty scale (the relative importance level) is determined based on the difference value of the mean importance of the indicators obtained from the expert questionnaires¹⁰. The weight, the combined weight and the consistency ratio of each

indicator were calculated by yaahp10.1. A consistency ratio <0.1 indicates reasonably distributed indicator weights and good consistency¹¹.

2.5 Statistical methods

Epidata 3.1 and SPSS 24.0 were used to input, organize and analyze the data. The general information of experts is described by percentages; the enthusiasm coefficient of experts is expressed by the effective recovery rate of the questionnaires; the authoritativeness of experts is described by the authoritativeness coefficient (Cr); the coordination degree of expert opinions is expressed by the coefficient of variation and the Kendall coordination coefficient (W).

3 Results

3.1 General information of experts

Questionnaires were sent to a total of 31 experts (2 clinicians and 29 nursing experts) from 20 hospitals in Beijing, Chongqing, Sichuan, and Hubei. See Table 1 for details.

3.2 Expert enthusiasm

A two-round survey was conducted for this study. 31 copies of the questionnaire were delivered and recovered in the first round. The recovery rate was 100%. 16 experts put forward suggestions for changes and additions; 31 copies of the questionnaire were delivered in the second round and 29 recovered. The recovery rate was 93.5%. Three experts put forward suggestions for changes and additions. The enthusiasm coefficients of the experts were > 70% in both of the surveys⁹, indicating that the participating experts were enthusiastic about the research.

3.3 Expert authority

Expert authority coefficient (Cr) is the mean value of the expert judgment basis (Ca) and

expert familiarity with the indicators (Cs), that is, 0.940, and the Cs are 0.839 and 0.903, and the $Cr = (Ca + Cs) / 2$. $Cr > 0.7$ is acceptable [10]. For both surveys of this study, the Ca are 0.905 and 0.940, and the Cs are 0.839 and 0.903, and the Cr are 0.872 and 0.922, indicating that the experts have high authority.

Table 1 General information of experts (n = 31)

Items	Case Number	Percentage (%)
Age		
30~	16	51.6
40~	8	25.8
50~	7	22.6
Education		
Bachelor	24	77.4
Master's and above	7	22.6
Job Title		
Intermediate	9	29.0
Sub-senior	18	58.1
Senior	4	12.9
Department		
Respiration Department	20	65.5
Rehabilitation Department	11	35.5
Area of Expertise		
Clinical Medicine	2	6.4
Clinical Nursing	14	45.2
Nursing Management	15	48.4
Hospital-Level		
Tier one	26	83.9
Tier two	5	16.1
Years of Working (year)		
10~	24	77.4
20~	7	22.6

Table 2 Coordination Degree of Expert Opinions

Indicator	First Round			Second Round		
	<i>W</i>	χ^2	<i>P</i>	<i>W</i>	χ^2	<i>P</i>
Primary Indicator	0.222	13.788	<0.002	0.583	33.791	<0.001
Secondary Indicator	0.326	70.743	<0.001	0.498	115.649	<0.001
Tertiary Indicator	0.119	165.715	<0.001	0.407	506.996	<0.001
Overall	0.145	250.977	<0.001	0.416	663.184	<0.001

Table 3 Quality Assessment Indicator system for Respiratory Rehabilitation Nursing

Indicator (weight)	Importance Value ($\bar{x} \pm s$)	Variations Coefficient	Full Mark Rate	Combination Weight
1 Structure quality (0.085)	4.54±0.51	0.11	0.50	
1-1 Nursing human resource management (0.207)	4.68±0.48	0.10	0.63	0.018
1-1-1 Nurse-patient ratio (0.063)	4.32±0.61	0.14	0.37	0.001
1-1-2 Respiratory rehabilitation specialist nurse available (0.382)	4.64±0.56	0.12	0.63	0.007
1-1-3 Respiratory rehabilitation MDT team available (0.325)	4.61±0.50	0.11	0.57	0.006
1-1-4 Training and assessment of respiratory rehabilitation (0.229)	4.57±0.50	0.11	0.53	0.004
1-2 Nursing quality management system (0.207)	4.68±0.48	0.10	0.63	0.176
1-2-1 Respiratory rehabilitation nursing management system (0.137)	4.43±0.50	0.11	0.40	0.002
1-2-2 Procedures and specifications of respiratory rehabilitation nursing (0.493)	4.61±0.50	0.11	0.57	0.009
1-2-3 Respiratory rehabilitation operating standards (0.370)	4.57±0.50	0.11	0.53	0.007
1-3 Respiratory rehabilitation nursing facility and equipment management(0.055)	4.43±0.50	0.11	0.40	0.005
1-3-1 Functional intact rate of respiratory rehabilitation related equipment(0.200)	4.36±0.56	0.13	0.37	0.001
1-3-2 Qualified rate of first aid items (0.800)	4.57±0.50	0.11	0.53	0.004
1-4 Respiratory rehabilitation nursing ability (0.531)	4.93±0.26	0.05	0.87	0.045
1-4-1 Pass rate of special knowledge assessment (0.098)	4.54±0.51	0.11	0.50	0.004
1-4-2 Pass rate of specialist nursing operation assessment (0.098)	4.54±0.51	0.11	0.50	0.004
1-4-3 Nursing plan execution rate (0.373)	4.75±0.44	0.09	0.70	0.017
1-4-4 Teamwork ability (0.431)	4.79±0.42	0.09	0.73	0.019
2 Process quality (0.597)	4.93±0.26	0.05	0.87	
2-1 Respiratory rehabilitation assessment (0.191)	4.82±0.39	0.08	0.77	0.114
2-1-1 Dyspnea assessment (0.167)	4.82±0.39	0.08	0.77	0.019
2-1-2 Assessment of respiratory muscle function (0.144)	4.79±0.42	0.09	0.73	0.016
2-1-3 Pulmonary function assessment (0.144)	4.79±0.42	0.09	0.73	0.016
2-1-4 Sputumdrainage capability assessment (0.167)	4.82±0.39	0.08	0.77	0.019
2-1-5 Movement function assessment (0.099)	4.71±0.53	0.11	0.70	0.011
2-1-6 Sports risk assessment (CPET) (0.115)	4.75±0.52	0.11	0.73	0.013
2-1-7 Swallowing function assessment (0.030)	4.50±0.64	0.14	0.53	0.003
2-1-8 Anxiety, depression assessment (0.047)	4.57±0.63	0.14	0.60	0.005
2-1-9 Daily activity ability assessment (0.070)	4.64±0.56	0.12	0.63	0.008
2-1-10 Nutritional status assessment (0.018)	4.43±0.63	0.14	0.47	0.002
2-2 Rehabilitation prescription implementation (0.476)	4.89±0.31	0.06	0.83	0.284
2-2-1 Implementation rate of correct breathing training (0.304)	4.93±0.26	0.05	0.87	0.086
2-2-2 Airway clearance effective rate (0.195)	4.79±0.42	0.09	0.73	0.055
2-2-3 Correct execution rate of exercise prescription (0.250)	4.86±0.36	0.07	0.80	0.071
2-2-4 Execution rate of daily activity training (0.068)	4.54±0.51	0.11	0.50	0.019
2-2-5 Nutrition solution implementation rate (0.025)	4.43±0.50	0.11	0.40	0.007
2-2-6 Nursing effective rate on anxiety and depression (0.043)	4.50±0.51	0.11	0.47	0.012

2-2-7 Correctness rate of adverse event prevention & emergency response (0.116)	4.64±0.49	0.11	0.60	0.033
2-3 Health education (0.333)	4.86±0.36	0.07	0.80	0.199
2-3-1 Disease prevention knowledge awareness rate (smoke quitting, vaccination against pneumococcus and influenza, prevention of environmental stimuli, etc.) (0.079)	4.68±0.48	0.10	0.63	0.016
2-3-2 Exercise prescription awareness rate (0.079)	4.68±0.55	0.12	0.67	0.016
2-3-3 Correctness rate of home oxygen therapy (0.122)	4.82±0.39	0.08	0.77	0.024
2-3-4 Correctness rate of drug therapy (use of inhalation preparation, drug effects, side effects, etc.) (0.165)	4.89±0.31	0.06	0.83	0.033
2-3-5 Correctness rate of breathing training technique (0.186)	4.93±0.26	0.05	0.87	0.037
2-3-6 Correctness rate of effective Sputum drainage techniques (0.140)	4.86±0.36	0.07	0.80	0.028
2-3-7 Correctness rate of breath shortness remission technique (0.140)	4.86±0.36	0.07	0.80	0.028
2-3-8 Nutrition knowledge awareness rate (0.014)	4.32±0.61	0.14	0.37	0.003
2-3-9 Effective rate of emotion management (0.014)	4.32±0.67	0.15	0.40	0.003
2-3-10 Patient follow-up rate (0.060)	4.61±0.50	0.11	0.57	0.012
3 Results quality (0.318)	4.79±0.42	0.09	0.73	
3-1 Nursing efficacy (0.875)	4.79±0.42	0.09	0.73	0.279
3-1-1 Patients' capacity for daily activities (0.500)	4.68±0.48	0.10	0.63	0.139
3-1-2 Patient self-management ability (0.500)	4.68±0.48	0.10	0.63	0.139
3-2 Job Satisfaction (0.125)	4.32±0.48	0.11	0.30	0.040
3-2-1 Patient satisfaction with nurse job (0.500)	4.39±0.50	0.11	0.37	0.020
3-2-2 MDT members' satisfaction with nurse job (0.500)	4.39±0.50	0.11	0.37	0.020

3.4 Coordination of expert opinions

Coordination degree of expert opinions was judged, based on variation coefficient and Kendall coordination coefficient (W). The smaller the variation coefficient, the more unanimous the expert opinions tend to be. The indicators at all levels in the questionnaires of both surveys were statistically significant by the Kendall W test ($P < 0.01$), indicating that the expert opinions are well-coordinated and unanimous. See Table 2 for details.

3.5 Indicator screening results

After the first-round survey, the research team discussed and revised 3 secondary indicators, 14 tertiary indicators, and deleted 10 tertiary indicators, according to relevant criteria, and expert suggestions. Specific amendments are

as follows: No changes in the primary indicators; three changes in the secondary indicators, with "specialized nursing knowledge and operating technique" changed to "respiratory rehabilitation nursing ability", "patient outcome" changed to "nursing efficacy"; "specialized nursing assessment and nursing measures" changed to "respiratory rehabilitation assessment" and "Rehabilitation prescription implementation". Ten tertiary indicators were deleted, including "proportion of rehabilitation specialist nurses", "person-time of lung rehabilitation training/training", "social-family support network building", etc. 14 tertiary indicators were revised, with "composition of lung rehabilitation professionals" changed to "composition of respiratory rehabilitation MDT team", "pass rate of lung rehabilitation related equipment disinfection"

changed to "respiratory rehabilitation related equipment function intact rate", "implementation rate of kinesitherapy" to "rate of correct implementation of exercise prescription", etc. 12 tertiary indicators, such as "respiratory rehabilitation nursing management system", "respiratory rehabilitation nursing plan implementation rate", and "team collaboration ability" were added; 2 tertiary indicators were merged into other indicators: "correctness rate of inhalation preparation use" into "correctness rate of drug therapy", and "mastery degree of breathing training technique"; "mastery degree of airway secretion clearance technique" into "pass rate of specialized nursing operation assessment".

After the second-round survey, one indicator was revised: "composition of respiratory rehabilitation MDT team" was changed to "Respiratory rehabilitation MDT team available"; and two were added: "Respiratory rehabilitation nursing facility available" and "Emergency response plan available".

After two rounds of expert questionnaires, the quality assessment indicator system for respiratory rehabilitation nursing was finally determined, including 3 primary indicators, 9 secondary indicators, and 46 tertiary indicators. Based on the importance value from the second-round expert questionnaire, the weight of each indicator was calculated with the analytic hierarchy process. See Table 3 for details.

4. Discussion

4.1 The quality assessment indicator system of respiratory rehabilitation nursing is objective and scientific

The nursing quality assessment indicator is a quantitative and objective evaluation tool for nursing quality¹¹, which directly or indirectly affects nursing quality. The three-dimensional

quality evaluation model of "structure-process-result" is the theoretical basis for all the countries to establish nursing quality standards and evaluation indicator systems. Employing the three-dimensional quality evaluation model, and based on the requirements of evaluation standards for China's tertiary general hospital, the technical specifications for rehabilitation treatment and other policy documents, as well as patient needs, this study builds a theoretical framework of assessment indicator system, which covers the entire nursing process and reflects the patient-centered concept. With the Delphi method, the major parameters for scientificity and reliability assessment of the indicator system, that is the representativeness, enthusiasm, authority and opinion coordination of the subjects of the questionnaires are surveyed. For this study, experts with rich practical experience and theoretical knowledge in clinical medicine, specialized nursing, and nursing management were selected, 71% of which have senior titles, and 83.9% are from tertiary hospitals. The effective recovery rates of the two rounds of expert questionnaires are 100% and 93.5%, respectively, indicating high enthusiasm of the experts, and the authority coefficients are 0.872 and 0.922, respectively, indicating the high authority of the experts. The Kendall coordination coefficients of the expert opinions during both questionnaires were statistically significant ($P < 0.01$), indicating that the opinions of the experts were relatively unanimous. In this study, the analytic hierarchy process was used to calculate the weights and combined weights of the indicators, and a consistency test was performed, showing the one-time ratios of the indicators at all levels were < 0.1 , indicating that the weights of the indicators were reasonably distributed, with good consistency. Based on the three-dimensional

quality structure model, the quality assessment indicator system is scientific, reasonable and reliable, which is helpful for the objective, scientific and comprehensive evaluation of respiratory rehabilitation nursing quality.

4.2 Quality assessment indicator system of respiratory rehabilitation nursing comprehensively reflects the characteristics of specialized nursing

The nursing quality assessment system emphasizes the need to set up structural indicators, process indicators, and outcome indicators ¹², so as to realize the quality evaluation of each link in the respiratory rehabilitation nursing process and ensure the comprehensiveness of nursing content.

For structure quality, this study includes 4 primary indicators and 13 tertiary indicators in nursing human resource management, nursing quality management system, respiratory rehabilitation nursing facility and equipment management, and respiratory rehabilitation nursing ability, the one with the greatest weight (0.531), and the indispensable ability for respiratory rehabilitation specialist nurses to carry out work, directly affecting the quality of rehabilitation nursing and patient rehabilitation effect ¹³. Among the tertiary indicators, the team collaboration ability has the greatest weight (0.019). Respiratory rehabilitation requires multidisciplinary team cooperation, during which nurses play the role of a bridge, coordinating communications between team members and patient families, creating favorable conditions for patient rehabilitation ¹⁴.

For process quality, this study includes three secondary indicators and 27 tertiary indicators in respiratory rehabilitation assessment, health education and the rehabilitation prescriptions implementation, the one with the greatest weight

(0.476). Of the tertiary indicators, the correct execution rate of breathing training has the greatest weight (0.086), followed by the correct execution rate of exercise prescription (0.071). Breathing training can increase lung capacity, reduce residual capacity ¹⁵, improve patients' sports endurance and life quality ⁵, the core content of respiratory rehabilitation. Health education, as a significant part of respiratory rehabilitation nursing, is an important means to ensure the effectiveness of respiratory rehabilitation treatment ^[16]. For health education (weight of 0.333), this study includes indicators in drug therapy, breathing training technique, effective sputum drainage technique, and breath shortness remission technique, etc., highlighting the importance of the content and quality of specialized nursing, which is highly recognized by experts.

For results quality, this study includes 2 secondary indicators and 4 tertiary indicators in job satisfaction, as well as in nursing efficacy, the one with the greatest weight (0.875). Patient outcome is the most concerned indicator since the ultimate purpose of nursing activities is to help patients recover and reduce pain ¹⁷. Patients' ability of self-management and daily activities is both an important target and a key indicator for respiratory rehabilitation nursing, as some studies have pointed out that there is a serious deficiency in self-management of patients with chronic obstructive pulmonary disease in China, as the patients are usually the aged with limited ability¹⁷.

5. Summary

Based on Avedis Donabedian's three-dimensional quality structure model of "structure- process-results", and employing literature review, semi-structured interview and Delphi method, this study sets up a quality

assessment indicator system for respiratory rehabilitation nursing, including 3 primary indicators, 9 secondary indicators, and 46 tertiary indicators. Highlighting the characteristics of specialized nursing, the assessment indicator system is reliable and scientific and can provide a reference for the objective evaluation of the quality of respiratory rehabilitation nursing. The indicator system shall be used to evaluate and continuously improve the quality of respiratory rehabilitation nursing.

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