Construction of the course training system of infectious disease specialist nurses' core competence: a Delphi study

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Abstract

Aims

This study aimed to construct a set of course training system which was scientific, authentic and comprehensive to foster the infectious disease specialist nurses' core competence.

Background

Nowadays, with the further spread of infectious diseases, it puts forward higher requirements for the improvement of the ability and quality of nurses, especially infectious disease specialist nurses. It is an urgent task to standardize and improve the core competence of infectious disease specialist nurses. There was no course training system of infectious disease specialist nurses' core competence.

Design:

A two-round Delphi consultation survey were carried out to get feedback from experts on constructing the course training system of infectious disease specialist nurses' core competence.

Methods

This study adopted a series of methods including group discussion, theoretical analysis and Delphi consultation to draft the course training system of infectious disease specialist nurses' core competence. 21 Chinese experts from the fields of infectious disease health care, infectious disease nursing, and infectious disease nursing education were invited to participate in the Delphi consultation between November 2021 and December 2021.

Results

The experts were highly motivated in this study and they were regarded as leading authority on the subject. Besides, they reached a consensus on the results. The final course training system of infectious disease specialist nurses' core competence focused on 5 competence modules and was composed of 12 course categories with 66 class contents and corresponding objectives.

Conclusions

The research methods were scientific and precise. The course system was comprehensive in content and reliable in result. It could be reference for course training of infectious disease specialist nurses.

Why Is This Research Needed?

- With the spread of infectious diseases all over the world, the importance of specialized nurses for infectious diseases has become increasingly prominent.
- As the front-line personnel in the treatment of infectious diseases, the ability level of nurses in the Department of infectious diseases is related to the quality of nursing and the efficiency of nursing treatment.
- Continuing education is the most effective way to improve the ability of clinical nurses. Carrying out standardized training courses is conducive to improving the ability of specialized nurses of infectious diseases.
- Delphi consultation method is an effective and scientific way to formulate nurse training courses.

What this paper adds?

- Based on the previous research, we constructed the core competence training course for infectious disease specialist nurses.
- At the same time, we have defined the training objectives of infectious disease specialist nurses, which provides a reference for more scientific training of infectious disease specialist nurses.

1. Introduction

With the rapid development of medical treatment, especially in the era of knowledge explosion, medical personnel must continue to learn in order to meet the needs of professional development^{1,2}. It is reported that continuing education and vocational learning are the main ways for nurses to obtain knowledge³. Systematic and scientific training courses can help nurses learn more efficiently and master new knowledge and skills^{4,5}. Specialist nurses refer to expert clinical nurses with high level and expertise in a special nursing field, who can use their knowledge, expertise and technology to provide nursing services for patients and social groups^{6,7}. As the backbone of the nursing team, specialist nurses play an important core role in the teamwork^{8,9}. Therefore, continuing education for this group is particularly important. In China, however, specialist nurse training is still at the initial stage, we need to improve and enhance the teaching arrangements, teaching methods and training process continually¹⁰⁻¹².

1.1 Background

Currently, with the development of transportation and subsequent economic and cultural exchanges helped speed up the spread of the COVID-19, the pandemic has seriously threatened the life and health of all mankind, and has brought extremely serious negative effects on countries around the world^{13,14}. In the process of infectious disease prevention and control, infectious disease nursing staff have played critical roles in fighting against the pandemic^{15,16}. Their ability is not only related to their own work safety, but also greatly affects the quality and efficiency of infectious disease nursing. As an important ways of talent transmission, nursing training ensures the sustainability of nursing team. Therefore, how to scientifically train infectious disease specialist nurses who can adapt themselves to the needs of the times and better respond to the COVID-19 pandemic is of great importance and urgency¹⁷. At present, more and more studies focus on the ability of infectious disease nurses¹⁸⁻²⁰. But there are no mature, systematic and scientific training courses for infectious disease specialist nurses to take. As the core of the training, courses are of crucial significance for carrying out homogeneous training. The implementation of standardized curriculum can comprehensively improve the core competence of infectious disease nurses.

Therefore, our study aims at constructing a set of scientific and authentic training courses for infectious disease specialist nurses which can regulate the training of infectious disease specialist nurses in different hospitals, improve the training quality and push the development of infectious disease specialist nursing so as to better respond to the infectious diseases.

1.2 Delphi method

The Delphi method was a kind of technique to get feedback via several rounds of anonymous consultation until consensus was obtained²¹. The procedure included: firstly receiving the experts' assessment on the problem, secondly compiling the experts' responses and revised the questions, thirdly sending the revised questions to every expert anonymously and seeking their responses, again and again until consensus of opinion was obtained²². Delphi expert method can avoid some shortcomings of group decision-making. The person with the loudest voice or the highest status has no chance to control the will of the group. At the same time, Delphi method is to consult each expert by letter, and everyone's views will be collected. Managers can ensure that everyone's views are obtained when collecting opinions^{23,24}.

2. Method

This study adopted the Delphi method for research. Our research group drafted the course training system of infectious disease specialist nurses' core competence on October 2021 and complied the Delphi consultation questionnaire. Two rounds of Delphi consultation were carried out during November and December of 2021. In this process, the training courses were refined and revised until the final version of the course training system of infectious disease specialist nurses' core competence was constructed.

2.1. Setting up research group

The research group was set up before the research. And it was composed of one professor, one associate professor, two lecturers, one nurse-in-charge and one postgraduate. Based on the index system of core competence assessment for infectious disease specialist nurse constructed in early stage, the research group drafted the course training system of infectious disease specialist nurses' core competence after group discussion and experts interviews. At the same time, the research group compiled the experts consultation questionnaires, sent out the questionnaires and analyzed the feedback.

2.2. Selection of the expert panel

Generally speaking, the number of consultation experts was between 15 to 50²⁵. And the more experts there was, the more reliable the result would be. This study adopted random sampling method and 21 experts were selected to get involved in the consultation. The expert panel contained three types of people and the inclusion criterion were as follows: (a) for experts on infectious disease health care: they should be engaged in infectious disease health care or infectious disease medical supervision for more than 15 years, obtain the intermedium or advanced level of certificate, acquire a bachelor degree or above, sign the informed consent for and voluntarily participate in this study; (b) for experts on infectious disease nursing: they should be engaged in infectious disease nursing or infectious disease nursing supervision for more than 15 years, obtain the intermedium or advanced level of certificate, acquire a bachelor degree or above, sign the informed consent for and voluntarily participate in this study; (c) for experts on infectious disease nursing education, they should be engaged in the teaching of infectious disease nursing in the training class of infectious disease specialist nurses for more than 3 years or in institution of higher education for more than 15 years, obtain the intermedium or advanced level of certificate, acquire a bachelor degree or above, sign the informed consent form and voluntarily participate in this study.

2.3. Constructing expert consultation questionnaire

The expert consultation questionnaire was composed of three parts: (a) basic information of the experts involved, namely name, age, professional title, years of engaging in infectious disease specialist nurse training and working unit, etc.; (b) the first draft of the course training system of infectious disease specialist nurses' core competence, namely 5 competence modules, 12 course categories, 46 class contents and their corresponding objectives. The importance of course system was evaluated by way of Likert 5-level scoring method, 5 = very important, 4 = important, 3 = general, 2 = unimportant, 1 = completely unimportant, and the column for suggestions and supplements was provided; (c) expert familiarity with content of the survey and judgement.

2.4. Questionnaire collection and classification

The consultation questionnaires were sent via e-mail. To ensure the quality of the consultation questionnaire, the experts had two weeks to fill in the questionnaire. We revised the questionnaire as per the result of the first round consultation and issued the revised questionnaire to the experts for the second round.

The statistical software SPSS24.0 was applied in the process of data analysis. Data measurement and data calculation were expressed in the form of mean $\pm$ standard deviation and frequency, percentage respectively. The enthusiasm of the experts was also expressed in the form of questionnaire recovery rate. The authority degree of the expert opinion was expressed by the authority coefficient. The coordination degree of expert opinion was expressed by variable coefficient and Kendall harmony coefficient. $P < 0.05$ indicated that the difference was statistically significant.

2.5. Quality control

To ensure the research quality, the research group selected experts from 5 different provinces and cities to participate in the consultation. Besides, the experts were from three different fields, namely infectious disease health care or medical supervision, infectious disease nursing or nursing supervision and infectious disease nursing education, which assured the authority and quality of consultation.

2.6. Ethical consideration

This study complied with the Declaration of Helsinki^{26,27}. Before formal consultation, the purpose and significance of the study was elaborated to the experts and informed consent of experts was obtained. During the investigation, the experts could terminate and withdraw from the consultation at any time. And their personal information was completely confidential and none of the participants were provided with details of the other participants in the study. The inquiry data was only used for this study and not open for other purposes.

3. Results

3.1. Basic information of the experts

According the inclusion criterion of this study, 21 experts from 5 provinces and cities including Shaanxi, Hubei, Zhejiang, Chongqing and Beijing were selected. The age of the experts involved ranged from 34 to 51 years old, with an average of 42.48 (SD 4.63) years old. Their working year varied from 3 to 24, with an average of 14.05 (SD 6.36) years. The details were shown in Table 1.

3.2. Experts' enthusiasm

The enthusiasm of the experts was assessed on the basis of the recovery of the questionnaires. In this study, during the two rounds of consultation, 21 questionnaires were distributed and 21 valid questionnaires were returned, with a recovery rate of 100%, and 18 and 4 experts respectively put forward their suggestions on the revision of the course items, indicating that the experts attached great importance to this study and had a good enthusiasm. The details were shown in table 2.

3.3. Expert authority coefficient

The authority degree of the expert opinion was expressed by the authority coefficient. It was the arithmetic average of the judgement coefficient and familiarity coefficient. Generally speaking, if the authority coefficient was over 0.7, it meant the result of consultation was reliable. The experts' judgement was based on four aspects, namely practical experience, theoretical analysis, domestic and foreign reference materials and intuitive perception. The degree of expert familiarity were very familiar, relatively familiar, familiar, not quite familiar and completely not familiar. Each item was referred to a different value and the details were shown in table 3 and table 4.

In this study, the judgement coefficient of the experts was 0.952, the degree of expert familiarity was 0.962 and the authority coefficient of the experts was 0.957, indicating that the degree of expert authority was relative high and the result of the study was reliable, as shown in table 5 and table 6.

3.4. Experts' opinion coordination degree

The experts' opinion coordination degree was used to evaluate whether the experts had disagreements on the importance of the items. It was normally expressed by Kendall's coefficient of concordance (Kendall's W). The Kendall's W ranged from 0 to 1. The closer it was to 1, the higher the expert's opinion coordination degree was.

For this study, in the first round of consultation, the Kendall's W of competence module, course category and class content were 0.280, 0.292 and 0.303 respectively while in the second of consultation, they were 0.301, 0.350 and 0.253 respectively. So the Kendall's W test had statistical significance ($P < 0.05$), indicating that the experts' opinion coordination degree in the two rounds of consultation was preferable, as shown in table 7.

3.5. Results of the Delphi consultation

In the first round of questionnaire consultation, 18 experts put forward their suggestions on the revision of the course system. After group discussion, we made modifications on the course system: revising 2 course categories, deleting 1 class content, revising 10 class content, adding 10 class contents, splitting 1 class content into 2 parts, revising 12 class objectives and adding 22 class objectives.

In the second round of questionnaire consultation, 4 experts put forward their suggestions on the revision of the course system: revising 1 class content and 4 class objectives.

Finally, core competence training courses for infectious diseases specialist nurses were focused on 5 competence modules (professional development abilities, responsiveness to infectious diseases, nursing abilities for infectious diseases, professionalism and humanistic accomplishment, and infection prevention and control abilities). The courses were divided into 12 categories and composed of 66 classes, as shown in table 8.

4. Discussion

4.1. Reliability and scientificity of Delphi expert consultation results

Under the guidance of the previous index system of core competence assessment for infectious disease specialist nurses¹⁹ and on the basis of fully reviewing the core competence training course of specialist nurses in and out of China, after rigorous Delphi expert consultation, this study constructed the training system for infectious disease specialist nurse. The system contained 4 aspects, namely the training competence modules, course categories, class contents and class objectives. In this study, the course was developed in a gradual and orderly manner and the research contents were comprehensive. Before class contents were formulated, the research group held group meeting, consulted the infectious disease health care experts, nursing supervision experts and nursing education experts, drew feedback from the experts, and invited relevant experts to assess the feasibility of the first draft of the course system so as to ensure the practicability of the class contents. Since there was no unified course training system of infectious disease specialist nurses' core competence, our study scientifically constructed a comprehensive course training system through combined methods of literature review and expert questionnaire consultation. Besides, the effective recovery rate of the two rounds of expert consultation questionnaire were 100% in this study, and most experts put forward scientific and reasonable opinions, indicating that the experts were enthusiastic in the research. The experts involved in the research came from level-A tertiary hospital, infectious disease specialist hospital and School of Nursing in high educational institutions in 5 provinces and cities around China. They all had rich clinical and nursing education experience of infectious diseases. The selection of the experts were very strict, assuring the expert authority. The Kendall's coefficient of concordance of the two rounds of Delphi expert consultation after significance testing ($P < 0.05$) indicated that the experts' opinion coordination degree was preferable and the result of the study was reliable.

4.2. Analysis of course system contents

The course training system of infectious disease specialist nurses' core competence in this study focused on 5 competence modules and was divided into 12 course categories which involved 66 class contents and corresponding objectives. The system covered all the aspects related to core competence, such as infectious disease specialist nurses' scientific researches, management and response to epidemic.

4.2.1. Competence module of professional development

The competence module of professional development was the key point of this course training system. Scientific researches on nursing was the biggest problem that had always plagued the clinical nurses^{28,29}. Compared with ordinary nurses, the specialist nurses should have a more systematic and comprehensive scientific research knowledge system and capability³⁰. Besides, a good level of scientific research could improve efficiency and quality of nursing work³¹. Therefore, this study concentrated on the weakness of clinical nurses and problems that were urgently needed to be solved. Scientific researches on nursing was regarded as the priority of the course training system. The system not only covered contents such as scientific research selection and design, literature review and statistical analysis, paper writing and etc, but also extended to related contents such as research project application and achievement declaration, clinical issues and patent transformation so that the system could effectively provide guarantee for the improvement of the specialist nurses' core competence. In the competence module of professional development, the weighting target of classes of nursing management accounted for the largest proportion, around 0.082. It covered the contents of management of nursing quality, management of refined nursing and so on, aiming to improve the nursing management capabilities of the infectious disease specialist nurses through comprehensive management training classes so that the specialist nurses could play the role of nursing managers in clinical work and improve the quality of infectious disease nursing. Specialist

nurses not only needed to play important roles such as nursing staff and nursing managers, but also needed to be nursing educators who could deliver lectures on infectious diseases to ordinary nurses, nurse students and nursing staff in other departments^{32,33}. In response to the COVID-19 pandemic, nurses in infectious disease department provided great help for nurses in other departments in quickly responding to the pandemic³⁴.

4.2.2 Competence module of response to infectious disease

The classes under the competence module of response to infectious disease were set in accordance with the current global pandemic background. Countries were closely linked and no country could be immune to the global pandemic³⁵⁻³⁷. Therefore, the training course system should also keep pace with the times and meet the needs. The infectious disease specialist nurses should not only be proficient in infectious disease nursing, but also have the ability to respond to infectious diseases. Considering that the infectious disease specialist nurses were lack of the ability of response to infectious diseases, the competence module of response to infectious disease was regarded as a relative important part of this training course system. Started with two course categories, namely prediction and emergency drills and response to infection disease epidemic, this module elaborated the distribution of the current key global infectious diseases and analysis of their development trend, prediction and recognition of the public health emergencies, interpretation of laws and regulations related to major infectious diseases, and the China's experience in responding to major outbreaks of infectious diseases in the past ten years. The contents of this module ranged from theories to practices, from macro analysis to specific operations. This kind of setting aimed to provide effective measures and meet the needs in responding to future infectious disease emergencies.

4.2.3. Competence module of nursing for infectious disease

Nursing abilities for infectious disease were the basic abilities that infectious disease specialist nurses should acquire. The weighting targets of this competence module was 0.204, ranking second. This competence module of nursing for infection disease included three categories, namely nursing capabilities, commonly used diagnosis and treatment technology in infectious disease department and critical thinking capabilities, with nursing capabilities accounting for the largest proportion of 0.086. Infectious disease patients were different from patients in specialist wards with a single type of disease, which placed high demands on the nurses' nursing ability in infectious disease department. Infectious disease specialist nurses should be proficient in the symptoms and sign of different types of infectious diseases patients and corresponding nursing techniques, and take targeted nursing measures so as to provide patients with high-quality nursing service²⁰. They also should be proficient in commonly used diagnosis and treatment techniques in infectious disease nursing process. By attending training courses, they should further clarify and consolidate the main points and precautions of the operation techniques in diagnosis and treatment so as to promote more improvement of operational techniques. At the same time, in the process of training course, they should develop their critical thinking capability³⁸. It was important in nursing work because it could help effectively avoid nursing errors and bad nursing accidents and improve work efficiency. The classes of critical thinking aimed to strengthen the specialist nurses' critical thinking abilities in the nursing of clinical infectious disease.

4.2.4. Competence module of professionalism and humanistic accomplishment

The competence module of professionalism and humanistic accomplishment included two categories, professionalism and humanistic care, their weighting targets were 0.080 and 0.082 respectively. The classes of professionalism aimed at improving the infectious disease specialist nurses' professionalism through the study of career planning and vocational stress coping in infectious disease nursing. The classes of humanistic accomplishment were composed of humanistic care in nursing, health education and health promotion, and application of hospice among infectious disease patients. The classes reflected the humanistic feelings in infectious disease nursing, including the care to infectious disease patients and the health education to the public, as well as the hospice care to infectious disease patients at terminal stage. The humanistic spirits of the nursing staff were integrated into all aspects of the classes.

4.2.5. Competence module of infection prevention and control

Competence module of infection prevention and control occupied the largest proportion of the expert questionnaire consultation in this training course system. Infection prevention and control ability was the most important ability which was the guarantee for the

continuation of the combat effectiveness of nursing staff. The competence module of infection prevention and control included two categories, disinfection & quarantine and vocational protection, their weighting targets accounting for the same proportion, about 0.090. The contents of disinfection & quarantine classes and vocational protection classes were arranged from two aspects, both theoretical and practical, so as to provide comprehensive lectures on infectious disease disinfection and quarantine, improvement and standardization of infectious disease specialist nurses' vocational protection ability.

4.3. Practical significance of the construction of the course training system

At present, there are differences in training contents, training objectives, teaching resources, teaching management and so on for the training of infectious disease specialist nurses in and out of China so there is no uniform training standard for the training of infectious disease specialist nurses. Combining with the characteristics and competence requirements of the post, this study establishes a comprehensive, scientific and standardized training course system of infectious disease specialist nurses. The training course system covers both the competence requirements that general nurses need to meet and the contents that infectious disease specialist nurses should learn. The study has important practical significance for the training specialist nurses, improving both the overall training quality and core competence of infectious disease specialist nurses.

5. Conclusion

Since the COVID-19 pandemic is still spreading nowadays, training high-quality infectious disease specialist nurses with comprehensive competence is an effective way to respond to the pandemic development and to fight against the pandemic³⁹. In this study, through two rounds of Delphi expert questionnaire consultation, we construct the course training system of infectious disease specialist nurses' core competence which focus on 5 competence modules and is divided into 12 course categories with 66 class contents and corresponding objectives. The research methods are scientific and rigorous, contents of the training course system are comprehensive and the research results are reasonable and reliable. In this way, the training course system could be reference for the training of infectious disease specialist nurses.

Declarations

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Author's contributions

Chao Wu wrote the main manuscript text. Ping Wu, Lina Du and Hongjuan Lang distributed questionnaires to experts. Jing Wu contributed to the analysis and processing of data. Feixia Cheng and Donglei Jiang contributed to the writing and revision of articles. Yanling Du, Huanmin Qu and Shizhe He contributed to the design of index system.

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Ethics approval and consent to participate

This study was conducted in compliance with the ethical standards in the Declaration of Helsinki and those followed at Air Force Medical University. The study was part of the project to improve the core competence of infectious disease specialist nurses which received approval from the Institutional Review Board of Air Force Medical University. The panelists provided written informed consent before they took part in the study. They have the right to withdraw at any stage of the study.

Consent for publication

Not applicable.

Competing interests

Author reports no competing interests.

Availability of Data and Materials

The datasets generated and analyzed during the current study are not publicly available due to the protection of the privacy of consulting experts but are available from the corresponding author (906963251@qq.com) on reasonable request.

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Tables

Table 1 Demographic information of experts (n=21).

Item	Project	Frequency	Proportion %
Age (years)	40	5	23.81
	40-49	14	66.67
	≥50	2	9.52
Working experience (years)	15	5	23.81
	15-19	13	61.90
	≥20	3	14.29
Research field	infectious disease health care	4	19.05
	infectious disease nursing	7	33.33
	nursing education	10	47.62
Professional title	Senior-level	3	14.29
	associate-senior level	9	42.86
	Intermediate level	9	42.86
Educational background	Doctorate	4	19.05
	Master	12	57.14
	undergraduate	5	23.81
Region	Shaanxi province	7	33.33
	Hubei province	4	19.05
	Zhejiang province	4	19.05
	Beijing city	3	14.29
	Chongqing city	3	14.29

Table 2 Recovery of the questionnaire and suggestions offered.

Field of the experts	First round			Second round		
	Number of questionnaire distributed	Number (Rate) of recovery	Proposed number (ratio)	Number of questionnaire distributed	Number (Rate) of recovery	Proposed number (ratio)
Health care	4	4 100%	2 9.52%	4	4 100%	1 4.76%
Nursing	7	7 100%	6 28.57%	7	7 100%	1 4.76%
Nursing education	10	10 100%	10 100%	10	10 100%	2 9.52%
Total	21	21 100%	18 85.71%	21	21 100%	4 19.05%

Table 3 Experts' criterion.

Experts' criterion	High	Medium	Low
Practical experience	High 0.5	Medium 0.4	Low 0.3
Theoretical analysis	High 0.3	Medium 0.2	Low 0.1
Domestic and foreign reference materials	High 0.1	Medium 0.1	Low 0.1
Intuitive perception	High 0.1	Medium 0.1	Low 0.1

Table 4 Experts' familiarity.

Degree of familiarity	Very familiar	Relatively familiar	Familiar	Quite familiar	Completely not familiar
Value	0.9	0.7	0.5	0.3	0.1

Table 5 Frequency of experts' judgement coefficient.

Experts' criterion	High		Medium		Low	
	Times	Frequency %	Times	Frequency %	Times	Frequency %
Practical experience	14	66.67	7	33.33	0	0
Theoretical analysis	18	85.71	3	14.29	0	0
Domestic and foreign reference materials	5	23.81	10	47.62	6	28.57
Intuitive perception	14	66.67	5	23.81	2	9.52

Table 6 Frequency of experts' familiarity.

Degree of familiarity	Very familiar		Relatively familiar		Familiar		Quite familiar		Completely not familiar	
	Times	frequency	Times	frequency	Times	frequency	Times	frequency	Times	frequency
Self-assessment	17	80.95	4	19.05	0	0	0	0	0	0

Table 7 Experts' opinion coordination degree.

Round	Index	Number	Kendall's <i>W</i>	χ^2	<i>P</i>
The first round	Competence module	5	0.280	23.520	0.000
	Course category	12	0.292	67.357	0.000
	Class content	46	0.303	286.604	0.000
The second round	Competence module	5	0.301	25.250	0.000
	Course category	12	0.350	80.837	0.000
	Class content	66	0.253	341.092	0.000

Table 8 Consultation result of the course training system of infectious disease specialist nurses' core competence.

Competence modules, course categories and class contents (class objectives)	Average	Standard deviation	Variable coefficient	Weighting target
Professional Development Abilities	4.524	0.512	0.113	0.190
-1 Scientific researches on nursing	4.524	0.512	0.113	0.081
-1-1 Selection and design of scientific researches on nursing (to master the principles of scientific research topic selection and the basic principles of topic design)	4.619	0.498	0.108	0.015
-1-2 Literature retrieval and literature quality evaluation (to master Chinese and English language literature retrieval methods, literature management and literature quality evaluation)	4.571	0.507	0.111	0.015
-1-3 Questionnaire Preparation & designing and data selection (to master the principles of questionnaire preparation and designing, methods of electronic question designing and data collection)	4.714	0.463	0.098	0.015
-1-4 Medical statistics (to master the common medical statistical methods and the methods of filling in and drawing statistical charts, be able to perform basic statistical analysis)	4.619	0.498	0.108	0.015
-1-5 Paper writing and submission (to master the requirements and specifications of paper writing, know the precautions and procedures of paper submission)	4.810	0.402	0.084	0.016
-1-6 Research project application and achievement declaration (to know the steps and procedures of research project and achievement declaration)	4.476	0.512	0.114	0.014
-1-7 Scientific research literacy (to master the academic moral norms and medical scientific research ethics, and the methods to improve scientific research)	4.429	0.507	0.115	0.014
-1-8 Clinical issues and patent transformation (to know the existing clinical issues, be able to creatively solve the issues and transform the patent in time)	4.381	0.498	0.114	0.014
-2 Nursing supervision	4.571	0.507	0.111	0.082
-2-1 Management of nursing quality in infectious disease section under the model of responsibility system for nursing (to master the methods of nursing quality management)	4.667	0.483	0.104	0.015
-2-2 Management of refined nursing (to master the methods of refined nursing and be able to carry out refined nursing according to the patient's individual difference)	4.714	0.463	0.098	0.015
-2-3 Management of patients' safety in infectious disease section (to master the methods and measures of safety management for infectious disease patients)	4.667	0.483	0.104	0.015
-2-4 Management of nursing personnel in infectious disease section (Understand the management requirements and methods of nursing personnel in infectious disease section)	4.762	0.436	0.092	0.015
-2-5 Management of materials such as drugs, consumable items and instruments in infectious disease section (to know the requirements and methods of material management in infectious disease section)	4.714	0.463	0.098	0.015
-2-6 Procedure and management of clinical reception in fever clinic and enteric diseases clinic (to master the precautions and management of clinical reception in fever clinic and enteric diseases clinic)	4.667	0.483	0.104	0.015
-2-7 Management of operating room in infectious disease hospital or infectious disease department (to know the management procedures and methods of operating room in infectious disease hospital or infectious disease department)	4.810	0.402	0.084	0.016
-3 Nursing education	4.381	0.498	0.114	0.079
-3-1 Class design and teaching methodology (to master the design	4.476	0.512	0.114	0.014

principles and methods of nursing course and know the different teaching methods, such as flipped class model)				
-3-2 Multi-media teaching courseware making (to master the techniques and methods of multi-media courseware making)	4.619	0.498	0.108	0.015
-3-3 Clinical teaching and practical teaching (to master the principles and requirements for clinical teaching and practical teaching)	4.667	0.483	0.104	0.015
-3-4 Training of nurses in general department under the circumstance of infectious disease emergencies (to know the content of procedure-oriented training to nurses in general department under the circumstance of infectious disease emergencies)	4.857	0.359	0.074	0.016
Responsiveness to Infectious Diseases	4.810	0.402	0.084	0.202
-1 Prediction and emergency drills	4.429	0.507	0.115	0.080
-1-1 Analysis of key global infectious diseases and research on epidemic trends (to know the epidemic distribution of the global infectious diseases and the trends)	4.571	0.507	0.111	0.015
-1-2 Prediction and recognition of the public health emergencies of the infectious diseases (to master how to predict and recognize the public health emergencies of the infectious diseases)	4.619	0.498	0.108	0.015
-1-3 Emergency plan and drill for public health emergencies of the infectious diseases (to know the response plan for public health emergencies and how to carry out emergency drill)	4.714	0.463	0.098	0.015
-1-4 Laws and regulations related to major infectious diseases (to know the laws and regulations related to major infectious diseases)	4.571	0.507	0.111	0.015
-2 Response to Infectious Disease Epidemic	4.714	0.463	0.098	0.085
-2-1 Response to public health of the infectious diseases such as SARS, Ebola hemorrhagic fever and COVID-19 (to master the nursing experiences of responding to major infectious disease events, draw lessons for future improvement)	4.857	0.359	0.074	0.016
Nursing Abilities for Infectious Diseases	4.857	0.359	0.074	0.204
-1 Nursing capabilities	4.810	0.402	0.084	0.086
-1-1 Introduction to infectious disease nursing (to get an overview on infectious disease nursing)	4.810	0.402	0.084	0.016
-1-2 Nursing care to infectious disease patients with common symptoms and signs (to master the nursing care to infectious disease patients with common symptoms and signs such as fever, rash, coughing, diarrhea, tic and convulsion)	4.714	0.463	0.098	0.015
-1-3 Commonly used drugs and nursing care in infectious disease department (to master the principles of dosage, route and method of common medication, observation of curative effect, and precaution of toxic and side effect)	4.667	0.483	0.104	0.015
-1-4 Nursing care to patients with the flu (to master the nursing care to influenza, Influenza A virus subtype H7N9, and Influenza A virus subtype H1N1)	4.714	0.463	0.098	0.015
-1-5 Nursing care to patients with rash (to know the nursing care to patients with chicken pox, herpes zoster, measles, rubella, scarlet fever, Epstein-Barr virus, hemorrhagic fever with renal syndrome, scrubtyphus, tsutsugamushi disease, epidemic cerebrospinal meningitis and dengue fever)	4.714	0.463	0.098	0.015
-1-6 Nursing care to patients with liver diseases (to master the nursing care to patients with acute viral hepatitis, chronic hepatitis, cirrhosis of the liver, hepatic encephalopathy, liver cancer, hepatic failure, upper gastrointestinal hemorrhage and automatic liver disease, and patients after transjugular intrahepatic portosystemic shunt and endoscopic esophageal varix ligation)	4.762	0.436	0.092	0.015

-1-7 Nursing care to patients with virus infectious diseases (to know the nursing care to patients with virus infectious diseases such as mumps, Acquired Immune Deficiency Syndrome, epidemic encephalitis B, hand-foot-and-mouth disease, rabies and HFRS)	4.619	0.498	0.108	0.015
-1-8 Nursing care to patients with bacterial infectious diseases (to know the nursing care to patients with bacterial infectious diseases such as bacterial food poisoning, bacillary dysentery, tuberculosis, epidemic cerebrospinal meningitis and brucellosis)	4.619	0.498	0.108	0.015
-1-9 Nursing care to patients with infectious diseases of protozoa and helminths (to know the nursing care to patients with infectious diseases of protozoa and helminths such as kala-azar, ancylostomiasis, amoebiasis and etc.)	4.667	0.483	0.104	0.015
-1-10 Nursing care to patients with multiple resistant bacteria (to understand the nursing care to patients with multiple resistant bacteria)	4.667	0.483	0.104	0.015
-1-11 Treatment to septic shock patients (to master the symptoms and signs of septic shock patients, emergency measures, nursing measures and apply the measures in a flexible manner)	4.667	0.483	0.104	0.015
-1-12 Nursing care to infectious disease patients during peri-operative period (to master the nursing procedures, complication prevention and precaution for infectious disease patients during peri-operative period)	4.667	0.483	0.104	0.015
-1-13 Application of clinical pathway in the nursing care for infectious disease patients (to know the common clinical nursing pathway in infectious disease nursing)	4.714	0.463	0.098	0.015
-2 Commonly used diagnosis and treatment technology in infectious disease department	4.619	0.498	0.108	0.083
-2-1 Collection of different specimen from infectious disease patients and transport of blood culture specimen (to master methods of specimen collection and precautions of specimen transport, to master the indications, operational approaches and precautions of blood culture from infectious disease patients)	4.762	0.436	0.092	0.015
-2-2 Nursing care for infectious disease patients after paracentesis (to master the nursing techniques for infectious disease patients after liver puncture, abdominocentesis, lunbar puncture and arterial intubation)	4.762	0.436	0.092	0.015
-2-3 Application of blood purification technology in infectious disease patients and nursing to the patients (to master the operational principles and nursing key points of blood purification in infectious disease patients)	4.714	0.463	0.098	0.015
-2-4 Nursing care of endoscopic hemostasis for infectious disease patients (to master the nursing care of endoscopic hemostasis and precautions after operation)	4.667	0.483	0.104	0.015
-2-5 Application of respirators among infectious disease patients and management of artificial airway (to master the usage of respirators, artificial airway nursing and precautions)	4.714	0.463	0.098	0.015
-2-6 Nursing care to infectious diseases patients after compression hemostasis placed with Sengstaken-Blakemore tube (to master the indications of compression hemostasis placed with Sengstaken-Blakemore tube, the nursing interventions, prevention and treatment for complications)	4.714	0.463	0.098	0.015
-2-7 Usage specification of instruments such as infusion pump, injection pump, temperature control blanket and air disinfectant in infectious disease section (to master the using steps and precautions of infusion pump, injection pump, temperature control blanket and air disinfectant in infectious disease section)	4.810	0.402	0.084	0.016
-3 Critical thinking capabilities	4.571	0.507	0.111	0.082
-3-1 Application of critical thinking in infectious disease nursing (to master the application of critical thinking in infectious disease nursing)	4.905	0.301	0.061	0.016
-3-2 Application of evidence-based nursing (to understand the application of evidence-based nursing in guiding infectious disease practices)	4.857	0.359	0.074	0.016

Professionalism and Humanistic Accomplishment	4.667	0.483	0.104	0.196
-1 Professionalism	4.429	0.507	0.115	0.080
-1-1 Nurses' career planning (to know nurses' career planning)	4.667	0.483	0.104	0.015
-1-2 Vocational stress coping in infectious disease nursing (to understand the sources of occupational stress in infectious disease nursing work, and master the methods of psychological regulation and stress adjustment)	4.857	0.359	0.074	0.016
-1-3 Nurse-patient communication skills (to master the nurse-patient communication skills and principles, and the measures to deal with nurse-patient disputes)	4.571	0.507	0.111	0.015
-1-4 Nursing and laws (to understand the relevant legal knowledge in the infectious disease nursing)	4.429	0.507	0.115	0.014
-2 Humanistic care	4.571	0.507	0.111	0.082
-2-1 Psychological characteristics of infectious disease patients (to know the infectious disease patients' negative emotion such as self-abasement and anxiety and their psychological characteristics)	4.381	0.498	0.114	0.014
-2-2 Psychological nursing of infectious disease patients (to master the methods of positive psychological nursing and narrative nursing so as to provide psychological nursing to infectious disease patients)	4.619	0.498	0.108	0.015
-2-3 Humanistic care in nursing (to master the mode and method of humanistic care in nursing and application of narrative medicine)	4.667	0.483	0.104	0.015
-2-4 Health education and health promotion (to master the methods of health education and health promotion so as to carry out health education among infectious disease patients and the public)	4.571	0.507	0.111	0.015
-2-5 Application of hospice care among infectious disease patients and their families (to know the application of hospice care among infectious disease patients and their families)	4.381	0.498	0.114	0.014
Infection Prevention and Control Abilities	5.000	0.000	0.000	0.210
-1 Disinfection and Quarantine	5.000	0.000	0.000	0.090
-1-1 Infection prevention and control in infectious disease section (to master infection prevention and control methods in infectious disease section)	4.905	0.301	0.061	0.016
-1-2 Disinfection of the environment and instrument in infectious disease section (to master the purpose and types of disinfection, the common disinfection methods and disposal of special infectious disease pollutants)	4.857	0.359	0.074	0.016
-1-3 Isolation of infectious diseases (to master the isolation requirements, principles and management system and commonly used isolation technologies)	4.857	0.359	0.074	0.016
-1-4 Transport of infectious disease patients (to master the methods and protective measures of transport, and the terminal disinfection after transportation)	4.905	0.301	0.061	0.016
-1-5 Management of hand hygiene (to master disinfection approaches of hand hygiene, indications for hand washing, monitoring and requirements of hand hygiene)	4.857	0.359	0.074	0.016
-1-6 Management of medical waste (to master the key points of medical waste classification and collection, transport and temporary storage management in infectious disease section)	4.857	0.359	0.074	0.016
-1-7 Monitoring and reporting of infection in hospitals (to know the infection cases' monitoring scope and reporting, time and procedures in hospitals)	4.905	0.301	0.061	0.016
-2 Occupational protection	5.000	0.000	0.000	0.090

-2-1 Response and treatment process of vocational exposure to infectious diseases (to know the classification and prevention of vocational exposure to infectious diseases, the evaluation, response and treatment process after vocational exposure to infectious diseases)	4.857	0.359	0.074	0.016
-2-2 Standard prevention and different types of prevention (to master the basic characteristics, categories and main measures of standard prevention and different types of prevention)	4.810	0.402	0.084	0.016
-2-3 Management and prevention requirements of severe infectious disease section (to know the setting of severe infectious disease section, personnel and material flow, prevention principles and measures)	4.857	0.359	0.074	0.016
-2-4 Put-on and removal procedures of the medical protective equipment (to master the selection of medical protective equipment under different protection levels and correct put-on and removal procedures of protective equipment)	4.810	0.402	0.084	0.016