

CORE COMPETENCIES IN DROPLET-TRANSMITTED INFECTIONS FOR NURSING STUDENTS: A DELPHI STUDY TO ESTABLISH AN EMERGENCY EDUCATION FRAMEWORK IN MACAO

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Abstract

Introduction and aim: The escalating threat of droplet-transmitted infectious diseases, exemplified by the SARS and COVID-19 pandemics, has exposed critical vulnerabilities in global health preparedness. A significant gap persists in standardized, contextually-relevant emergency nursing education for undergraduate students, particularly in densely populated regions like Macao. This study aimed to develop and validate, through expert consensus, a scientifically rigorous educational framework to equip future nurses with the essential competencies to manage droplet-transmitted infectious disease emergencies.

Material and methods: This study employed a rigorous, multi-round modified Delphi method. An initial 58-item framework was systematically developed by synthesizing evidence from a comprehensive literature review and qualitative insights from preliminary interviews with eight clinical and academic experts. This framework was then subjected to a formal two-round Delphi consultation with a panel of ten distinguished experts in infectious disease control, emergency nursing, and nursing education to achieve consensus on its structure and content. Consensus criteria were stringently defined as a mean item score of ≥ 4.0 (5-point scale), a Coefficient of Variation (CV) of ≤ 0.25 , and a statistically significant Kendall's W.

Results: A robust consensus was achieved. The iterative process resulted in a finalized, three-tier framework comprising six core modules and 56 validated Level 3 items. The final round demonstrated a significant and improved level of expert agreement (Kendall's W = 0.454, $p < .001$). Crucially, all 56 final items met the stringent consensus criteria, with CV values ranging from an excellent 0.00% to 16.35%, and the percentage of scores ≥ 4.0 ranging from 88.9% to 100.0%. These results confirm the framework's high internal consistency and strong validation by the expert panel.

Conclusion: This study culminates in the development of a scientifically validated and contextually relevant educational framework that addresses a critical deficit in nursing education. More than just a curriculum, this framework provides a replicable, evidence-based model for nursing education reform, designed to bridge the gap between academic theory and the practical demands of frontline emergency response. Its adoption can significantly enhance the preparedness and competence of future nursing professionals, thereby strengthening the resilience of public health systems against future respiratory-based pandemic threats.

Keywords: nursing students, droplet transmission, infectious diseases, emergency nursing education, Delphi study, curriculum development, consensus framework

1. Introduction

The escalating threat of infectious disease emergencies, such as the 2003 outbreak of Severe Acute Respiratory Syndrome (SARS) and the global pandemic of Coronavirus Disease 2019 (COVID-19), has exposed critical vulnerabilities in global health preparedness. Specifically, during the COVID-19 pandemic from 2020 to 2022, the global death toll reached 14.9 million cases [1]. This pandemic posed severe threats to social security systems, human health, and economic development. Effectively controlling and mitigating pandemic crises caused by droplet-transmitted infectious diseases has become a top priority in the field of public health.

Given the frequent outbreaks of global infectious diseases, there is an urgent need to strengthen the construction of emergency response systems and talent cultivation in infectious disease management [2]. As early as the 1990s, the World Health Organization (WHO) proposed that countries should actively prepare for epidemic responses and enhance nursing emergency education [3]. As future frontline professionals, nursing undergraduates will inevitably face major infectious disease outbreaks in their careers, and their competencies will directly impact the effectiveness of emergency responses [4]. Multiple studies have demonstrated that training experience serves as a positive predictor of healthcare professionals' response capabilities [5, 6]. However, surveys indicate that nursing students in China still exhibit intermediate to low levels of emergency rescue capability when responding to infectious disease outbreaks [7], often accompanied by psychological challenges such as fear and lack of confidence.

Although these studies describe the emergency response capabilities of nursing students [8], there remains a lack of specialized research in Macao on developing infectious disease curricula, particularly concerning droplet-transmitted infectious disease emergencies. Notably, there are relatively few educational training programs specifically targeting infectious disease emergencies for undergraduate nursing students, with most retrieved literature focusing on comparing the effectiveness of different teaching methods [9, 10]. Therefore, a systematic and comprehensive training program, validated by expert consensus and tailored to the unique context of Macao, is urgently needed. This study is part of a larger research project aimed at developing educational frameworks for different types of infectious disease transmission. The methodology employed is consistent with that used in our parallel study on contact-transmitted infections [11].

2. Literature Review

2.1. The Imperative for Emergency Nursing Education

The World Health Organization (WHO) has long advocated that proactive preparation and enhanced nursing education are fundamental to effective epidemic response [3]. Nursing undergraduates, as future frontline responders, are central to this strategy, as their competencies directly impact patient outcomes and public health containment efforts during outbreaks [4,18]. Research consistently demonstrates that targeted training

experience is a significant positive predictor of a healthcare professional's response capabilities, enhancing not only their skills but also their willingness to engage in emergency rescue efforts [5, 6, 7].

2.2. Existing Gaps in Nursing Curricula

Despite the recognized need, current nursing education systems often exhibit significant shortcomings. Surveys indicate that nursing students frequently report intermediate to low levels of emergency rescue capability, often accompanied by psychological challenges such as fear and lack of confidence [7, 8]. These deficiencies are frequently attributed to a lack of specialized and systematic training programs within university curricula [7]. Most existing literature focuses on comparing the effectiveness of different teaching methods rather than on the fundamental development of a core curriculum [16]. This highlights a critical need for a foundational, expert-validated framework that can serve as a blueprint for standardized training.

2.3. The Delphi Method in Curriculum Development

To address this gap, the Delphi method was selected as the most appropriate research design. It is widely recognized as a rigorous and reliable approach for achieving consensus among experts, particularly in the field of curriculum development [14, 15]. The method's iterative and anonymous structure mitigates common biases found in group discussions and allows for the synthesis of diverse perspectives into a harmonized and validated framework [16]. Adherence to established reporting guidelines, such as CREDES and PRISMA for the initial literature review, further ensures the methodological rigor and transparency of the development process [12, 13].

3. Aim

This study aims to establish expert consensus on the core content and structure of an educational framework for emergency nursing education focused on droplet-transmitted infectious diseases, addressing the practical teaching needs for undergraduate nursing students in Macao.

4. Material and methods

4.1. Study Design

This study employed a modified Delphi method to systematically develop and validate an educational framework for emergency nursing on droplet-transmitted infections. The initial curriculum framework was developed based on a synthesis of a systematic literature review and qualitative insights from semi-structured interviews with eight initial clinical and academic experts. Subsequently, a formal two-round Delphi consultation was conducted with a separate panel of ten experts to refine the framework and achieve consensus, adhering to the CREDES guidelines for reporting Delphi studies [12]. The overall study process is illustrated in Figure 1.

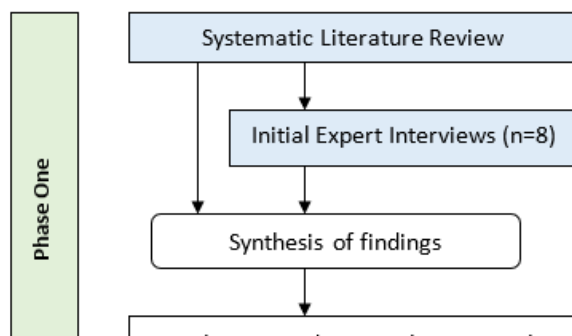


Figure 1. The Process of the Delphi Study

4.2. Phase One: Initial Framework Construction

The initial step in constructing the framework was a systematic review of relevant literature, conducted in accordance with the PRISMA guidelines [13]. A comprehensive search was performed across both Chinese and English databases. Among the 3,508 initially identified articles, 2,800 were preliminarily screened. Full texts of 80 articles were reviewed, and ultimately, 47 research articles met the eligibility criteria. Following the literature review, qualitative insights were gathered through semi-structured individual interviews with eight initial experts (including physicians, professors, and specialist nurses). The synthesis of findings from both the literature review and these expert interviews informed the development of a preliminary, semi-structured educational framework. This initial framework, comprising 58 items, served as the basis for the subsequent Delphi consultation rounds.

4.3. Phase Two: Framework Validation via Delphi Consultation

A formal two-round Delphi consultation was conducted to validate and refine the preliminary framework. A panel of ten experts in infectious disease control, emergency nursing, and nursing education was recruited for the first round. These experts were asked to rate the importance of each of the 58 items on a 5-point Likert scale and provide qualitative feedback for revisions. Based on the quantitative results and qualitative suggestions from the first round, the framework was revised, resulting in 56 items for the

next round. In the second round, nine of the original ten experts participated and were asked to re-evaluate the revised 56-item framework.

4.4. Data analysis

Quantitative data were analyzed using SPSS version 26.0 (IBM Corp., Armonk, NY, USA). Expert engagement was evaluated based on questionnaire response rates and the proportion of suggestions submitted. The authority coefficient (Cr), calculated from the judgment basis (Ca) and familiarity level (Cs) of the experts, was used to quantify expert credibility, with higher values indicating greater authority. Expert consensus was assessed using the coefficient of variation (CV) and Kendall's W coefficient, where lower CV and higher W values reflect stronger agreement among experts. The criteria for item retention included an average importance score ≥ 3.5 and a $CV \leq 0.25$. The analytic hierarchy process (AHP) was used to calculate the weight values of hierarchical entries.

4.5. Ethical Considerations

All procedures in this study received ethical approval from the Institutional Review Board of Macao Polytechnic University in February 2023 (Approval No. RP/FCSD-02/2023). Prior to participation, every expert was provided with detailed information about the study and gave written informed consent. Participants were also explicitly informed of their right to withdraw from the research at any stage without penalty.

5. Results

5.1. Expert Panel

The Delphi process achieved high participation across both rounds. In the first round, all ten invited experts participated (100% response rate). For the second round, nine of the original ten experts responded, yielding a response rate of 90%. The panel consisted of highly experienced professionals, with 50% holding a doctorate and 50% being professors. A significant majority (70%) possessed over 20 years of work experience, ensuring a high level of expertise. The primary research fields represented were clinical nursing (40%) and nurse education (40%). Full demographic details of the expert panel are presented in our prior publication [11].

5.2. Consensus on the Educational Framework Structure and Content

Through the iterative process of expert consultation, a robust consensus was achieved on the structure and core content of the framework. The finalized training system adopts a three-tier modular design, comprising six Level 1 core training modules, nine Level 2 entries, and 56 validated Level 3 entries. These six core modules systematically cover: concepts and characteristics of public health emergencies and emergency preparedness; risk assessment and warning classification; ethics and law; infection control; knowledge of infectious diseases; and self-regulation and methods of stress management.

5.3. Results of the Delphi Rounds

The results from the first round of the Delphi study are presented in Table 1. In this initial round, ten experts provided their ratings on 58 items. The overall Kendall's W for all items was 0.349 ($p < .001$), indicating a low but statistically significant level of agreement. A

detailed analysis revealed a variable range of consensus, with several items exhibiting high Coefficient of Variation (CV) values (up to 30.70%) and low mean scores (down to 3.90), thus failing to meet the predefined consensus criteria.

Based on these initial results and expert feedback, two items were removed and others were revised. In the second round, nine experts re-evaluated the refined 56-item framework, with results presented in Table 2. A marked improvement in consensus was observed, with the Kendall's W increasing to 0.454 ($p < .001$). Crucially, all 56 final items met the stringent consensus criteria, with CV values ranging from a perfect 0.00% to a maximum of 16.35% and mean scores from 4.44 to 5.00. These robust quantitative indicators confirm a strong and reliable expert consensus on the final framework.

6. Discussion

This study successfully constructed and validated a comprehensive educational framework for emergency nursing focused on droplet-transmitted infections, utilizing a rigorous, two-round Delphi method. The process yielded a robust expert consensus, evidenced not only by the statistically significant Kendall's W coefficient, which improved from 0.349 to 0.454 ($p < .001$), but also by the fact that all 56 final items met stringent consensus criteria. The convergence of these quantitative indicators unequivocally demonstrates the methodological rigor of the framework's content.

The methodological rigor of this study is fundamentally anchored in the exceptional credibility of the expert panel. A high level of expert authority is paramount for the validity of Delphi-derived curricula [14]. The marked improvement in consensus from Round 1 to Round 2 highlights the effectiveness of the iterative Delphi process in synthesizing diverse expert perspectives into a harmonized structure. This moderate level of consensus, when coupled with high individual expert authority, suggests a thoughtful and nuanced refinement process, a hallmark of high-quality curriculum development, rather than a mere statistical convergence [15].

The practical relevance of the curriculum is grounded in its meticulous, needs-based foundation, a key strength of context-specific curriculum development [16]. This approach ensured the framework addresses the lived experiences of local clinicians, a process refined through data-driven modifications in the Delphi rounds. For example, items on diseases with lower local prevalence and consensus, such as Scarlet Fever and Meningitis, were strategically removed after Round 1, optimizing the curriculum's efficiency and impact on high-priority threats.

The final six-module structure is particularly responsive to the multi-faceted demands of managing droplet-transmitted diseases. It critically integrates modules on "Ethics and Law," addressing legal frameworks governing public health actions like quarantine [17], and "Infection Control," providing essential competencies in airborne pathogen mitigation. Furthermore, the inclusion of a "Stress Management" module acknowledges the profound psychological distress experienced by healthcare workers during respiratory pandemics.

This comprehensive approach contributes to cultivating a more resilient public health workforce [18].

7. Conclusion and Implications for Nursing Education

This study culminates in the successful development and validation of a structured, evidence-based educational framework meticulously tailored to address droplet-transmitted infectious diseases within the context of Macao's undergraduate nursing curriculum. For nursing educators, this study provides a replicable, contextually sensitive model for curriculum reform. Ultimately, its adoption can contribute to strengthening the broader public health infrastructure by ensuring that nursing graduates are empowered to lead, innovate, and provide exemplary care in the face of emerging infectious disease threats.

Acknowledgment

The authors are deeply indebted to the experts who participated in both the initial qualitative interviews and the subsequent Delphi rounds. The foundational insights from our initial interviewees and the rigorous feedback from our Delphi panel were both indispensable to the development and validation of this framework. We extend our sincere gratitude for their invaluable contribution to this research.

Table 1 The Results of the First Round

Curriculum Module	Course Title	Items	Mean	SD	CV (%)	Percentage of Scores $\geq$ 4.0
One: Theory	Concept and characteristics of public health emergencies, emergency plan	1. Concept and characteristics of public health emergencies	4.90	.32	6.45	100.0
		2. Characteristics of emergency nursing in public health emergencies	4.80	.42	8.78	100.0
		3. Positive prevention before public health emergencies	4.40	.70	15.89	90.0
		4. Positive rescue of public health emergencies occurs	4.60	.52	11.23	100.0
		5. Proper handling after public health emergencies	4.60	.52	11.23	100.0
		6. Risk assessment of public health emergencies	4.90	.32	6.45	100.0
		7. Warning grading of public health emergencies	4.80	.42	8.78	100.0
	Ethics of public health emergencies	8. Ethical principles of emergency nursing in public health emergencies	4.80	.63	13.18	90.0
		9. Ethical requirements of emergency nursing in public health emergencies	4.60	.70	15.20	90.0
	Law and regulation of public health emergencies	10. Mainland China: Regulation on Preparedness for and Response to Emergent Public Health Hazards—Chapter 2: Prevention and Emergency Preparedness	4.80	0.42	8.78	100.0
		11. Chapter 3: Report and information release	4.80	0.42	8.78	100.0
		12. Chapter 4: Emergency response	4.80	0.42	8.78	100.0
		13. Chapter 5: Legal responsibility	4.70	0.42	10.28	100.0
		14. Macao, China: Legal Framework for Civil Protection—Chapter 2: Public emergencies	4.90	0.32	6.45	100.0
		15. Chapter 4: Implementation of civil defence activities	4.70	0.42	10.28	100.0
		16. Chapter 5: Obligation and responsibility	4.80	0.32	8.78	100.0

Curriculum Module	Course Title	Items	Mean	SD	CV (%)	Percentage of Scores $\geq$ 4.0
Two: Theory		17. Macao, China: Civil Protection Legal Framework Regulation—Chapter 2: Early warning system for public emergencies	4.70	0.63	14.36	90.0
		18. Macao, China: Communicable Diseases Control Law—Chapter 2: General Measure	4.70	0.32	14.36	90.0
		19. Macao, China: Communicable Diseases Control Law—Chapter 3 Special Measure	4.90	0.32	14.36	100.0
		20. Macao, China: Communicable Diseases Control Law—Chapter 4: Rights and protection	4.90	.32	6.45	100.0
		21. Macao, China: Communicable Diseases Control Law—Chapter 5: Criminal liability	4.90	.32	6.45	100.0
	Infection control basics	22. Objective and principle of infection control	4.90	.32	6.45	100.0
		23. Chain of infection (source of infection, route of transmission, susceptible host)	4.90	.32	6.45	100.0
	Infection control strategy and measures	24. The principle of standard precautions	4.80	.42	8.78	100.0
		25. Definition, purpose, principle, requirement, indication for sterilisation, timing of hand hygiene	4.90	.32	6.45	100.0
		26. Purpose, using time of personal protective equipment, principle of supply selection, treatable method and precaution after contamination	4.80	.42	8.78	100.0
		27. Purpose, function, and precaution of the isolation ward	4.90	.32	6.45	100.0
		28. Environmental decontamination, object disinfection, reusable device reprocessing, and contaminated waste handling.	4.90	.32	6.45	100.0
	Prevention and treatment of	29. Definition of needlestick injuries	4.50	1.08	24.00	80.0
		30. Major risk factor of needlestick injuries	4.50	1.08	24.00	80.0

Curriculum Module	Course Title	Items	Mean	SD	CV (%)	Percentage of Scores ≥ 4.0
Three: Theory	occupational accidental exposure	31. Hazards of needlestick injuries	4.50	1.08	24.00	80.0
		32. Preventive Measures for Needlestick Injuries	4.50	1.08	24.00	80.0
		33. Post-exposure management protocol for needlestick injuries	4.50	1.08	24.00	80.0
		34. Definition of splashes and sprays of liquids or blood	4.40	1.07	24.43	80.0
		35. Main Risk Factors for Splashes and Sprays of Liquids or Blood	4.40	1.07	24.43	80.0
		36. Liquid or Blood Splash and Splatter Hazards	4.50	1.08	24.00	80.0
		37. Related Preventive Measures	4.50	1.08	24.00	80.0
		38. Procedures for Handling Liquid or Blood Splash/Splatter Incidents	4.50	1.08	24.00	80.0
	Knowledge of droplet-transmitted infectious diseases	39. Definition of Droplet Transmission	4.80	.63	13.18	90.0
		40. Disease Categories (Tuberculosis, COVID-19, Scarlet Fever, Measles, Pertussis, Meningitis, Influenza)	4.40	.84	19.17	80.0
		41. Tuberculosis: Definition, Symptoms, Transmission Routes, Epidemiology	4.40	.97	21.96	70.0
		42. Measles: Definition, Symptoms, Transmission Routes, Epidemiology	4.30	.95	22.06	70.0
		43. COVID-19: Definition, Symptoms, Transmission Routes, Epidemiology	4.70	.67	14.36	90.0
		44. Scarlet Fever: Definition, Symptoms, Transmission Routes, Epidemiology	3.90	1.20	30.70	50.0
		45. Meningitis: Definition, Symptoms, Transmission Routes, Epidemiology	3.90	1.20	30.70	50.0
		46. Protection Methods, Techniques, and Precautions	4.90	.32	6.45	100.0

Curriculum Module	Course Title	Items	Mean	SD	CV (%)	Percentage of Scores $\geq$ 4.0
Four: Practical skills training	Method of psychological crisis assessment, self-adjustment and stress management	When in Contact with Patients with Droplet-Transmitted Diseases				
		47. Definition of psychological crisis assessment	4.80	.42	8.78	100.0
		48. Assessment Methods	4.80	.42	8.78	100.0
		49. Intervention Content	4.80	.42	8.78	100.0
		50. Intervention Measures	4.80	.42	8.78	100.0
		51. Self-Adjustment and Stress Management (Macau Context)	4.90	.32	6.45	100.0
		52. Introduction to Self-Perception and Stress Detection	4.90	.32	6.45	100.0
		53. Adjustment and stress management methods	4.70	.48	10.28	100.0
	Skill operation of contact-transmitted infectious diseases	54. Commonly used items sterilised classification	4.70	.67	14.36	90.0
		55. Medical Waste Classification for Infectious Disease Patients	4.70	.67	14.36	90.0
		56. Needle Stick Injury Management Methods	4.50	1.08	24.00	80.0
		57. (Demonstration and Student Practice) PPE Donning and Doffing & Isolation Zone Setup	4.80	.42	8.78	100.0
		58. (Demonstration and Student Practice) Closed Suctioning	4.90	.32	6.45	100.0

Note. SD = standard deviation; CV = Coefficient of Variation.

Table 2 The Results of the Second Round

Curriculum Module	Course Title	Items	Mean	SD	CV	Percentage of Scores $\geq$ 4.0
One: Theory	Concept and characteristics of public health emergencies, emergency plan	1. Concept and characteristics of public health emergencies	5.00	.00	.00	100.0
		2. Characteristics of emergency nursing in public health emergencies	5.00	.00	.00	100.0

Curriculum Module	Course Title	Items	Mean	SD	CV	Percentage of Scores $\geq$ 4.0
		3. Positive prevention before public health emergencies	4.67	.71	15.15	88.9
		4. Positive rescue of public health emergencies occurs	4.89	.33	6.82	100.0
		5. Proper handling after public health emergencies	4.89	.33	6.82	100.0
		6. Risk assessment of public health emergencies	4.89	.33	6.82	100.0
		7. Warning grading of public health emergencies	4.89	.33	6.82	100.0
	Ethics of public health emergencies	8. Ethical principles of emergency nursing in public health emergencies	5.00	.00	.00	100.0
		9. Ethical requirements of emergency nursing in public health emergencies	5.00	.00	.00	100.0
	Law and regulation of public health emergencies	10. Mainland China: Regulation on Preparedness for and Response to Emergent Public Health Hazards—Chapter 2: Prevention and Emergency Preparedness	4.78	.44	9.23	100.0
		11. Mainland China: Regulation on Preparedness for and Response to Emergent Public Health Hazards—Chapter 3: Report and information release	4.78	.44	9.23	100.0
		12. Mainland China: Regulation on Preparedness for and Response to Emergent Public Health Hazards—Chapter 4: Emergency response	4.78	.44	9.23	100.0
		13. Mainland China: Regulation on Preparedness for and Response to Emergent Public Health Hazards—Chapter 5: Legal responsibility	4.78	.44	9.23	100.0
		14. Macao, China: Legal Framework for Civil Protection—Chapter 2: Public emergencies	4.78	.44	9.23	100.0
		15. Macao, China: Legal Framework for Civil Protection—Chapter 4: Implementation of civil defence activities	4.67	.71	15.15	88.9
		16. Macao, China: Legal Framework for Civil	4.67	.71	15.15	88.9

Curriculum Module	Course Title	Items	Mean	SD	CV	Percentage of Scores $\geq$ 4.0
Two: Theory		Protection—Chapter 5: Obligation and responsibility				
		17. Macao, China: Civil Protection Legal Framework Regulation—Chapter 2: Early warning system for public emergencies	5.00	.00	.00	100.0
		18. Macao, China: Communicable Diseases Control Law—Chapter 2: General Measure	4.78	.67	13.95	88.9
		19. Macao, China: Communicable Diseases Control Law—Chapter 3 Special Measure	4.78	.67	13.95	88.9
		20. Macao, China: Communicable Diseases Control Law—Chapter 4: Rights and protection	4.78	.67	13.95	88.9
		21. Macao, China: Communicable Diseases Control Law—Chapter 5: Criminal liability	4.78	.67	13.95	88.9
		22. Objective and principle of infection control	4.78	.67	13.95	88.9
	Infection control basics	23. Chain of infection (source of infection, route of transmission, susceptible host)	4.78	.67	13.95	88.9
		24. The principle of standard precautions	4.78	.67	13.95	88.9
		25. Definition, purpose, principle, requirement, indication for sterilisation, timing of hand hygiene	4.67	.71	15.15	88.9
		26. Purpose, using time of personal protective equipment, principle of supply selection, treatable method and precaution after contamination	4.67	.71	15.15	88.9
		27. Purpose, function, and precaution of the isolation ward	4.56	.73	15.95	88.9
		28. Environmental decontamination, object disinfection, reusable device reprocessing, and contaminated waste handling.	4.56	.73	15.95	88.9

Curriculum Module	Course Title	Items	Mean	SD	CV	Percentage of Scores ≥ 4.0
	Prevention and treatment of occupational accidental exposure	29. Definition of needlestick injuries	4.44	.73	16.35	88.9
		30. Major risk factor of needlestick injuries	4.44	.73	16.35	88.9
		31. Hazards of needlestick injuries	4.44	.73	16.35	88.9
		32. Preventive Measures for Needlestick Injuries (including operational, environmental, and material handling aspects)	4.44	.73	16.35	88.9
		33. Post-exposure management protocol for needlestick injuries	4.67	.71	15.15	88.9
		34. Definition of splashes and sprays of liquids or blood	4.67	.71	15.15	88.9
		35. Main Risk Factors for Splashes and Sprays of Liquids or Blood	4.67	.71	15.15	88.9
		36. Liquid or Blood Splash and Splatter Hazards	4.67	.71	15.15	88.9
		37. Related Preventive Measures (Operational, Environmental, Tool Use, Material Handling/Disposal)	4.67	.71	15.15	88.9
		38. Procedures for Handling Liquid or Blood Splash/Splatter Incidents	4.67	.71	15.15	88.9
Three: Theory	Knowledge of contact-transmitted infectious diseases	39. Definition of Droplet Transmission	4.78	.67	13.95	88.9
		40. Disease Categories (Tuberculosis, COVID-19, Measles)	4.56	.73	15.95	88.9
		41. Tuberculosis: Definition, Symptoms, Transmission Routes, Epidemiology	4.44	.73	16.35	88.9
		42. Measles: Definition, Symptoms, Transmission Routes, Epidemiology	4.44	.73	16.35	88.9
		43. COVID-19: Definition, Symptoms, Transmission Routes, Epidemiology	4.78	.44	9.23	100.0
		44. Protection Methods, Techniques, and Precautions	4.67	.71	15.15	88.9

Curriculum Module	Course Title	Items	Mean	SD	CV	Percentage of Scores $\geq$ 4.0
Four: Practical skills training	Method of psychological crisis assessment, self-adjustment and stress management	When in Contact with Patients with Droplet-Transmitted Diseases				
		45. Definition of psychological crisis assessment	4.78	.44	9.23	100.0
		46. Assessment Methods	4.78	.44	9.23	100.0
		47. Intervention Content	4.67	.71	15.15	88.9
		48. Intervention Measures	4.67	.71	15.15	88.9
		49. Self-Adjustment and Stress Management (Macau Context)	4.78	.44	9.23	100.0
		50. Introduction to Self-Perception and Stress Detection	4.78	.44	9.23	100.0
		51. Adjustment and stress management methods	4.78	.44	9.23	100.0
	Skill operation of contact-transmitted infectious diseases	52. Commonly used items sterilised classification	4.56	.73	15.95	88.9
		53. Medical Waste Classification for Infectious Disease Patients	4.67	.50	10.71	100.0
		54. Needle Stick Injury Management Methods	4.44	.73	16.35	88.9
		55. (Demonstration and Student Practice) PPE Donning and Doffing & Isolation Zone Setup	4.78	.44	9.23	100.0
		56. (Demonstration and Student Practice) Closed Suctioning	5.00	.00	.00	100.0

Note. SD = standard deviation; CV = Coefficient of Variation.

Author contributions:

WIPP: Conceptualization, methodology, supervision, project administration, writing—original draft, writing—review & editing, and final approval of the submitted version.

ZW: method and design, data collection, analysis, and interpretation, data curation, writing—original draft, and final approval of the submitted version.

NY: method and design, data collection, analysis, interpretation, and final approval of the submitted version.

HY: Conceptualization, methodology, supervision, and final approval of the submitted version.

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