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Assessing educational gaps in Iran's nursing education system: a mixed-method approach to the infectious diseases curriculum

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Abstract

Background Nurses play a significant role in the health system. The outbreak of emerging infectious diseases, such as COVID-19, highlights the need for nursing staff to be aware of the various aspects of these diseases. Therefore, considering the critical importance of infectious diseases, the present study aims to identify the educational needs of the infectious diseases course in nursing in Iran.

Method This mixed-method study was conducted in two phases. First, a qualitative study using a conventional content analysis approach was performed to identify educational needs. Subsequently, in the quantitative phase, a panel of 10 nursing faculty members was asked to prioritize these needs using the Delphi technique.

Results The qualitative phase identified three main categories of educational needs: (1) enhancing the theoretical content of infectious diseases, (2) strengthening the practical and clinical components of the course, and (3) optimizing educational strategies. The needs assessment questionnaire, developed in the qualitative phase, was analyzed over two rounds using the modified Delphi method with descriptive statistics.

Conclusion The use of a mixed-method (quantitative and qualitative) approach to assess the curriculum needs for infectious diseases, conducted for the first time in Iran, revealed the necessity of revising both theoretical and clinical curricula.

Keywords Educational needs assessment, Nursing student, Infectious diseases, Curriculum

Introduction

Human resources are the backbone of a country's health and treatment systems. If educational plans and programs do not match the real needs of the profession and the social conditions of the country, they will not be able to improve public health enough for people to

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¹ Department of Medical Surgical Nursing, School of Nursing and Midwifery, Shahid Beheshti University of Medical Sciences, Tehran, Iran live healthy, productive lives—both socially and economically. Nurses, who make up more than a third of the healthcare workforce, play a key role in the health system [1]. According to a report by the National Union of Nurses, many nursing programs have not kept up with the changing needs of patient care [2]. A study conducted by Arabpour et al. in Iran also highlighted the importance of revising the nursing curriculum in response to global changes in the healthcare landscape [3]. According to the Global Burden of Disease Study, infectious diseases account for 21.9% of the total disease burden in Iran [4]. The outbreak and rapid spread of new infectious diseases like COVID-19, which the World Health Organization has classified as one of the top global health emergencies, show how important



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it is for nurses and other healthcare workers to fully understand these diseases [5, 6].

Since 2004, after the SARS outbreak in China and the crucial role of nurses in preventing infections, recognizing symptoms, controlling outbreaks, isolating patients, and caring for their overall health, universities in Hong Kong updated their nursing programs. They placed greater focus on personal protection, infection prevention, and public health [7]. The integration of infectious disease concepts and related educational strategies is increasingly recognized as a critical need within undergraduate nursing curricula [3]. However, in many medical universities in our country, the infectious diseases course is still a small part of the curriculum, and for years, it has remained unchanged [8]. The first and most important step in improving any educational program is to understand what is truly needed. A needs assessment helps identify the most important gaps and provides a foundation for setting goals and making better plans. To design an effective and practical program, we must first identify the specific learning needs of students and then develop clear strategies to meet them [9]. The results of a needs assessment can also guide future changes in the curriculum [10]. The undergraduate nursing curriculum in Iran was last revised on May 27, 2013, by the Supreme Council for Medical Sciences Planning and is still in use today. At the broader level, it defines its core values, goals, and vision, as well as the expected skills of graduates, teaching methods, ethical guidelines, and evaluation processes. However, there has been no study specifically examining the educational needs of infectious disease courses in detail.

Given the complexity of the topic and the need for a deep understanding of educational needs, this study employed a mixed-methods approach (qualitative– quantitative). Initially, qualitative data were collected through interviews, and in the subsequent quantitative phase, the findings were prioritized and validated. Using a concurrent design in this study allows for a more comprehensive analysis, combining the depth of qualitative data with the generalizability of quantitative findings.

Method

This study employed a mixed-methods approach with a concurrent design. It is part of a broader curriculum revision initiative guided by Harden's model for curriculum planning, which emphasizes outcomes-based education and alignment between learning objectives, content, teaching methods, and assessment. The study method diagram is presented in Supplementary file 1.

Qualitative phase

A qualitative study was first conducted using conventional content analysis based on Graneheim & Lundman's (2004) approach [11]. Semi-structured interviews were conducted with 16 undergraduate nursing students from various faculties across Iran and one nursing faculty member. Mean ager of participants were 25±35. Demographic characteristics of the participants in the qualitative phase is provided in Supplementary File 2. The interviews explored participants' perspectives on the limitations of the current infectious diseases curriculum, suggestions for improvement, and perceptions of the course's effectiveness in clinical practice. Thematic questions were designed to elicit responses about perceived gaps, content relevance, and the practical application of course material. The full interview guide is provided in Supplementary File 3.

Data analysis

Qualitative data were analyzed in five systematic steps: (1) transcription of interviews immediately after completion; (2) full reading to achieve a general understanding; (3) identification of meaning units and initial codes; (4) grouping of similar codes into broader categories; and (5) abstraction of categories to define core educational themes. Data reduction, integration, and synthesis were applied throughout the process. The validity of this phase was established through credibility, transferability, dependability, and confirmability [11].

Quantitative phase

In the second phase, In order to obtain the mean of experts' opinions across the two rounds of the Delphi process and to measure the differences between these means a questionnaire was developed based on the educational needs extracted from the qualitative data. Domains and items were first identified and refined. The measurement scale used in this study was a 5-point Likert scale, which ranged from'strongly disagree'to'strongly agree.'This scale was specifically chosen to provide a clear and precise measure of the respondents'level of agreement with each statement. The range of responses ensures a comprehensive understanding of the participants'attitudes and perceptions regarding the educational needs identified in the qualitative phase. Ten faculty members with experience teaching both theoretical and practical components of the infectious diseases course were recruited to prioritize the needs. Their average age was 33.9 \pm 6.5 years, and their teaching experience in this course was 7.9 years., In all stages, sampling was conducted using a purposive sampling method. The modified Delphi technique was employed in two rounds to finalize educational priorities.

Descriptive statistics, including frequency, mean, and standard deviation, were used for analysis [12]. Demographic Characteristics of Delphi Phase Participants are presented in Supplementary File 2.

Results

Qualitative phase

The qualitative phase of the study involved interviews with 16 students and one faculty member. Due to the Covid-19 pandemic, limited in-person access to participants, and the need for maximum diversity in responses, student interviews were conducted remotely via phone using a semi-structured format. The duration of each interview ranged from 15 to 30 minutes, and data collection spanned approximately three months. MAXQDA 20 software was utilized to manage qualitative data. Ultimately, educational needs were categorized into three main categories, six subcategories, and 13 sub-subcategories, resulting in a total of 271 codes (Table 1). An example of the placement of meaning units, sub-subcategories, subcategories, and categories is presented in supplementary file 4.

The need for participants to pay attention to the content of the infectious disease curriculum

The first extracted category highlights the need for participants to focus on the content of the infectious disease curriculum. This category is further divided into two subcategories: (1) obstacles in the infectious disease curriculum and (2) the importance of the infectious disease curriculum.

Several challenges were identified during the interviews, including: 1) The extensive amount of course

content compared to the limited time allocated; 2) The low weight of the infectious disease course in the overall grading system; 3) The inclusion of unnecessary details, leading to content overload; 4) Boring and ineffective virtual classes; 5) The lack of integration between lesson content and practical applications; 6) The absence of a structured lesson plan in the first session; 7) The difficulty in pre-reading and the lack of emphasis on uncommon diseases. These findings emphasize the need for a more structured, engaging, and relevant infectious disease curriculum to enhance students'learning experiences.

A nursing student stated, "We didn't have a lesson plan. If a structured lesson plan were provided, allowing students to pre-study before each session, it would significantly enhance our learning experience."

In relation to the importance of the infectious disease curriculum, the applicability and prevalence of infectious diseases were emphasized. A nursing student in the eighth semester stated, "Many of the diseases we encounter in our daily lives have an infectious origin and are highly prevalent, ranging from urinary infections to COVID-19. As nurses, we frequently deal with infectious diseases, making it crucial for us to gain a thorough understanding of them."

The need for participants to focus on the internship component of the infectious diseases course

The second extracted category highlights the necessity of emphasizing the internship in the infectious disease curriculum, which was divided into two sub-categories: the importance of internship and obstacles to internship. A nursing student stated, *"The internship was beneficial for us as it reinforced key principles and concepts. For*

 Table 1
 The results of category and sub category and sub-sub category

Category	Sub-category	Sub-sub category
The need participants to pay attention to the edu- cational content of infectious diseases	Obstacles in the educational program of infectious diseases	Obstacles related to the development of educa- tional content
		Obstacles related to the time allocated to the course unit
		A large volume of infectious curriculum
	The importance of the infectious curriculum	Applicability of the curriculum
		The prevalence of infectious diseases
The need participants to pay attention to the internship of infectious diseases.	The importance of internship	The importance of internship in learning
		Applicability of internship
	Internship barriers	The gap between theory and clinical practice
		Lack of experienced clinical professor
The need participants to pay attention to the edu- cational strategy	Advantages and Disadvantages strategy Teacher oriented	Disadvantages of using a teacher-centered strategy
		Advantages of a teacher-centered strategy
	Advantages and Disadvantages strategy Student oriented	Advantages of using a student-centered strategy
		Disadvantages of using a student-centered strategy

example, my instructor emphasized proper handwashing and adherence to safety precautions. Additionally, the clinical topics we covered significantly helped us review and better understand the infectious diseases course."

In relation to the obstacles of internships, the gap between theory and practice in the clinic and the lack of experienced clinical instructors were also highlighted. A nursing student stated, "From the first day of all internships, we were told that clinical work is different from theory, which has become normal for us. For instance, they didn't provide sterile gloves for us to dress the patient, and when we washed our hands frequently, they questioned, What's going on?"

The participant, an assistant professor with 25 years of teaching experience, stated, "One of the crucial factors in the internship is that the instructor must have sufficient skills and knowledge in the field of infectious diseases. In my opinion, the clinical instructor must have the confidence to work with infectious patients and be able to guide students in clinical settings."

The need for participants to focus on educational strategies

The third category extracted was the need for participants to focus on educational strategies, which were divided into two sub-categories: Advantages and Disadvantages of teacher-centered strategies and Advantages and Disadvantages of student-centered strategies. Regarding the teacher-centered strategy, two sub-subcategories were identified: advantages and disadvantages. Among the advantages, cost-effectiveness and time-saving were highlighted, while the disadvantages included student passiveness and dry, soulless classes. For the student-centered strategy, advantages and disadvantages were also identified as sub-sub-categories. The advantages of this approach included active student participation and enhanced learning, while the disadvantages included time-consuming processes and resistance to changing traditional methods.

Quantitative phase results

This stage involved the preparation of a questionnaire containing the educational needs extracted from the qualitative phase. Initially, the first version of the extracted questions from the qualitative phase was presented to 10 members of the nursing faculty. The faculty members reviewed the content and the relevance of the questions to the research topic and provided their feedback. Based on their feedback, questions that were conceptually or contextually irrelevant or unnecessary were revised or modified. The revised questionnaire was then sent to expert professors for validation in the second round of the Delphi method. In this second round, no significant changes or recommendations for reform were suggested by the professors. The responses from the questionnaires in each Delphi stage were analyzed using descriptive statistics (i.e., frequency, mean, and standard deviation) (Supplementary 5).

The first stage of Delphi revealed that more than 60–70% of the experts in the first round assigned a very high score [5] to several key items, which included: the importance of addressing the goals and expected outcomes in the first session, ensuring that the content meets the needs of the students, focusing on local infectious diseases, integrating multimedia teaching methods, adjusting class schedules to accommodate content, ensuring instructors possess sufficient teaching skills, emphasizing the principles of procedure during internships, adopting a patient-oriented approach during internships, and conducting systematic evaluations during internships.

In the second round of Delphi, 70 to 80 percent of the participants assigned higher scores than in the first round to the following items: the importance of addressing the goals and expected outcomes in the first session, the need to adjust the content to meet students'needs, the importance of instructors having sufficient teaching skills, the fundamental implementation of procedures during internships, and the focus on conducting internships in a patient-oriented manner.

Discussion

In the present study, an educational needs assessment was conducted using a mixed-methods approach, combining qualitative and quantitative research. In the qualitative phase, three main categories of needs were identified: the need for participants to pay attention to the content of the infectious diseases course, the need for participants to focus on the internship component of the course, and the need to consider educational strategies. In the quantitative phase, the needs questionnaire, developed from the qualitative findings, was analyzed in two rounds using the modified Delphi method and descriptive statistics (frequency, mean, and standard deviation).

The curriculum should be responsive to the needs of society and students, which necessitates the adaptation of the infectious diseases curriculum [13]. Welch et al. emphasize that key components for the effectiveness of a course include educational materials, teaching methods, course evaluation, management and organization, and the physical environment in which the course is delivered [14]. Watson criticized the traditional approaches to nursing education and argued that the curriculum should be designed based on the concept of care and the lived experiences of students and other learners [15].

Developing the content of the infectious diseases curriculum to adequately prepare students for effective performance in the dynamic healthcare environment is crucial. It is essential that the curriculum aligns with the practical settings in which graduates will work [16]. One of the most frequently mentioned issues by both students and professors in this study was the large volume of content in the infectious diseases course. This course, which only consists of 0.5 units across four class sessions, is limited in time and lacks integration of some relevant topics within the program. These concerns underscore the importance of reviewing and revising the infectious diseases curriculum in educational planning. These findings are consistent with the results of the study by Manning et al., who also argued that although certain infectionrelated concepts are included in nursing courses, there is limited evidence of their comprehensive integration throughout the curriculum-an issue that may contribute to nursing students' inadequate understanding of infection prevention and control [17]. In this study, both professors and students, as well as experts involved in the Delphi stages, highlighted the necessity of using lesson plans to define the general and specific goals, as well as the expected outcomes of the course. Experts in the educational system believe that enhancing the teaching and learning process requires the implementation of effective teaching methods and techniques, especially through the development of lesson plans. A well-developed lesson plan serves as the foundation for educational planning and fosters interaction and dynamic engagement between professors and students. It is considered one of the most effective ways to improve the quality of education. However, in many medical universities in Iran, lesson plans are either not sufficiently developed by professors or, if they are, they are not adequately shared with students or effectively implemented [18].

Setting a lesson plan clearly defines important goals, such as "what we want" and "how to teach" for the teacher, and "how to learn" for the student. Moreover, by reducing inhibiting factors, it enables the optimal use of class time, enhancing both efficiency and effectiveness [19]. A suitable lesson plan should, at a minimum, include outlines, main and behavioral goals, learners'input behavior, assessment methods, educational activities, teaching methods, required educational tools, and supplementary activities outside the classroom.

In Shahrokhi et al.'s study, which analyzed 100 lesson plans from 24 nursing and midwifery schools in Iran, only 13% of the lesson plans were deemed optimal, while 83% were classified as average quality [18]. Similarly, Nik Bakhsh et al. found that most faculty members did not present their lesson plans to students in writing and did not use formative assessments to evaluate students [20]. The implementation of systematic evaluation in internships was one of the key points emphasized by experts in nursing education. Systematic evaluation allows for the accurate identification of problems, enables stakeholders to engage in finding solutions, optimizes the use of resources, and prevents redundant efforts. Additionally, it leads to higher-quality teaching and is an essential step in motivating learners. It clarifies problems, identifies opportunities, and defines relationships between people involved in the process [21]. In the present study, over 80% of professors agreed with preparing and presenting the lesson plan in the first session of the infectious diseases course. In contrast, Sabarian et al.'s study found that 49.1% of nursing professors were opposed to presenting the lesson plan at the first session [19].

Since many teachers have been trained in environments that predominantly use teacher-centered and lecture-based methods, they tend to prefer using the same teaching approach [22]. Various factors such as the ease of the lecture method, its suitability for crowded classes, a lack of teachers'skills in other teaching methods, limited teaching time, and the large volume of educational content contribute to the continued use of the teachercentered approach [23]. These teachers are often contentoriented and prefer formal classes with fewer participants [24].

The shift away from traditional teaching methods, a topic frequently discussed in educational research, remains a major concern for the country's education system. In Zareiyan Jahromi et al.'s study, the transition from teacher-centered strategies to more interactive approaches, such as pamphlet writing, was emphasized [24]. Haj Bagheri et al's study, which compared various teaching methods on nursing students'satisfaction, anxiety, and learning, revealed that involving students in teaching had a significant positive effect on their learning and satisfaction [25]. Chenjaler and Chomphtong, in their research on the student-centered teaching method, found that students taught using active, student-centered approaches were more satisfied than those taught through traditional methods [23, 26]. In Mohammadi Mehr's study, it was highlighted that most students consider the correct use of educational tools as an important criterion for evaluating a competent teacher [27]. University professors who use various teaching tools and methods to present educational content can make the material more engaging, even with large and complex subject matter. Effective communication methods during teaching can help reduce student distraction and increase concentration. Additionally, a flexible classroom environment that fosters a two-way relationship between professors and students ultimately contributes to meaningful learning [28].

Clinical training is crucial in nursing education, as it provides students with real-world experiences that allow them to apply theoretical knowledge and develop essential decision-making and problem-solving skills [29, 30]. Clinical education, which comprises about half of nursing students'training, plays a vital role in professional development. Therefore, it is necessary to have appropriate evaluation methods for clinical environments. Evaluating clinical skills is one of the most critical aspects of assessing nursing students [31]. However, as highlighted by several studies, accurate and objective evaluation of students in clinical education remains a challenging and stressful task for professors [32].

Leaving students in clinical environments without an instructor, not utilizing professors from the infectious disease theory course during related internships, not involving professors skilled in the field of infectious diseases, and the gap between theory and clinical practice were some of the concerns raised by students in their interviews. Gazavi et al. also reported negative experiences of students feeling neglected by clinical professors in the clinical setting [32]. Similarly, Sabarian et al. found that most professors did not maintain a close relationship with their students [33].

Given the ever-evolving nature of clinical education, the need for new and innovative evaluation methods has become more pronounced. Currently, various evaluation methods have been developed for clinical environments, including workbooks, direct observation of skills (DOPS), objective structured clinical examinations (OSCE), short clinical exams, 360-degree evaluations, and exposure to simulated clinical conditions [33]. However, experts hold different views on which clinical evaluation methods are most effective. For instance, in a study conducted on Shiraz students, the use of a logbook for evaluating internal surgery and gynecology was met with relative dissatisfaction. Asgari et al. also found that this method did not meet all of the set learning goals [34]. Another new evaluation method, patient discussion, helps assess students'mental competence. However, it is time-consuming and may lack accuracy due to uncertainties regarding the students'documentation and the general comments used for grading, which poses challenges in ensuring objectivity [35, 36]. On the other hand, in Hosseini et al.'s study, midwifery students reported significantly higher satisfaction with modern clinical evaluation methods, such as DOPS, compared to the logbook method. This greater satisfaction is likely due to the more objective nature of the modern methods, which do not rely on the personal judgment of professors [31]. In generally the findings of this study are consistent with those of Farahani et al., who identified several key challenges in nursing education in Iran, including the dominance of the biomedical model in the curriculum, weak alignment between theoretical and clinical education, and inadequate educational infrastructure. These challenges may hinder the development of students' professional identity and the implementation of competency-based education [3]. One of the limitations of the present study was the difficulty in accessing nursing faculty members who teach the infectious diseases course, particularly during the COVID-19 pandemic. This challenge hindered the qualitative interview process and may have affected the scope and diversity of the qualitative data collected.

Conclusion

The findings of this study revealed that the teaching of infectious diseases in nursing curricula faces several challenges, including the large volume of theoretical content, limited allocated time, the gap between theory and clinical practice, and a shortage of experienced clinical instructors. Participants also emphasized the need for more active and student-centered teaching methods. Based on these results, the following recommendations are proposed: Revise and align the curriculum content with local clinical needs; Employ blended and engaging teaching strategies by instructors; Ensure structured internships with skilled and confident clinical educators; Reconsider the time allocation and academic weighting of the course by educational policymakers; Implement comprehensive and skill-based evaluations during clinical training. These actions can enhance the effectiveness of infectious disease education and better prepare nursing students to manage such conditions in real-world settings.

Supplementary Information

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Supplementary Material 1.	
Supplementary Material 2.	
Supplementary Material 3.	
Supplementary Material 4.	
Supplementary Material 5.	

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During the preparation of this work, the author(s) used [BEING and Chat GPT 3.5] in order to [ENGLISH EDITING]. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.

Authors' contributions

Author contributions All authors conceptualized and designed the study. HE and MZ organized data collection. RGG, HE, and MZ wrote the manuscript. All authors read and approved the final manuscript.

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Data availability

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request and data "available on request.

Declarations

Ethics approval and consent to participate

This study was conducted in full compliance with the ethical principles of the latest version of the Declaration of Helsinki (https://www.wma.net/polic ies-post/wma-declaration-of-helsinki/). Ethical approval was obtained from [Shahid Beheshti University of Medical Sciences] (Approval Code: ID: 991399). Prior to participation, all individuals provided informed consent. Participation was entirely voluntary, and all necessary precautions were taken to ensure the anonymity and confidentiality of participants. No physical, psychological, or social harm was inflicted on the participants.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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