Analysis of a Questionnaire Survey from a Community Infectious Disease Skills Training Conference (Postprint)

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Abstract

Objectives 1. To investigate the capacity of primary healthcare workers in diagnosing and treating community infectious diseases, identify existing problems and deficiencies, design and deliver targeted training programs on infectious diseases, and enhance primary-level capabilities for infectious disease prevention and control. 2. To evaluate the effectiveness of online continuing medical education under the normalized COVID-19 prevention and control measures, and provide references for improving future continuing medical education on community infectious diseases.

Methods Through a national-level continuing education conference on community infectious diseases organized by the Department of Family Medicine, University of Hong Kong-Shenzhen Hospital in November 2021, an infectious disease knowledge questionnaire was distributed to participants. Collected questionnaires were analyzed to assess participants' understanding of community infectious disease-related knowledge, the infectious disease prevention and control status at their community health centers, and their preferences for future training topics. Simultaneously, training effectiveness of online participation was evaluated by comparing pre- and post-conference questionnaires. A total of 301 primary healthcare workers completed the pre-conference questionnaire, with 194 completing both pre- and post-conference questionnaires.

Results Among all respondents, 166 (55.1%) had participated in community infectious disease training after commencing employment. Among those who had received such training, 49 (29.5%) expressed satisfaction with their self-assessed infectious disease diagnosis and treatment capabilities, 99 (59.6%) expressed neutral satisfaction, and 11 (6.6%) expressed dissatisfaction. Among trained individuals, 143 (86.1%) expressed willingness to manage community

infectious diseases. Self-assessment and training receipt were influencing factors on willingness to manage community infectious diseases, whereas gender, professional title, years of experience, professional knowledge scores, and attitudes toward hepatitis B showed no significant influence. Among participants who completed both questionnaires, the pre-conference correct response rate for legally mandated notifiable infectious diseases requiring compulsory management was highest at 89.2%. The correct response rate for disinfection types for COVID-19 infection was lowest at only 16.9%. Correct response rates for other questions ranged from 33.8%-64.6%. Post-conference correct response rates for all questions exceeded pre-conference rates, ranging from 48.7%-70.2%. Regarding attitudes toward hepatitis B, the mean difference in total score was 66.38 ± 12.11 (95%CI: 37.73-95.00), and the mean difference in average score was 0.3421$±$0.0624 (95%CI: 0.1946-0.4897), p=0.0009, indicating more positive post-conference attitudes toward hepatitis B. In post-conference feedback, 254 (96%) expressed satisfaction. Regarding suggestions for the online conference, 179 (68.5%) and 174 (66.6%) indicated that network smoothness and degree of online interaction required improvement.

Conclusion Primary healthcare workers receive insufficient training in community infectious diseases. Infectious disease training can enhance primary healthcare workers' self-affirmation of their capabilities and their attitudes toward actively managing community infectious diseases, while concurrently improving their diagnostic and treatment competencies. Future directions for continuing medical education should emphasize training on emerging infectious diseases and new medical concepts.

Full Text

Preamble

Questionnaire Analysis of the Community Infectious Diseases Skills Training Conference

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Abstract

Objectives: 1. To assess primary healthcare providers' capacity for diagnosing and treating community infectious diseases, identify existing problems and weaknesses, and design and implement targeted training programs to improve community-level infectious disease prevention and control capabilities. 2. To evaluate the effectiveness of online continuing medical education under normalized COVID-19 prevention and control measures, providing reference for future community infectious disease continuing education initiatives.

Methods: During the National Continuing Education Conference on Community Infectious Diseases held by the Department of General Medicine at The University of Hong Kong-Shenzhen Hospital in November 2021, participants were surveyed using infectious disease knowledge questionnaires. The analysis covered participants' knowledge of community infectious diseases, infectious disease prevention and control capacity at their community health centers, and preferred future training topics. Training effectiveness for online participants was evaluated through pre- and post-conference questionnaire comparisons. A total of 301 primary healthcare providers completed the pre-conference questionnaire, with 194 participants completing both pre- and post-conference surveys.

Results: Among all respondents, 166 (55.1%) had participated in community infectious disease training after starting work. Of those who had received training, 49 (29.5%) were satisfied with their infectious disease diagnosis and treatment capabilities, 99 (59.6%) rated their abilities as average, and 11 (6.6%) were dissatisfied. Among trained participants, 143 (86.1%) expressed willingness to manage community infectious diseases. Self-evaluation and prior training participation were influencing factors for willingness to manage community infectious diseases, while gender, professional title, years of service, professional knowledge scores, and attitudes toward hepatitis B showed no significant influence. Among participants who completed both questionnaires, the pre-conference correct response rate was highest for mandatory statutory infectious diseases at 89.2%, while the lowest correct rate (16.9%) was for disinfection types for COVID-19 infection. Correct rates for other questions ranged from 33.8% to 64.6%. Post-conference correct rates for all questions were higher than pre-conference rates, ranging from 48.7% to 70.2%. Regarding attitudes toward hepatitis B, the mean difference in total scores was 66.38 ± 12.11 (95% CI: 37.73-95.00), and the mean difference in average scores was 0.3421 ± 0.0624 (95% CI: 0.1946-0.4897), with $p = 0.0009$, indicating significantly more positive attitudes post-conference. In post-conference feedback, 254 participants (96%) expressed satisfaction. Regarding suggestions for the online conference, 179 (68.5%) and 174 (66.6%) participants respectively indicated that network stability and online interaction needed improvement.

Conclusion: Primary healthcare providers receive insufficient training in com-

munity infectious diseases. Infectious disease training can enhance providers' self-confidence in their capabilities and foster positive attitudes toward actively managing community infectious diseases while improving their diagnostic and treatment skills. Future continuing medical education should focus on emerging infectious diseases and new medical concepts.

Keywords: community infectious diseases; diagnosis and treatment capacity; primary healthcare providers; online continuing medical education

Introduction

Infectious diseases are illnesses that can be transmitted through direct contact with infected individuals and their bodily fluids or excretions, or through vectors such as water, air, and food. Transmission speed depends on the pathogen, transmission routes, and typical characteristics, and emerging infectious diseases often cause social panic and significant harm [1]. The global COVID-19 pandemic in 2020 has unprecedentedly strengthened public attention toward infectious diseases and public health prevention and control. In addition to establishing and improving relevant measures at national and local government levels, constructing a community infectious disease prevention and control system that is accessible to ordinary people and closely related to daily life is crucial for eliminating or decomposing infectious disease hazards at their source and minimizing epidemic governance costs. In this context, the gatekeeper role of general practice is paramount [2].

As grassroots units for infectious disease prevention and control, community health service institutions serve as the frontline and critical checkpoints for infectious disease management. They are responsible for epidemic surveillance, vaccination, health education, and assisting disease control departments in investigating and managing outbreaks and public health emergencies. These institutions play active roles in community-based prevention and control, protection of susceptible populations, control of infection sources, and health education, making them essential for effective infectious disease prevention and control.

One survey revealed that by the end of 2019, among 342 community health service centers in Beijing, 140 (40.94%) had no capacity to diagnose and treat any of 29 common infectious diseases, 135 (39.47%) could manage five or fewer types, and only 33 (9.65%) could manage ten or more types. Furthermore, only 61.40% of institutions had specially trained physicians responsible for infectious disease management, indicating relatively low capacity among community health service personnel compared to larger hospitals and specialized institutions [3]. Another survey of community general practitioners in four urban districts of Beijing showed that correct response rates for infectious disease management knowledge (56.28%) were higher than for specialized infectious disease knowledge (33.04%), concluding that community health center physicians had generally poor understanding of infectious disease prevention and control knowledge and required

strengthened training, particularly in specialized infectious disease knowledge [4]. As a city with high population density and mobility, Shenzhen's community infectious disease prevention and control is particularly important. Currently, no studies have examined Shenzhen's general practitioners' capacity for infectious disease diagnosis and treatment or their training status. Therefore, this study utilized an online questionnaire during a national community infectious disease continuing education conference to conduct a preliminary investigation of participants' capabilities in community infectious disease diagnosis and treatment.

1.1 Study Subjects

All participants in the National Continuing Education Conference on Community Infectious Diseases held by the Department of General Medicine at The University of Hong Kong-Shenzhen Hospital in November 2021.

1.2 Research Methods

Before the conference, a survey questionnaire was distributed via a Questionnaire Star QR code sent by email to all registered participants. The questionnaire included basic information, subjective attitudes toward community infectious disease prevention and control, current practices in community infectious disease diagnosis and treatment, professional knowledge of infectious disease prevention and control, and knowledge related to conference content. A total of 301 participants completed the pre-conference questionnaire, with a 100% qualification rate. After the conference, another questionnaire was distributed via Questionnaire Star QR code, focusing primarily on conference-related knowledge, subjective attitudes toward community infectious disease prevention and control, and satisfaction with the online conference. A total of 259 questionnaires were collected post-conference, with 194 participants completing both pre- and post-conference questionnaires.

1.3 Statistical Methods

Questionnaire data were collected and exported via Questionnaire Star and verified. SPSS 26.0 was used for statistical analysis. Measurement data were expressed as ($\pm$ s) and compared between groups using t-tests. Count data were expressed as percentages (%) and compared between groups using t-tests, with $P < 0.05$ considered statistically significant.

Results

Among the 301 participants, 100 (33.2%) held junior professional titles, 172 (57.1%) held intermediate titles, and 29 (9.5%) held senior or principal senior

titles. Professionally, there were 97 general practitioners (32.2%), 56 specialists (18.3%), 19 traditional Chinese medicine practitioners (6.3%), 8 public health physicians (2.6%), 9 nurses (2.9%), 24 pharmacists (7.9%), 10 laboratory technicians (3.3%), and 78 other professionals including emergency and imaging staff (25.9%). A total of 292 participants (97%) were from Guangdong Province, with 9 (3%) from other regions. Basic information including years of service is detailed in the table below.

2.2 Training Participation and Testing Capacity

A total of 166 participants (55.15%) had attended community infectious disease training after starting work, while 135 (44.85%) had not. Among infectious disease tests conducted at participants' institutions, the top three were hepatitis B, HIV/AIDS, and hepatitis C. The three most commonly encountered infectious diseases in the past six months were hepatitis B, influenza, and hand-foot-mouth disease.

2.3 Subjective Assessment

Among all respondents, 166 (55.1%) had participated in community infectious disease training after starting work. Among trained participants, 49 (29.5%) were satisfied with their infectious disease diagnosis and treatment capabilities, 99 (59.6%) rated their abilities as average, and 11 (6.6%) were dissatisfied. Among participants without training, 22 (16.3%) were satisfied, 69 (51.1%) rated their abilities as average, and 18 (13.3%) were dissatisfied. Regarding willingness to manage community infectious diseases, 143 trained participants (86.1%) expressed willingness, while 23 (13.8%) were unwilling. In contrast, among untrained participants, 99 (73.3%) were willing and 36 (26.7%) were unwilling. Among participants satisfied with their capabilities, 66 (27.2%) expressed willingness to manage community infectious diseases, while among those dissatisfied or unclear about their capabilities, only 20 (8.3%) and 19 (7.8%) respectively expressed willingness. Detailed results are shown in Table 3 .

2.4 Objective Professional Knowledge

Among participants who completed both pre- and post-conference questionnaires, the pre-conference correct response rate was highest for mandatory statutory infectious diseases at 89.2%, while the lowest correct rate was 16.9% for disinfection types for COVID-19 infection. Correct rates for other questions ranged from 33.8% to 64.6%. Post-conference correct rates were higher than pre-conference rates for all questions, ranging from 48.7% to 70.2%. The questions with highest and lowest correct rates remained unchanged. Question 1 was not covered in the conference training and served as a control. Detailed results are shown in Table 4 .

Table 4: Pre- and Post-Conference Correct Response Rates

Question Topic	Pre-Conference	Post-Conference
Reporting timeframe for Class A infectious diseases	56.92%	92.82%
Which disease groups are subject to mandatory management	89.23%	18.46%
Disinfection types for COVID-19 infection	16.92%	48.72%
What is travel medicine?	33.85%	52.31%
Health promotion as part of primary care - tertiary disease prevention	40.51%	63.08%
Correct statements about hepatitis B antiviral treatment indications	64.62%	49.74%

2.5 Attitudes Toward Hepatitis B

Eight questions assessed participants' attitudes toward hepatitis B, with positive attitudes scored as 5 points and negative attitudes as 0 points. Independent samples t-tests were conducted on total and average scores for each question. The mean difference in total scores was 66.38 ± 12.11 (95% CI: 37.73-95.00), and the mean difference in average scores was 0.3421 ± 0.0624 (95% CI: 0.1946-0.4897), with p = 0.0009, indicating participants' attitudes toward hepatitis B were significantly more positive after the conference. Detailed results are shown in Table 5 .

Table 5: Analysis of Attitudes Toward Hepatitis B

Metric	Pre-Conference (N=8)	Post-Conference (N=8)	Mean Difference	95% CI	p-value
Total Score	743.6 ± 34.22	810.0 ± 24.05	66.38 ± 12.11	37.73-95.00	0.0009
Average Score	3.833 ± 0.1764	4.175 ± 0.1239	0.3421 ± 0.0624	0.1946-0.4897	0.0009

2.6 Post-Conference Feedback

A total of 254 participants (96%) expressed satisfaction with the conference. Regarding suggestions for the online format, 179 participants (68.5%) and 174

participants (66.6%) respectively believed that network stability and online interaction needed improvement.

2.7 Factors Influencing Willingness to Manage Community Infectious Diseases

Chi-square tests revealed that while males showed greater willingness than females (^{2} = 1.933, P = 0.164), intermediate-level professionals showed greater willingness than other levels (^{2} = 0.659, P = 0.719), and those with longer service years showed greater willingness (^{2} = 2.002, P = 0.735), these differences were not statistically significant. Participants with professional knowledge scores above 3 points (^{2} = 1.691, P = 0.194) and those with more positive attitudes toward hepatitis B (^{2} = 2.149, P = 0.143) also showed greater willingness, but again without statistical significance. However, participants satisfied with their self-evaluated capabilities (^{2} = 15.166, P = 0.0002) and those who had received community infectious disease training (^{2} = 6.692, P = 0.008) demonstrated significantly greater willingness to manage community infectious diseases. Thus, self-evaluation and training participation were influencing factors, while gender, professional title, years of service, professional knowledge scores, and attitudes toward hepatitis B were not. Detailed results are shown in Table 6 .

Discussion

Infectious diseases continue to pose serious threats to human health, with the ongoing COVID-19 pandemic claiming countless lives worldwide. Community health service institutions, as the medical facilities closest to residents' homes, possess inherent geographical advantages for infectious disease prevention and control [5], and the heavy responsibility for this work falls on primary healthcare providers. Therefore, primary healthcare providers' capacity for infectious disease diagnosis and treatment is particularly important, directly influencing medical activities including patient diagnosis, protection, treatment, and referral. This online continuing education conference on community infectious diseases attracted 301 participants, including general practitioners (32.2%) and primary and intermediate-level professionals (90%), reflecting that the primary audience for online continuing education consists of junior medical staff.

3.1 Community Infectious Disease Testing Practices

The survey revealed that testing for common infectious diseases such as hepatitis B, HIV/AIDS, and hepatitis C is relatively widespread in Guangdong community health centers, while testing for gonorrhea, condyloma acuminatum, and genital herpes is less common. This may be due to greater difficulty in collecting specimens for the latter diseases, resulting in lower implementation rates.

3.2 Community Infectious Disease Incidence

According to the survey, the three most common community infectious diseases in Guangdong were hepatitis B, influenza, and hand-foot-mouth disease. In contrast, the top three nationally notifiable infectious diseases in 2020 were influenza, hepatitis, and diarrheal diseases [6], with hepatitis and influenza remaining the most common community infectious diseases.

3.3 Training Status, Attitudes, and Influencing Factors

Only half of the primary healthcare providers had participated in community infectious disease training after starting work. Trained participants expressed greater satisfaction with their infectious disease diagnosis and treatment capabilities and demonstrated stronger willingness to manage community infectious diseases. The analysis revealed that self-evaluation and training participation significantly influenced willingness to manage community infectious diseases, while gender, professional title, years of service, professional knowledge scores, and attitudes toward hepatitis B did not. Therefore, infectious disease training can improve primary healthcare providers' self-satisfaction with their management capabilities, thereby enhancing their willingness to actively join community infectious disease prevention and control efforts.

3.4 Professional Knowledge of Primary Healthcare Providers

Responses to six conference-related infectious disease knowledge questions revealed that primary healthcare providers have limited understanding of emerging infectious diseases and new medical concepts but higher accuracy for statutory and common infectious disease concepts. Post-conference correct rates improved overall compared to pre-conference rates, though changes for some individual questions were not significant. The effectiveness of online conference training requires further improvement. According to post-conference feedback, key areas for improvement included enhancing network stability and increasing speaker-online interaction, as well as improving course design.

3.5 Attitudes Toward Hepatitis B

China has nearly 90 million hepatitis B virus carriers, with nearly 300,000 deaths annually from hepatitis B. One study demonstrated that universal hepatitis B screening for adults aged 18-70 is cost-effective [7]. This survey showed that hepatitis B is the most commonly encountered community infectious disease among primary healthcare providers. Therefore, universal hepatitis B screening in communities is both feasible and critical. In the absence of relevant policies, primary healthcare providers' knowledge and attitudes toward hepatitis B determine testing implementation. Our survey indicated that most primary healthcare providers hold positive attitudes toward hepatitis B, and post-conference attitudes became even more positive. Thus, hepatitis B training helps primary

healthcare providers better understand the disease, overcome negative attitudes, and improve patient management.

3.6 Future Training During the Pandemic

Under the fluctuating COVID-19 situation and with the development of internet technology, online teaching may become an important training method in the future. However, online training has limitations: participants find it difficult to maintain complete focus and are easily interrupted by other work or matters. Real-time interaction between students and teachers is challenging, affecting communication. Instructors cannot obtain timely feedback, adjust course pace and content based on participants' interests and comprehension, thereby impacting overall teaching effectiveness. Therefore, future online training should adopt small-class teaching and workshop formats to limit participant numbers, prevent network instability from hindering real-time communication, and enable instructors to receive timely feedback and adjust teaching pace. Group discussions can increase active participation and achieve more effective training outcomes.

3.7 Study Limitations

This study's participants were conference attendees, resulting in a limited sample size and lack of population representativeness. Additionally, the questionnaire's validity could not be verified, and the quality of online questionnaire completion could not be controlled.

In summary, primary healthcare providers receive insufficient infectious disease training. Such training can enhance providers' self-confidence in their capabilities and foster positive attitudes toward actively managing community infectious diseases while improving their diagnostic and treatment skills. Future continuing medical education should focus on emerging infectious diseases and new medical concepts. Under normalized COVID-19 prevention and control, online continuing medical education has developed rapidly, gradually replacing traditional offline conferences. Online continuing medical education breaks time and space constraints, allowing participants to learn anytime, anywhere, using fragmented time, without leaving home and at reduced cost. Survey results analysis demonstrated significant training effects from this online conference, though improvements are needed in network hardware technology, course design, and intellectual property protection. These findings provide clear direction for relevant departments to build better online medical education platforms and achieve resource sharing and lifelong learning for medical staff.

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Note: Figure translations are in progress. See original paper for figures.