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Research Article

Development and Perceived Usefulness of an App-based E-learning Programme for Capacity Building of Primary Healthcare Workers in Response to the COVID-19 Pandemic

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A B S T R A C T

Introduction: After its emergence in December 2019 in China, COVID-19 was declared a pandemic by March 2020. In India, there was a lack of equipment and a trained workforce. However, community health workers could play an important role in the prevention and control of disease transmission, thus reducing the burden on tertiary care facilities. Since in-person training was not possible, we developed a mobile application for the training and capacity-building of primary healthcare workers.

Objective: To develop a mobile-based application for capacity-building of primary healthcare workers in response to the COVID-19 pandemic and to assess its perceived usefulness among health workers.

Methods: An Android-based mobile application, named CoV Trainer was developed and provided on mobile phones of frontline workers for training during the COVID-19 pandemic. The content was based on the guidelines of the Government regarding the roles and responsibilities of frontline workers and was in the form of short videos. Perceived usefulness was assessed by conducting telephonic interviews with the users of the CoV Trainer app.

Results: The feedback received from the users highlighted that app-based training in the form of short audio-visuals was well-received and considered promising for capacity building of health workers, during the COVID-19 pandemic.

Conclusion: App-based training is possible which was well-perceived for capacity building of health workers during the COVID-19 pandemic. The experience thus gained can be used for capacity building of health workers for any epidemic or pandemic.

Keywords: Mobile App, COVID-19, Community, Primary, Health Workers, Training

Introduction

The World Health Organization (WHO) declared COVID-19 a public health emergency of international concern on January 30, 2020, and declared it to be a pandemic by March 11, 2020.[1] Most of the health systems were ill-prepared to tackle such an unprecedented situation. In India, the public health system was functioning with the limited skills of primary healthcare workers, and there was a paucity of trained workforce and equipment to respond to the pandemic. According to the World Bank, total hospital beds per 1000 people in India were 0.7 against 2.3 in the USA and 3.4 in Italy, while there were 2.3 critical care beds per 100,000 population in India, as compared to 12.5 in Italy, 29.2 in Germany, and 34.7 in the USA.2 However, there was a unique cadre of community health workers (0.5 per 1000 population) and community health volunteers (1 per 1000 population), which could play a vital role in the containment of community transmission, ensuring a lower burden on tertiary care facilities.[3] They were also entrusted with the responsibility of providing home care support to the patients infected with SARS-CoV-2 and basic support to the community during the pandemic.

However, there were unique challenges regarding the training of health workers for performing these duties as neither there was sufficient time, nor there was a possibility of on-site training because of physical distancing, which was one of the most promising interventions to prevent transmission during the pandemic.[4] In this crucial time, we explored the opportunity to develop a mobile application-based training programme for health workers in primary care settings. The earlier experience with mobile-based applications in reproductive and child health programmes in India indicated that their use is accepted among frontline workers.[5] Therefore, we developed a mobile application for training and capacity-building of primary healthcare workers during the COVID-19 pandemic. In this article, we have described the process of developing the mobile-based application and its perceived usefulness among primary health workers.

Materials and Methods

This descriptive exploratory study was conducted at the All India Institute of Medical Sciences, New Delhi from May 2020 to December 2020.

The study was conducted in two phases. In the first phase, the e-learning content was prepared. In the second phase, an Android-based application, named CoV Trainer was developed to provide this content on the mobile phones of frontline workers.

Description of E-learning Content

As per the guidelines by the Ministry of Health and Family Welfare of the national Government, the primary healthcare workers were required to perform the following roles:

1. Community awareness through inter-personal communication regarding:

- Uptake of preventive and control measures including social distancing
- Addressing myths and misconceptions

2. Supporting the district surveillance team in:

- Contact tracing as per the Standard Operating Procedures (SOPs)
- Implementing home quarantine, home care, and supportive services for high-risk and probable cases

3. Psychosocial care and addressing stigma and discrimination
4. Reporting and feedback
5. Personal safety and precautions[6]

The e-learning content was developed based on these expected roles and responsibilities. The training toolkit developed by the Government was used for reference.[7] There were ten modules and one introductory module on how to use the application. The content was in the form of short videos (8–10 minutes each) in English and vernacular language. These included short movies, presentation slides and case scenarios (Figures 1 and 2). The training modules were prepared by experts in public health, infectious diseases, hospital infection control, and experts in e-learning at the institute over a period of two months.

The online content was peer-reviewed and validated by experts. The content was shared with faculty members (n = 9) of relevant disciplines, i.e. Community Medicine, Internal Medicine, Anaesthesiology and Critical Care, Microbiology and Infectious Diseases. Their comments were sought regarding the accuracy of the scientific content, duration of the learning modules, appropriateness of language and quality of audio-visuals. After incorporating their suggestions, the learning modules were then shared with the Clinical Research Unit (CRU) of the institute. After obtaining written approval from the CRU, the learning modules were finalised. In the second phase, an Android-based mobile application was designed with the help of a software professional and was made available on the Google Play Store. The users could download the videos and view them in offline mode at any time convenient to them. For self-assessment of the learning process, each video was followed by 5 to 8 multiple-choice questions.

All the healthcare workers in the rural field practice area of the institute were encouraged to use this application.

To gain an insight into the perceived usefulness of this app among the learners, feedback was obtained from the users.

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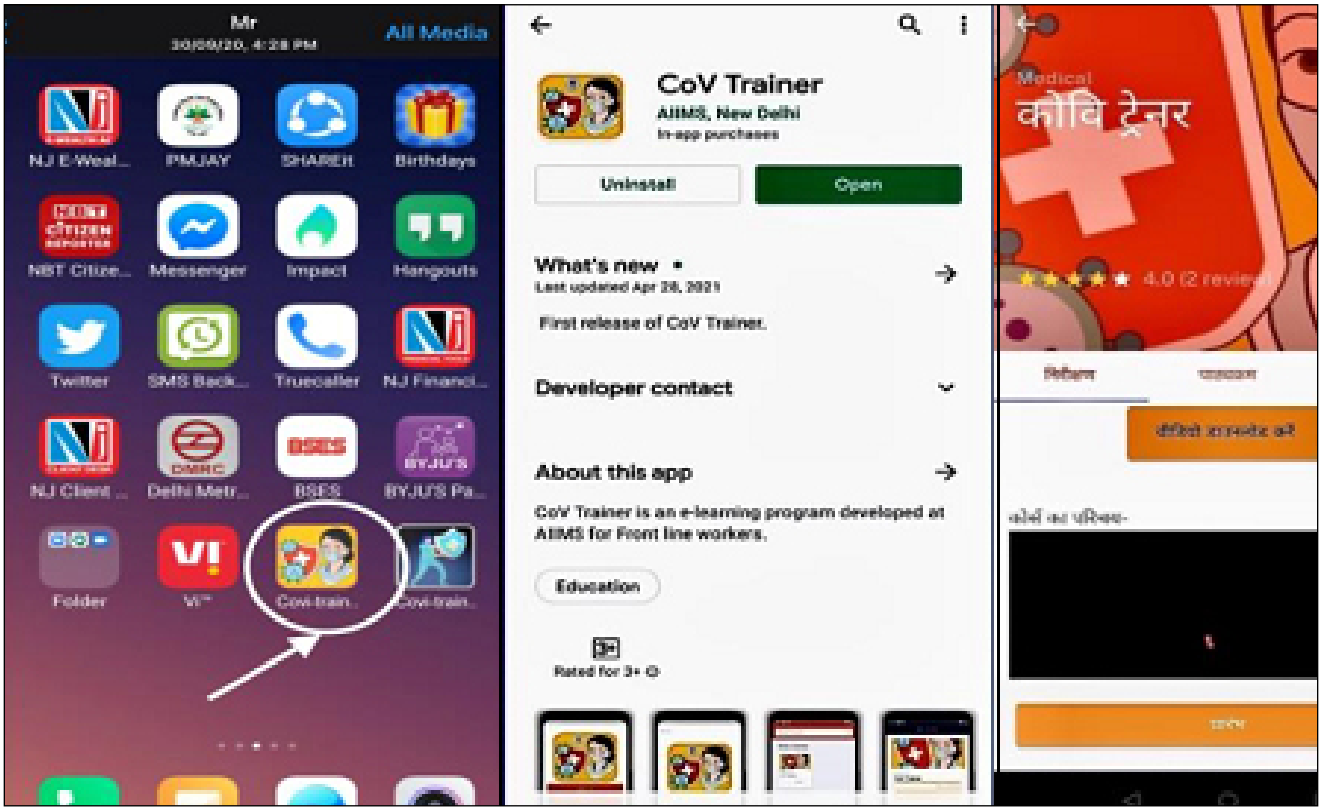

Figure 1.Mobile Interface of the App (CoV Trainer)

Figure 2.Contents of E-training

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Telephonic interviews were conducted among thirty-two users about their experience of learning through this app, the advantages/ disadvantages of e-learning as compared to traditional training, and further suggestions to improve the training programme.

Ethical Considerations

The protocol was approved by the Institute Ethics Committee of the All India Institute of Medical Sciences, New Delhi (Approval number IEC-279/17.04.2020). Data anonymity was ensured and a data privacy policy was followed for the security of the users. Informed consent was obtained from the users, and it was an in-built feature of the app. For conducting interviews regarding the usefulness of the app, telephonic consent was obtained from the participants.

Statistical Analysis

The data were entered in the Epi-info application and imported into the MS Excel sheet. Data analysis was conducted using Jamovi (version 2.3.21). The results were expressed as proportions.

Results

The app was prepared and made available on Google Play Store through the link - https://play.google.com/store/apps/details?id=com.covitrainer.aiims.

Feedback was obtained from the users. Out of the total thirty-two (32) health workers who were interviewed, eleven were male. The age ranged from 26 to 57 years, while the years of experience ranged from 8 to 23 years.

The majority of the users revealed that they found the app useful in understanding the relevant information. Regarding the content, almost all (96.8%) of the users responded that the information was adequate. The images and graphical representations were reported to be convincing. The users found the videos very appealing. The language was easy to comprehend (93.7%). However, nearly 40% of the users suggested that the audio quality could be improved (Table1).

The most appreciated aspect was the short duration of the videos, as they were easy to watch and did not consume much time. Also, the option to watch the content offline and at their own pace was found to be very useful.

Table 1.Usefulness of the Mobile Application as Perceived by the Users

S. No.	Domain	Description	Number (%) of Users
1.	Technical content	The content was adequate and helped us understand all the pertinent facts required to perform our duties during the COVID-19 pandemic.	31 (96.8)
2.	Quality of video	The videos and graphics were very appealing.	32 (100.0)
3.	Audio quality	The quality of the audio could be enhanced.	13 (40.6)
4.	Duration of the modules	The videos were short (each video was 5–8 minutes in duration). The duration was appropriate.	32 (100.0)
5.	Language	The content was available both in Hindi and English. The language was easy to understand.	30 (93.7)
6.	Ease of use	The availability of videos in the offline mode was a major facilitating factor, as it allowed us to watch the videos at our convenient time. If required, we could watch the videos again and again and complete the training at our own pace. The mobile interface was very convenient, registration process was simple, and we were assured of safety and privacy.	32 (100.0)
7	Intention to use app-based training for other programmes	Almost all the health workers expressed that they would like to use app-based training for other health programmes too.	32 (100.0)

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Regarding the overall perceived usefulness, all the users (100%) opined that the app helped them update their knowledge regarding COVID-19, particularly regarding field activities such as community surveillance. Overall, the app was well-received by primary healthcare workers.

Discussion

An increasing acceptability of digital tools that aid data capture, clinical decision support, and in-service training has been reported among frontline workers in low and middle-income countries. Mobile-based technology has been successfully used for training healthcare workers in maternal and child health interventions, early detection of cancer, and refresher training for Accredited Social Health Activists (ASHAs).[8,9] The studies have reported that mobile-based learning programmes are relatively low-cost and feasible options for training when face-to-face training is not possible.[10]

The COVID-19 pandemic posed a unique challenge as capacity building was the need of the hour, while physical training was not feasible. It has been demonstrated that training programmes provided through mobile applications have the ability to train many health workers using a standardised curriculum, at a time and location convenient to the trainees, without interfering with their regular duties.[11]

In a study conducted in Nigeria, where a mobile-based application was developed for training primary healthcare workers for COVID-19 management, Otu et al. reported that 98% of the users were satisfied with the app. In our study too, it was found that nearly all the users were satisfied with the mobile application. However, Out et al. reported challenges such as lack of internet access and non-availability of the mobile application on the Google Play Store.[12] In our study, the application was made available on the Google Play Store through a link. There was an option of downloading the content so that the trainees could watch it in offline mode at their own convenience. This was one of the most admired features of our application.

Ali et al., in a study conducted to evaluate a mobile-based short course on family planning among frontline workers, also reported that access to smartphones and the internet were the limiting factors that influenced the uptake of the course.[13] In our study, we did not face these challenges as all the healthcare workers possessed smartphones.

A scoping review by Singh et al. highlighted that the COVID-19 mobile applications were a valuable tool during the pandemic, and emphasised that the experience of developing and using these applications should be shared across different platforms so that it can be utilised for combating future challenges.[14]

In a systematic review of the studies on COVID-19 mobile applications, Kondylakis et al. reported that COVID-19 mobile apps were successfully implemented for training, information sharing, risk assessment, and management. However, most of the studies regarding COVID-19 mobile apps were small-scale observational studies that were limited to a small number of participants. The authors highlighted the need for more rigorous, high-quality studies.[15]

Our study also had these limitations. Moreover, we could not do a pre-test and post-test validation for the training. However, since the objective of the study was to determine the perceived usefulness of the mobile application, telephonic interviews were conducted to assess the same.

Our experience of developing a mobile-based training programme for primary healthcare workers during the COVID-19 pandemic indicated that mobile-based e-learning programmes are well-accepted and may prove promising during such times, resulting in a workforce well-trained in knowledge and skills for control and prevention of COVID-19 in the community, including the rural areas. However, the utility of mobile application-based training programmes depends on factors such as access to the internet, digital literacy, duration of the programme, and quality of the content.

Conclusion

App-based training was feasible and was well-perceived for capacity building of health workers in rural areas during the COVID-19 pandemic. This experience might be useful for training and capacity-building of health workers for similar challenges in future.

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