Development and implementation of a sustainable COVID-19 training package for healthcare workers: Experience from a teaching hospital of North India

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ABSTRACT

Background: With the impending threat of future COVID-19 waves, it is imperative that teaching hospitals develop, implement, and evaluate a systematic training program to render HCW elastic in delivering COVID-19 related services. We present our experience in developing, implementing, and evaluating a sustainable and scalable COVID-19 patient management training package for healthcare workers. **Materials and Methods:** A mixed-methods study design was used. Rapid assessment to understand the need of the trainees and identify the available resources was done followed by planning of the training module and its implementation. The program was evaluated for effectiveness and sustainability. Data analysis was done using descriptive statistics and qualitative data generated from open-ended questions in the feedback forms and the discussions were analyzed using rapid content analysis. **Results:** A total of 66.8% of the doctors and 18.9% of the nurses were trained by online synchronous mode while 55.0% of the nursing officers and 47.1% of the nursing orderlies and paramedical staff were trained in onsite skill development sessions. Need assessment identified that healthcare workers were ill-prepared to use medical devices such as Bipap machines, ventilators, and oxygen delivery devices. The participants mentioned that the multidisciplinary approach and video-based demonstrations facilitated their online learning while the incremental learning approach, easy-to-understand terminology and hands-on experience facilitated their onsite skill development sessions. **Conclusion:** The COVID-19 training package developed was multidisciplinary, effective, sustainable, and scalable in a resource-limited setting. We suggest that this model can be adapted by healthcare organizations to develop and implement such training packages for their healthcare workers.

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Introduction

The second COVID-19 wave in India from March to May 2021 was overwhelming for the healthcare system as the need was not only to respond to this pandemic but also to maintain other essential health services.[1,2] As predicted by experts, there still is a possibility of more waves, and to have a better response and preparedness, training our health workforce is essential.[3] From the lessons learned during this pandemic, it has become clear that we need to consider the "elasticity" of our human power so that we can deploy, redeploy, and repurpose as and when needed.[4,5] One of the key components of the health workforce development for dealing with any health emergency is to be equipped with the required knowledge and skills for emergency response for managing surge capacity.[4] Teaching hospitals associated with medical colleges in India are usually at the topmost tier of providing healthcare services in a designated geographical area. It also gets referred patients from the satellite hospitals in its vicinity.[6] For a healthcare organization's readiness to manage the COVID-19 surge, it is imperative that the teaching hospitals develop, implement, and evaluate a systematic training program to render HCW elastic in delivering COVID-19-related services.[7] In this article, we present our experience in developing, implementing, and evaluating a sustainable and scalable COVID-19 patient management training package for healthcare workers.

Methodology

A multidisciplinary COVID training resource group (CTRG) was formed which included the dean of the medical college and the nursing college, officials from hospital administration, unit in-charges of certain specialties, which are expected to take lead in managing the COVID-19 patients, and the Medical Education Unit faculty.

The following steps were taken by the group:
A) *A rapid assessment* was done to understand the need of the trainees and to identify the available resources. A Google Form was used to find out the perceived need of the workers who had worked during the second wave of the pandemic. Opinions were also sought from the healthcare workers through the unit in-charges. A series of face-to-face and online discussions were held among the CTRG members.

Transect walks were conducted in the college and hospital wards to identify the spaces and equipment required for training. The in-charges of different departments, sections, and units were asked to nominate the trainers for the teaching sessions.
B) *Planning of the training module*: While developing the training module the following principles and strategies were considered: a) COVID-appropriate behavior should be adopted for the training sessions; b) A review of the already available COVID-19 patient management training programs for healthcare workers was done; c) Content identification was done through group discussion by the subject experts. The priorities were decided based on the needs and on the observations of the hospital administrators and faculty in-charges as to identify the existing practices and the lacunae regarding protection from COVID-19 and clinical management of the COVID-19 patients in hospital settings. d) Customizing the contents of the training according to the category of the healthcare workers while taking into consideration that multitasking will be required in any future pandemic waves; e) Decision on the mode of training was taken based on the availability of the resources, number of trainees, and desired COVID-appropriate behavior; f) The organization of the components of the training resources was done by creating a coordinating team to oversee the smooth conduction of the program. Prior intimations and reminders to the trainers and trainees, and by including a select number of trainees from the various departments on a rotation basis to also allow the routine functioning of respective departments. The trainees were contacted by email and/or social media messaging groups such as WhatsApp and were informed about the program schedule.
C) The *developed program was evaluated* through pre- and posttest scores of different sessions, feedbacks, and discussions among CTRG members. The results of these evaluations and feedbacks were used to modify the training program in the continuum. The data reported were from July 1, to August 15, 2021.
D) *Sustainability and scalability*: To make the current initiative scalable and sustainable, the available resources like healthcare personnel and educational technology were explored. The aim was to generate peer trainers who could deliver the program consistently while maintaining quality.

The study was performed in accordance with the principles of Helsinki Declaration. Since the study was based on a feedback analysis, it was not subjected to the institutional ethics committee's approval.

Results

In total, 66.8% (522/781) doctors and 18.9% (198/1014) nurses of the parent teaching hospital were trained in an online synchronous mode in five batches in July and August 2021. In addition to these, 113 doctors and 125 nurses from satellite hospitals also attended the online sessions. Around half (55.0%, 558/1014) of the nursing officers and half (47.1%, 245/520) of the nursing orderlies and paramedical staff from the parent hospital and 169 nurses and 59 doctors from the satellite hospitals were trained in onsite skill development sessions.

Identified need

The need assessment revealed that in the second COVID-19 wave, the healthcare workers were ill-prepared to effectively use the medical devices, such as Bipap machines and ventilators, and to manage the COVID-19 patients regarding oxygen saturation maintenance and common comorbidities such as diabetes mellitus. Many healthcare workers were from pre- and

paraclinical departments as they were needed to make up for the unprecedented surge in the COVID-19 patients once our hospital became a COVID-designated hospital. The hospital administration prioritized skill training of the nursing officers and the paramedical staff with more emphasis on emergency lifesaving equipment such as oxygen delivery devices and various types of ventilators.

Identified resources

Microsoft Teams® was used for conducting and recording the online training sessions. Mobile phone cameras were used for recording the skill sessions.

For workplace-based training, four stations broadly categorized as Medicine, Anesthesia, Pediatrics, and Nursing, were created. This helped in the creation of a map for hands-on sessions for skill training by the faculty from the respective departments.

The developed training packages

Considering COVID-appropriate methodology, it was decided that a blended method will be followed, consisting of both online sessions for the knowledge domain and onsite sessions for skill training.

Onsite, skill training was done in small groups, that is, 8–10 participants in a particular session. The local requirement was prioritized and familiarity with the facilities and equipment was taken into consideration.

The package, thus, developed included three types of modules: an online module for doctors and nurses; a skill module for doctors and nurses; and a skill module for the paramedical staff and nursing orderlies.

The content was identified, and the package was developed following thematic analysis of the Google Forms, and discussions were done for need assessment.

A multidisciplinary online training module spread over 8 h over 3 consecutive days was developed. The module comprised prerecorded and live online lectures, video demonstrations, dedicated time slots for interaction, and sharing of available online resources. The list of topics covered in the online sessions is given in Box 1.

For onsite skill training, four stations on COVID-19 management were developed as given in Box-2. Each day, 25–35 participants were divided into four groups and were rotated for 30 min each at one of these four stations.

Evaluation

The online sessions were attended by 958 individuals. Pretest and posttest responses were received by 59.3 and 46.6%, respectively. The mean (SD) pretest and posttest scores were 3.2 (1.57) and 4.4 (1.4), respectively, and the difference was statistically

significant ($P < 0.001$); 20.4% (196/958) of the participants filled the online feedback form. The participants mentioned that a multidisciplinary approach, video-based demonstrations, brief and focused sessions, and appropriately sequenced and timed sessions, facilitated their learning. The participants mentioned the following challenges in the online sessions: Internet connectivity, non-familiarity with the online platform, no separate time given to them for attending online sessions, and continuous back-to-back sessions.

Feedback about onsite skill sessions was obtained from all the participants. The problems reported were majorly related to logistic issues like seating arrangement and ready availability of drinking water. The participants mentioned that the sessions involving various technical skills and handling medical devices were particularly relevant and helpful. The incremental learning approach, easy-to-understand terminology, and the use of local language facilitated the learning, as reported.

Sustainability and scalability

To make the program sustainable and scalable, coordinators and trainers were identified on a rotation basis from the respective departments. The online training sessions were recorded and made available as online videos on YouTube [Figure 1]. Nursing officers were identified as peer trainers to conduct future sessions.

Discussion

The training package developed was aligned with the needs of the second COVID wave in India in March and April 2021, and with the available resources. During the first COVID-19 wave in 2020, employees of the institute were trained in hand hygiene, donning, and doffing of Personal Protective Equipment (PPE) kits. The e-resources related to these were available and accessible to the workers. Therefore, the inclusion of these components was minimum in the current training package. Video-based online training is effective in teaching about infection control.[8] As the disease impacts the mental health of the caregivers of the COVID-19 patients, psychosocial support for the patients and their family members was included in this package according to the guidelines developed by the Indian Council of Medical Research (ICMR).[9] The disease often involves long hospitalization, and so, a physiotherapy module was included in the training package.[10,11]

Though many national and international training packages.[12-15] were available, we took care to develop our package, as we thought that the resources developed locally will be more relevant and effective as they will be created using the local equipment, references, examples, and anecdotes, and will bring familiarity, and thus, confidence while using them.

The pre- and posttest scores helped us to understand the effective delivery of the online course content and the narrative. The anonymous feedback revealed their opinion about the program

Box 1: Modules for online COVID-19 patient management training

Microbiology module
  COVID 19 Specimen collection and Testing
  Biomedical waste management and infection control practices
Medicine Module
  Approach to a patient with COVID-19: Clinical features, classification, diagnosis, and evaluation in OPD and IPD
  Management of COVID patients: Early identification and evaluation of complications
  Approach to use of steroids, anticoagulation, and repurposed drugs in COVID-19
  Management of hyperglycemia/diabetes in COVID-19
  Nutritional requirements of COVID-19 patients during acute illness and convalescence
Gynecology and obstetrics module
  Management of COVID-19 in pregnant and lactating women
Pediatric module
  Management of COVID-19 in children
Anesthesia module
  Principles, devices, and techniques for administering oxygen therapy to moderate and severe COVID-19 patients
Psychiatry module
  Psychosocial aspects of dealing with COVID-19 patients & family
Physiotherapy module
  Physiotherapy exercises for Covid patients

Box 2: Modules for onsite skill training sessions for COVID-19 patient management

Four stations pertaining to four domains of COVID-19 management were developed as follows. Skills to identify and operate the following medical equipment and devices pertaining to these four domains were identified.
Anesthesia
  Oxygen cylinders, High flow nasal cannula (HFNC) ventilator, Bilevel Positive Airway Pressure (Bipap) machine
Medicine
  ECG*, nebulizer use, Steroids, control of hyperglycemia, Insulin delivery.
Pediatrics
  Open thermal care of infant, O_2 delivery in children, ventilatory support care
Nursing
  Types of oxygen masks- simple face masks, non-rebreather masks, oxygen concentrators

Note: For nursing orderlies and paramedical staff, two skill stations i.e., Anesthesia and Nursing were kept

and those academic and non-academic domains which required improvement.

Medical colleges and associated hospitals being tertiary care teaching hospitals should be able to provide training on-demand to develop the healthcare workers' readiness for future waves of the COVID-19 pandemic.[16] The package was aligned not only with the training needs of the healthcare workers but also with the operating goals of the administrative authorities to create a pool of competent healthcare workers currently working in various hospital settings, which can be deployed and redeployed to effectively manage the COVID-19 patients as and when needed.

The participatory leadership styles of college and hospital authorities enabled the team to train many healthcare workers in a short time. The various committees and subcommittees which were formed provided crucial feedback daily to improve the training package and implement it.

We also believe that this current pandemic made us realize that the half-life of scientific knowledge related to this virus and disease can be very short due to the rapid buildup of newer research in this field.[17-19] The training model shared here may help in continuing with refresher training to update and supplement the knowledge and skills of the healthcare workers to manage the COVID-19 patients. The future waves of the pandemic may also require that the updated information is provided in a limited time to the healthcare workers.

Our aim to develop qualified local providers to deliver the program and the use of internal resources for developing the content should help this program to be sustainable. The availability of e-resources helped in self-paced learning and ensured wider accessibility and supported asynchronous learning.

The following were the strengths of this model: 1) Content that was customized to local institutional needs while being globally relevant; 2) Developed e-resources and generated peer trainers to make the program sustainable; 3) Could be quickly replicated in the hospital in critical time during the surge of a need of workforce; 4) Generated a set of quality peer trainers which could be leveraged to promote peer learning and scale up the program; 5) Blended learning with a mix of different training methods was adopted.

The following challenges were faced while implementing the modules: 1) Training programs from the state government for different training schedules disrupted our training as the participants had to attend those training sessions as per the government orders. 2) During the implementation time, the
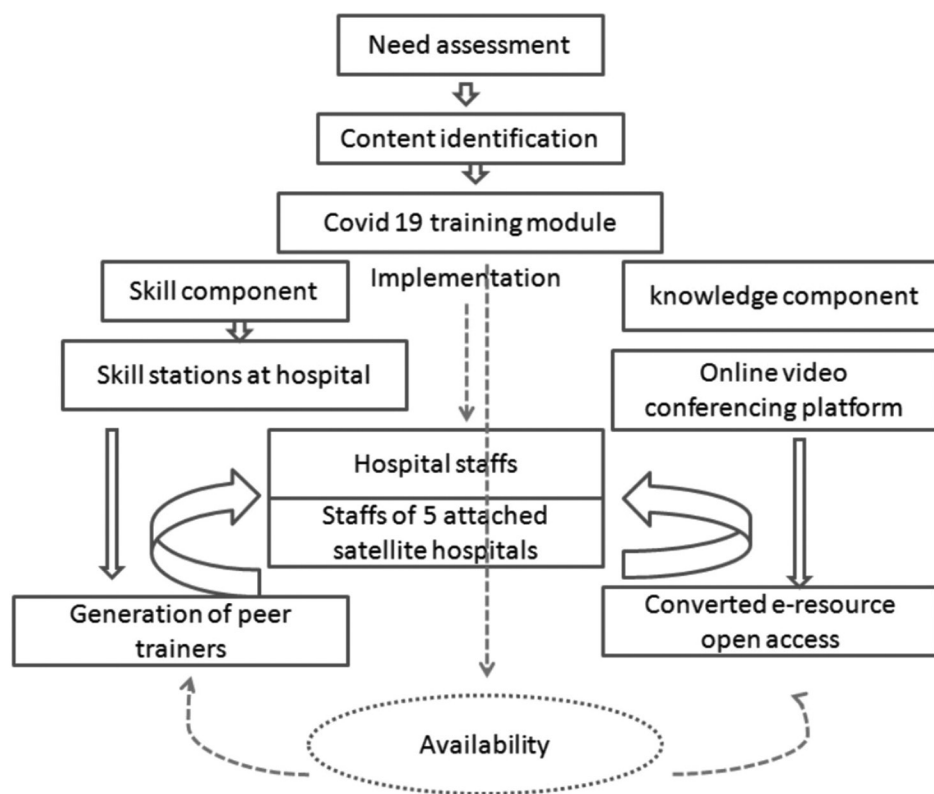
Figure 1: Sustainable and scalable model developed and implemented within the existing resources to train healthcare workers in managing the COVID-19 patients in a teaching hospital in North India

hospital was turned into a non-COVID hospital, due to which all the healthcare providers became busy in their routine tasks of their respective departments leaving no dedicated time for the trainers to conduct the training. 3) The schedule which was developed for the trainees many times did not match their job roster in the respective departments.

We suggest that hospitals use the existing resources and frameworks and use blended learning for the capacity building of the healthcare workers for the management of the COVID-19 patients during its pandemic waves. Dedicated physical space and dedicated time slots which are separate from the working hours should be provided to the HCWs to attend the training.

Conclusion

The developed COVID-19 training package was effective, multidisciplinary, sustainable, and scalable, and was implemented in a resource-limited healthcare setting. We suggest that this model can be adapted by the healthcare organizations to develop COVID-19 training packages and train the healthcare workers.

Conflicts of interest

There are no conflicts of interest.

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