

# Rapidly strengthening capacity of health care workers in Bhutan to provide lifesaving COVID-19 case management and critical care

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- Dr. Pandup Tshering,  
Honourable Secretary  
of the MOH

The Meeting Targets and Maintaining Epidemic Control (EpiC) project has complemented the efforts of the Royal Government of Bhutan to strengthen case management and critical care capacity since March 2021. Prior to the project, the U.S. Government donated 15 Medtronic PB560 ventilators to the Ministry of Health (MOH) of Bhutan in October 2020.

Through partner Save the Children Bhutan, EpiC collaborated with the MOH and the Jigme Dorji Wangchuk National Referral Hospital (JDWNRH) the top referral hospital in Bhutan, to roll out a technical assistance (TA) and training package in the country.

## Supporting installation of ventilators for COVID-19 care and facility assessments

In November 2020, the EpiC project, which is funded by the United States Agency for International Development (USAID), supported the installation of the donated ventilators in five facilities designated by the MOH: JDWNRH, two regional referral hospitals, and two general hospitals. Health care workers at these facilities were oriented on the operation and use of the ventilators by a local agent of Medtronic, Must Healthcare.

Additionally, more than 40 MOH biomedical engineering personnel were trained on the repair and maintenance of ventilators by a biomedical engineer from Must Healthcare and the biomedical engineering division (BMED) of the MOH. The BMED, in collaboration with Must Healthcare, also completed preventive maintenance for all donated ventilators after the first six months of use.

In December 2021, the project conducted five facility-level assessments (FLA) to better understand hospital readiness and identify TA needs for critical care. The assessment employed tools developed by the University of California, San Francisco (UCSF), an EpiC consortium partner. The FLA report was disseminated to the MOH through a high-level meeting chaired by the honourable secretary of the MOH.

## Preparing training curricula for clinical trainings

The MOH assigned a technical working group (TWG) spearheaded by Dr. Kezang Namgyel — the only intensivist in the country, who works at JDWNRH — to review and adapt UCSF's Adult COVID-19 Case Management training curriculum for doctors and Bedside Care training curriculum for nurses to the country context. A team of doctors from JDWNRH participated in a weeklong offsite workshop supported by EpiC and reviewed all existing curricula, including in-country resources. At the end of the workshop, an intensive six-day curriculum was designed for doctors and a five-day curriculum for nurses. The curricula adapted much of the adult COVID-19 case management series and covered several additional aspects of intensive care, including hands-on sessions (see Box 1 and Box 2).



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Meeting Targets and  
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### Box 1. Adapted Curriculum on COVID-19 Case Management and Emergency Critical Care for Doctors

#### Day 1

- Pretest
- Airway management in COVID-19 patient
- Respiratory physiology
- Oxygen therapy
- Difficult airway  
*Skills session on airway management*

#### Day 2

- Non-invasive ventilation (NIV)
- Approach to arterial blood gas (ABG)
- Basics of mechanical ventilation (MV)  
*Skills session on NIV and MV and ward rounds to ICU and ER*

#### Day 3

- Advanced cardiac life support (ACL) in COVID-19
- Waveform analysis
- Weaning from ventilation  
*Skills session on ACLs and ward rounds*

#### Day 4

- Sedation in critical care
- Respiratory and hemodynamic monitoring
- Vasopressor and inotropes  
*Practical on MV and ward rounds*

#### Day 5

- Sepsis
- COVID-19 acute respiratory distress syndrome (ARDS) and lung-protective ventilation
- Point-of-care ultrasound (POCUS)  
*Practical on POCUS and ward rounds*

#### Day 6

- Medical therapeutics in COVID-19
- Personal protective equipment (PPE)
- Management of respiratory failure without ABG
- Post-test

### Box 2. Adapted Curriculum on Bedside Care and COVID-19 Patient Management for Nurses

#### Day 1

- Pretest
- Bedside care and monitoring
- Communication in ICU
- Airway management
- Airway opening, using airway adjuncts
- Preparing and assisting intubation
- Care and suctioning of endotracheal tube (ETT) and tracheal tube  
*Practical sessions on ICU monitors and airway management*

#### Day 2

- Transporting of critically ill patient
- Basic life support (BLS) — general concepts
- BLS — assessment, team dynamics, BLS in pregnancy  
*Practical sessions on cardiopulmonary resuscitation and defibrillator use*

#### Day 3

- Oxygen therapy (low- and high-flow system; non-invasive ventilation)
- Basic ventilator settings
- Care bundles in intubated patient
- Sedation  
*Practical sessions on basic ventilator setting, oxygen therapy, hands-on use of ventilators in the unit*

#### Day 4

- Review basic electrocardiogram (ECG) interpretation
- Advanced cardiac life support (ACLS)
- Disinfection and decontamination of medical equipment  
*Practical sessions on basic ECG interpretation, ACLS, and mega code*

#### Day 5

- Prone position
- Personal protective equipment (PPE)
- Management of dignified body of COVID-19 patient
- PPE — donning and doffing
- Post-test

## Building capacity of 390 health care workers in critical care

### Training of trainers

To support the rollout of nationwide trainings, EpiC, in consultation with the MOH, adopted a training of trainer (TOT) model in which 24 health workers (including medical specialists, anesthesiologists, medical officers, and senior nurses working in ICUs and emergency units) were trained as master trainers using the adapted curriculum.

The training was designed to equip the participants with the knowledge and skills for safe, accurate, and prompt care of COVID-19 patients, and to prepare them to conduct cascade trainings in their respective facilities.

Dr. Kezang Namgyel and members of the TWG led the TOT in April 2021. Dr. Lundy Campbell, a critical care specialist from UCSF, assisted the team by delivering key sessions.

### Cascade clinical trainings

Once trained, the master trainers cascaded the clinical trainings to staff in facilities across Bhutan. The training initially focused on facilities that had a USG-donated ventilator installed, those that had an intensive care unit (ICU), and facilities in districts at high risk for COVID-19 (e.g., those bordering India where there is high cross-border migration). The training was later expanded to most of the 45 hospital-level facilities in the country.

The training was delivered using lectures, case studies, videos, and demonstration and skills stations using Zoe training models. When possible, ward rounds were undertaken to provide hands-on exposure to day-to-day care and application of knowledge and skills, including performing essential procedures and caring for critically ill patients in the ICU and emergency room (ER).

By the end of December 2021, 21 batches of trainings were delivered to 390 health workers (100 medical doctors and 290 nurses). The in-country master trainers also trained about 30 additional medical doctors interning at JDWNRH on basic ICU management of COVID-19 patients. The curriculum was expanded for the interning doctors by requiring them to review cases daily and to assist and/or perform procedures such as intubation and central line insertion.



A Must Healthcare engineer briefs health care workers on the features and operation of the PB560 Medtronic ventilators in Paro Hospital.

*Photo credit: Tashi Dendup, EpiC consultant, Save the Children*



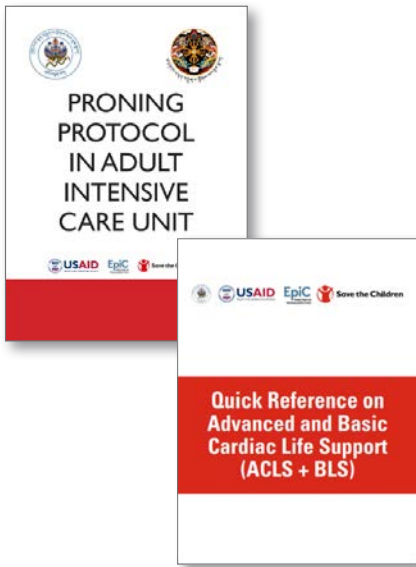
Health care workers learn intubation during hands-on skills sessions with models.

*Photo credit: Dr. Ujal Pradhan, anesthesiologist, JDWNRH*

### Society of Critical Care Medicine online courses on critical care

EpiC funded the registration of 202 health workers from across the country in the internationally recognized Fundamental Critical Care Support (FCCS) online course offered by the Society of Critical Care Medicine (SCCM). Five learners also enrolled in the FCCS instructorship certification.

EpiC further supported 114 learners enrolled in the FCCS obstetrics (37) and pediatric (77) courses. Many learners successfully completed the course and received certifications, and the remaining participants will complete the certification soon. The learners for the online FCCS courses were nominated through the emergency medical services division and the human resource division of the MOH. EpiC's support for the FCCS course was considered an important milestone by the MOH to promote continuous medical education (CME) for the health workforce of the country.



## Developing ICU protocols and mobilizing ICU resource books

In response to recommendations from the FLA, eight ICU protocols were developed by the TWG and reviewed by EpiC's clinical experts. The protocols covered acute respiratory distress syndrome (ARDS) ventilation, ventilator weaning, ventilator-associated pneumonia (VAP) prevention, paralysis/proning, sedation, early mobility, delirium prevention, and nutrition. A virtual training on these protocols was delivered to 52 health workers from six facilities with ICU units (including those where USG-donated ventilators were installed) in November 2021. The training was facilitated by TWG members involved in the development of the protocols. The protocols were printed and distributed to the facilities by the MOH.

The TWG also developed job aids, quick references on critical care, quick references on advanced and basic cardiac life support (ACLS/BLS), and posters on universal precaution. In addition, the project supported the procurement of about 20 textbooks and training resource books on ICU and critical care.

## Lessons learned and the way forward

EpiC has been instrumental in enhancing the country's capacity to manage COVID-19 patients and provide care for mechanically ventilated patients. In his address during the FLA dissemination meeting, Dr. Pandup Tshering, Honourable Secretary of the MOH, stated that "the technical assistance offered by USAID through EpiC has not only been beneficial during this pandemic but will also help to strengthen the overall critical care capacity in the country."



TOT program participants attend a practical demonstration session on point-of-care ultrasound (POCUS) during ward rounds.

*Photo credit: Dr. Ujal Pradhan, anesthesiologist, JDWNRH*

Participants in the clinical training expressed that the training was very useful and that they gained knowledge and skills to increase their confidence in the management of patients needing critical care. During the project closeout meeting, Dr. Kezang shared, "I am happy to report that almost all doctors have had hands-on training including intubation. Now facilities are able to perform basic crucial procedures such as intubation at their facility, before patients are referred to JDWNRH for ICU care — this has been lifesaving."

The knowledge gained through the training was also evident in the significant increase in the post-test scores. For example, there was an almost 60% increase in the mean scores after the TOT conducted at the JDWNRH, and the increase was greater than 90% for a cascade training conducted at the Central Regional Referral Hospital (CRRH), in Gelephu, Bhutan.

Going forward, the MOH plans to use the training curricula on COVID-19 Adult Case Management and the pool of master trainers to train newly recruited doctors and nurses and provide refresher training. The FCCS courses will be kept open for learners who have yet to complete them. Similarly, resources such as books on critical care and ICU management, the FLA tool, eight ICU protocols, and job aids developed with the support of the EpiC project will go a long way in strengthening the critical and emergency care capacity of Bhutan's health force to deal with COVID-19 and other pandemics in the future.

For inquiries, please contact  Hally Mahler, EpiC Project Director: [hmahler@fhi360.org](mailto:hmahler@fhi360.org)

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