

Strengthening capacity of secondary level critical care providers on COVID-19 critical care and mechanical ventilation in Mongolia

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Box 1. COVID situation in Mongolia

Mongolia is a lower middle-income (LMIC) landlocked country of about 3.3 million people in Northeast Asia, bordering Russia in the north and China in the south. Following the reports of SARS-COV-2 emergence in China in December 2019, Mongolia immediately initiated pre-emptive and comprehensive control measures. Because of these measures, there was no community transmission until November 2020. Since then, the country has experienced four distinct peaks in the COVID-19 epidemic curve, with the most recent surge registering 3,282 cases on January 21, 2022. Daily COVID cases have been declining steadily, with less than 30 cases reported on April 17, 2022. Overall, the country recorded more than 920,000 COVID-19 cases and more than 2,100 deaths.

Since December 2020, the Meeting Targets and Maintaining Epidemic Control (EpiC) project, funded by the United States Agency for International Development (USAID), has provided technical assistance (TA) to support the Government of Mongolia's efforts to combat COVID-19 (Box 1).

Supporting installation and use of ventilators for COVID-19 care

In December 2020, 50 Vyaire ventilators¹ were donated to Mongolia by the United States Government (USG) and distributed to 12 general hospitals across 11 provinces. To support installation and effective use of the USG-donated ventilators, EpiC Mongolia, in collaboration with Health Development Center (HDC) within the Ministry of Health (MOH) conducted rapid facility-level assessments (FLAs) of the hospitals that received the ventilators. The FLAs revealed that beyond infrastructure and consumables, facilities would benefit from strengthening capacity of the critical care workforce to manage severe and critically ill cases of COVID-19. Due to COVID-19 restrictions and lockdowns, Vyaire, USAID, and EpiC jointly conducted virtual training sessions on the installation and use of the ventilators for biomedical engineers, technicians, and relevant clinical staff between February and May 2021. However, over time it became evident that there was high demand for in-person training on broader critical care topics with hands-on practical skills-building sessions. In response, EpiC delivered clinical TA on COVID-19 for critical and intensive care providers at secondary level of health services nationwide.

Developing a national training curriculum on adult COVID-19 case management and critical care

The EpiC project partnered with the University of California San Francisco (UCSF) to design a clinical training curriculum on adult COVID-19 case management and critical care. The curriculum and technical resources were reviewed, adapted, and translated into Mongolian by a team of about 15 experienced and senior-level national experts from the MOH's Critical Care, Emergency Medicine, and Anaesthesiology Advisory Councils, led by the chair and professor of emergency medicine at the Mongolian National University of Medical Sciences (MNUMS). These national experts were invited to serve as master trainers to roll out cascade trainings for the intensive care workforce at provincial general and Ulaanbaatar city district hospitals. A special orientation session on the curriculum and latest global clinical guidance on case management and bedside care was conducted virtually for the master trainers on August 15, 2021, by Dr. Lundy Campbell, clinical professor and critical care expert at UCSF.

¹ LTV2TM 2200 Ventilators, Vyaire Medical, Mettawa, IL, USA

Box 2. Adapted Curriculum on COVID-19 Case Management and Emergency Critical Care

Day 1: Doctors and Nurses

- Personal protective equipment (PPE)
- Low- and high-flow oxygen therapies
- High-flow invasive oxygen therapy (CPAP, BiPAP)
- Proning of COVID-19 patients

Day 2: Doctors

- Intubation and airway management
- Basics of mechanical ventilation (MV)
- Sedation and pain management during MV
- Extubation and ventilator weaning
- Acute respiratory distress syndrome (ARDS), lung protective ventilation
- *Skills session*

Day 2: Nurses

- Respiratory assessment and role of nurses
- Assessment and monitoring of COVID-19 patients: case documentation
- Oxygen therapy strategies and equipment
- Care of intubated patients
- Care for severe forms of COVID-19

Day 3: Doctors and Nurses

- COVID-19 therapeutics
- Home-based care of COVID-19
- Arterial blood gas (ABG) and non-ABG based airway management
- Weaning from ventilation
- *Skills session on mechanical ventilation*

Box 3. Technical resources distributed to workshop attendees

- Respiratory care pocket reference card
- Inter-facility patient transfer checklist
- Makeshift (i.e., temporary) hospital poster
- Hypoxia algorithm
- Job Aid 1 – Quick reference to critical care (Difficult airway, anaphylaxis, ARDS, POCUS)
- Job Aid 2 – Quick reference on advanced and basic cardiac life support (ACLS and BLCS)
- Inter-facility COVID-19 patient transfer checklist

An intensive three-day curriculum was designed for doctors and nurses. The curriculum adapted much of the content from the COVID-19 adult case management series designed by UCSF and covered several additional aspects of intensive care (Box 2). The second day of the curriculum included separate training sessions for doctors and nurses. The second and third days featured practical skills-building sessions with the use of training models (mannequins), and training on the use of the donated ventilators and portable ultrasound equipment.

Strengthening capacity of critical care hospital providers through regional clinical training workshops

Mongolia is a vast country with a sparse and scattered population. Road and accommodation infrastructure in rural areas is often underdeveloped. Given COVID-19 restrictions and limited resources, it can be a challenging and expensive task for rural facilities and health care providers to have in-person trainings. To address this challenge, the EpiC Mongolia team developed a strategy to conduct regional training workshops (northern, eastern, western, central, and southern regions) to cover critical and intensive care providers at all secondary health care facilities across rural Mongolia and the capital, Ulaanbaatar. The regional workshops were coordinated jointly by EpiC, the HDC, the medical post-graduate training, certification and licensing agency under the MOH, and health departments of all 21 provinces in the country.

Between August and February 2022, EpiC held six regional training workshops covering 114 critical care doctors and nurses from 31 general hospitals (21 main provincial hospitals, four inter-Soum designation facilities, and six district hospitals). The workshop was interactive, combining lectures with practical skills sessions. Technical resources and job aids were prepared in advance and distributed to attendees. For example, the project disseminated a [hypoxia algorithm](#) and a [makeshift hospital tool](#) during the trainings (Box 3).

The EpiC clinical trainings received overwhelmingly positive feedback. Participants expressed high satisfaction and appreciation that the training was in-person, timely, and practical. Many attendees indicated the training increased their confidence in managing COVID-19 patients.

The effectiveness of the training was evident from the increase in the test scores among workshop participants. The improvements observed in the post-test scores for doctors and nurses were 25 percent and 26 percent, respectively.



A skills session is held during clinical training in Ulan Baatar to show FAST ultrasound assessment on a mannequin.

Photo credit: Save the Children Japan, Mongolia Office



Dr. Ganbold Lundeg, Head of Critical Care and Anesthesia Department, MNUMS, leads a clinical training session in Uvurkhangai province.

Photo credit: EpiC

I used the methods of mechanical ventilation and proning of patients learned during the training and over 16–30 days, was able to save lives of four pregnant women and two critically ill COVID patients. I found the Vyair ventilator particularly effective for CPAP which was performed on ~150 patients.

— B. Bayarkhuu, Head of the ICU, Orkhon Hospital

The respiratory care pocket card was very helpful for ICU doctors and nurses by providing quick and easy reference to invasive O2 modalities. The diagram on titrating oxygen therapy helped prevent unnecessary delays in initiating needed therapy and preventing complications.

— A. Altantogos, ICU Doctor, Sukhbaatar Hospital

I used lung-protective ventilation techniques presented at the workshop to save 53-years old female with COVID-19 and reverse acute respiratory distress syndrome (ARDS).

— E. Bat-Undral, ICU doctor, Uvurkhangai Hospital

I am working as an ICU nurse for 16 years now. This training equipped me with new knowledge and skills to care for critical care patients on mechanical ventilation and positioning of patients to improve oxygen therapy. This training should be extended to all other nurses.

— B. Enkhtsetseg, ICU nurse, Dornod Hospital

The Vyair ventilators were effective for delivering oxygen therapy, and with training, these ventilators helped us save the lives of more than 100 critical patients. Moreover, the ventilator was also used to successfully transport an unconscious patient to Ulaanbaatar, approximately 600 kilometres away from the Dornod province.

— S. Delgerjargal, ICU Head, Dornod Hospital



Dr. Altanchimeg in the ICU department at Mongolia-Japan teaching hospital at MNUMS.

Photo credit: Dr. Altanchimeg

Box 4. BASIC course for COVID-19 curriculum modules

1. Acute respiratory failure
2. Airway management
3. Shock
4. Sepsis
5. Oliguria and renal failure
6. Arrhythmias
7. Arterial blood gas interpretation
8. Metabolic problems in ICU
9. Assessment of critically ill patients
10. Mechanical ventilation
11. COVID-19 therapeutic management

Promoting continuous medical education for critical care via online courses

Fundamentals of Critical Care Support (FCCS) course

EpiC funded the registration of 39 English-proficient critical care specialists from tertiary hospitals across Ulaanbaatar to enroll in the internationally recognized FCCS online course offered by the Society of Critical Care Medicine (SCCM). The learners for the online FCCS course were nominated from the critical care, emergency medicine, and anesthesiology advisory councils within the MOH. About one-third of learners successfully completed the course comprising 14 modules and a practicum skills station and were certified by SCCM.

Dr. Altanchimeg Sainbayar, a doctor and assistant head of the ICU Department at Mongolia-Japan teaching hospital at MNUMS said, “Thanks to the course, we learned the latest on treatment and care of critically ill patients, including lung-protective techniques, which is an important part of the treatment and care of COVID patients. The course presented topics in online video lecture modules in interactive formats. The virtual skills session connected learners directly with the SCCM experts. The knowledge acquired through the course will help learners improve the quality of critical care in Mongolia.”

BASIC course for COVID

EpiC also funded translation into Mongolian and in-country hosting of the BASIC course for COVID, which was originally developed by the Chinese University of Hong Kong. The adapted BASIC course for COVID includes 11 modules and is aimed at doctors with little or no experience working in ICU or emergency critical care settings (Box 4). Learning is mainly self-directed and includes reading of course material, assessments, and an in-person or virtual skill. The Mongolian version of the course is hosted on MNUMS' online e-learning MOODLE platform. The course is undergoing testing and further improvements as needed. Once finalized, the course will be open for all health care providers in Mongolia.

Conclusion

EpiC has prepared Mongolia to respond to COVID-19 and other pandemics in the future by strengthening the critical and emergency care capacity of the health workforce. Going forward, the MOH will use the clinical training curriculum and technical resources on COVID-19 adult case management and bedside care to train new recruits of doctors and nurses and provide refresher training. Similarly, technical resources including job aids and posters on critical care and ICU management are already being distributed to critical care and ICU departments. Mongolian National University will continue to offer in-country hosting of a translated BASIC course for COVID-19 for medical students at the university and practicing doctors and nurses engaged in emergency care.

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