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Case Report

Repatriation of a Critically Ill Coronavirus Disease 2019–Positive Patient Across Closed Borders

Florian Pracher, MD, FCICM, FANZCA, Sidharth Agarwal, MBBS, FCICM, Paul Goldrick, MBBS, FCICM, FANZCA, FFARCSI, Jane Davies, MBBS, FRACP

ABSTRACT

We report on the international retrieval of a critically ill, ventilated, coronavirus disease 2019–positive patient from Dili, East Timor, into the intensive care unit of the Royal Darwin Hospital in Australia. The patient had severe respiratory failure, and the medical team in Dili was struggling to maintain adequate oxygenation with a fraction of inspired oxygen of 1 most of the time. This occurred during an outbreak of coronavirus disease 2019 in East Timor, placing strain on the local health system. Therefore, it was decided to transfer the patient to Australia. Given the closed international borders of Australia, organization of the retrieval and infection control measures were challenging and are described in the article. We discuss the need for a pathway to retrieve critically ill patients into a well-resourced country during a pandemic and the importance of public health measures including a robust vaccination program.

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We report on the international air medical retrieval of a patient with severe coronavirus disease 2019 (COVID-19) into Australia from Dili, East Timor. At the time of the retrieval, Dili was in the middle of a significant surge in COVID-19 cases with a 7-day average of 168 cases per day.

The patient was a 69-year-old woman with dual citizenship (Australian and Timorese); her comorbidities included diabetes and arterial hypertension. She presented to the Vera Cruz COVID isolation and treatment center during a COVID-19 outbreak in Dili, East Timor, after having been unwell for about 10 days. On the day of presentation, she required noninvasive ventilation, and within 24 hours of presentation, she was intubated and mechanically ventilated due to rapidly worsening hypoxic respiratory failure.

Figure 1 and 2.

She had refractory hypoxemia and, despite ventilation with a fraction of inspired oxygen (FiO₂) of 1.0, had frequent episodes with oxygen levels < 90% (refer to figure 2 for a chest x-ray of the patient). There was no evidence of any other organ dysfunction on the limited blood tests performed in the resource-constrained pandemic situation of Dili.

The patient was treated with dexamethasone (6 mg twice daily) and meropenem to cover for any secondary infections. She also received deep vein thrombosis prophylaxis with heparin and insulin for glycemic control. However, her respiratory condition did not improve.

Given the seriousness of her illness, her failure to improve, and the extremely limited resources in Dili, Top End Health Services and CareFlight were approached to explore the possibility of international air medical retrieval. Royal Darwin Hospital (RDH) was the preferred option given Darwin’s proximity to Timor Leste and it being her Australian place of residence and her family’s home. This referral was made indirectly via the patient’s local Darwin-based physician to RDH intensive care unit (ICU) and infectious disease teams on May 18, 2021.

International repatriation of this nature in the current pandemic situation has not been previously attempted in Australia. The chief health officer of the Northern Territory and the Australian Border Force in consultation with the Top End Health Services executive team, the infectious disease team, and public health directors approved the transfer after a multidisciplinary meeting. In the background, the CareFlight logistics coordinator initiated the discussions with respect to the logistics of the transfer with the Department of Immigration and the Department of Health in East Timor. The ICU and the infectious disease teams at RDH were also involved as the...
accepting teams. Because this was an unprecedented situation, multiple discussions occurred over a period of 5 days, before the patient could be retrieved into the ICU at RDH. Tarmac-to-tarmac transfer was explored but rejected because of the limited transport resources in Dili. A significant logistical barrier to retrieval was the operational impact of 14 days of isolation on the flight crew, including a pilot, 2 nurses, and a CareFlight/ICU specialist.

The protection of the people of the Northern Territory and Australia was of the utmost importance; hence, a comprehensive multifaceted infection prevention protocol was developed for the medical and aviation crews who agreed to retrieve the patient. This included the following: the stipulation that team members were fully vaccinated against COVID-19 (defined as being more than 14 days post 2 doses of an approved severe acute respiratory syndrome coronavirus 2 [SARS-CoV-2] vaccine), airborne (N95 masks) and contact precautions, personal protective equipment (PPE) to be worn by all team members during their time on the ground in Dili as well as during the patient transfer, a trained spotter traveled with the team, and a 14-day quarantine for the retrieval team at a place approved by the Chief Health Officer on return with daily saliva polymerase chain reaction (PCR) testing. The requirement to quarantine for 14 days became a prohibitive factor to securing a doctor with the appropriate skill set to enable the retrieval to go ahead; therefore, in order to facilitate the retrieval, a risk mitigation strategy was agreed on for the retrieval team doctor. After 9 days of quarantine with daily testing (saliva self-swab for SARS-CoV-2 PCR), a return to clinical duties was facilitated on day 10 with the addition of daily preshift Cepheid GeneXpert rapid PCR testing on a combined deep nasal/throat swab.

The retrieval proceeded on day 7 of the patient’s presentation to Dili hospital. The flight time from Darwin to Dili in a Beechcraft B400 airframe is 70 minutes. The team left Darwin in the morning and was welcomed by police, immigration, and a local ambulance on the tarmac at Dili airport. After equipment and team members were sprayed with a disinfectant at the airport, the team proceeded to the Vera Cruz COVID isolation and treatment center before retrieval.

The chest x-ray available at the Vera Cruz COVID isolation and treatment center before retrieval.

The retrieval crew stabilized the patient for transfer. Neurology could not be assessed because the patient had been paralyzed for an episode of ventilator dyssynchrony. A chest x-ray from the morning confirmed satisfactory position of the endotracheal tube and nasogastric tube; there were dense bilateral air space opacifications and no evidence of a pneumothorax. The retrieval team inserted a second peripheral intravenous catheter and an arterial line before transferring the patient onto the stretcher and retrieval ventilator. To minimize the risk of aerosol generation with associated exposure and infection risk to staff during the ventilator change, the patient was paraparalyzed, ventilation was paused, and the endotracheal tube was clamped. Once the patient was connected to the retrieval ventilator, the clamp was removed, and ventilation was recommenced. After 1 hour for stabilization, the team left with the patient and proceeded to the airport where the patient was loaded onto the plane (figure 1). Once the teams’ passports were returned, the flight left for Darwin.

The retrieval was uneventful. The patient was supine and ventilated with a pressure-controlled synchronized ventilation mode with a lung-protective strategy with a moderate positive end-expiratory pressure of 14 cm H2O. With this strategy, the FIO2 could be weaned to 0.4 at the time of handover to the RDH ICU 2 hours later. The total mission time from departure of Darwin to the handover in the RDH ICU was 6 hours.

At the time this report was written, the patient was stable and generally improving. She underwent a tracheostomy on day 8 in the RDH ICU. On the basis of 2 negative SARS-CoV-2 PCR tests, she was desisolated on day 19. She was decannulated on day 23 and transferred to the rehabilitation unit.

The retrieval team underwent home isolation for 14 days with the exception of the flight medical officer. Daily COVID-19 surveillance tests were performed, which were all negative, including the daily GeneXpert rapid SARS-CoV-2 PCR test for the retrieval team specialist doctor returning to clinical service on day 10 after retrieval.

Discussion
With the exception of a second wave in July 2020, until June 2021, Australia had successfully navigated the COVID-19 pandemic. This was a result of strict border control policies and public health measures including social distancing, face masks in settings where social distancing is not possible, and appropriate PPE for health care...
workers.\textsuperscript{3-5} Unfortunately, these measures have left many Australians stranded overseas with a cap placed on the number of Australians who were able to return each week. With worsening international case numbers, particularly in the Asian region,\textsuperscript{6} overseas Australians are at risk of contracting COVID-19 in an environment with limited access to health care.

The risk to Australians stranded overseas has to be balanced with the risk to the Australian population as a whole from the reintroduction of COVID-19 into the community. In fact, all local outbreaks have originated from returned travelers in managed quarantine facilities. This risk is further increased by a slow vaccination rollout and concerns about public acceptance of vaccine and COVID-19 control measures.\textsuperscript{7}

The main barriers to retrieval and repatriation remain international border controls designed to eliminate the transmission of COVID-19 from returning travelers and the operational impacts on retrieval organizations of quarantine requirements for flight crews.

Improved vaccination rates in combination with appropriate public health measures are critical to enable progression to less stringent yet still safe border controls. Investment in measures to increase public confidence and advocacy for vaccination are urgent priorities in a pandemic.\textsuperscript{8}

In addition, approval for future international retrievals will require reconsideration of isolation requirements for vaccinated medical teams in full PPE with no identified breaches during the mission. Ideally, with daily surveillance testing and self-monitoring, the eventual goal should be reduced or even no quarantine requirement in this group.

Most air medical organizations in Australia and worldwide have COVID-19 management plans, but to our knowledge there is no European Aero-Medical Institute– or Commission on the Accreditation of Medical Transports–endorsed international standard. Providers use different levels of PPE, and some use isolation pods for air medical retrievals. We briefly considered using an isolation pod for our retrieval, but ultimately decided against it based on concerns regarding accessibility of a critically ill patient in case of complications. Moreover, the risk of accidental or intentional breaches would have required the same level of PPE for the attending staff.\textsuperscript{9}

This case has demonstrated that it is possible to safely repatriate a critically ill, ventilated COVID-19 patient from a country with a COVID-19 outbreak to Australia using the described precautions. We had no PPE breaches or transmission of COVID-19 to staff. This is consistent with the experience overseas where many COVID-19–positive patients are safely transported in fixed wing and helicopter air ambulances with a negligible number of infections of transport personnel.\textsuperscript{10-13}

We argue that as a well-resourced country with sufficient capacity in our hospitals and ICUs, we should develop a process to repatriate critically ill (COVID-19 or critical illness in general including multi-trauma) Australians who are otherwise at risk of dying overseas, often far away from their family and loved ones in Australia.\textsuperscript{14} An international recommendation on minimum PPE standards for air medical retrievals would be helpful in future pandemics.

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