Case Report

Experiences of the Intensive Care Unit of Hospital Raja Perempuan Zainab II in handling the Massive Evacuation of Critically-Ill Patients during Flood Disaster.

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Abstract

In December 2014, Malaysia had suffered nationwide floods after unprecedented monsoon rains overwhelmed several parts of the country. The East Coast areas of Malaysia were especially badly affected, specifically for the state of Kelantan, whereby a total of 170,000 victims were evacuated to the evacuation centres. This was the worst flood in the last 40 years and has been referred to by the locals as 'Bah Kuning'. As a tertiary centre for the state of Kelantan with a total number of hospital beds of 937, HRPZ II was also badly compromised during this time. The electricity supply to the main hospital building was shut-down during this period and the hospital had managed to maintain its operations using power from a generator which had faced the risk of being shut down if the water levels had increased further. These issues might have caused a worse impact via possible loss of electrical and oxygen supply and non-functional life support systems. In relation to this flood disaster, the Anaesthesiology and Intensive Care Unit of HRPZ II would like to share the experiences of handling ventilated and critically ill-patients for evacuation during the massive floods in 2014 from the ICU of Hospital Raja Perempuan Zainab II to "an open stage with no facilities". During this time, we had a total of 19 patients in our 21-bedded Intensive Care Unit. The challenge was the need to evacuate all the critically ill patients and to set-up a new ICU in a safer place immediately at the time.

Keywords: Flood, Disaster Management, Mass Casualty Management

*International Journal of Human and Health Sciences Vol. 02 No. 04 October'18 Page : 224-227
DOI: <http://dx.doi.org/10.31344/ijhhs.v2i4.60>*

Introduction

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In relation to this flood disaster, the Anaesthesiology and Intensive Care Unit of HRPZ II would like to share the experiences of handling ventilated and critically-ill patients for evacuation during the massive floods in 2014 from the ICU of Hospital Raja Perempuan Zainab II to “an open stage with no facilities”-Trauma ICU, Hospital University Sciences of Malaysia (HUSM), KubangKerian, Kelantan, Malaysia.

Case Presentation

The Challenges

During this flood disaster, we had a total of more than 20 ventilated patients and 10 non-ventilated patients in the ICU, the High Dependency Ward and other critical care areas. The challenge was the need to evacuate all the critically- ill patients to a safer place immediately including the ICU beds, ventilators, support staffs and other equipment such as IV cannula and tubes.

The water levels were rising rapidly and unpredictably, and if the water levels had touched the generator power set, the hospital electrical power would have been shut-off leaving the ICU with no electrical supply causing non-functional equipment especially the ventilators and infusion pumps. Thus, a meeting to discuss contingency measures with the HUSM authorities was held to manage the need of immediate evacuation of critically-ill patients. Eventually, we managed to obtain a new centre for the temporary ICU setup. However, the new place was an empty space which is the newly-built Trauma ICU HUSM, Kelantan. The only facilities which were available here at that time were the oxygen wall supply as well as the air and suction system.

Therefore, we needed to transfer our patients together with support equipment and supporting staffs to the newly set-up ICU in that centre. This is what we meant by “open stage with no facility”. However, it is our duty to provide safe conditions to our patients even in natural disaster conditions and even with limited staffs. The critical care team activation was done. Only 50% of specialists and consultants, 60% medical officers and 50% supporting staffs were able to come for emergency roll-call due to the constraints caused by this calamity. To make matters worse, we had problems in communication due to disruption of mobile phone coverage. Apart from that, the access to the hospital was also limited as the main road was inaccessible due to flood. Unfortunately, the ambulance was unable to pass through the flood into the hospital compound. Our final options were the Radicare and the Fire Department lorries with hydraulic lift which thankfully could get through the floods for transporting the patients and

the equipment.

Pre-event ICU Planning

Our management was divided into the pre-transfer phase involving asset protection and documentation, as well as the planning and preparation on inter-hospital patient transfer from the ICU. A key aspect during the transfer process was about the discussion with hospital administrators regarding the main power plant and generator set, as well as the discussion with HUSM regarding the location for urgent patient transfer.

A total of 14 intubated patients were successfully transferred to SICU and Trauma ICU in HUSM from 10 am until 2 am the following morning as the water kept increasing to dangerous levels and had drowned the hospital compound. This was done concurrently with the transfer of ventilators, infusion pumps, monitors and ICU supporting staffs. The water level monitoring was done continuously on 24.12.2014 & 25.12.2014.

Figure 1: Water levels rising in front of the Emergency Department.

Transfer Process

The transfer process which started at 10am were continuous until 2 am in the morning. ICU patients were successfully transferred to receiving hospitals as per standard inter-hospital transfer and placement in Trauma ICU (10 patients) and SICU (3 patients) using equipment from HRPZ2.

Figure 2: Transfer process of patients and equipment using lorries.

HRPZII Icu Evacuation Plan For Flood Disaster

1. *Designation of critical care leader & coordinator*

- ICU HRPZ II Operation Centre – Intensivist 1 to outline the movement plan.
- HUSM Operation Centre (receiving hospital) – Intensivist 2 and HOD.
- 2. **Staffing coordination**
 - Immediate staffs roll call and task-flow briefing
 - Staffs that follow the patients during the transfer from centre 1 to centre 2 will continue to take care of those patients in centre 2.
- 3. **Preparation of critical care transportation**
 - Hospital Support Department and the fire brigade lorry with hydraulic lift and ambulance.
- 4. **Patient stratification according to severity**
 - Intubated patients were given priority and stabilized prior to transfer.
- 5. **Tracking of critical care patients**
 - Sending patient documentations together with the patient – BHT/forms.
- 6. **Tracking equipment/ assets documentation**
 - a) Assets without patients
 - i. Types of ventilator, syringe pumps and beds were recorded with asset numbers and sites of placement.
 - b) Assets together with patients
 - i. Portable monitors, Ambu bags, transportation bags, oxygen cylinders, beds, drips set, syringe pumps, portable ventilators, BP cuffs, Spo2 probes, arterial lines, ECG cable with cables, suction canisters with vacuum and oxygen regulators, mechanical DVT prophylaxis pumps, ripple mattresses and feeding pumps. These were recorded together with asset numbers in documented forms.
 - ii. Forms prepared in several copies for filing and tracking purposes in both facilities.
- 7. **Checking of equipment compatibility in the receiving hospital facilities**

Recovery Phase

The post flood phase was about cleaning and restoration of affected facilities, and the transferring of the patients from HUSM back to HRPZ2. The process of transferring back of those patients from HUSM were done in a staggered manner from 31.12.2014 till 4.1.2015.

Discussion and Conclusion

Overall, the emergency evacuation process was deemed to be successful. However, there is still room for improvement in terms of our future practice, such as to be able to anticipate the worst outcomes with a proper back-up plan and to recognize the strength of resources and potential

vulnerabilities before any disaster occurs. We recognize that the overall planning for patient evacuation to a safer place should begin as early as possible because of the unpredictable water level and subsequent worse consequences. This includes identifying the receiving hospitals for patient evacuation and resources availability. This can be done via the role of the critical care leader & coordinator which are crucial to support early and frequent communication for close coordination and support of ICU evacuation preparations (King et al., 2014)

They are also responsible for categorizing ICU patients based on ICU resource requirements.

We would like to suggest that each hospital should have a standardized preparation plan of critically ill patients which should be performed prior to hospital to hospital transfer to prevent unanticipated complications. In addition to that, we would also like to emphasize the use of a detailed checklist to provide a proper tracking system of patients and assets by both the sending and the receiving hospitals as the process involves many critically-ill patients with large amount of equipment (Brunsveld-Reinders, Arbous, Kuiper, & de Jonge, 2015)

The preparation of all supporting life devices and equipment should be well executed for all patients in critically ill patients as per standard ICU care post patients transfer in new centre (Lin, Foster, Chaboyer, & Marshall, 2016)

In conclusion, irrespective of the current level of training obtained, intensive care providers are obliged to always be ready to perform safe and effective ICU evacuations to provide a safe area of critical care during flood disaster. We hope that this case report may contribute towards the local consensus of transferring critical care patients during any natural disaster. Based on our shared experiences above, the methods used were proven to be successful via inter-hospital and intra-hospital collaboration with functional ICU communication, great leadership and teamwork.

Acknowledgements

We would like to thank the Anaesthesia and critical care departments of the HRPZII team, the HUSM stakeholders, the Kelantan Fire Department, Radicare staffs, as well as the Emergency Department of HRPZII team. Last but not least, we are also thankful for the support we have received from the Minister of Health and Director General of Health of Malaysia.

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