

HOSPITAL PREPAREDNESS AND RESPONSE TO THE FREETOWN OIL TANKER EXPLOSION - A CASE STUDY OF A TERTIARY HOSPITAL IN SIERRA LEONE

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ABSTRACT

Oil tanker explosions are a fairly common cause of disaster in sub-Saharan Africa. These disasters may have secondary effects on health service delivery due to collapse of routine health service provision as staff concentrate on taking care of the disaster victims. This might suggest that our hospitals and health systems are not fully prepared to cope with these situations.

The article aims to share our experience in managing tanker explosions in terms of disaster preparedness and response, access to drugs and medical supplies, access to laboratory facilities and the medical and surgical problems commonly encountered as well as possible recommendations.

INTRODUCTION

Oil tanker explosions and the resulting fire disaster with consequent loss of lives and properties are not uncommon in Africa¹. Over the last 12 years, about 10-12 of these explosions have occurred in sub-Saharan Africa¹. Together, these explosions account for the loss of more than a thousand lives as these individuals attempt to scoop leaked fuel from the tankers [1]. The dangers of oil tanker accidents include somersaulting of the vehicle, explosions, inferno and fuel leakage². Possible causes include distracted driving from mobile phones or driving under the influence of alcohol or recreational drugs; despising traffic rules, over speeding or aggressive driving, inclement climatic conditions as well as poor vehicle maintenance².

Ignorance, population boom, unchecked migration to urban areas and low socioeconomic state are major players that increases the likelihood of occurrence of disasters in a certain place³. Disasters are often unplanned and they increase human sufferings through illness or injuries and are often associated with a discrepancy between availability of resources and demands for them leading to a state of disorder and disharmony³. The occurrence of a disaster may have secondary effects on health service delivery due to collapse of routine health service provision as staff concentrate on taking care of the disaster victims. In certain instances, such as epidemics or pandemics, gains made in public health campaigns may be lost⁴

The article aims to share our experience in managing tanker explosions in terms of disaster preparedness and response, access to drugs and medical supplies, access to laboratory facilities and the medical and surgical problems commonly encountered.

The Incident

On 5th November, 2021, a road traffic accident occurred between an oil tanker and a lorry at a busy road junction at Wellington, east end of Freetown. It was reported that the lorry carrying granite lost its brakes and ran into the tanker. This led to fuel leakage from the tanker and nearby bike riders and traders rushed to the scene to get free fuel. This rampage lasted for about 45 minutes before the explosion and resulting inferno.

A total of 158 patients were received into all the hospitals while 87 persons were brought in dead. A total of 67 patients (out of 158) died while on admission, with an estimated mortality rate of 42.4%. There was destruction of properties including houses, vehicles, shops, motorbikes, tricycles and vegetation. This will have untold effects on the social and economic livelihood of the residents in the nearby neighbourhoods⁵

Preparedness

Disasters are sometimes inevitable and often have dire consequences on society⁶. A report issued by the United Nations Office for Disaster Risk Reduction said that hospitals are crucial assets during disasters⁷. In addition, the World Health Organization (WHO) has encouraged all countries to implement disaster preparedness and risk mitigation strategies such as coordination, planning, implementation, continuous assessment and monitoring, and building resilience⁸. However, the inadequacies and weaknesses of emergency services and health care facilities to manage a disaster will exacerbate the negative impacts.

Shortly after the explosion, officials from the newly formed National Disaster Management Agency (NDMA) were at the scene and were able to coordinate the early involvement of the fire service, National Emergency Medical Service (NEMS) ambulances and the police force to cordon the area. Many of the fire victims including the

dead, were transported to Connaught Hospital, the Country's major referral hospital for medical and surgical cases. The number of patients from the disaster overwhelmed the capacity of this hospital, therefore, other hospitals like Rokupa Government Hospital, Choithram Memorial Hospital (private Hospital), Emergency Surgical Center (an NGO) came in to help out with some patients. Patients were triaged, treated or admitted as suggested by the Burns Case Management team. This team included Plastic Surgeons, General surgeons, Anaesthesiologists, Physicians, nutritionists and nurses.

There was some level of organized care given to these victims right at the start. However, there are still gaps in our disaster preparedness mechanisms including risk perception by the population, availability of specialized units like burns unit, early disaster coordination and the road worthiness of large trucks. In addition, it is still questionable whether there are any recovery plans for these victims such as compensation, restoration of livelihood for survivors and their dependants and improving our health care delivery system. Much is desired from a country that has suffered from several disasters in recent times such as Ebola Epidemic and the Mudslide.

RESPONSE

Connaught Hospital is the main tertiary referral hospital for medical and surgical conditions in Sierra Leone. It is one of the main hospitals in the University of Sierra Leone Teaching Hospitals Complex. It has the highest number of specialists and specialized units in country. On the night of the fire disaster, Connaught hospital received 82 severely injured patients and 87 corpses of burnt persons. The ground staff on duty at the accident and emergency department (A&E) at that time included 3 doctors and 8 nurses. The first action was to repurpose nursing staff from other wards to the accident and emergency department. The

second line of action was to call on staff who were not on duty to support the overwhelming patient load. An immediate supply of drugs and consumables were received from the hospital store and pharmacy. Meanwhile, triage and separation of patients based on the degree of burns and chance of survival was ongoing. Full utilisation of A&E and repurposing of existing wards for initial resuscitation of the burns patient was ensured.

An Incident Management Team was established by the Ministry of Health and Sanitation (MoHS) to coordinate activities in all hospitals, including Connaught Hospital. The patients were managed by an interdisciplinary team comprising of plastic surgeons, general surgeons, orthopaedic surgeons, anaesthetists, physicians, nurses, physiotherapists, nutritionists. Establishment of standardised management plans was done. To support our emergency response to the disaster, we received medical teams (surge teams) from Senegal, United States of America, Liberia, Italy and China. The activities of the local team and the surge teams were effectively managed by daily coordination meetings. On the job training of local staff on burns care by experts (local and international) was also carried out.

The disaster attracted donations from non-governmental organizations (NGOs), Government partners at home and abroad, religious organizations and well-meaning Sierra Leoneans. These donations included food stuffs, water, intravenous fluids, drugs and other items. The hospital set up a committee to ensure that the items donated were evenly distributed among the hospitals involved in the care of burns patients.

Access to drugs and laboratory facilities.

In the initial 12-24 hours, drug supplies were barely enough. However, this scenario was quickly surmounted as donations of drugs from local pharmacies, private institutions, Guinea, the

European Union, World Health Organization started pouring in.

The laboratory as well as the blood banking facilities at Connaught Hospital were completely overwhelmed. There were little or no reagents to conduct basic laboratory tests. However, several private labs came in to render pro bono service to these patients. This service included basic lab tests as well as blood culture and wound culture and sensitivity.

Other support units in the management of burns were also mobilized such as psychosocial and mental health units, nutrition and safe burial teams. These units ensured that a holistic care is given to the burns victims.

In high-income countries, healthcare facilities accreditation involves preparedness for internal and external disasters that consider the availability of an emergency medical services (EMS) system and training [9][10][11]. In addition, hospitals are considered satisfactorily prepared for disasters if they have an external disaster plan and maintain a stockpile of drugs and medical supplies such as antibiotics, intravenous solutions, gauze, bandages that exceed the usual stashes designated for everyday use [10][12].

In Sierra Leone, like many other low and middle-income countries, hospitals do not have disaster plans and stockpiles of drugs and medical supplies for disasters. It is well-known that even with good external disaster plans and repeated drills, hospitals still perform poorly in actual disasters [13]. Within 24-48 hours of the incident, hospitals were short of drugs and medical supplies such as antibiotics, intravenous fluids, anaesthetics, gloves, bandages, gauze, infusion sets to name a few. The failure to have such things in place placed an additional burden on the hospitals' meagre resources and complicated patient management. These inadequacies are a concern since in a mass

disaster with hundreds of casualties requiring medical intervention within a short period, hospitals will need to accept additional numbers of patients that exceed their everyday bed and medical resource capacity. Previous reports of responses to medical disasters that have appeared in the literature indicate that hospitals need additional resources above and beyond the daily needs to correctly provide health services in disaster. [13][14].

Medical and surgical problems encountered

The common medical problems encountered were infections, acute kidney injury, hypovolemia and pulmonary edema. Despite the enhanced infection control practices being upheld by Connaught Hospital, infections were still a major problem. An attempt to combat severe infections was made worse by the unavailability of blood culture service in the hospital. There were many possible precipitants of acute kidney injury such as hypovolemia, use of non-steroidal anti-inflammatory drugs, sepsis, haemolysis and rhabdomyolysis. Fluid losses from the burnt surface area and enhanced insensible losses were the major contributors to hypovolemia. Despite the need for fluids, these patients could also suffer from volume overload due to over hydration.

Some of the surgical problems included delayed burn wound excision and grafting, Inadequate nutritional support and physiotherapy for the burn victims. Most of these patients sustained full-thickness burns and ideally should have been excised and grafted within 3-10 days after the burn [15]. However, due to shortage of trained personnel with only two plastic surgeons in the country and also lack of functioning support services, such as blood bank and laboratory support. These procedures were not commenced until well into the second week. This delay in burn wound excision also increased the susceptibility of

the victims to infections as the eschar serves as a nidus for infection.

Adequate nutritional support is vital in the treatment of burn patients. Their metabolic rate can increase more than twice the normal and this increase may last up to a year [16][17]. Nutritional support for these victims was also a challenge as there is limited number of nutritionists in the country and they had limited experience in providing nutritional support for burn victims. Adequate physiotherapy is an integral part of the management of burns to promote healing and prevent complications such as pneumonia, deep vein thrombosis and contractures. Burn victims were admitted across five hospitals and, of these, only Connaught hospital had 2 trained physiotherapists. This meant that this important aspect of care could not be delivered adequately until partner help was sought and three physiotherapists were brought from abroad to assist.

Challenges and opportunities

Challenges faced included the lack of rapid response teams at the site to do an initial triage at the incident site, lack of a specialized burns unit in the entire country, poor hospital and emergency response funding and shortage of clinical dieticians and physiotherapists.

This disaster gave us an opportunity to assess our local human resource (medical and allied health professional capacity), to develop standardized management protocols in our hospital for burns and other frequently occurring ailments. It also created a platform for the establishment of a burns unit and establish links with international experts and institutions on burns management. A dedicated burns unit will enhance technical capacity for burns management. There is need for easy access to parenteral nutrition, facilities for skin grafting, training of more plastic surgeons and

support staff like nutritionists and physiotherapists. There is need to improve safety education as well as the quality of life of the population.

Possible recommendations include enhanced training of first responders including teenagers, improved triage at scene of event, stockpiles of drugs and necessary consumables in specific location, creation of multiple burn units and if possible the availability of air transport for disasters occurring far away from urban settings.

CONCLUSIONS

Strides have been made in our disaster response mechanisms as a country. However, there is still room for improvement in terms of the creation of space to accommodate disaster victims, stockpiling of drugs in specific locations, enhanced laboratory and mortuary facilities to cater for disaster victims. A plan to accommodate many patients may be developed based upon hazard risk analysis and casualty estimates.

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