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Management of blood system in disasters

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ABSTRACT

Managing the blood system in disasters is one of the main challenges for any blood transfusion service exposed to natural hazards such as earthquakes, floods and tsunamis, biological threats such as pandemic influenza as well as manmade disruptions and terrorism. Sri Lanka had to face contrasting types of situations. The most unexpected and dreadful one was the 2004 December 26 tsunami catastrophe which cost >30,000 human lives, leaving more than 23,000 injured. Health services were overburdened with influx of dead bodies and injured people, most due to drowning. Injuries varied from small lacerations to deeper wounds, broken arms, legs, ribs, damaged organs and head injuries. The National Blood Transfusion Service, had to coordinate its blood supply effectively and to manage large number of blood donors during the first few days following tsunami.

In contrast to the acute destruction of tsunami, Sri Lanka also faced a "chronic disaster" of 3 decades due to the separatist war waged by the Tamil Tigers, until it was completely terminated in 2009. There were large scale terrorist attacks using suicide bombers, land mines and claymore mines resulting in frequent influxes of dead bodies and injured patients to hospitals.

The experiences of Sri Lanka blood system in the face of two contrasting types of disastrous situations are presented.

1. Introduction

In the context of a blood transfusion service, the word "disaster" generally refers to any situation that temporarily restricts or eliminates the ability of the service to maintain its blood supply or a situation that creates a sudden demand for blood higher than usual or a massive influx of donors posing difficulties to the blood collection system.[1] The issue of "blood system management in disasters" is one of the main challenges today for any blood transfusion service, in a background of natural hazards such as earthquakes, floods and tsunamis, biological threats such as epidemic outbreaks and pandemic influenza as well as manmade work disruptions and destructive acts of terrorism. Disasters can create undesirable impact on blood donors, blood service staff, volunteers, blood bank processes, logistics and facilities as well as on patients, hospitals and general public. In blood system management planning, the impact of the disaster on these critical elements of the blood system must first be identified and then appropriate action plans developed.

2. Blood system in Sri Lanka

The island of Sri Lanka with a square area of 25,332 sq. miles is populated with approximately 19 million people. The country blood system is mainly coordinated by the National Blood Transfusion Service (NBTS) under the Ministry of Health. The NBTS is the main collector and supplier of blood and blood components to the nation. It comprises of the National Blood Center (NBC) in Colombo and a network of more than 70 Hospital-Based Blood Banks (HBBs). This nationally coordinated blood system gives a unique place for Sri Lanka among most other South Asian countries which are characterized by fragmented and less coordinated blood banking systems.

The country comprises 9 provinces and in each province one major Hospital Blood Bank is identified as the Regional Blood Center of the province. These Regional Centers coordinate with the National Blood Center in Colombo as well as the other Regional centers and Hospital Blood banks to constitute the nationally coordinated blood system of Sri Lanka. As the Hospital Blood Banks directly come under the NBTS, Sri Lanka has been able to manage its blood system effectively whenever it has to face a disaster situation with a potential to challenge its blood system.

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3. Managing blood system in the midst of disasters - Sri Lanka's experience

As far as Sri Lanka is concerned it had to face a number of contrasting disastrous situations during its recent past. Out of those, the most unexpected and dreadful one was the 2004 December 26 tsunami catastrophe which destroyed more than 30,000 human lives, affecting more than 250 000 families leaving more than 23 000 injured[2]. Health services were over-burdened with sudden influx of dead bodies and injured people. Most of the deaths and casualties were due to drowning. Injuries varied from small lacerations to deeper wounds, broken arms, legs, ribs, damaged organs and head injuries. In this disastrous and difficult situation the National Blood Transfusion Service had to face the challenge of coordinating its blood supply effectively while avoiding the potential risk of excessive blood collection from an influx of blood donors during the first few days following the tsunami, due to emotional feelings and uncoordinated media appeals by various parties, as seen in most of the previous similar situations the world over.

Although the number of deaths and casualties was overwhelming, actual blood requirements were within the manageable limits of available blood stocks. Fig. 1 shows, the daily blood issues at Ampara hospital in the severely affected Eastern province, during the week before and after the tsunami disaster of December 26, 2004. There had been no significant increase of red cell issues immediately following the disaster. The pattern was essentially the same in all other hospitals in affected areas. Even at the National hospital in Colombo, there was no increase of red cell issues immediately after the tsunami (Fig. 2). This seems to be the common scenario in relation to most of the natural disasters recorded in the world, which does not show any immediate increase in the need for blood. As a result, in most cases, immediate blood requirements of these victims are manageable within the available inventory of blood collection centers[3,4]. However in some Hospital Blood Centers in the severely affected southern province, daily blood collection had fallen to almost zero, immediately after the tsunami (Fig. 3).

In this situation the main strategy of NBTS was to mobilize its blood stocks for needy places effectively through its nationally coordinated network of blood banks. Regional centers and major Hospital Blood Banks (HBBs) with rapid access to the affected area played a considerable role in meeting the emergency need for blood within the affected area. Therefore, the strategy of NBTS was to utilize its available blood stocks effectively through effective coordination with nearby Regional centers and HBBs as the "first line providers" for blood products to avoid unnecessary donations and uncordinated overload from other remote provinces. Additionally, it also utilized those Regional centers and HBBs, which have the most rapid means of transportation to reach the affected places.

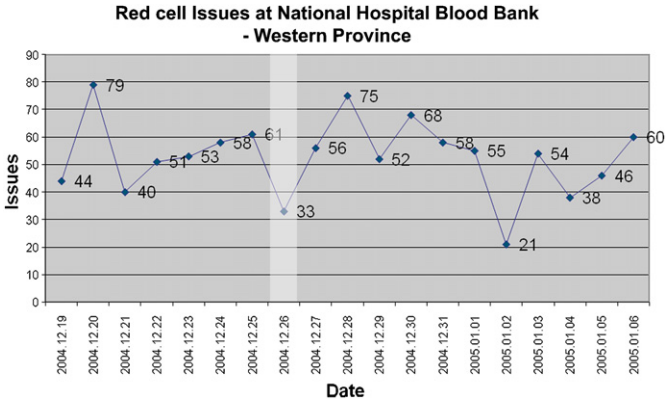

Fig. 2. Red cell issues at the National Hospital Blood Bank in Western province. No of Red cell units issued during the week before and after the Tsunami disaster (26.12.2004).

With this background the NBTS did not need to call the public openly asking to donate blood in order to manage the blood requirements related to the tsunami. However during major natural disasters, a strong community response is spontaneously generated [5]. Many people often come with a strong willingness to donate blood[6]. In line with this trend of altruistic motivations, significant numbers of volunteers turned up to the National hospital blood bank immediately following the disaster (Fig. 4). However the NBTS was able to convince most of these donors regarding the importance of making their voluntary donation at the proper time to ensure maximum utility of it. This strategy greatly helped to avoid the burden of additional workload and safety risks associated with massive influx of donors.

Experience around the world has repeatedly shown that uncoordinated massive influx of donors poses a challenge to the blood collection system. In a typical disaster scenario, hundreds of altruistic people mostly first-time donors crowd collection facilities. However in these situations usually the qualified staffs are in short supply with higher risk of screening errors due to hastily recruited minimally qualified staff working beyond their fatigue levels. In such situations, supplies and storage capabilities are usually pushed to their limit, with the risk of some blood getting

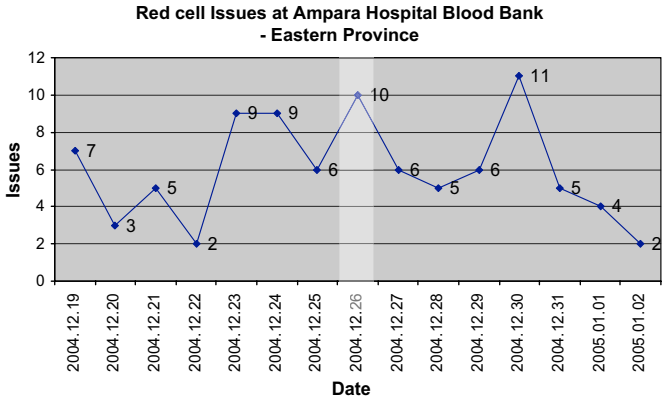

Fig. 1. Distribution of red cell issues at the Ampara hospital. No of Red cell units issued during the week before and after the Tsunami disaster (26.12.2004) at Ampara Hospital in tsunami affected Eastern province of Sri Lanka.

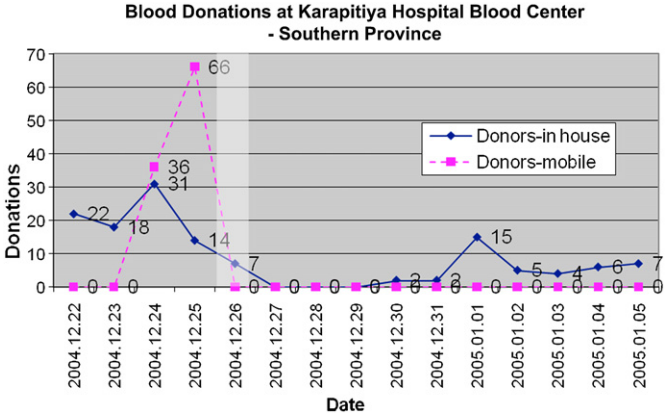

Fig. 3. Blood donations at Karapitiya hospital blood center in severely affected Southern province. No of blood donations during the week before and after the Tsunami disaster (26.12.2004).