DISASTER TRANSFUSION EXPERIENCE
Contribution to Disaster Planning

CHARLES K. ALLAM, RAIF E. NASSIF and SAMIH Y. ALAMI*

Introduction

Disaster planning in a University Hospital such as the American University of Beirut Medical Center (AUBMC), imparts on the Blood Bank and its staff certain responsibilities which are geared to meet the transfusion needs of mass casualties in a relatively short period of time. The effective implementation of that plan depends largely on the integrity of established systems and procedures for blood procurement and its safe administration. The magnitude of the blood bank response to a disaster call, i.e. the number of blood units needed is dependent on the anticipated estimate of the number and nature of casualties. It is usually assumed that the plan would be implemented for a predictable period of time normally estimated in days or weeks at the most.

A special situation is faced when under unpredictable and protracted disaster conditions a University Hospital blood bank must still function even though its organizational system of blood procurement and collection has broken down. Such a situation was encountered at AUBMC in 1975 and 1976, and in June to September 1982, and was managed with minimal jeopardy to life. Due to the sustained pressure and especially after the area and the Hospital itself became a shelling target, we experienced unavoidable laxity in the standards for blood processing and administration due to the reduced number of trained personnel and to the dwindling supplies of reagents and blood collection bags.

* Department of Laboratory Medicine, American University Medical Center, Beirut, Lebanon.

TABLE II

	April-Dec. 1975	Jan.Nov. 1976	June-Sept. 1982
Casualties: ER	581	7743	1985
Admitted	248	1554	679
Total Admissions, AUH	10,013	8036	2925
Whole Blood Consumption	3140	9315	2939
Packed Cell Consumption	1031	128	478

Results

Table I: Summarizes blood sources and consumption of blood during the events. Before 1975, our experience with hemotherapy showed a progressive trend toward a better utilization of blood and blood components[1,2]. From March 1975 to November 1976, the use of whole blood increased in proportion to the number of casualties admitted to the hospital. In 1976 whole blood constituted 86.2% of the total consumption. During the same period benevolently donated blood became the sole source of blood procurement. Blood waste is less than 1% of our total consumption; 76 units for 1975, 72 units for 1976 and 64 units for 1982 (June-Sept.).

The rough estimate of the total number of casualties in Lebanon for 1975 and 1976 was put at 200,000 wounded and 50,000 dead[3,4].

Table II: Shows the number of casualties treated or admitted at AUBMC and the number of units of blood used. It reflects indirectly the increasing workload of the Blood Bank as disaster calls become more frequent and casualties increase. It is to be noted that for the most active months of 1976, March to November, about one quarter to one third of the total admissions were casualty cases. The average number of blood units transfused per case whether casualty or not, is 1.35 for that period while the average number of units transfused per admitted casualty case is 4.6 units. Since only about 50% of casualty cases were transfused, the average number of units effectively transfused per casualty case admission is therefore 9.2 units of whole blood. For a comparative period of 1975, when fewer casualties were admitted, the average number of units transfused per admission is 0.4 units. During the latest Lebanese troubles, June to September 1982, our experience was essentially the same as before.

The aim of this communication is to share the lessons learned from this experience.

Materials and Methods

The Blood Bank of the AUBMC serves a major referral and teaching Hospital of 420 beds. Its physical facilities consist of four large rooms located on the third floor of a ten story compact Hospital compound accessible by elevators and a stairway. Adequate waiting space for donors and working space for technicians is available.

Procedures for donor registration and screening; collection and processing of blood; typing, cross matching and issuance of blood are performed according to standard methods outlined in the American Association of Blood Banks Technical Manual.

Five technicians trained and experienced in phlebotomy and blood bank techniques provided continuity of work and attendance during the day with one additional technician for night and weekend work. Extra help could be had at times, conditions permitting, from the available personnel of the Hospital Laboratory. The Blood Bank operation was supervised by a rotating resident physician and the permanent director physician of the Blood Bank or the Director of Laboratories.

Blood is collected a AUBMC from professional and volunteer donors. It is also available from the Lebanese Red Cross, the Palestinian Red Crescent, the Central Blood Bank, and some of the commercial blood banks in the city. The student body at the American University at large constitutes an additional occasional source of blood.

TABLE I

	1975	1976	1982 June-Sept.
Whole Blood	3956	9549	2939
Packed Cells	1480	155	478
Benevolent Blood	3055	8740	—
Commercial Blood	2380	666	—
Wastage	76	72	64

Discussion

For a period of almost two years, in 1975 and 1976 and again from June to September 1982, the AUBMC experienced a progressive disruption of its health care system as more and more disaster calls were made. In the latter part of 1976 it became a mixed-care facility serving war casualties and regular patients in variable proportions. The blood bank experienced a transformation of its blood procurement systems, an irregular working schedule, and a shift from the use of blood components to that of whole blood exclusively. Difficult communications and precarious security prevented us from reorganizing our systems. This difficult situation differs in many respects from that of a strictly military field hospital or a totally civilian hospital. The category of patients served and the conditions of medical practice are different. For the Blood Bank itself, the techniques may be similar but blood sources and blood procurement systems as well as technician's precise function and motivation vary widely. In such confused environment, technician's spirit and motivation have been severely affected by stress and fear which explain fluctuation in attendance to work and an irregular performance. In military field hospital rules and regulations impose more regularity in attendance to work and a better performance. The most difficult task the Blood Bank team had to assume during this period was to combine the function of blood collection and blood processing. Rush of casualties and marked fluctuations in donor response to various kinds of appeals have at times drained our inventory to dangerously low levels. In a military hospital, the technicians who process the blood are usually spared the time-consuming function of blood procurement, donor selection, blood collection and blood screening — a valuable advantage. These and other factors such as: lack of supplies, interference of armed individuals with technician's work and continued stress, further contributed to the impediment of work and the proper control of the environment. In such a situation we restricted our control measures of blood processing and issuance to the minimum required. At times, under severe pressure isogroup units of whole blood were transfused without screening and/or crossmatching. Despite all the adverse conditions, no major complication of transfusion occurred.

From this review, a few general rules can be derived which may serve as practical guidelines for hospitals and blood banks which experience work conditions similar to ours. Unwarranted confusion created by donors in the blood bank premises can be prevented by

providing a separate locale, easily accessible for donor selection and blood collection. As attempted by us, a special team should be responsible, when feasible, for the organization of appeals and the selection of donors and blood collection. This will ease the work load of the blood bank technicians. Replenishing the blood bank minimal blood inventory could be achieved by storing 4.5 units of whole blood per casualty to be admitted. This figure is similar to that of other studies[6]. Since the number of casualties is unpredictable, the rule of thumb is to have a secure inventory level at all times. Indeed the risk of outdating of blood could increase consequently but benefits in terms of preparedness to respond to an emergency call may well outweigh the disadvantage. Outdating reached about 20% of total blood use in a naval ship hospital[6] where, however, many units of frozen blood were used. A good organization of blood collection and supply by an independent or mobile team should eliminate the need for frozen blood and at the same time minimize waste. In our society, the motivation of donors in time of war or disaster proved remarkably high and enabled us to obtain the quantity of blood needed. Finally technicians should be provided with psychological reassurance and moral support besides physical accomodations in the hospital so that they achieve regularity and quality in their performance.

Disasters are a source of learning for all in the practice of medical care[5,8]. The Lebanese war was unique in that it covered a span of many years and was unpredictable in its variations. It had a deep effect on the Lebanese people; the AUBMC and its staff acquired considerable experience in traumtology during that period. The AUBMC-BB has learned its lessons too.

References

1. ALLAM C.K., and ALAMI S.Y. Blood components therapy. Five years experience at the American University Hospital. *Leb. Med. J.* 27: 3, 257, 1974.
2. ALAMI S.Y., ALLAM C. Blood Components Therapy — Editorial, *Leb. Med. J.* 27: 3, 245, 1974.
3. BARAKA A. Anaesthetic Problems during the Tragic Civil War in Lebanon. *M.E.J. Anaesth.* 5: 7, 1978.
4. SLIM M.S. Penetrating Injuries of the Heart and the Great Vessels. *M.E.J. Anaesth.* 5: 77, 1978.
5. GARNER KING E. The Moargate Disaster: Lessons for the Internist. *Ann. Of Int. Med.* 84: 333, 1976.
6. MENDELSON J.A. The use of Whole Blood and Blood Volume - Expanders in the U.S. Military Medical Facilities in Vietnam, 1966-71. *The Journal of Trauma* 15: 1, 1975.

7. MONAGHAN W.P., LEVAN D.R., and CSIAP F.R. JR. Military Blood Banking: Blood Transfusion Aboard a Naval Hospital Ship Receiving Multiple Casualties in Combat Zone, a controlled Medical Environment. *Transfusion* 17;473, 1977.
8. RUTHERFORD W.H. Experience in the Accident and Emergency Department of the Royal Victoria Hospital with patients from civil disturbances in Belfast 1969-1972 with a review of disasters in the United Kingdom 1951-1972. *Injury* 4;189, 1973.