Multinational Concepts for Blood Supply with Special Provision for Experiences in ISAF 2003

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ABSTRACT

In a multinational environment in NATO-missions it is necessary to create an interdisciplinary approach for a management on the emergency treatment in theatre. Especially for the triage management not only the practical work on patients has to be coordinated but as well the support for these treatments. One of the issues in the second line is the provision of blood products. As a matter of fact the right product has to be made available at right place and time. To fulfil this demand the tight cooperation between theatre hospitals including their blood banks is absolutely necessary. In disaster scenarios the combination of blood products like normal red packed cells, deep frozen red cells and fresh produced whole blood donations is essential to back up the treatment of severely injured soldiers. Necessities to achieve this objective is the multinational work at field hospitals with an active blood bank management. With that cooperation it is possible to handle attacks like the one on German soldiers at the bus bombing in July 2003 and to support successfully lifesaving treatments. Through optimization of limited resources even soldiers with rare blood group typings will get a chance to survive.

1.0 INTRODUCTION

1.1 Historical Aspects and Treatment Necessities

Since early medicine the time-critical factor for sufficient treatment is the quick and efficient response to injuries with massive blood losses (1,2). Different approaches were done including the clinical (3-6) evaluation of a system with frozen red packed cells. In disaster situations the use of whole blood donations (WBD) as an ultima ratio is tolerated (7). As known from reports from Afghanistan and Iraq the concept of different treatment levels – Forward Surgical Teams (FST), Combat Support Hospitals (CSH) – leads to a change of injuries which can be seen (8,9). The earlier treatment possibility gives chance to the particular difficult management of blast injuries from Improvised Explosive Devices (IED) (10). Massive blood losses from even seemingly small wounds and “mangled extremities” with (nearly) completed amputations request sooner the start of treatment, for further stabilisation the maintenance of coagulation capabilities of the patient and a fast transportation to final treatment at a level 4 hospitals. One backup for treatment in theatre is a level 3 hospital with radiology (computerised tomography (CT)) and laboratory (blood bank) facilities to support several operating tables like the GE field hospital of the Multinational Medical Task Force.

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1.2 Blood supply in theatre

1.2.1 The Joint aspect

Through the GE/NL command in ISAF 2003 the blood supply was available at two blood banks at Camp Warehouse (GE) and Kabul Airport (NL). The shared knowledge of capacity and technical procedures enabled the training of standardized procedures for treatment and created a multinational medical experience. Shortly after beginning a new contingent with exchanged personnel the first challenge was the treatment of seven wounded persons in the GE field hospital after a car accident.

The main emphasis was in this aspect the coordination in treatment and the advanced training of all medical and other military personnel. It was conducted following the existing mass casualty (MASCAL) plans of ISAF, which were updated and revised.

1.2.2 The Joint Blood Bank aspect

As a result for the laboratory work the exchange of blood products was established. The two blood banks had a different approach concerning their available products: In the NL blood bank frozen red cells, plasma and platelets were stored, in the GE blood bank red packed cells, lyophilised plasma and a capability for whole blood donations were disposable. With that cooperation it was possible to combine the time management for thawing frozen products and usage of cooled or dried products. The availability of the GE red packed cells at Kabul Airport enabled the immediate use for treatment. For the GE hospital additional products from the NL reserve enabled the prolonged treatment of severe bleedings. This procedure was in line with the discussions following the NATO blood safety conference in May 1996.

2.0 CLINICAL REPORT

Two serious matters characterised the work of 2003. At first the bombing attack in Kabul on 07.06.2003 and secondly the accident of an Italian citizen one week later.

2.1 The implications of blood groups

Following the bus attack 24 of initially 35 injured soldiers were sent to the multinational hospital in Camp Warehouse. During two hours after admittance four heavily injured patients were identified and with them occurred two challenges. They had two blood groups: two soldiers A Rhesus positive and one Zero Rhesus negative. With additional seven requests for blood group typing indicated the possibility to need more blood with blood group A Rhesus positive. In these two hours were requested 80% of the “universal” blood group Zero Rhesus negative and 95% for blood group A Rhesus positive.

Early during the ongoing treatment the ranking of the severe injured showed the patient with blood group Zero Rhesus negative on top. He displayed a severe damage of the right and left leg, an arterial bleeding from right and left arm and the loss of the right eye.

After mass transfusion with known clinical complications as coagulopathy and ongoing microbleedings further surgical treatment was necessary and so the support with red cells for treatment had to be assured.

Therefore the use of frozen blood components from the NL hospital was indicated.

Figure 1-3: Frozen platelets: Storage, Thawing and Delivery at NL hospital

The use of plasma, coagulation factors available at the GE field hospital, as well as frozen red packed cells and frozen platelets from the NL hospital produced stabilization on low level. Because of the ongoing haemostatic situation (haemoglobin 46 g/l, platelets $14x10^9$/l, aPTT > 75s, Quick 37%) the additional application of fresh whole blood was initiated.

In the second case the patient was severely injured after a car accident. He had a commotio cerebri 1st grade, a blunt trauma chest and multiple fractures of his left leg and arm. His blood group was A Rhesus negative, so that based on the experience one week earlier the decision to give whole blood came short term though enough blood with blood group Zero Rhesus negative was available.

2.2 The use of whole blood

In the literature you can find a long history of discussion about the use of whole blood (3,4,7,11,12,13). Formerly as primary therapy used, it was abandoned to promote the therapy with blood components, but it had still significant effects in reducing the further need of blood components (3,7).

In missions the use of leukocyte-depleted whole blood donations as an ultima ratio therapy in GE field hospitals is accepted. Without a given availability of every amount of blood components and the need for platelets in ongoing treatments because of the military intensity or delayed conditions for suitable transportation of the patients to a level 4 hospital the whole blood donations maintain the readiness for treatment.

For the severe patient from the bus attack the ongoing instable haemostasis demanded the use of leucocytedepleted whole blood donation from voluntary military donors.

The appeal for donation was followed by dozens of soldiers. An initial group of fifteen soldiers got a preformatted questionnaire and clinical examination. Due to some excluding results in this process ten donors were chosen. The drawing of blood followed the rules for normal donations, except the specifying of the infectious serology, which was done afterwards.

Near the clinical laboratory in an air-conditioned area inside of the hospital were acceptable facilities for the donation.


Figure 4-5: Whole blood donation at GE Hospital

Eight out of ten produced units were administered successfully resulting in satisfactory clinical conditions of this patient (haemoglobin 93 g/l, platelets $35x10^9$/l, aPTT 41s, Quick 78%) for transportation by MEDEVAC (medical evacuation) airlift to Germany. With that therapy this patient has survived.

3.0 CONCLUSIONS

Here we report about a reapplied use of NL frozen blood products with clinical effectiveness and can accentuate the need for whole blood donation as an ultima ratio in case of shortage of blood of non-substitutable blood groups. The combined use of different blood products from blood bank facilities in theatre in case of a mass casualty can back up the treatment of severely injured soldiers. Through optimisation of limited resources even soldiers with rare blood group typings will get a chance to survive. As discussed for naval units soldiers in a transfusion program could be an adequate reserve for blood therapy (14).

Due to different time-tables of availability the delay of thawing in using frozen products can be solved only by sufficient at-once-availability of cooled red packed cells. The urgent demand for platelet substitution could only accomplished by frozen or fresh products. Frozen products and additional reserves through whole blood donation are a basis for sufficient trauma treatment as seen for massive haemorrhage in elective surgery (15,16).

To be discussed has the initial missing of serological testing the donors and produced blood products and the possibility of a mismatch of a) blood groups between donated and needed blood and b) the performed cross matching tests.

Whole blood donation seems even then to be a basic necessity in case of unavailable frozen products in missions. In repeated mass casualties happened shortly after a first attack it is possible to maintain the blood support in a mission. Normally it would not be necessary because of an excellent delivery of needed blood components into theatre.

In remembrance of the victims.

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