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### Blood Usage during Wartime: The Sarajevo Blood Bank Experience

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The aim of this study was to analyze blood usage in the treatment of hospitalized patients in a war zone. A retrospective analysis of 3,055 injured or uninjured patients (1,732 civilians and 1,323 soldiers) hospitalized at the SHS between 11 May 1992 and 11 May 1993 was done. In this study, 864/3,055 patients (28.3%) received blood transfusions [average number of blood transfusions =  $4.15 \pm 4.16$  blood units (BU)]. There was a large number of civilians among the wounded (997/2,045 or 48.8% of total wounded). Civilians received 1,764 BU, while soldiers received 1,817. A total of 3,479/3,581 (97.1%) BU were given within 30 days of the injury, and 2,306/3,479 (66.3%) were administered in the first 24 hours. The frequency of blood use among soldiers (401/1,323 or 30.3%) was significantly higher than in civilians (463/1,732 or 26.7%;  $p < 0.05$ ). The average blood volume given also was higher among soldiers ( $4.53 \pm 4.27$  BU) compared with civilians ( $3.81 \pm 3.90$  BU;  $p < 0.01$ ). This was due to the larger representation of injured individuals in the group of hospitalized soldiers (79.2%) compared with hospitalized civilians (57.6%). A total of 63 massive blood-transfusion recipients (2.1% of all hospitalized patients and 7.3% of all transfused patients) received 725.5 BU (20.3% of total blood transfused). The average blood usage ranged from 61–153 BU/100 patients. In conclusion, hospital blood banks should be able to provide 2–3 times the peacetime blood supply during complex emergencies.

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### Operation Phoenix: Support of the Hospital Services in Sarajevo

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UK-Med is a nongovernmental organization which deployed to Sarajevo on behalf of the British Government to support the medical services in Sarajevo, Bosnia. This was a "turnkey"-type of operation and operated from May 1994 to March 1995. The main aims were to: 1) re-establish plastic surgery and rehabilitation services; 2) equip and develop an emergency service in the city; 3) support the WHO program; and 4) provide essential drugs and equipment.

The plastic surgery programme was unusual in using senior hospital specialists from the National Health Service for two-week periods. This innovative approach was necessary given the unusual circumstances and worked very well. We hope to repeat this approach in the future.

The emphasis on rehabilitation also was unusual. This important area needs more consideration in the future. A close working relationship with the WHO was essential and worked very well.

There were difficulties both logistically and operationally. We will cover these problems and the lessons learned. Health-care reform is badly needed in Bosnia, and the war is perceived as an ideal time to attempt it. We advised on reform of the hospital service and will discuss our deliberations. We will discuss the re-establishment of a hospital service following a period of war.

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### Emergency Medical Services in a Complex Emergency: The Siege of Sarajevo

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The siege of Sarajevo is a complex emergency of international significance. One of us (EP) performed a rapid assessment, reviewed internal reports, and collected epidemiological data on the status of emergency health care in the city during May 1993. In 33 months of war, 68,809 have been killed or wounded, 24% children. In a review of 220 casualties who arrived to the 2,000-bed Clinical Center, 60% were civilians, 6% of head trauma victims had the airway secured, and 30% with external hemorrhage had compressive bandages applied in the field. Ninety percent of casualties arrived in private vehicles.<sup>1</sup> Transport time ranged from 0.5–3 hours in 70%–80%. In a review of 71 patients who died at the 140-bed State Hospital, the primary cause of death was prolonged hemorrhagic shock; 61% died within 24 hours of injury.<sup>2</sup> Hospitals were running on auxiliary power supply, which was scarce. Essential equipment such as respirators, ECG monitors, anesthetics, and anesthesia machines were in short supply. The minimum standard of patient care was barely being met. Continuous assessment of emergency care needs accompanied by the well-coordinated and rapid delivery of unencumbered outside aid is needed, to avoid unnecessary deaths. Intentional "peacekeeping" forces must, at a minimum, protect hospitals and their staffs, ensure entry of humanitarian relief, and evacuate some patients for definitive care. Training of physicians in advanced trauma life support is essential.

#### References

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