

Intra-hospital Blood Bank Needs Identification Tool

Developed by DC EHC

Introduction and purpose:

The DC Emergency Healthcare Coalition (DC EHC or 'Coalition') regularly reviews and updates its collective vulnerabilities through updates to its Hazards Vulnerability Analysis (HVA). The 2011 revision identified potential limitations in emergency blood supply for the District of Columbia as a possible vulnerability during an emergency or disaster. Further investigation was conducted during 2012 to better understand the blood supply situation. This included meetings with the American Red Cross (ARC) and the American Association of Blood Banks (AABB). In addition, a survey of the blood product processing and use at DC EHC acute care facilities was conducted.

These activities revealed a robust capability at the national and regional levels for managing and distributing blood supplies during an emergency or disaster. At the same time, intra-hospital communications between the clinical departments and their respective blood banks was identified as a possible area for improvement.

This template tool was developed to improve and expedite the communication of needs from clinical departments to their intra-facility blood bank. Facilitating this interaction can expedite the transmission of projected blood product needs to regional blood banks, reducing the probability that blood products will be delayed or insufficient to meet emergency needs. This tool does not set any standard, and its use is not mandated. Some facilities may in fact have a more sophisticated mechanism for communicating between clinical services and their blood bank. This template is designed to support those facilities that do not have a pre-designated process.

Background:

A range of calculations have been published for estimating blood product needs during emergencies and disasters. Few have been validated through any controlled studies. The following concepts are relevant, and referenced to the publications list at the end of this document:

- US Department of Defense (DoD) has, in the past, used estimates of 3 uPRBCs of type O for each admitted trauma casualty.
- A 2007 HHS survey study generally supports the above DoD estimate. It is notable that 60% of all US hospitals responded to this survey. The average utilization of blood was 3 uPRBC *for all patient types requiring blood transfusion* - i.e. not just trauma.
- A PAHO study uses aggregate data from multiple countries and this provides an estimate of 2.33 uPRBC per trauma patient across all types of trauma situations.
 - The PAHO publication also recommends that systems estimate their total PRBC needs, and then add 4% for emergency (disaster) situations. There is no data provided on how this is calculated.

- Specific formulas for burns have been published, but they are supported by only limited data (e.g. burn area for grafting +donor site/32xtotal blood volume = predicted amount needed during a burn victim's hospital course)
- A historical US military perspective notes that 16% of all casualties reaching medical care in the Vietnam War required some form of blood transfusion.
- In 2000, 8% of admissions at Maryland Shock Trauma required transfusion services.
- The CDC projects that 50% of all casualties will typically arrive within the first hour after a large scale domestic, traumatic incident (the veracity of this estimate is questionable).
- An estimate for earthquake impact on US cites projects that 30% of the population seeking medical care will require hospitalization. Of these, only 5-10% will require blood products.
- Massive blood transfusion usage rates were documented in one UK study. In this study, the following were median usage rates per case.
 - 11 uPRBC
 - 4 uFFP
 - 2 PLT
 - 2 Cryoprecipitate
- The median use of uPRBC for massive transfusions in a US study was higher at 18 uPRBC. In this study, various amounts of FFP were transfused but as the ratio came closer to 1:1, patient mortality improved.
- The following are aggregated blood product use estimates in each of these major US incidents:
 - San Francisco earthquake, 1989: 40 uPRBC
 - Oklahoma City bombing, 1995: 131 uPRBC
 - World Trade Center, 2001: 258 uPRBC (in first 24 hours)

In summary, the aggregate blood use after domestic US disasters has not been extreme or overwhelming, but a significant potential for this remains. The data cited above suggests that, in certain types of mass trauma situations, the AABB estimation of 3 uPRBC average need per trauma casualty, aggregated across all casualties, may be an accurate projection. The above data elements were utilized in constructing the following tool for estimating needs.

Intra-facility blood tool:

Purpose: This form is designed to facilitate the ability of a transfusion service in an acute care facility to estimate the projected blood use needs for a mass trauma situation as it is developing. As the incident evolves, the projection method will shift to using more specific clinical information based upon the evaluation of individual patients.

Tool instruction: This form is designed to process information provided to the transfusion service by the clinical services at their facility. The form may be sequentially updated (time/date stamped) as the mass trauma situation evolves:

- Initial Blood Products Projection: This utilizes initial casualty estimates (section 5). The form is completed when the patient care receiving area, (usually the emergency department) receives initial notification of the expected number of casualties in route to your facility. Form is then immediately submitted to facility's transfusion services.

- Sequential Blood Products Projection (time/date stamped): This utilizes information from the initial clinical assessment of the arriving patients. (section 6)
- Follow-on Blood Products Projection (time/date stamped): This utilizes information from the patient receiving area for the aggregate cohort of incident patients, based upon the then current assessment of all incident patients. (section 6)

These are suggested uses only and the tool may be utilized more or less frequently by the facility as the situation dictates. The data should be rapidly conveyed to the appropriate facility's transfusion services each time new estimates are accumulated.

Blood needs estimation tool	1. FACILITY NAME	2. DATE	3. TIME	4. REPORTING AREA (e.g. Emergency Department)
		PREPARED	PREPARED	
5. Initial uPRBC ESTIMATES (projected based upon information from EMS or other sources)				
Estimated casualties by type	Casualty number	Multiplication estimate		**Estimated uPRBC (these are estimates only and should not be interpreted as definitive need)
Major patients: those expected to require immediate operative and/or critical care resources		X 3 uPRBC		
Moderate patients: those that may require a procedure and possible admission		X 2 uPRBC		
Minor patients: those that are expected to be discharged		X 0		0
Total expected/estimated:				____uPRBC
6. SUBSEQUENT Blood Product ESTIMATES (projected from casualty assessments)				
	MALE	FEMALE	Multiplication estimate	Estimated blood products (not definitive need)
Massive transfusion protocols: Number of patients expected to require initiation of massive transfusion protocol			X 18 uPRBC	
			X 18 FFP	
			X 3 PLT (single donor)	
			X 30 Cryo	
Number of patients needing immediate operative intervention for thoracic, abdominal, and/or vascular extremity injuries (next 0-4 hours)			X 3 uPRBC	
Number of patients needing operative intervention which can be temporarily (hours) delayed			X 2 uPRBC	
Other anticipated significant blood product needs for non-incident patients			uPRBC FFP PLT Cryo	
Totals			uPRBC FFP PLT Cryo	

References

- Hess J. Blood use in war and disaster: The US experience. *Scand J Trauma Resusc Emerg Med* 2005; 13; 74-81.
- Disaster Operations Handbook: Coordinating the Nation's Blood Supply during Disasters and Biological Events. American Association of Blood Banks. Version 2.0. October 2008.
- United States General Accounting Office. Maintaining an Adequate Blood Supply is Key to Emergency Preparedness. Statement of Janet Heinrich (Director, Health Care – Public Health Issues) before the Subcommittee on Oversight and Investigations, Committee on Energy and Commerce, House of Representatives. September 10, 2002. GAO-02-1095T
- Pan American Health Organization (PAHO). Recommendations for Estimating the Need for Blood and Blood Components. Washington DC, 2010.
- Fuller G, Bouamra O, Woodford M et al. Recent massive blood transfusion practice in England and Wales: view from a trauma registry. *Emerg Med J*, 2011. 10.1136/emj.2010.104349.
- Steadman, P, Pegg S. A quantitative assessment of blood loss in burn wound excision and grafting. *Burns* 1992, 18:6. 490-1.
- Duchesne J, Hunt J, Wahl G, et al. Review of current blood transfusions strategies in a mature level I trauma center: were we wrong for the last 60 years? *J Trauma*, 2008; 65 (2): 272-8
- Kashuk J, Moore E, Johnson J, et al. Postinjury life threatening coagulopathy: Is 1:1 fresh frozen plasma: packed red blood cells the answer? *J Trauma*, 2008, 65(2): 261-271
- Borgman M, Spinella P, Perkins J et al. The ration of blood products transfused affects mortality in patients receiving massive transfusions at a combat support hospital. *J Trauma*, 2007; 63 (4): 805-813