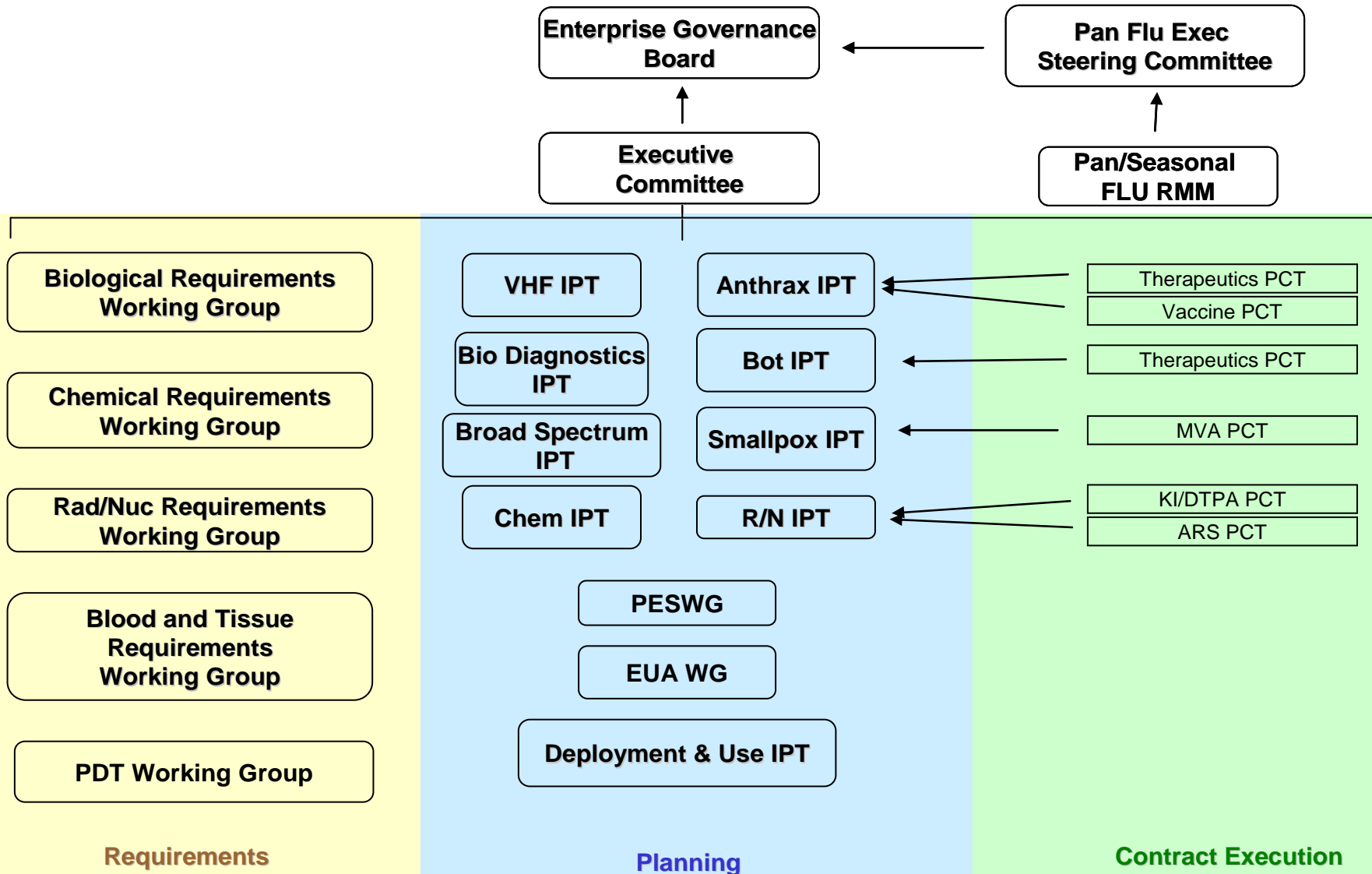




Topic Area Update: Blood and Tissue- Related Medical Countermeasures Working Group

**Jerry A. Holmberg, Ph.D.
Co-Chair Blood/Tissue Working Group**

BARDA Enterprise Governance Board Sub-Structure



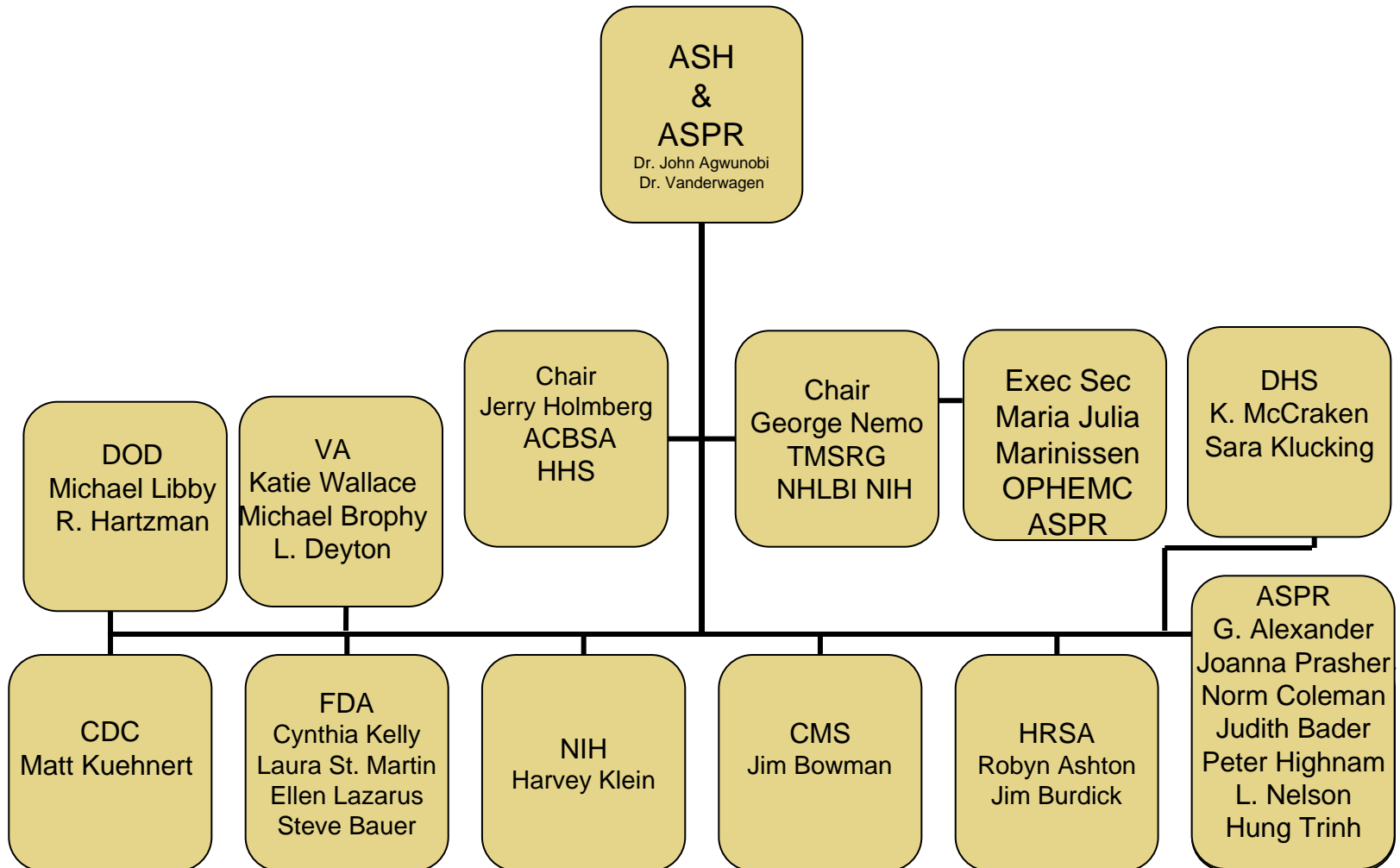
Biological, Chemical, Radiological/Nuclear and Blood/Tissue Medical Countermeasures (MCM) Requirements Working Group Charter

- Mission:
 - Working Groups established by the Enterprise Executive Committee
 - Determine which medical countermeasures, including blood and tissue, for Chemical, Biological, Radiological, or Nuclear (CBRN) threats
 - ❖ SNS
 - ❖ Affiliated Repositories
 - Reports to the Executive Committee

Blood and Tissue-related MCM WG Goal

- Identify and address blood and tissue requirements as part of the medical countermeasures that would be needed to counteract the medical consequences of public health emergencies, including a radiological or nuclear attack.
 - Strategic issues;
 - Quantities;
 - Availability and suitability of blood and tissue products currently held in USG supplies, commercially available, or in the development pipeline;
 - Blood and tissue product use in the context of deployment strategies and utilization policies that are supportable by current and foreseeable response capabilities of Federal, State, local, and tribal public health emergency responders following a CBRN event;
 - Blood and tissue product specifications that are compatible with the medical need and with available resources/capabilities.
- Biannual report to the Executive Committee in November.

Organizational Structure







MADRID BOMBING

- 191 DEATHS
- MORE THAN 2000 INJURED

Information presented by Pedro Martínez Tenorio, MD. At HRSA Meeting Dec 10, 2004

MADRID

National Disasters: March 11th

- Conditions:
 - » Head Trauma
 - » Amputations
 - » Thoracic Trauma
 - » Abdominal Trauma
 - » Hip Fractures
 - » Concussions
 - » Tympanic perforations
 - » Scalp

Information presented by Pedro Martínez Tenorio. MD. At HRSA Meeting Dec 10, 2004

Madrid Bombing of March 11, 2004

Blood Usage following the Madrid Bombing

	March 11	March 12	Total
RBC	696	594	1290
Platelets	89	68	157
Fresh Frozen Plasma	246	209	455

Information presented by Pedro Martínez Tenorio. MD. At HRSA Meeting Dec 10, 2004

Madrid Bombing

Products	Total # of Product Transfused	Total # Serious Patients*	Average # of Units per Patient
RBC	1,290	273	4.7
Platelets	157	273	0.6
FFP	455	273	1.7

* Unknown the number of patients that were transfused. Average is based only on the number of serious patients seen.

Donations

- 1963 donations

- 53% of donors were 18-29 years old



Blood Product Transfusions For OIF and OEF

As of 30 June 2007

		Total # Units Transfused	Total # Pts Transfused	Average # Units/Pt	Low	High
WB	OIF/OEF	5,939	1,029	5.8	1	48*
RBCs	OIF/OEF	83,000	14,323	5.8	1	143*
Platelets	OIF/OEF	3,534	1,467	2.4	1	29*
FFP	OIF/OEF	40,039	6,226	6.4	1	98*
Cryo	OIF/OEF	11,220	1,010	11.1	1	114*

- Non-U.S. patients in Iraq
- Used with permission of the Armed Services Blood Program Office

OIF United States (U.S.) Patient Transfusions vs. Wounded in Action (WIA)

As of 30 June 2007

	Total # Products Transfused to U.S. Patients	Total # U.S. Patients Transfused	Average # Products Per Transfused U.S. Patient	Average # Products Per WIA*	% of U.S. Transfused Patients Per WIA*
WB	3,107	442	7.0	0.12	1.7%
RBCs	22,040	3,350	6.6	0.83	12.6%
PLTs	1,303	506	2.6	0.05	1.9%
FFP	11,923	1,704	7.0	0.45	6.4%
CRYO	4,333	344	12.6	0.16	1.3%

- OIF: Number of WIA: 26,558
 - Used with permission of the Armed Services Blood Program Office
- (Source: WHS)

OEF U.S. Patient Transfusions vs. WIA

As of 30 June 2007

	Total # of Products Transfused to U.S. Patients	Total # of U.S. Patients Transfused	Average # Products per Transfused U.S. Patient	Average # of Products per WIA*	% of Transfused Patients per WIA*
WB	96	14	6.9	0.07	1.0%
RBCs	1062	201	5.3	0.78	14.8%
PLTs	15	2	7.5	0.01	0.1%
FFP	368	74	5.0	0.27	5.4%
CRYO	72	12	6.0	0.05	0.9%

* OEF: Number of WIA: 1,361

- Used with permission of the Armed Services Blood Program Office

(Source: WHS)

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Blood Components/Casualty

Event	year	Casualty/ Blood rec	PRBC	FFP	random Platelets	Cryo	Total components
Lebanon I	1982	657	2.8	1.1	0.11	0.27	1.5
“Intifada”*	2000-05	7,497	1.3				0.9
Lebanon II	2006	1,923	2.7	1.0	1.7	0.4	3.1
Lebanon I	1982	224	8.2	3.4	0.34	0.8	4.5
“Intifada”*	2000-05	1,512	6.7				4.5
Lebanon II	2006	120	8.0	4.2	2.4	3.0	9.7

*Injury Severity Score-as evaluated by the “triaging” EMS teams on the scene

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Blood & components needed in Wars and Mass Casualties

Year	Event	No. of Casualties involved	No. of severe/moderate	Supply/casualty		Supply/blood recipient	
				Units	Components	Units	Components
1982-3	Lebanon War I	657	224 (34%)	2.8	1.5	8.2	4.5
1996-7	Terrorists Attacks	546	NA*	3.2	1.7		
2000-5	“El-Aktza* Intifada”	7,497	1,512 (20%)	1.3	0.9	6.7	4.5
2006	Lebanon War II	1,923	120 (6.2%)	2.7	3.1	8.0	9.7

***Injury Severity Score-as evaluated by the “triaging” EMS teams on the scene**

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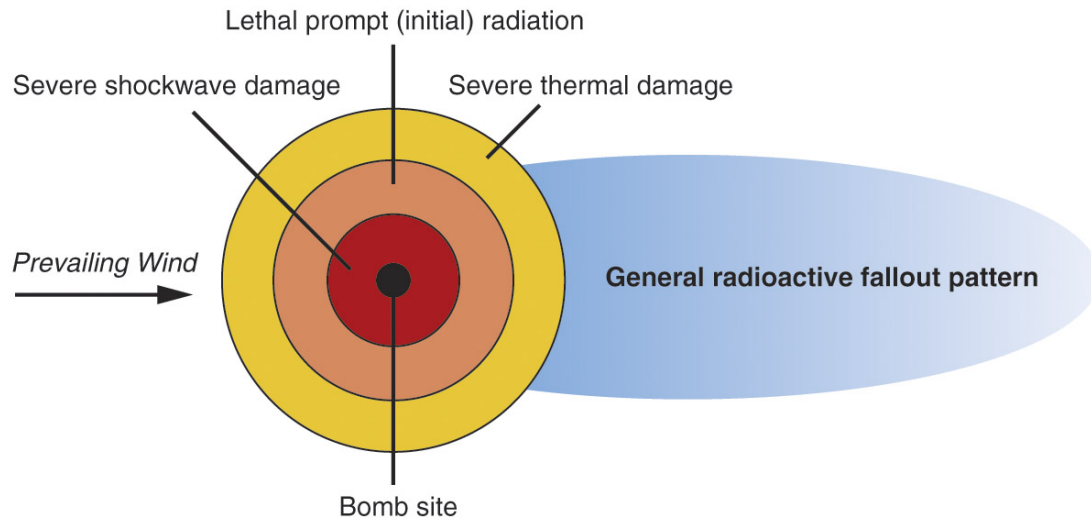
Blood Services SOPs in a Nutshell

- ☆ Receive notification, ASAP, from the EMS central dispatch, regarding:
 - ☆ Extent and type of the event
 - ☆ Total number of casualties, gender, injury severity score and the admitting medical centers
- ☆ Asses the national blood inventory
- ☆ “Calculate” **2.7** blood units, **3.1** component /casualty
or **8** blood units, **9.7** component /severe & moderate
- ☆ Contact the receiving hospitals for update and needs
- ☆ Supply needed blood (ground or air transportation)
- ☆ Evaluate the need for a public appeal



RAD/NUC Blood Assumptions

- Based on 10KT
- Potential blood use
 - 10-20K will need blood support
 - Irradiated products will be used in first response if available
 - Supportive care should be with irradiated blood products



RAD/NUC Blood Assumptions

- Current blood use in irradiated patients for BMT
 - Partial
 - ❖ RBC 2 units
 - ❖ Platelet 12-18 equivalent units
 - Total
 - ❖ RBC 8-12 units
 - ❖ Platelets 40-60 units

RAD/NUC Potential Blood Requirement

- Initially possible requirement
 - 40,000 units of RBC
 - 24,000 equivalent units of platelets
 - 68,000 units of FFP
- GAP
 - Country's surge capacity?
 - ❖ Estimated daily collections are approx 40K per day
 - ❖ Currently country is less than 3 days of supply
 - ❖ Less 10% of blood supply irradiated.
 - Country's response wave?

Potential Blood Requirement

- Initially possible requirement
 - 40,000 units of RBC
 - 24,000 equivalent units of platelets
 - 68,000 units of FFP
- GAP
 - Country's surge capacity?
 - ❖ Estimated daily collections are 38,000 per day
 - ❖ Currently country is less than 3 days of supply
 - ❖ Less 10% of blood supply irradiated.
 - Country's response wave?
 - Modeling requirement

Short Term Solutions

- Blood as a critical medical counter measure
- Local planning and national participation with monitoring systems - BASIS
- National Blood Reserve
- Frozen products as backfield
 - Frozen RBC
 - Frozen Platelets
 - Fresh Frozen Plasma
- Hemostatic agents

Long Term Solutions

- Efficacy studies of whole blood v. component therapy
- Efficacy studies of age of blood
- Rapid Testing to support initial screening “walking donors”
- Hemoglobin based Oxygen Carriers (HBOC)
- Coagulation “cocktail”
- Platelet Substitutes
- Pathogen inactivation

Next Steps:

- Request National Blood Reserve be placed on Enterprise Governance Body agenda
- Contact national and international SMEs on blood and tissue requirements in mass casualty events
 - UK
 - Chernobyl
 - Israel
- Explore frozen and substitute platelet products
- Refine models with blood and tissue requirements