



# IRC THURSDAY AFTERNOON LIVE



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# Emocomponenti e LTOWB in ambito tattico

Vincenzo Mauro GIACONELLA



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# OBIETTIVO



Overview a livello internazionale sull'utilizzo delle trasfusioni di sangue e/o emocomponenti in ambito tattico (ambiente ostile semi/non-permissivo).



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# RIFERIMENTI





## TCCC UPDATES

### Fluid Resuscitation in Tactical Combat Casualty Care

#### TCCC Guidelines Change 21-01

4 November 2021

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*Travis Deaton, MD<sup>1</sup>; Jonathan Auten, DO<sup>2</sup>; Richard Betzold, MD<sup>3</sup>; Frank Butler, MD<sup>4</sup>;  
Terence Byrne, SOCM<sup>5</sup>; Andre Cap, MD, PhD<sup>6</sup>; Ben Donham, MD<sup>7</sup>; Joseph DuBose, MD<sup>8</sup>;  
Andrew D. Fisher, MD, PA-C<sup>9</sup>; James Hancock, MD<sup>10</sup>; Victor Jourdain, MD<sup>11</sup>; Ryan Knight, MD<sup>12</sup>;  
Lanny Littlejohn, MD<sup>13</sup>; Matthew Martin, MD<sup>14</sup>; Kevin Toland, SOIDC<sup>15</sup>; Brendon Drew, DO<sup>16</sup>*

**In summary, the currently available evidence indicates that neither crystalloids nor Hextend are acceptable options for the prehospital fluid resuscitation of trauma patients in hemorrhagic shock.**



# DAMAGE CONTROL RESUSCITATION (DCR)

VS


# REMOTE DAMAGE CONTROL RESUSCITATION (RDCR)



UKRAINE

## Ukraine's first blood transfusion in trench paves way for increased combat survival rates

Performing a blood transfusion in a trench within the "golden hour" rather than waiting for evacuation to a stabilization point or hospital has the potential to save many more lives among Ukraine's wounded soldiers.

 BY IRYNA VOICHUK · 15/11/2023 · 1

<https://euromaidanpress.com/2023/11/15/ukraines-first-blood-transfusion-in-trench-paves-way-for-increased-combat-survival-rates/#:~:text=Ukraine,Ukraine's%20first%20blood%20transfusion%20in%20trench%20paves%20way%20for%20increased,lives%20among%20Ukraine's%20wounded%20soldiers>



Joint Trauma System

# TCCC GUIDELINES 2024

25 JAN 2024



## e. Fluid resuscitation

- Assess for hemorrhagic shock (altered mental status in the absence of brain injury and/or weak or absent radial pulse).
- The resuscitation fluids of choice for casualties in hemorrhagic shock, listed from most to least preferred, are:

1. Cold stored low titer O whole blood
2. Pre-screened low titer O fresh whole blood
3. Plasma, red blood cells (RBCs) and platelets in a 1:1:1 ratio
4. Plasma and RBCs in a 1:1 ratio
5. Plasma or RBCs alone

### Balanced component therapy (BCT)

- Resuscitate with cold stored low titer O whole blood, or, if not available
- Pre-screened low titer O fresh whole blood, or, if not available
- Plasma, RBCs, and platelets in a 1:1:1 ratio, or, if not available
- Plasma and RBCs in a 1:1 ratio, or, if not available
- Reconstituted dried plasma, liquid plasma or thawed plasma alone or RBCs alone
- Reassess the casualty after each unit. Continue resuscitation until a palpable radial pulse, improved mental status or systolic BP of 100 mmHg is present.
- Discontinue fluid administration when one or more of the above end points has been achieved.
- If blood products are transfused, administer one gram of calcium (30 ml of 10% calcium gluconate or 10 ml of 10% calcium chloride) IV/IO after the first transfused product.



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# TRANSFUSION CRITERIA



## RABT Score


**Penetrating** injury  
**Positive** FAST  
**SI > 1.0**  
**Pelvic Fracture**

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**≥ 2 predicts MT**

Joseph et al. World J Surg 2018  
Hanna et al World J Surg 2020

Revised Assessment of Bleeding and Transfusion (RABT) Score for Predicting Massive Transfusion

JOINT TRAUMA SYSTEM CLINICAL PRACTICE GUIDELINE (JTS CPG)	
	<b>Prehospital Blood Transfusion</b> The CPG provides a brief summary of the scientific literature for prehospital blood use and essential instructions on resuscitation procedures using blood products.
Contributors	
MSG Jared Voller, MC, USA CAPT Joshua M. Tobin, MC, USNR COL Andrew P Cap, MC, USA COL Cord W Cunningham, MC, USAR HMC Michael Denoyer, MC, USN CAPT Brendon Drew, MC, USN	COL Jay Johannigman, MC, USAR Elizabeth Mann-Salinas, PhD, COL(ret), USA CAPT Benjamin D Walrath, MC, USN COL Jennifer Gurney, MC, USA Col Stacy A Shackelford, USAF, MC
Publication Date: 30 Oct 2020	

**Severe Traumatic Injury: ISS ≥16 and ≥ 2 body regions injured with AIS severity ≥ 2 AND SBP < 100 OR HR > 100 OR hematocrit < 32% OR pH <7.25) within 3 hours of injury**



# LTOWB BENEFITS



THOR 2018

## Raising the standards on whole blood

DOI: 10.1097/TA.0000000000001778  
© 2017 Wolters Kluwer Health, Inc.

*J Trauma Acute Care Surg*  
Volume 84, Number 6, Supplement 1  
Yazer et al.

**TABLE 1.** Benefits of Low Titer Group O WB Compared With Blood Components for Hemorrhagic Shock

### Efficacy

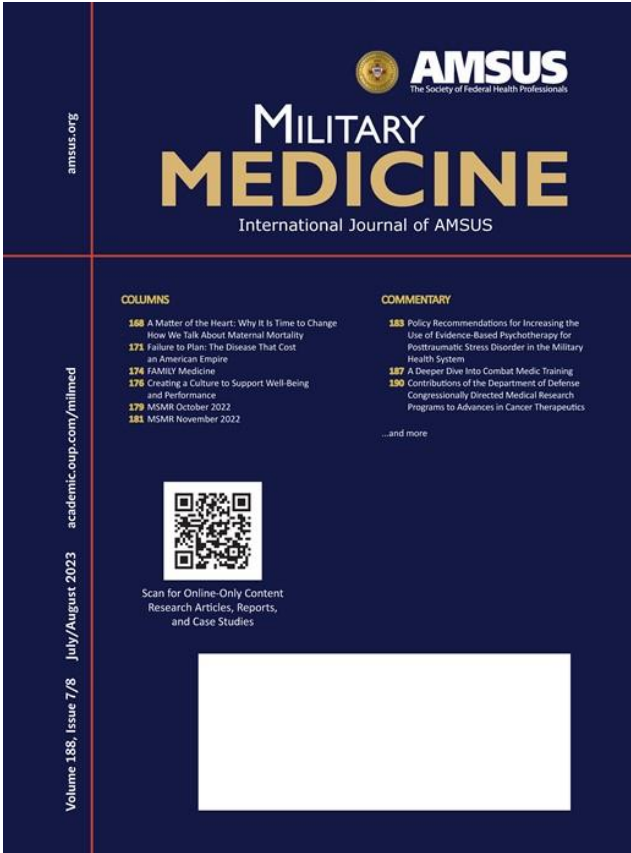
- The cold stored platelets provide improved hemostasis compared to room temperature platelets
- More concentrated product that contains less anticoagulants and additive solution than an equal amount of components

### Safety

- Reduced risk of hemolysis from the low titer incompatible plasma compared to the risk from untitered incompatible plasma or platelets
- Reduced risk of bacterial contamination compared to room temperature stored platelets
- Impressive safety record with over 1 million units transfused in combat and civilian settings

### Logistic

- Increased access to platelets for both prehospital and early in-hospital resuscitations
- Simplifies and accelerates the provision of all blood components needed to treat hemorrhagic shock

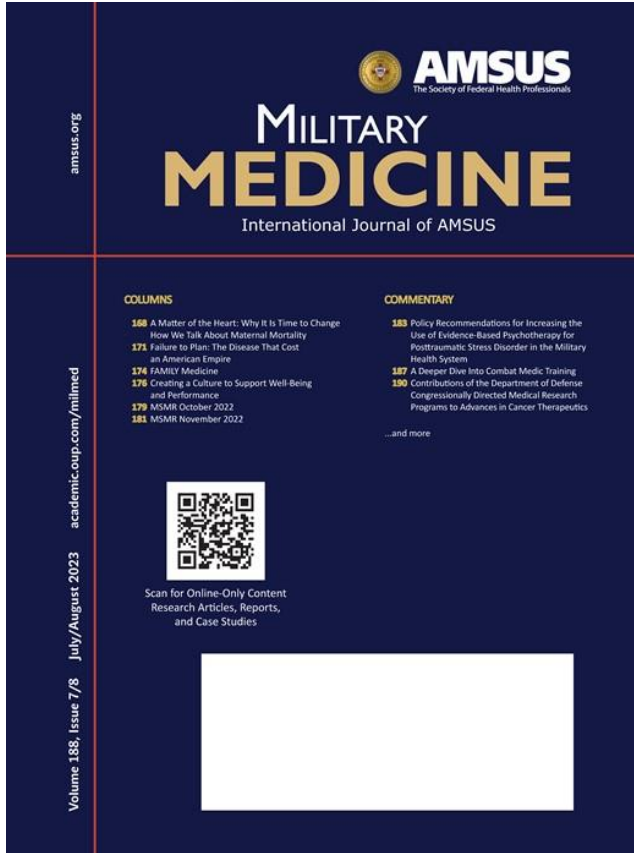


## Whole Blood Transfusion FREE

Andrew P Cap, MC USA, Andrew Beckett, MC CAF, Avi Benov, MC IDF, Matthew Borgman, MC USA, Jacob Chen, MC IDF, Jason B Corley, MSC USA, Heidi Doughty, MC UK, Andrew Fisher, SP USA, Elon Glassberg, MC IDF, Richard Gonzales, MSC USA ... Show more

*Military Medicine*, Volume 183, Issue suppl\_2, September-October 2018, Pages 44–51,  
<https://doi.org/10.1093/milmed/usy120>

- Low titer group O whole blood can be considered the standard of care in resuscitation of major hemorrhage.
- The preferred donors for FWB are fully pre-screened, low titer O donors.



## Practical Considerations for a Military Whole Blood Program <sup>FREE</sup>

Marshall Bahr, MD, USA, Andrew P Cap, MD, USA, Devin Dishong, Mark H Yazer, MD  
*Military Medicine*, Volume 185, Issue 7-8, July-August 2020, Pages e1032–e1038,  
<https://doi.org/10.1093/milmed/usz466>



**Cold-stored LTOWB that has been screened for TTDs is the preferred product for resuscitation of severe hemorrhage and simplifies the logistics of transfusion.**

## Ranger O Low Titer (ROLO): Whole Blood Transfusion for Forward Deployed Units

[Get access >](#)

Kaoru H Song, MC, USA, Hans M Winebrenner, MC, USA, Ty E Able, MSC, USA, Charles B Bowen, MSC, USA, Noel A Dunn, MC, USA, Joseph D Shevchik, MC, USA  
*Military Medicine*, Volume 188, Issue 7-8, July/August 2023, Pages e2733–e2737,  
<https://doi.org/10.1093/milmed/usab473>



**Fresh Whole Blood VS Cold-Stored Whole Blood**




# Blood Product Administration During the Role 1 Phase of Care: The Prehospital Trauma Registry Experience <sup>FREE</sup>

Andrew D Fisher, MD, MPAS, Matthew W Paulson, BA, Jerome T McKay, PhD, James Bynum, PhD, Kathleen M Flarity, DNP, PhD, Michelle Howell, BSN, Vikhyat S Bebarta, MD, Steven G Schauer, DO, MS

*Military Medicine*, Volume 187, Issue 1-2, January/February 2022, Pages e70–e75,  
<https://doi.org/10.1093/milmed/usaa563>

amsus.org



## MILITARY MEDICINE

International Journal of AMSUS

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amsus.org
academic.oup.com/milmed
Volume 188, Issue 7/8 July/August 2023

Prehospital Trauma Registry	Demographics	18-25	7% (2)
		26-33	29% (11)
		34-41	17% (5)
		Unknown age	35% (10)
	Component	Male	100% (28)
		U.S. Conventional	3% (1)
		U.S. Special Operations	29% (8)
		NATO	3% (1)
	Mechanisms of injury <sup>a</sup>	Host nation	64% (18)
		Explosive	28% (8)
	Firearm	64% (18)	
	Fragmentation	7% (2)	
	Burn	3% (1)	
Location	Afghanistan	85% (24)	
	Iraq	11% (3)	
	Syria	3% (1)	
DoD Trauma Registry <sup>b</sup>	Injury severity score	Composite	20 (8-32)
	Serious injuries by body region	Head/neck	5% (1)
		Face	0% (0)
		Thorax	52% (9)
		Abdomen	29% (5)
		Extremities	23% (4)
		Skin	11% (2)
Outcome	Survival to discharge	94% (16)	

<sup>a</sup>Patients could have had more than one mechanism of injury (MOI) listed.

<sup>b</sup>Seventeen patients were linked from the Prehospital Trauma Registry to the DoDTR.



Whole Blood  
Field Transfusion  
Course

<https://thor.podia.com/thor-whole-blood-transfusion-course>



Transfusion: Volume 64, Issue S2

## A Supplement to TRANSFUSION The THOR Network 2024 Remote Damage Control Resuscitation Supplement

Pages: I-VI, S1-S209

May 2024

Issue Edited by: Mark H. Yazer, Sarah A. Watts, Christine M. Leeper

Received: 30 December 2023 | Revised: 1 January 2024 | Accepted: 2 January 2024

DOI: 10.1111/trf.17718

MILITARY TRANSFUSION

TRANSFUSION

### Deploying whole blood to the battlefield—The Israel Defense Forces Medical Corps initial experience during the 2023 war

Ofer Almog<sup>1,2</sup> | Avi Benov<sup>1,3</sup> | Zivan Beer<sup>1,2</sup> | Tsvi Sirotkin<sup>1</sup> | Omri Shental<sup>1</sup> | Elon Glassberg<sup>1,3,4</sup>

[wileyonlinelibrary.com/journal/trf](https://wileyonlinelibrary.com/journal/trf)

*Transfusion.* 2024;64:S14–S18.

The goal was to make whole blood (LTOWB) available as close as possible to the point of injury and within minutes from time of injury (by "mobile intensive care unit").



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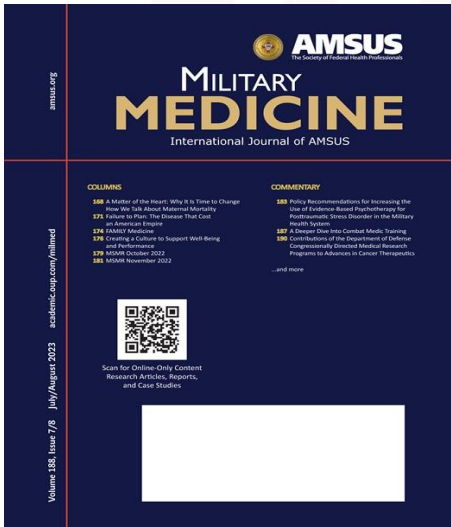
Blood and Transplant

# Dried blood plasma project to help save soldiers' lives launches

24 April 2023

...dried plasma can be stored at room temperature...

<https://www.nhsbt.nhs.uk/news/dried-blood-plasma-project-to-help-save-soldiers-lives-launches/>



## Damage Control Resuscitation FREE

Andrew P Cap and others

*Military Medicine*, Volume 183, Issue suppl\_2, September-October 2018, Pages 36–43,

<https://doi.org/10.1093/milmed/usy112>

...spray-dried plasma

Spray-dried plasma contains clinically meaningful levels of coagulation activity and in vitro data suggest robust ability to generate thrombus.

THE JOURNAL OF AAB

transfusion.org

# TRANSFUSION

SUPPLEMENT ARTICLE

## Spray-dried plasma: A post-traumatic blood “bridge” for life-saving resuscitation

Mark A. Popovsky Nathan White

First published: 16 July 2021 | <https://doi.org/10.1111/trf.16536>



Italian Resuscitation Council

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## Emergency Whole Blood use in the Field: A Simplified Protocol for Collection and Transfusion

G Strandenes, MD<sup>1,2</sup>; M De Pasquale, 18D, NREMT-P, BS<sup>3</sup>; A P Cap, MD, PhD, FACP<sup>4</sup>; Tor A Hervig, MD, PhD<sup>2</sup>; EK Kristoffersen, MD, PhD<sup>2</sup>; M Hickey, DO, MPH<sup>5</sup>; C Cordova, PA-C, MPAS<sup>6</sup>; O Berseus, MD, PhD<sup>7</sup>; HS Eliassen, OF-1<sup>2</sup>; L Fisher, HMCS, SOIDC<sup>8</sup>; S Williams, RN, CEN, CFRN<sup>9</sup>; PC Spinella, MD, FCCM<sup>4,10</sup>

- **Buddy Transfusion**

Malsby R, 3rd, Frizzi J, Ray P, Raff J. Walking donor transfusion in a far forward environment. Southern Medical Journal. 2005;98(8):809-10. PubMed PMID: 16144177

- **Field Donor Card**

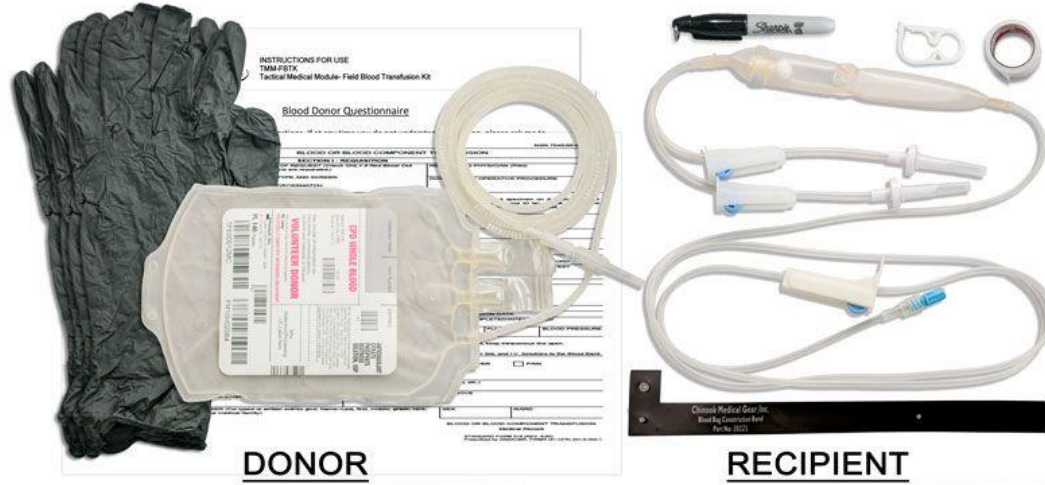
- **Pre-mission donated blood/Field Blood Bank (Walking Blood Bank)**

- **Recycling Blood from a Wound**

Neading R et al, Approach to Handling Atypical Field Blood Transfusion Scenarios, JSOM Volume 23, Edition 1 / Spring 2023; 76-81.



# FIELD BLOOD TRANSFUSION KIT

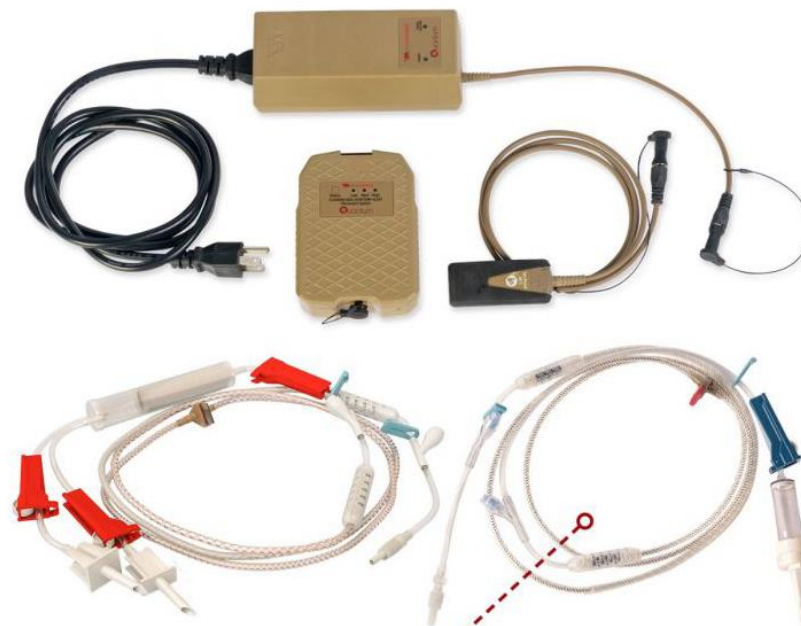


A blood typing card with four wells labeled 'Anti-A', 'Anti-B', 'Anti-D', and 'Control'. Below the wells is a form for patient information in multiple languages. The card also includes a lot number 'LOT 20321 X 2022-06 J'.

Name / Nom / Nom - Nom - Nom - Nom - Nom - Nom - Nom - Nom	Address / Dirección / Endereço / Adresse / Adresse / Adresse / Adresse / Adresse
Name / Nom / Nom - Nom - Nom - Nom - Nom - Nom - Nom - Nom Address / Dirección / Endereço / Adresse / Adresse / Adresse / Adresse / Adresse	Address / Dirección / Endereço / Adresse / Adresse / Adresse / Adresse / Adresse
Sex / Sexo / Geschlecht / Sexe / Sexe / Sexe / Sexe / Sexe Birth / Nacimiento / Aniversário / Nato / Date de naissance / Geboren / Geboort / Fødselsdato / Fødselsdato / Fødselsdato / Fødselsdato	Signature / Firma / Signat / Firma / Signature / Unterschrift / Unterschrift / Unterschrift / Unterschrift / Unterschrift / Unterschrift
ABC (Rhous D)	Date / Fecha / Data / Date / Datum / Datum / Datum / Datum



# FLUID WARMING SYSTEM



***Thermal Infusion Set***



# ATTUALE POLICY



BLOOD PROGRAMMES OF NATO NATIONS

AMedP-1.1-1\_EDA\_V1\_E\_SRD\_2939 (settembre 2018)



NORTH ATLANTIC TREATY ORGANIZATION

ALLIED MEDICAL PUBLICATION

Decreto Interministeriale 20 ottobre 2022 Allegato "B"  
Soccorritore Militare per le Forze Speciali



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# PROSPETTIVE FUTURE



- Artificial Blood Development Project.....



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***“Per gestire una crisi occorre sapere imparare rapidamente... per imparare rapidamente nel corso della crisi è necessario avere già imparato molto tempo prima”***

**Patrick Lagadec**



**GRAZIE PER  
L'ATTENZIONE!!!**



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