RDSTF – Region 5
Trauma Advisory Board

Whole Blood Transfusion
Guideline Resource

March 2022

Dear Trauma & EMA Stakeholders,

Hemorrhage from trauma remains a major cause of death and disability, approaching 20% for adult patients and 24% for pediatric patients within the first 24 hours of injury. Studies repeatedly show that a significant portion of potentially preventable pre-hospital deaths are from hemorrhage (1). In light of this, the need to continuously advance procedures and practices for field care of hemorrhage is critical towards achieving the goal of zero preventable deaths from trauma.

Beginning with the extensive efforts of the United States military's Joint Trauma System in the 2000s, research has demonstrated the value of blood product transfusion over normal saline, culminating in the adoption of a 1:1 transfusion protocol as a standard practice (2). This transition from large volume infusion of normal saline to 1:1 transfusion of packed red blood cells (PRBC) and fresh frozen plasma has demonstrated dramatic improvements in rates of survival (2). The next step from 1:1 product transfusion is the development of processes and protocols for whole blood transfusion, both within Trauma centers and in the field for EMS providers.

The Florida Regional Domestic Security Task Force Region 5 Trauma Advisory Board with the support of the Central Florida Disaster Medical Coalition has established an ad hoc committee to review the existing literature and practices for whole blood transfusion by Florida's EMS agencies. The goal is to develop a document that will serve as a resource for EMS agencies within Region 5 that seek to develop guidelines for whole blood infusion by EMS and that will also serve as a model for other EMS agencies across Florida.

Respectfully,

Peter A. Pappas MD FACS
Executive Director
RDSTF-5 Trauma Advisory Board

1. Mark H Yazer, Philip C Spinella, Eric A Bank, Jeremy W Cannon, Nancy M Dunbar, John B Holcomb, Bryon P Jackson, Donald Jenkins, Michael Levy, Paul E Pepe, Jason L Sperry, James R Stubbs, Christopher J Winckler THOR-AABB Working Party Recommendations for a Prehospital Blood Product Transfusion Program Prehosp Emerg Care. 2021 Nov 19;1-13. doi: 10.1080/10903127.2021.1995089. Online ahead of print.

2. Holcomb JB, Tilley BC, Baraniuk S, Fox EE, Wade CE, Podbielski JM, del Junco DJ, Brasel KJ, Bulger EM, Callcut RA, et al. Transfusion of plasma, platelets, and red blood cells in a 1:1:1 vs a 1:1:2 ratio and mortality in patients with severe trauma: the PROPPR randomized clinical trial. JAMA. 2015;313(5):471–82. doi:10.1001/jama.2015.12

Region 5 Blood in the Field Guide

The CFDMC formed an ad hoc committee to review and develop a guide for bringing blood products to the prehospital world. Every red blood cell counts after trauma and the earlier we can get blood products on board the better the chance for recovery. Included in this document is a PowerPoint discussing how and why blood prehospital is important, a mock grant proposal, check sheets for equipment and blood, equipment quotes, refrigeration products and pricing etc. The goal was to include everything needed to move forward as an agency with prehospital blood products.

As EMS Chief at Martin County Fire Rescue I fought long and hard to put together our whole blood program and was met with defeatist attitudes at every turn. Most said that it hasn't been done that way or that it was an impossible task. It took years but it was accomplished. We saw positive results on day one. It isn't an impossible task. Blood products in the prehospital environment save lives which makes the task worth the effort to engage.

The first thing you must do is secure the funding. A mock grant proposal is included. The Florida DOH Matching EMS Grant is a 75% matching grant available separate from the EMS Grant that EMS agencies split up each year.

Second, contact OneBlood, or another blood product supply company. OneBlood is statewide and is establishing a universal contract for prehospital agencies. Their contact is:

> Frieda Bright, MT(ASCP)SBB MHA
> Director of Compatibility Labs West Region
> OneBlood
> Office- 561-540-6633 Ext 26633
> Cell - 561-758-2302

Next, review the product list with your chosen blood supply company. You will need specific refrigeration, coolers, check sheets, tracking forms and delivery receiving procedures. An example of these procedures and products has been included.

Protocols for use will have to be written. Included is the protocol we created for MCFR.

Once these hurdles have been accomplished you will be well on your way to implementation.

Christopher Kammel, BA CCEMT-P
Bureau Chief, Rescue
Martin County Fire Rescue

Whole Blood Transfusions

How and Why

Whole Blood Transfusions

- ACLS has the ABC's
- PHTLS-ITLS and all new paramedic curriculums start with the XABC's. The X stands for Exsanguination.
- STOP the Bleed Program
  - Two studies presented at the American College of Surgeons (ACS) Clinical Congress 2020 provide evidence that STOP THE BLEED® training is effective and has made a lifesaving difference around the world. /www.newswise.com/articles/stop-the-bleed-training
  - EVERY RED BLOOD CELL COUNTS AFTER TRAUMA

Whole Blood

Hemorrhage accounts for 30%–40% of total trauma deaths.[1] Blood transfusion with balanced components (red cell concentrate, plasma, platelets, and cryoprecipitate) is the current standard of care for patients suffering from hemorrhagic shock.[2-5] The United States military is using whole blood, both out-of-hospital and in the deployed hospital setting, as a **standard of care**.

Recent studies evaluating blood product transfusion (both plasma and RBC) in the prehospital setting have shown that these products are associated with improved early outcomes, with little wastage.

References:
https://onlinelibrary.wiley.com/doi/full/10.1002/emp2.12089
https://cbc.org.br/wp-content/uploads/2017/11/112017SCiv.pdf

Whole Blood

In 2011, Haut and colleagues59 showed, that patients with trauma who received prehospital IV lines had significantly higher mortality than those who did not. The patients receiving prehospital IV fluid were receiving crystalloid only resuscitation.

Reference:
https://cbc.org.br/wp-content/uploads/2017/11/112017SCiv.pdf

Whole Blood Transfusions

- Single most effective treatment for hemorrhagic shock
- Hemorrhagic shock is responsible for 40% of mortality in traumatic injuries
- Cost in Martin County 2020
  - $448.06 per unit
  - 32 units/ 1 year = $14,337.92
  - 32 units to 16 patients = $896.12 per patient

Whole Blood in Martin County 2020

- 11 survived, 5 deceased
- $1,433.80 per survivor
- Has been added to billing
- 0.8% of the overall operating budget for helicopter

Whole Blood in Martin County 2020

- Blood Refrigerator-$4,000
- Blood Cooler-$1,000
- Protocol and Policy (sample included in this packet)
- IV warmer sets and unit-$6,000
- Estimated start up cost $11,000
- Florida's primary blood supplier is One Blood
  - They require a contract for supply

Applicant Information

Special Note: Section 401.111, Florida Statutes, requires the state to assist private nonprofit youth athletic organizations that work in conjunction with local EMS with costs for automated external defibrillators. We intend to fund grant requests of this type.

Optional: In your application package cover letter you may request to be, or recommend a person to be, a reviewer of matching grant applications during this grant cycle.

Request for Grant Fund Distribution Page: This page is the last page of the grant application. You must complete the top part of the form and state EMS staff will complete the bottom portion, as indicated on the form.

Ask a staff member of your organization who does cash transactions with the state for the organization name to use on the Distribution Form and the exact corresponding address of its 9-digit federal tax ID plus its 3-digit sequence code.

Number of Pages: Each application must be no more than 15 one-sided pages, including the form and all content. However, you may submit a one-page cover letter and letters of recommendation. These pages will not count against the total page limit. Please note, reviewers are not required to read anything over 15 one-sided pages.

Fastening. If you send a paper application, do not use a booklet cover. Simply staple it in the upper left corner, with the first page of the application form the first of the stapled pages.

While preparing the application, you may contact state EMS staff for assistance.

EMS MATCHING GRANT APPLICATION

FLORIDA DEPARTMENT OF HEALTH
Emergency Medical Services Program

Complete all items unless instructed differently within the application.

Type of Grant Requested: ☐ **Rural** ☐ **Matching**

ID Code (The State EMS Section will assign the ID Code – (leave this blank) _____

1. Organization Name:
2. Grant Signer: (The applicant signatory who has authority to sign contracts, grants, and other legal documents. This individual must also sign this application.)
Name:
Position Title:
Address:

City:	County:
State: Florida	Zip Code:
Telephone:	Fax Number:
Email Address:	

3. Contact Person: (The individual with direct knowledge of the project on a day-to-day basis and responsibility for the implementation of the grant activities. This person may sign project reports and may request project changes. The signer and the contact person may be the same.)
Name:
Position Title:
Address:

City:	County:
State: Florida	Zip Code:
Telephone:	Fax Number:
Email Address:	

4. Legal Status of Applicant Organization (Check only one response):
   (1) ☐ Private Not for Profit [Attach documentation-501 (3) ©]
   (2) ☐ Private for Profit
   (3) ☐ City/Municipality/Town/Village
   (4) ☐ County
   (5) ☐ State
   (6) ☐ Other (specify): _____

5. Federal Tax ID Number (Nine Digit Number): VF _ _ _ _ _ _ _ _ _

6. EMS License Number: _____ Type: ☐Transport ☐Non-transport ☐Both

7. Number of Permitted Vehicles by Type: _____ BLS _____ ALS Transport _____ ALS non-transport

8. Type of Service (check one): ☐ Rescue ☐ Fire ☐ Third Service (County or City Government, non-fire) ☐ Air Ambulance ☐ Fixed Wing ☐ Rotor Wing ☐ Both ☐ Other (specify) _____

9. Medical Director of Licensed EMS Provider: If this project is approved, I agree by signing below that I will affirm my authority and responsibility for the use of all medical equipment and/or the provision of all continuing EMS education in this project. **[No signature is needed if medical equipment and professional EMS education are not in this project.]**

Signature: _____ Date: _____

Print/Type: Name of Director _____

Florida License Number _____

Note: All organizations that are not licensed EMS providers must obtain the signature of the medical director of the licensed EMS provider responsible for EMS services in their area of operation for projects that involve medical equipment and/or continuing EMS education.

If your activity is a research or evaluation project, omit Items 10, 11, 12, 13, and skip to Item Number 14. Otherwise, proceed to Item 10 and the following items.

10. Justification Summary: Provide on no more than three one-sided, double-spaced pages, a summary addressing this project covering each topic listed below.

A) Problem description (Provide a narrative of the problem or need);
B) Present situation (Describe how the situation is being handled now);
C) The proposed solution (Present your proposed solution);
D) Consequences if not funded (Explain what will happen if this project is not funded);
E) The geographic area to be addressed (Provide a narrative description of the geographic area);
F) The proposed time frames (Provide a list of the time frame(s) for completing this project);
G) Data sources (Provide a complete description of data source(s) you cite);
H) Statement attesting that the proposal is not a duplication of a previous effort (State that this project doesn't duplicate what you've done on other grant projects under this grant program).

Next, only complete one of the following: Items 11, 12, 13 or 14. Read all four and then select and complete the one that pertains the most to the preceding Justification Summary. Note that on all, that credible before-after differences for emergency victim data are the highest scoring items on the Matching Grants Evaluation Worksheet used by reviewers to evaluate your application form.

11. Outcome for Projects that Provide or Effect Direct Services to Emergency Victims: This may include vehicles, medical and rescue equipment, communications, navigation, dispatch, and all other things that impact upon on-site treatment, rescue, and benefit of emergency victims at the emergency scene. Use no more than two additional one-sided, double-spaced pages for your response. Include the following.

A) Quantify what the situation has been in the most recent 12 months for which you have data (include the dates). The strongest data will include numbers of deaths and injuries during this time.
B) In the 12 months after this project's resources are on-line, estimate what the numbers you provided under the preceding "(A)" should become.
C) Justify and explain how you derived the numbers in (A) and (B), above.
D) What other outcome of this project do you expect? Be quantitative and explain the derivation of your figures.
E) How does this integrate into your agency's five-year plan?

12. Outcome for Training Projects: This includes training of all types for the public, first responders, law enforcement personnel, EMS and other healthcare staff. Use no more than two additional one-sided, double-spaced pages for your response. Include the following:

A) How many people received the training this project proposes in the most recent 12-month time period for which you have data (include the dates).
B) How many people do you estimate will successfully complete this training in the 12 months after training begins?
C) If this training is designed to have an impact on injuries, deaths, or other emergency victim data, provide the impact data for the 12 months before the training and project what the data should be in the 12 months after the training.
D) Explain the derivation of all figures.
E) How does this integrate into your agency's five-year plan?

13. Outcome or Other Projects: This includes quality assurance, management, administrative, and other. Provide numeric data in your responses, if possible, that bear directly upon the project and emergency victim deaths, injuries, and/or other data. Use no more than two additional one-sided, double-spaced pages for your response. Include the following.

A) What has the situation been in the most recent 12 months for which you have data (include the dates)?
B) What will the situation be in the 12 months after the project services are on-line?
C) If this project is designed to have an impact on injuries, deaths, or other emergency victim data, provide the impact data for the 12 months before the project and what the data should be in the 12 months after the project.
D) Explain the derivation of all numbers.
E) How does this integrate into your agency's five-year plan?

Skip Item 14 and go to Item 15, unless your project is research and evaluation and you have not completed the preceding Justification Summary and one outcome item.

14. Research and Evaluation Justification Summary and Outcome: You may use no more than three additional one-sided, double spaced pages for this item.

A) Justify the need for this project as it relates to EMS.
B) Identify (1) location and (2) population to which this research pertains.
C) Among population identified in 14(B) above, specify a past time frame, and provide the number of deaths, injuries, or other adverse conditions during this time that you estimate the practical application of this research will reduce (or positive effect that it will increase).
D) (1) Provide the expected numeric change when the anticipated findings of this project are placed into practical use.
(2) Explain the basis for your estimates.
E) State your hypothesis.
F) Provide the method and design for this project.
G) Attach any questionnaires or involved documents that will be used.
H) If human or other living subjects are involved in this research, provide documentation that you will comply with all applicable federal and state laws regarding research subjects.
I) Describe how you will collect and analyze the data.

ALL APPLICANTS MUST COMPLETE ITEM 15.

15. Statutory Considerations and Criteria: The following are based on s. 401.113(2)(b) and 401.117, F.S. Use no more than one additional double-spaced page to complete this item. Write N/A for those things in this section that do not pertain to this project. Respond to all others.

Justify that this project will:
A) Serve the requirements of the population upon which it will impact.
B) Enable emergency vehicles and their staff to conform to state standards established by law or rule of the department.
C) Enable the vehicles of your organization to contain at least the minimum equipment and supplies as required by law, rule or regulation of the department.
D) Enable the vehicles of your organization to have, at a minimum, a direct communications linkup with the operating base and hospital designated as the primary receiving facility.
E) Enable your organization to improve or expand the provision of:
1) EMS services on a county, multi county, or area wide basis.
2) Single EMS provider or coordinated methods of delivering services.
3) Coordination of all EMS communication links with police, fire, emergency vehicles, and other related services.

16. Work Activities and Time Frames: Indicate the major activities for completing the project (use only the space provided). Be reasonable, most projects cannot be completed in less than six months and if it is a communications project, it will take about a year. Also, if you are purchasing certain makes of ambulances, it takes at least nine months for them to be delivered after the bid is let.

Work Activity	***Number of Months After Grant Starts***	
	___Begin___	___End___
Craft training documents and program	Day 1	Day 20
Purchase Blood refrigerator and cooler	Day 1	Day 20
Establish contract with One Blood	Day 1	Day 30
Write protocol approved by Medical director	Day 1	Day 30
Purchase IV warmer and sets	Day 1	Day 30

17. County Governments: If this application is being submitted by a county agency, describe in the space below why this request cannot be paid for out of funds awarded under the state EMS county grant program. Include in the explanation why any unspent county grant funds, which are now in your county accounts, cannot be allocated in whole or part for the costs herein.

Blood products are prohibitively expensive during start up due to the increased price of refrigeration and transport. Total start up is estimated at $11,000 plus the cost of maintaining the product supply for the first year that can be as much as $30,000. Blood use and waste is determined by a shelf life of less than 28 days combined with the frequency of patients that qualify for blood products. This variability is inherent in the system and therefore challenging to accurately estimate. (YOUR DEPARTMWENT) responds to (NUMBER OF TRAUMA CALLS) per year, of which (PERCENT THAT ARE TRAUMA ALERTS) are trauma alerts. Therefore the estimated use of blood is _____, and 50% waste is expected until a trade policy can be created with local Trauma Centers.

18. Budget:		
Salaries and Benefits: For each position title, provide the amount of salary per hour, FICA per hour, fringe benefits, and the total number of hours.	**Costs**	**Justification:** Provide a brief justification why each of the positions and the numbers of hours are necessary for this project.
NA		
TOTAL:	**$ 0.00**	Right click on 0.00 then left click on "Update Field" to calculate Total

Expenses*: These are travel costs and the usual, ordinary, and incidental expenditures by an agency, such as, commodities and supplies of a consumable nature, excluding expenditures classified as operating capital outlay (see next category).	**Costs:** List the price and source(s) of the price identified.	**Justification:** Justify why each of the expense items and quantities are necessary to this project.
$(calculate 2x trauma alerts times $438, the cost of each unit)	$	
Blood refrigerator	**Approx. $4,000**	
Blood Cooler and Accessories	**$2,000 - $5,000**	
Warmer	**$3,000 - $7,000**	
IV Sets	$2,000	
TOTAL:	**$ 0.00**	Right click on 0.00 then left click on "Update Field" to calculate Total

***Above estimated costs are for demonstration purposes and representative of a range of prices for equipment reviewed by the Whole Blood Ad hoc Committee in January and February of 2022. True costs will depend on specific equipment chosen by an Agency.**

Vehicles, Equipment, and Other: Operating capital outlay means equipment, fixtures, and other tangible personal property of a non-consumable and non-expendable nature, and the normal expected life of which is 1 year or more.	**Costs:** List the price of the item and the source(s) used to identify the price.	**Justification:** State why each of the items and quantities listed is a necessary component of this project.
NA		
TOTAL:	**$ 0.00**	Right click on 0.00 then left click on "Update Field" to calculate Total

State Amount (Check applicable program)		
☐ Matching: 75 Percent	**$ 0.00**	Right click on 0.00 then left click on "Update Field" to calculate Total
☐ Rural: 90 Percent	**$0.00**	Right click on 0.00 then left click on "Update Field" to calculate Total
Local Match Amount (Check applicable program)		
☐ Matching: 25 Percent	**$ 0.00**	Right click on 0.00 then left click on "Update Field" to calculate Total
☐ Rural: 10 Percent	**$ 0.00**	Right click on 0.00 then left click on "Update Field" to calculate Total
Grand Total	**$ 0.00**	Right click on 0.00 then left click on "Update

19. Certification:

My signature below certifies the following.

I am aware that any omissions, falsifications, misstatements, or misrepresentations in this application may disqualify me for this grant and, if funded, may be grounds for termination at a later date. I understand that any information I give may be investigated as allowed by law. I certify that to the best of my knowledge and belief all of the statements contained herein and, on any attachments, are true, correct, complete, and made in good faith.

I agree that any and all information submitted in this application will become a public document pursuant to Section 119.07, F.S. when received by the Florida Bureau of EMS. This includes material which the applicant might consider to be confidential or a trade secret. Any claim of confidentiality is waived by the applicant upon submission of this application pursuant to Section 119.07, F.S., effective after opening by the Florida Bureau of EMS.

I accept that in the best interests of the State, the Florida Bureau of EMS reserves the right to reject or revise any and all grant proposals or waive any minor irregularity or technicality in proposals received and can exercise that right.

I, the undersigned, understand and accept that the Notice of Matching Grant Awards will be advertised in the *Florida Administrative Weekly*, and that 21 days after this advertisement is published I waive any right to challenge or protest the awards pursuant to Chapter 120, F.S.

I certify that the cash match will be expended between the beginning and ending dates of the grant and will be used in strict accordance with the content of the application and approved budget for the activities identified. In addition, the budget shall not exceed the department approved funds for those activities identified in the notification letter. No funds count towards satisfying this grant if the funds were also used to satisfy a matching requirement of another state grant. All cash, salaries, fringe benefits, expenses, equipment, and other expenses as listed in this application shall be committed and used for the activities approved as a part of this grant.

Acceptance of Terms and Conditions: If awarded a grant, I certify that I will comply with all of the above and also accept any attached grant terms and conditions and acknowledge this by signing below.

Signature of Authorized Grant Signer (Individual Identified in Item 2)	/ / MM / DD / YY

THE TOP PART OF THE FOLLOWING PAGE MUST ALSO BE COMPLETED AND SIGNED.

FLORIDA DEPARTMENT OF HEALTH
EMERGENCY MEDICAL SERVICES (EMS) GRANT UNIT

REQUEST FOR GRANT FUND DISTRIBUTION

In accordance with the provisions of section 401.113(2) (a), *Florida Statutes*, the undersigned hereby requests an EMS grant fund distribution for the improvement and expansion of pre-hospital EMS.

DOH Remit Payment To:
Ask a finance person in your organization who does business with the state to provide the information to complete the top part of this form, but it should be signed by the person identified in Item 2, 1st application page.

Name of Agency: _____

Mailing Address: _____

_____

Federal 9-digit Identification Number: _____ 3-digit Seq. Code _____

Authorized County Official: _____
Signature **Date**

_____
Type or Print Name and Title

Sign and return this page with your application to:

Florida Department of Health
Emergency Medical Services Unit, Grants
4052 Bald Cypress Way, Bin A-22
Tallahassee, Florida 32399-1722

Do not write below this line. For use by State Emergency Medical Services Section

Grant Amount for State to Pay: $_____ Grant ID: Code: _____

Approved By: _____ _____
Signature of State EMS Unit Supervisor Date

Approved By: _____ _____
Signature of Contract Manager Date

State Fiscal Year: 2019 - 2020

Organization Code	EO	OCA	Object Code	Category
64-61-70-30-000	03	SF003	751000	059999

Federal Tax ID: VF ___ ___ ___ ___ ___ ___ ___ ___ ___ Seq. Code: ___ ___ ___

Grant Beginning Date: _____ Grant Ending Date: _____

Blood Product Administration

Martin County Fire Rescue LifeStar will carry whole blood for the use in the hemodynamically unstable trauma or medical patient with either external or suspected internal hemorrhage. Consider early use in patients who exhibit evidence of decompensating shock.

Permissive Hypotension

In adult trauma a sustained SBP **~90 mmhg or greater** is generally acceptable before aggressive fluid resuscitation is required. The goal of fluid resuscitation is to maintain mentation and evidence of adequate peripheral perfusion which approximates to SBP of 90 (radial pulse), SpO2 > 94% and EtCO2 levels between 35-45 mmHg.

Caution

IV Medications other than Normal Saline cannot be given in the same IV/IO as blood products. A separate IV/IO line must be utilized to deliver medications if blood is being infused in order to avoid blood interactions.

INDICATIONS

- ☐ Signs and symptoms consistent with shock:
  - Hypotension
  - Weak to absent radial pulse
  - Pale/Blue, cool/cold, clammy/diaphoretic skin
  - Decrease LOC, confusion/altered/unconscious
- ☐ Positive FAST exam
- ☐ Cardiac arrest occurs after care has been initiated for trauma

CONTRAINDICATIONS

- ☐ Patient refusal of blood products
- ☐ Blood product unavailable

CONSENT

- ☐ Prior to blood administration for the awake, alert and competent adult the following must be explained to patient
  - A description of the risks, benefits and treatment alternatives (this includes non-treatment)
  - The opportunity to ask questions
  - The right to accept or refuse blood products

Blood Product Administration

PRE-PROCEDURE

- ☐ Obtain temperature with vital signs
- ☐ Obtain consent, if possible
- ☐ Establish 2 large bore IV /IO
- ☐ Draw PURPLE TOP vacutainer but DO NOT DELAY treatment
- ☐ Assess lung sounds

PROCEDURE

- ☐ **Adult 1 unit of Whole Blood**, repeat as needed
- ☐ **Pediatric (before puberty) 10ml/kg of Whole Blood**, repeat as needed
- ☐ Ask if patient has ever had blood transfusion in past with any adverse reactions
- ☐ IFT's: Obtain copy of blood type/screen from sending facility, if available
- ☐ Check blood product for release date from facility and expiration date
- ☐ Document on the blood bag date and start time with signature
- ☐ Second crew member will sign on the "Verified By" line.
- ☐ Blood products will be used with IV warmer
- ☐ Pressure bag may be used at 300 mmHg or less
- ☐ During the first 10 minutes, administer as slowly as patient condition allows while observing for signs/symptoms of a transfusion reaction. DO NOT WITHHOLD blood if patient condition calls for rapid infusion.
- ☐ After the first 10 minutes, run wide open
- ☐ Blood must be delivered within 4 hours of being removed from cooler
- ☐ STOP IMMEDIATELY if reaction develops

TRANSFUSION REACTIONS

Transfusion reactions can occur due to allergens in the donated blood or donor incompatibility of blood type or Rh factor. Bacterial contamination of the blood or access site is very rare but can also cause a transfusion reaction that resembles sepsis with signs and symptoms occurring rapidly or within 30 minutes. **Signs and symptoms include:**

- ☐ Increase in body temp of 1° F or more
- ☐ Hives, itching or skin symptoms
- ☐ Headache
- ☐ Facial flushing
- ☐ Cough, Angioedema
- ☐ Wheezing
- ☐ Anaphylaxis
- ☐ Abdominal cramping
- ☐ Chest or Flank pain
- ☐ Palpitations
- ☐ Tachycardia
- ☐ Hypotension

Blood Product Administration

TRANFUSION REACTION

- ☐ IMMEDIATELY disconnect blood and tubing from the patient (save and turn over to receiving facility.)
- ☐ Withdraw and discard blood from IV lock, if possible and flush with **Normal Saline**
- ☐ Hang bag of **Normal Saline** to maintain IV patency and prevent clotting
- ☐ Assess temperature with vital signs
- ☐ Follow Allergic Reaction Protocol

TRANSFUSION COMPLETE

- ☐ Flush IV with **Normal Saline**
- ☐ Record completion time on blood bag
- ☐ Reassess and monitor patient vitals, temperature and response to transfusion

DOCUMENTATION

- ☐ Unit number
- ☐ Time of infusion started and completed
- ☐ Volume and rate of infusion
- ☐ Reaction yes/no
- ☐ Temperature with vital signs before, during and after transfusion

INTERFACILITY TRANSPORTS

- ☐ If sending facility provides blood and blood is not used during transport, turn in blood to receiving facility's blood bank for proper log in and storage.

HEMORRHAGE CONTROL

- ☐ Aggressive hemorrhage control measures should be conducted prior to or simultaneously with blood product administration **per Trauma Standing Orders.** Also refer to:
  - **Extremity Injury Protocol** PRN
  - **Abdominal/Pelvic Injury Protocol** PRN
  - **Chest Injury Protocol** PRN

Stages	Signs and Symptoms				
	Blood loss	**HR**	**RR**	**BP**	**LOC**
I	<15% or 750ml	>100	14-20	Normal	Slightly anxious
II	15-30% 750-1500ml	100-120	20-30	Normal	Mildly anxious
III	30-40% 1500-2000ml	120-130	30-40	Decreased	Anxiously confused
IV	>40% >2000ml	>140	>35	Decreased	Confused lethargic

MARTIN COUNTY FIRE RESCUE
LIFESTAR

Uncrossmatched Emergency Blood Release Form

Patient's Name_____ Date_____ Time_____

Flight Number_____ Flight Crew_____/_____

Receiving Hospital and Room # _____ Attending Physician_____

BLOOD CERTIFIED AS COMPATIBLE FOR THIS PATIENT CANNOT BE SUPPLIED BECAUSE OF INSUFFICIENT TIME FOR GROUPING, TYPING AND/OR CROSSMATCHING

Patient received _____ units of whole blood during flight and hospital staff notified that crossmatch needed

Female of childbearing age received _____ units of whole blood and may need RhoGAM

The units of blood referenced above were infused in the interest of protecting this patient from exsanguination, but we do not take responsibility for complete compatibility of the blood with that of the patient. The unit number(s) is/are:

Unit #_____Type_____Start Time_____End Time_____Amt Infused_____

Unit #_____Type_____Start Time_____End Time_____Amt Infused_____

Unit #_____Type_____Start Time_____End Time_____Amt Infused_____

Vitals Signs at Receiving Hospital: Time: _____ HR_____ BP_____/_____ RESP_____ TEMP_____

The patient exhibited signs/symptoms of a transfusion reaction during transport. YES/NO (Circle one)

If yes, what was the reaction?_____ Time of reaction?_____

Flight Crew 1 Signature_____/Printed Name_____Date_____

Flight Crew 2 Signature_____/Printed Name_____Date_____

I understand the information above regarding the emergency administration of uncrossmatched blood and am aware of the need to complete crossmatch and possible administration of RhoGAM.

Signed_____, RN Date: _____
Receiving Nurse

The clinical condition for the above-named patient is sufficiently urgent to necessitate this emergency transfusion before compatibility testing could be completed. The benefits of the transfusion outweigh the potential risk.

Signed_____, M.D. Date: _____
Receiving Physician

Flight crew will provide a photo copy of this form, in addition to the completed PCR including all vital signs, to the receiving facility. The original will be maintained with the patient's flight records

Form Rev. 1/29/20

Helmer SCIENTIFIC
14400 Bergen Boulevard
Noblesville,IN 46060

QUOTATION

Toll Free: 800.743.5637
EMAIL or FAX orders to:
orders@helmerinc.com
317-773-9082

Creation Date: 10/4/2017 8:20:13 AM

Quote #:
QUO-32789-F0C2M6
Rev: 1

PLEASE REFER TO THIS QUOTE NUMBER ON ALL CORRESPONDENCES AND ORDERS

YOUR REPRESENTATIVE:
Kathie Smith
317-773-9073 ext 3811
ksmith@helmerinc.com

Requestor: Cory Richter

772-221-2350

Facility ID:

Martin County Board of County Commissioners
2401 SE Monterey Rd
Stuart FL 34996

Ship to:

CONTRACT	Vizient T1	CE0260
Terms: N0 Days	**FOB:** Destination	**Shipping Charge:** Prepaid and Add
Effective Date		2017-10-04
Expiration Date		2017-12-31

Ln No	Part#	Model	Description / Details	QTY	Price Each	Total /Extended
1	5100105-1	iB105	iB105 i.Series® Blood Bank Refrigerator Undercounter, 5CF (142 Liters)	1	$3,696.93	$3,696.93
2	500004-1		Lift Gate Service	1	$272.00	$272.00

		Sub Total:	$3,968.93
Shipping Method:	-		
We accept Visa, Mastercard and American Express		**Total Amount:** All prices are in USD	**$3,968.93**

Notes:

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Noblesville,IN 46060

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317-773-9073 ext 3811
ksmith@helmerinc.com

Terms & Conditions: This quotation is for the goods named, and supersedes all other quotations, agreements, understandings, warranties and representations, written or oral, subject to the conditions noted: State and Local taxes will be collected on all sales unless a Tax Exempt Certificate is provided at time of order if applicable. A 3% processing fee will be assessed on credit card orders over $5,000.00. If applicable freight charges are subject to change. This offer is subject to change or withdrawal by Helmer prior to acceptance.

Return Policy: Helmer equipment may be returned for a credit under the following conditions: the equipment is new and unused, a return authorization has been issued by technical service within ninety (90) days after shipment, the equipment is received at Helmer within thirty (30) days of issuance of the return authorization, the equipment is returned in original packaging or Helmer issued packaging at the customer's expense, the freight to return the equipment is the responsibility of the customer, a 20% restocking fee plus any additional return costs will be deducted from the credit, the credit will be issued at the time equipment is inspected by Helmer and deemed in good condition, special request and/or customized units are not returnable to Helmer.

Customer Information Updates: Helmer may request new customers and established customers to complete a new customer form in order to create or update current account information. This requirement will be contingent on order amount and prior history with Helmer.

Domestic Warranties	i.Series			Horizon/Scientific		
	Compressor	Parts	Labor	Compressor	Parts	Labor
Refrigerators	7 yr	2 yr	1 yr	5 yr	2 yr	1 yr
Countertop Refrigerator	2 yr Parts, 2 yr Labor					
-30 Freezers	5 yr	2 yr	1 yr	3 yr	2 yr	1 yr
UltraLow Freezers	5 yr	2 yr	2 yr			
Platelet Incubators	5 yr	2 yr	1 yr	3 yr	2 yr	1 yr
Platelet Agitators	2 yr Parts, 1 yr Labor					
Plasma Thawers	2 yr Parts, 1 yr Labor					
Cell Washers	2 yr Parts, 1 yr Labor					
Centrifuges	5 yr Power Train, 2 yr Parts, 1 yr Labor					

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YOUR REPRESENTATIVE:
Kathie Smith
317-773-9073 ext 3811
ksmith@helmerinc.com

Configured As:

Line No: 1
Model: iB105
Item Number: 5100105-1
Description:

iB105 i.Series® Blood Bank Refrigerator - Undercounter, 5 cu ft (142 Liters)

Part Number	*Description*	*Qty*	*Price Each*
5100105-1	iB105 i.Series® Blood Bank Refrigerator - Undercounter, 5 cu ft (142 Liters)	1	3,696.93
4010001-1	Power Option: 115V 60Hz (for i.Series® Undercounter Refrigerators, 5 cu ft)	1	0.00
4110006-1	Power Cord Option: 115V 60Hz NEMA 5-15	1	0.00
4020001-1	Exterior Option: Powder Coat (for Undercounter Refrigerators, 5 cu ft)	1	0.00
4030001-1	Interior Option: Powder Coat (for Undercounter Refrigerators, 5 cu ft)	1	0.00
4040001-1	Light Option: None (for Undercounter Refrigerators, 5 cu ft)	1	0.00
4050001-1	Chart Recorder Option: Included (for 115V Undercounter Refrigerators with NEMA 5-15 plug, 5 cu ft)	1	0.00
4060001-1	Lock Option: Standard Key (for Undercounter Refrigerators and Freezers with Powder Coat Exterior, 5 cu ft)	1	0.00
4080022-1	Handle Option: Low Profile Locking (for Undercounter Refrigerators with Right Hinge Door, 4/5 cu ft)	1	0.00
4070001-1	Door Option: Right Hinge, Solid (for i.Series® Undercounter Refrigerators with Powder Coat Exterior, 5 cu ft)	1	0.00
4090017-1		1	0.00

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YOUR REPRESENTATIVE:
Kathie Smith
317-773-9073 ext 3811
ksmith@helmerinc.com

	Storage Option: Drawer, Factory Installed (for i.Series® Undercounter Refrigerators, 5 cu ft)		
4090017-1	Storage Option: Drawer, Factory Installed (for i.Series® Undercounter Refrigerators, 5 cu ft)	1	0.00
4900001-1	Special Option: Leveling Feet - Factory Installed (for Undercounter Refrigerators and Freezers, 5 cu ft)	1	0.00

Total Price: $3,696.93

Registered in Accordance with ISO 13485

Quotation

Quotation Title: Martin County Fire Rescue
Quotation Number: 7938
Account Id: 9444
Quotation Date: 02 Oct 2017
Expiration Date: 01 Nov 2017
Approver/Our Contact: Carmen Martinez

Bill To:

Cory Richter
Martin County Fire Rescue
800 SE Monterey Rd.
Stuart,Fl. 34994
Country: USA
772-288-5710
EMAIL: Crichter@martin.fl.us

Ship To:

Cory Richter
Martin County Fire Rescue
800 SE Monterey Rd.
Stuart,Fl. 34994
Country: USA
772-288-5710
EMAIL: Crichter@martin.fl.us

We are pleased to submit this quote in response to your recent request.
Please call us at 770-480-0146 if you require any clarifications.

Warranty:
Products are warranteed against failure for a period of one year. The warranty is void if the device has been dropped or misused, or if by unauthorized personnel repair has been attempted.
No representation is made for fitness for a particular application.
Packaging and Shipping:
Products will be packaged appropriately, and shipped 'Best Way' unless requested otherwise.

Please note that purchase orders once accepted by us cannot be cancelled.

Sales Person	F.O.B	Terms
Derek Bennett	Origin	Net 30

Parts#	Products	Quantity	Unit Price	Amount	Total
905-00010	The Belmont® Buddy Disposable Set-The disposable set features a large venting membrane which automatically vents air. Pressure-regulating valve prevents excess pressure from reaching unit and patient. 24/box	1	534.75	534.75	No
905-00017	The Belmont® Buddy Lite Fluid Warmer-The system includes the battery assembly, the heater unit and the external universal battery charger. List Price $2,520.00	1	2,520.00	2,520.00	No
905-00022	The Belmont® Buddy Lite AC Fluid Warmer-The system includes the battery assembly, the heater unit,external AC power supply and the external universal battery charger.	1	3,210.00	3,210.00	No
				TOTAL DUE ($):	0.00

Thank you for your business.

PELICAN BioThermal™

Crēdo ProMed™

THERMAL PACKAGING SOLUTIONS

THERMALLY PROTECTED MEDICAL TRANSPORTERS

Designed specifically for the dynamic needs of pharmaceutical reps and first responders, the Crēdo ProMed™ product line currently consists of three different sized temperature-controlled portable medical transport bags that thermally protect the integrity of valuable pharmaceutical samples and medical supply payloads for 72 - 96 hours.

The outer bag is constructed of highly durable ballistic nylon fabric and the patented TIC™ panels with phase change material and VIP components contained within, are qualified to consistently protect medical materials such as blood, platelets, and commercial bio-pharma product samples within two ranges (2-8°C and 15-25°C).

MATERIALS

Outer Container:

Ballistic Nylon Fabric with high quality faux leather trim accents and durable web strapping and secure buckles

Color Options:

Standard Tan*

*Other colors available upon request

CRĒDO PROMED™

DURATION
72 - 96 HOURS

SERIES 4

TEMPERATURE
2°C to 8°C

VOLUMES
2L, 4L, 8L

SERIES 22

TEMPERATURE
15°C to 25°C

VOLUMES
2L, 4L, 8L

PELICANBIOTHERMAL.COM

CRĒDO PROMED™ SERIES

In response to an identified need by pharmaceutical clients, we developed a dependable, easy-to-use “load and go” thermal protection soft-side bag.

The Crēdo ProMed™ is the same patented passive thermal protection technology that is part of the Crēdo Cube™ product family and is now available in three convenient payload volume sizes. These hand portable, highly durable and convenient to use soft-sided bags offer:

- **Easy conditioning** of the TIC™ system panels which makes the ProMed a simple, nimble, and consistently reliable option. Once the TIC™ system panels are staged and properly placed inside the VIP (vacuum insulated panels) assembly, simply insert payload content and be on your way
- **Rugged and sturdy** supportive interior side panels, double-stitched seams, reinforced protective corners, durable buckle straps, comfortable padded shoulder strap and a water and soil resistant protective bottom panel
- **A sophisticated design** with a clear view pocket for business essentials and a sturdy elastic back strap designed to slip effortlessly over telescoping handles enabling secure transport on top of wheeled bags

2 LITERS PAYLOAD

4 LITERS PAYLOAD

8 LITERS PAYLOAD

Type	Liters	Exterior Dimensions - Inches	Interior Dimensions - Inches	Tare Weight - lbs
SERIES 4				
Series 4	2L	10 x 9 x 8	6 x 5 x 4	8
Series 4 472	4L	12 x 12 x 11	6 x 6 x 6	12
Series 4 872	8L	16 x 11 x 11	11 x 7 x 7	18
SERIES 22				
Series 22C	2L	10 x 9 x 8	6 x 5 x 4	8
Series 22C 472	4L	12 x 12 x 11	6 x 6 x 6	12
Series 22C 872	8L	16 x 11 x 11	11 x 7 x 7	22

FOR MORE INFORMATION ABOUT PELICAN BIOTHERMAL PRODUCTS, PLEASE CONTACT:

INFO@PELICANBIOTHERMAL.COM T: +1 763 412 4800 PELICANBIOTHERMAL.COM

ISO17025, ISO9001-2008 Accredited

LIFESTAR DAILY BLOOD PRODUCT TEMPERATURE LOG

YEAR: _____ MONTH: _____ REFRIGERATOR ID: _____

ACCEPTABLE REFRIGERATOR TEMPERATURE RANGE 1° - 6° C

DAY OF THE MONTH	DIGITAL TEMP (°C)	CHART TEMP (°C)	SAFE-T-VUE INDICATOR IS GREEN (✓)	BLOOD PRODUCT VISUAL INSPECTION (✓)	CREW MEMBER INITIALS
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					

LIFESTAR COORDINATOR REVIEW: _____ DATE: _____

LIFESTAR BLOOD PRODUCT STORAGE AND MONITORING EQUIPMENT POLICY

RECEIVING OF FRESH BLOOD PRODUCTS

- Upon receipt of fresh blood products, two Martin County flight crew members will jointly verify that each unit of blood is:
    - Properly labeled with correct identifying information.
    - Within the appropriate expiration date and time period.
    - Visually inspected for contamination, damage or excessive temperature via the Safe-T-Vue indicator.
    - Immediately return any unit of blood that is deemed contaminated, damaged or out of temperature.

STORAGE OF BLOOD PRODUCTS

- Attach LIFESTAR **Uncrossedmatched Emergency Blood Release Form** to each unit of blood.
- Place each unit of blood in either the blood refrigerator or transport cooler.
- Ensure proper monitoring of blood products for adequate temperature control.
- If unable to maintain proper temperature range return blood product immediately.
- Complete the **LIFESTAR BLOOD PRODUCT TRACKING LOG**.
- Blood products will be stored in an approved blood refrigerator labeled "**FOR BLOOD PRODUCTS ONLY**".

BLOOD PRODUCT DESTRUCTION

- Blood product must be destroyed if packaging is broken or if blood product temperature exceeds >6° C.
- In the event a unit must be destroyed it will immediately be quarantined in the blood refrigerator.
- The destroyed unit of blood must be documented on the **LIFESTAR BLOOD PRODUCT TRACKING LOG**.
- Anytime a unit of blood is destroyed the **QA PATIENT SAFETY REPORT** must be completed and forwarded to the LIFESTAR coordinator.

DAY TO DAY OPERATIONS

- At the beginning of each shift, the on-duty flight crew will complete the **DAILY BLOOD PRODUCT TEMPERATURE LOG.**
- The temperature of the blood refrigerator will be kept between 1 – 6° C.
- A visual inspection of each blood product will be performed daily.
- If a discrepancy is noted with temperature or visual inspection LIFESTAR coordinator will be notified immediately.
- Each time a unit of blood is removed from a blood refrigerator it must be placed in a transport cooler and documented on the **LIFESTAR BLOOD PRODUCT TRACKING LOG**.
- The Thermal Isolation Chamber (TIC) from the cooler will be swapped out every 24 hours at the beginning of each shift. One TIC will be stored in transport cooler with the second in a freezer. Remove the TIC from the freezer, allow 20-30 to pass prior to

placing blood products inside the TIC. This prevents the blood products from freezing. DO NOT GO OUT OF SERVICE TO WAIT ON THE 20-30 MINUTES. If a flight request comes in, place blood products in TIC/transport cooler.

- Blood products will be taken with flight crew anytime the medical crew is on board the aircraft such as: missions flights, PR flights, training flights etc.
- Temperature indicators will be used to monitor the blood temperature while in the transport cooler.
- Upon returning to base blood products will be returned to blood refrigerator and documented on the **LIFESTAR BLOOD PRODUCT TRACKING LOG**.

LIFESTAR BLOOD PRODUCT STORAGE AND MONITORING EQUIPMENT POLICY

BLOOD PRODUCT TRANSFUSION

- Prior to blood transfusion consent must be obtained when applicable.
- Documentation of consent when applicable must be written in the patient care report.
- If unable to obtain consent justification must be documented in the patient care report.
- Whenever possible a purple top vacutainer will be obtained prior to blood administration.
- All blood products must be verified by both flight crew members prior to administration:
    - The unit has an associated Blood Transfusion Record.
    - The unit number is consistent with Blood Transfusion Record.
    - The unit has not pasted is expiration date.
    - The unit temperature is within range.
    - The unit has passed visual inspection.
- All blood products will be administered through a filtered administration set primed with normal saline first, then primed with blood.
- Both flight crew members will sign the **Uncrossedmatched Emergency Blood Release Form** a copy will be left at the receiving facility, the original will be scanned into the patient care report.
- Blood products will be administered using the IV Warmer.
- Blood products shall be administered as slowly as patient condition allows while observing for signs/symptoms of a transfusion reaction.

POST TRANSFUSION PROCESS AT RECEIVING FACILITY

- Both flight crew members will sign the **Uncrossedmatched Emergency Blood Release Form** a copy will be left at the receiving facility, the original will be scanned into the patient care report.

SUSPECTED TRANSFUSTION REACTION

- If signs/symptoms of transfusion reaction are suspected, immediately STOP the infusion, change entire IV line and treat patient accordingly.
- Keep the IV line and blood product, deliver to receiving facility's blood bank.

- Upon returning to base complete the **QA PATIENT SAFETY REPORT** and notify the LIFESTAR coordinator.

MAINTENANCE OF BLOOD PRODUCT EQUIPMENT

- All alarms for refrigerator temperatures will be checked and recorded on the **REFRIGERTOR ALARM CHECK FORM** per manufactures recommendation.
- Any unintended alarm must be documented on the **BLOOD REFRIGERATOR ALARM LOG** with an explanation to the cause and corrective action.
- LIFESTAR coordinator must be notified for any unintended alarms.

BLOOD PRODUCT DOCUMENTATION AND RETENTION

- All blood product logs will be scanned into the Blood Logs folder and retained for a minimum of 5 years.

LIFESTAR BLOOD PRODUCT TRACKING LOG

EVERY BLOOD PRODUCT MOVEMENT FROM BASE REFRIGERATOR TO A TRANSPORT COOLER MUST BE LOGGED BELOW

UNIT INFORMATION	FRIDGE IN / OUT INFORMATION					DISPOSITION				IF BLOOD IS GIVEN		
UNIT NUMBER	DATE	TIME OUT	DATE	TIME IN	✓ IF RETURN TEMP 1-6°	R *	D *	A *	O *	FLIGHT #	RECEIVING HOSPITAL	CREW INITIALS

LIFESTAR COORDINATOR REVIEW: _____ DATE: _____ R =

REFRIGERATOR D = DISTROYED A = ADMINISTERED O = ONE BLOOD

LIFESTAR BLOOD PRODUCT STORAGE AND EQUIPMENT MONITORING

REFRIGERATOR ALARM CHECK

YEAR: _____ **REFRIGERATOR ID: _____**

MONTH	REFRIGERATOR LOW TEMP ALARM	REFRIGERATOR HIGH TEMP ALARM	POWER FAILURE ALARM	DOOR OPEN ALARM	NO BATTERY ALARM	INITIALS
January						
February						
March						
April						
May						
June						
July						
August						
September						
October						
November						
December						

NOTE:

- **ALARM CHECKS WILL BE PERFORMED QUARTERLY**
- **PROCEDURE CAN BE REFERENCED WITHIN HELMER UNDERCOUNTER REFRIGERATOR SERVICE MANUAL**

LIFESTAR COORDINATOR REVIEW: _____ **DATE: _____**