New Orleans EMS Trauma Blood Administration Criteria & Guidelines
updated 12-01-22

I. Background

Red blood cell (RBC) transfusion improves the recipient's oxygen-carrying capacity by increasing the mass of circulating red cells. Careful attention to transfusion criteria and common patterns of injury in patients with uncontrolled hemorrhage (e.g. penetrating injury to the chest, abdomen, or pelvis, pelvic fracture, proximal amputations) helps to limit wastage of this important resource. When hemorrhage control is simultaneously undertaken, blood product usage can best be optimized.

Early transfusion of RBCs in patients with major traumatic hemorrhage has been shown to improve outcomes; yet, packed RBC Transfusion is not without risk. One potential complication associated with pRBC transfusion is hypocalcemia – this is largely due to the addition of citrate, an anticoagulant preservative used to store blood. Increased citrate levels lead to chelation (i.e. bonding) of calcium ions. Calcium is a potent inotrope; hypotension and severe cardiac depression can result from hypocalcemia. Administration of two grams of calcium (60 ml of 10% calcium gluconate or 20 ml of 10% calcium chloride) IV/IO using a secondary access point helps to prevent hypocalcemia.

Transfusion reactions are another risk of RBC transfusion. There are several types of transfusion reactions; the most common of these is transfusion associated circulatory overload (TACO) – this occurs in ~1% of the population. TACO and TRALI (transfusion-related acute lung injury) both present as acute pulmonary edema and are most common in persons with renal, heart, and/or lung impairment.

Anaphylactic reaction and hypotensive reaction occur in a significantly smaller population of patients following RBC transfusion. Removal of leukocytes (i.e. wbcs) from blood products helps to minimize the risk of transfusion reactions. In addition to removing wbcs, leukoreduction filters pro-inflammatory mediators, reduces human leukocyte antigen (HLA) antibody production, and prevents transmission of bloodborne infectious agents.

Conventional teaching and practice indicates that females of childbearing potential whose Rh type is unknown or who are RhD- should receive RhD- blood products. This ideology was based upon concern that the female blood recipient would develop an immune response to the RhD+ antigen and later develop antibodies against their fetus' RhD+ RBCs, the result of this reaction is severe fatal anemia aka hemolytic disease of the fetus and newborn (HFDN) . Since the development of fetal medicine in the 1980s, HFDN has become a detectable and almost completely treatable disease. Through significant advances, the high risk of maternal morbidity secondary to traumatic hemorrhage is considered by most clinicians to be greater than the small and uncertain risk of fetal morbidity when females of childbearing potential survive major traumatic events (i.e. resuscitation and exsanguination take precedence over potential future complications). In-hospital clinicians can perform blood tests and initiate Rhogam therapy as needed to females who are successfully resuscitated.

Finally, hypothermia is well established as a component of trauma's lethal triad. Use of infusion warming devices is highly recommended yet is costly. Several EMS agencies across Europe have administered blood products without warming for at least five years. Infusion of 500ml (two units) of cold blood can reduce core temperature by 0.5-1°C (0.9-1.8°F). Hemorrhagic shock, tissue, hypoxia, and the body's subsequent inability to regulate its core temperature all contribute to hypothermia – RBC transfusion addresses and treats this. Providers should attempt to prevent/treat hypothermia during transport by turning up the heat in the ambulance to > 80°F.

Blood medics should encourage other on-scene providers to provide non-blood patient care in order to expedite resuscitation.

Scene times of 15-25 minutes are likely to increase patient survival when care is comprehensive.

If a blood medic is not on-scene when the patient is ready for transport; providers should not delay transport of the patient to definitive care.

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II. Universal Patient Guideline

- Assure Scene Safety
- Primary Survey / Control Severe Traumatic Bleeding per guideline [Remember **MARCH**]
- Record baseline vitals to include:
    - Temperature pre & post infusion
    - Manual BP then NIBP @ 5 minute intervals
    - Cardiac Monitor , Pulse Oximetry & EtCO2
- Obtain IV/IO Access **x 2** if able
    - One IV/IO site should be used solely for blood products.
    - Use of 2% Lidocaine (2-3ml) with 0.9% NS is permitted to flush any IO site prior to blood product transfusion.
    - Use alternative access to give all other non-blood medications.
    - As a last resort, non-blood medications can be infused into the "blood line" after blood product transfusion is complete and the blood line is flushed with a minimum of 10ml of NaCl.

III. Inclusion Criteria (should have 2 or more of the following*)

1. Blood Product is available
2. Shock is due to hemorrhage
3. Age criteria:
    - **Adult** [ages 10 and older]
        - 2 units blood - **MAX 2 units**
        - 2g Calcium Chloride,
        - 2g Tranexamic Acid – [TXA]
    - **Pediatric** [ages 5 – 10]
        - 1 unit blood - **MAX 1 unit**
        - 1g Calcium Chloride
        - 1g Tranexamic Acid – [TXA]
4. Pt has no religious objections to blood products (obtain verbal consent if patient is capable)
5. Pt has ONE of the following criteria:
    - SBP < 70 mmHg
    - SBP < 90 mmHg with HR ≥ 110 bpm
    - Age ≥ 65 yo with SBP < 100mmHg and HR ≥ 100 bpm

If criteria is not met and the blood medic feels blood is indicated, contact the on-call Medical Control /Medical Director prior to initiating transfusion.

IV. Blood Product Consent

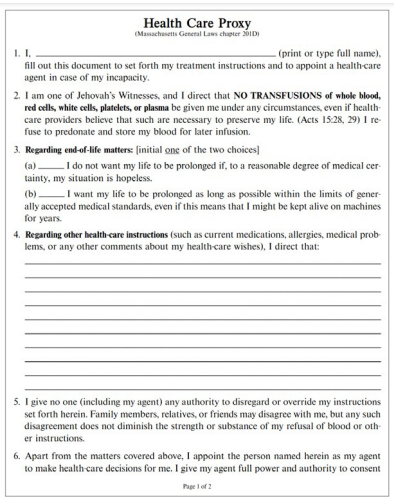
As noted in the inclusion criteria, patients have the right to object to the receipt of blood products – the most common reason for refusal is religious belief. Jehovah's Witnesses reference several passages of the Bible when choosing to abstain from blood transfusion (including whole blood, pRBCs, and plasma). Many members of Jehovah's Witness carry a Durable Power of Attorney card (DPA) that identifies their and their church's stance of blood transfusion. A patient's signed DPA card is considered equivalent to an advanced directive.

When the status of a Jehovah's Witness patient is not known and a blood card cannot be identified, the provider should act in the best interest of the patient. Relatives or friends on scene who suggest that a patient would not accept a blood transfusion should be asked to provide documentary evidence (e.g. "does the patient carry a blood card or DPA?"). If a patient is verbal and displaying appropriate decision making capacity or if a signed DPA card is provided, the EMS team should respect the verbal or written decision of the patient. If doubt exists about the validity of a DPA card, clinicians should aim to preserve life and administer the necessary blood product(s).

Exceptions to the above are blood transfusions in patients under 18 years of age. Within the state of Louisiana, parents and legal guardians cannot refuse care if it endangers the child's health in the opinion of the healthcare provider.

The entire prehospital team should make every effort to confirm a patient's wishes surrounding the receipt of blood products prior to its initiation – consent should not be assumed. Refusal of blood products should not be interpreted as the patient wishing to die; all other forms of medical treatment should be considered acceptable and should be initiated.

The Medical Director should be notified immediately of any instance where a confirmed or suspected Jehovah's Witness patient receives a blood transfusion.



Health Care Proxy
(Massachusetts General Laws chapter 201D)

1. I, _____ (print or type full name), fill out this document to set forth my treatment instructions and to appoint a health-care agent in case of my incapacity.
2. I am one of Jehovah's Witnesses, and I direct that **NO TRANSFUSIONS of whole blood, red cells, white cells, platelets, or plasma** be given me under any circumstances, even if health-care providers believe that such are necessary to preserve my life. (Acts 15:28, 29) I refuse to predonate and store my blood for later infusion.
3. **Regarding end-of-life matters:** [initial one of the two choices]
   (a) _____ I do not want my life to be prolonged if, to a reasonable degree of medical certainty, my situation is hopeless.
   (b) _____ I want my life to be prolonged as long as possible within the limits of generally accepted medical standards, even if this means that I might be kept alive on machines for years.
4. **Regarding other health-care instructions** (such as current medications, allergies, medical problems, or any other comments about my health-care wishes), I direct that:
5. I give no one (including my agent) any authority to disregard or override my instructions set forth herein. Family members, relatives, or friends may disagree with me, but any such disagreement does not diminish the strength or substance of my refusal of blood or other instructions.
6. Apart from the matters covered above, I appoint the person named herein as my agent to make health-care decisions for me. I give my agent full power and authority to consent

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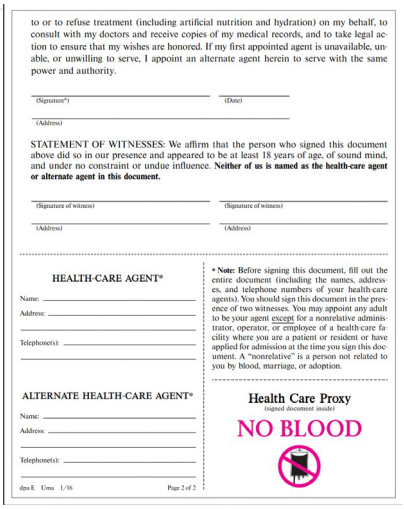

to or to refuse treatment (including artificial nutrition and hydration) on my behalf, to consult with my doctors and receive copies of my medical records, and to take legal action to ensure that my wishes are honored. If my first appointed agent is unavailable, unable, or unwilling to serve, I appoint an alternate agent herein to serve with the same power and authority.

(Signature*) (Date)

(Address)

STATEMENT OF WITNESSES: We affirm that the person who signed this document above did so in our presence and appeared to be at least 18 years of age, of sound mind, and under no constraint or undue influence. **Neither of us is named as the health-care agent or alternate agent in this document.**

(Signature of witness) (Signature of witness)

(Address) (Address)

HEALTH-CARE AGENT*

Name:
Address:
Telephone(s):

ALTERNATE HEALTH-CARE AGENT*

Name:
Address:
Telephone(s):

* **Note:** Before signing this document, fill out the entire document (including the names, addresses, and telephone numbers of your health-care agents). You should sign this document in the presence of two witnesses. You may appoint any adult to be your agent except for a nonrelative administrator, operator, or employee of a health-care facility where you are a patient or resident or have applied for admission at the time you sign this document. A "nonrelative" is a person not related to you by blood, marriage, or adoption.

Health Care Proxy
(signed document inside)
NO BLOOD

dpa-E Uma 1/16 Page 2 of 2

Example:
Durable Power of Attorney (DPA) card for Jehovah's Witness patients. This document folds so that the **NO BLOOD** *portion is clearly visible.*

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V. Blood Product Verification

1. Confirm patency of administration site -- if any doubt of patency, utilize a new administration site

2. Confirm the patient meets criteria above and/or Medical Control/Medical Director approves administration.

3. Record patient's baseline vital signs, including patient temperature (oral or axillary).

4. Inspect blood product to ensure no discoloration, clotting, or foreign objects. Ensure no cracking of the plastic bag that has led to leaking.

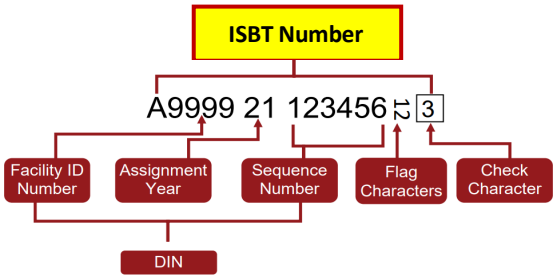
5. Confirm blood product by performing **MED CHECK** with a second (2) healthcare provider.

- Product Type **(Leukocyte Reduced Red Blood Cells, aka LRBCs)**
- ABO Group & Rh type **(O positive or O negative)**
- Expiration date **(on or after the date of transfusion)**

** The blood medic will be required to document all of the above blood product data. Additionally, the blood medic will be required to document the **ISBT Number** and **Expiration Date** in their patient care report to facilitate tracking and monitor potential transfusion reactions.

What is an ISBT Number?

A standard set by the International Society of Blood Transfusion, the ISBT number is a globally unique identifier assigned to each collected blood product. The number allows for traceability of medical products and consists of four required components (check character is optional).



VI. Blood Product Administration

1. Obtain oral or axillary temperature prior to beginning transfusion and every 5 min thereafter for the first 15 minutes. Patient's temperature should not rise more than 2°F above baseline.
2. Set up and prime Y blood tubing within the LifeFlow Plus Blood & Fluid Infuser ***(see Appendix A: LifeFlow Plus Infusion Quick Guide)***. Use 0.9% NS with Y tubing; do not use LR or D5W.
3. Transfuse **O LRBCs 1 unit** IV/IO via Y blood tubing
    a. If available, give O- LRBCS to females of childbearing age and children. Otherwise, most patients can receive O+ LRBCs.
    b. Flow through Y blood tubing until a small amount of blood remains in the bag (this helps to avoid creating a vacuum with the tubing. VS goal: MAP > 65 mmHg.
    c. May repeat O-LRBC x 1 if transfusion criteria are still met. Contact on-call Medical Control or Medical Director if additional blood is indicated during prolonged transport.
    d. Ensure absence of air in tubing prior to infusing second unit of blood.
4. Monitor for signs of transfusion reaction. If suspected transfusion reaction, STOP transfusion.
    a. Disconnect tubing from transfusion site and flush IV site with NS and keep IV line open with NS TKO.
    b. Treat **Anaphylaxis** in line with corresponding ROPE guideline.
    c. Treat **Acute Pulmonary Edema** in line with corresponding ROPE guideline.
    d. Monitor for signs of **Shock** and treat in line with corresponding ROPE guideline.
    e. Consider contacting on-call Medical Control or Medical Director for assistance.
    f. Report and document any adverse event and actions taken en route to receiving facility.
    g. Do NOT throw away the bag of blood – return the bag to 6232. The bag MUST BE RETURNED to the Blood Center.
        i. In addition to the ePCR, a Post-Transfusion Adverse Event Report Form must be completed for The Blood Center ***(see Appendix B: Post Transfusion Adverse Event Report Form)*.**
        ii. Contact Medical Director immediately for any suspected or confirmed transfusion reaction.
5. In the event the bleeding is controlled (i.e. pressure, packing, or tourniquet), and bleeding is stopped, proceed to administer blood back to normotensive levels.

    In the event O LRBCs are not available, the following may be given to reach permissive hypotension with hemodynamic stability.
    a. Low Titer A Liquid Plasma and/or
    b. Whole Blood

6. Administer Calcium Chloride 2g IV/IO or Calcium Gluconate 60 ml through a 2nd IV/IO access (may occur simultaneous to blood infusion; can also be mixed into TXA).
7. Administer TXA 2g (IV/IO) through a 2nd IV/IO access (may occur simultaneous to blood infusion).

Common Signs/Symptoms of Transfusion Reactions:

a. Chills/rigors
b. Temperature elevation > 2°F from baseline
c. Flushed face
d. Itching/hives
e. Sudden dyspnea
f. Wheezing/rales
g. Lumbar/flank pain
h. Unexplained hypotension

* Monitor for transfusion reactions the first 5-10 minutes after each unit of blood product.

VII. Blood Patient Transport & EMS to ED Handoff

1. A Blood Medic must remain with the patient throughout transport. If necessary, NOFD may drive the SPRINT SUV to ED (without lights & sirens).
2. Notify receiving facility prior to arrival that patient is being transfused LRBCs.
3. Upon arrival, report any adverse events and/or transfusion reactions.
4. Report any interruption in transfusion and provide an explanation for interruption.
5. Report O+ LRBCs given to female patients of childbearing age.

VIII. Documentation of Blood Product Administration

A Power Tool in ImageTrend Elite has been created to assist providers with documentation of blood product administration. Providers may access the Blood, TXA, and Calcium Power Tools by clicking on either of the following:

a. All Medications or
b. Routine Trauma Care

See Appendix C for ImageTrend Medication Power Tool examples.

IX. Blood Logistics

Agency Receipt of Blood

6232 (or the Deputy Chief of Logistics) will receive all shipments of blood product from The Blood Center (TBC) courier.

1. 6232 must check the temperature of all new unit of blood immediately upon receipt.
    a. The laser thermometer stored in Logistics will be used to measure temperature.
    b. Blood with a temperature > 10°C should be rejected and immediately returned to the TBC courier.
2. 6232 will log all blood products into Operative IQ.
    a. Log into Operative IQ.
    b. Select 'NARCOTICS' then select 'NARCOTIC SAFE'
    c. Select 'RECEIVE'
    d. Double-click 'BLOOD' (located inside the box in the middle of the screen)
    e. Enter the blood product's ISBT number (see image on p. 4) and quantity
        - ISBT Example: W0898 18 407733
        - Quantity should be entered as "1"
    f. When logging more than one blood product hit 'ADD ROW' and repeat Step 4.
    g. Click 'SAVE' – a confirmation pop-up will appear, click 'OK'
    h. Log out of Operative IQ
3. 6232 will place logged new blood product into the blood refrigerator and document the shipment in the Blood Event Log binder ***(see Appendix D: Blood Event Log Binder)*** located on top of the blood refrigerator.
    a. 6232 will confirm no refrigerator temperature excursions since the last event listed in the Blood Event Log binder
        - The acceptable temperature for storage of blood products is 1°C to 6°C. Temperature excursions occur when any temperature reading is outside of the acceptable storage range.
        - The blood refrigerator has a chart recorder on top which detects all temperature excursions *(Figures 1 and 2)* – excursions will be visible on the graph wheel
    b. Any temperature excursions should be promptly addressed by 6232 as outlined in ***Management of Overheated Blood Products***.

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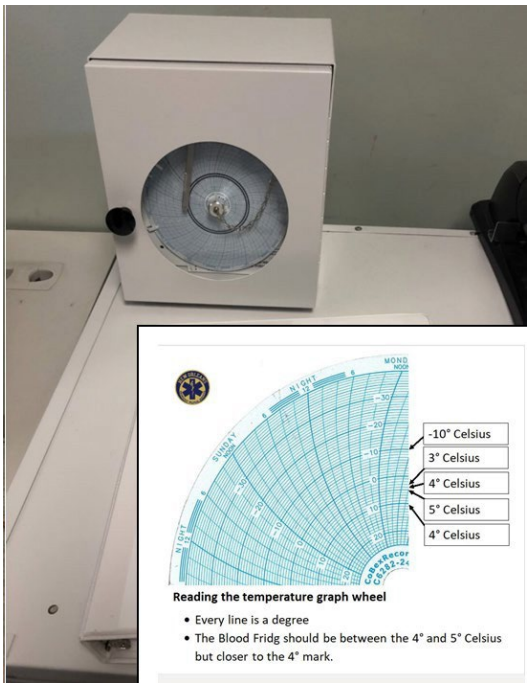
Fig 1: Blood Refrigerator

Fig 2: Refrigerator Chart Recorder



How do chart recorders work?

Circular chart recorders work by plotting refrigerator temperature in a circular graph, usually for a period of 7 days.

The paper continually rotates beneath the pen (in red) and records refrigerator temperature as fluctuating deflections on the paper.

Blood Medic Checkout (BTOD)

A Blood Medic who is sprinting should check out blood at the start of their shift.

1. Retrieve a Thermal Isolation Chamber, aka TIC, from the labeled TIC freezer *(Figures 3 & 4)*.
    a. Check the Blood Event Log Binder to ensure that your chosen TIC (i.e. TIC A, TIC B, or TIC C) has been stored in the freezer for a minimum of 8 hours.
    b. Document in the Blood Event Log Binder the time that you removed the TIC from the freezer.
    c. Let the TIC sit at room temperature for 25 minutes to allow the frost to melt prior to placing the blood inside. Remove the lid while defrosting.

Figures 3, 4, and 5: TIC Freezer, Thermal Isolation Chamber, and TIC inside of white inner compartment

2. Place the TIC into the white plastic inner compartment of the cooler.
3. Prior to removing the blood from the blood refrigerator, check the chart recorder to confirm there were no temperature excursions since the blood was last checked.
    a. Verify that the temperature on the chart recorder is within 1°C of the digital temperature at the base of the blood refrigerator.
    b. Document storage temperature acceptability (i.e. whether or not there were any excursions) in the Blood Event Log Binder.
    c. Notify 6232 <u>immediately</u> if any temperature excursions are identified.
4. Take two units of blood out of refrigerator and place them on top of the thermal barrier *(see Figure 7)* in the TIC.
    a. The silver thermal barrier at the base of the TIC will help maintain a stable temperature and prevent RBC hemolysis. Ensure that any remaining frost on the TIC does not touch the LRBCs.
    b. **If gross hemolysis is visualized upon inspection, do not use the blood and notify 6232 immediately.** Hemolysis is the breakdown of RBCs and subsequent release of hemoglobin, the pigmented protein in red cells *(see Figure 6)*. Free hemoglobin will cause discoloration of the supernatant of red blood cells – discoloration will vary from a light pink tinge to a dark red, almost purple, color depending on the extent of hemolysis.
    c. Place the thermometer probe (green bottle – *see Figure 8*) between the two units of blood and wrap the units together with a rubber band *(see Figure 9)*.

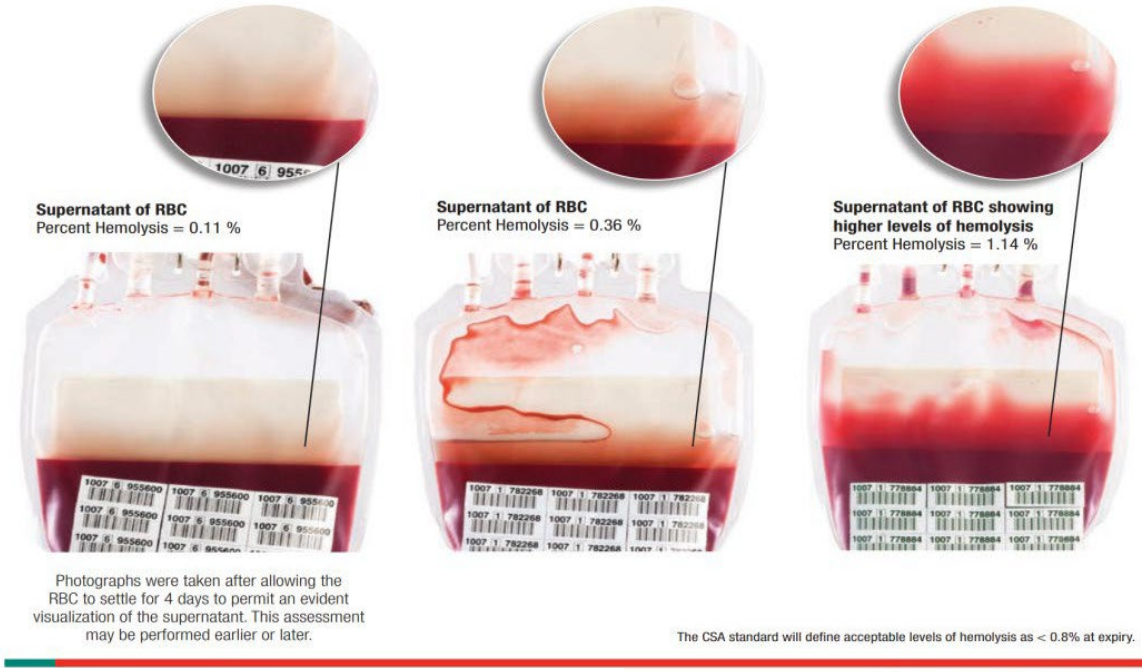
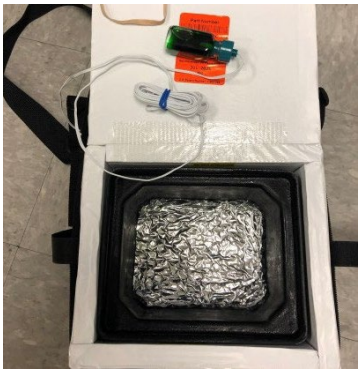


Figure 6: Signs of gross hemolysis of RBCs



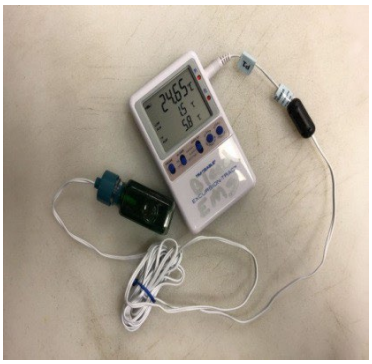


Figure 7: TIC with thermal barrier positioned at base of box
Figure 8: Temperature monitor (notice the green vial is the thermometer probe)
Figure 9: Thermometer probe enveloped by two units of blood product

5. Carry the TIC & white inner cooler compartment into the Narcotic Room to document the blood product check-out in Operative IQ. **<u>Be sure to scan both units of blood</u>.**
    a. Log into Operative IQ by performing biometric scan of your finger.
    b. Select 'NARCOTICS' then select 'NARCOTIC SAFE'
    c. Select 'LOAD BOX'
    d. Click the TIC (i.e. TIC A, B, or C) that you will be using, then click 'NEXT'
    e. In the lower right side of the screen click 'SELECT''
    f. In 'LOT NUMBER' select the ISBT number that matches the unit of blood you are checking out, then click 'SAVE'
    g. Click 'FINISH'
    h. Biometric scan your finger – a confirmation pop-up will appear, click 'OK'
6. Document the TIC check-out in Operative IQ.
    a. Select 'NARCOTICS' then select 'MY CONTROL NUMBERS'
    b. Click 'PICK UP FROM SAFE'
    c. In the middle of the screen, enter the TIC that you are using (TIC A, B, or C) into 'QUICK ADD CONTROL NUMBER', then click 'ENTER'
    d. Click 'LOG OUT' to exit Operative IQ
    e. Under the tab 'BOX ID' read and check each of the boxes under the blood cooler number that you are using, then click 'SUBMIT'
    f. Biometric scan your finger again – a confirmation pop-up will appear, click 'OK'
    g. Click 'LOG OUT' to exit Operative IQ

7. Place the TIC and inner cooler compartment into the beige outer cooler bag *(Figure 10)*
    a. Zip bag closed and ensure all straps are secured.
    b. Ensure the temperature monitor is working and connected.
    c. Insert the temperature monitor into the clear plastic pouch on top.
8. Notify OPCD that you are carrying blood.

Figure 10: Outer Cooler Bag

In-Field Blood Process

1. Check temperature monitor periodically throughout your clinical shift. Blood must be kept between 1 to 6°C.
    a. The temperature monitor will alarm when the blood temperature exceeds 5.8°C. Return to HQ as soon as possible (ideally within 1-2 hours) if the monitor alarms.
        i. Temporarily place blood back into the blood refrigerator.
        ii. Retrieve a new TIC from the TIC freezer and allow it to frost for 25 minutes.
        iii. Check the new TIC out of Operative IQ as outlined above. Document in Log Binder.
        iv. Check the old TIC into Operative IQ as outlined above. Document in Log Binder.
        v. Confirm the temperature in the new TIC is below 4.5°C, place blood into the new TIC, and go back into service.
    b. If blood temperature is ≥ 6°C, notify 6232 immediately. EMS Logistics must label blood and set it aside in the refrigerator. 6232 will follow procedure to determine if the blood can be reused once it is within the acceptable temperature range.
2. Respond to calls where blood transfusion may be indicated.
3. Initiate blood transfusion as per ROPE guideline.
4. Continue patient care during transport to the ED. NOFD may drive the SPRINT SUV to ED (without lights & sirens).
5. Immediately following patient care, notify 6232 of blood administration so that more can be ordered from The Blood Center

Restocking Blood after Field Use

1. After blood is administered and when no critical 911 response is required, the Blood Medic must return to headquarters and complete the “Blood Usage Form” in Operative IQ.
2. The Blood Medic should retrieve additional LRBCs out of the blood refrigerator and place it into the same blood box and cooler currently in use.

3. Captain must scan the restocked blood product in Operative IQ for official verification of restock and handoff to Blood Medic.
    a. Captain performs biometric scan of their finger.
    b. Captain selects 'SAFE' then 'ISSUE TO CREW'
    c. Captain selects 'CREW MEMBER' and clicks on the name of the Blood Medic they will handing the blood product to.
    d. Captain clicks on 'SELECT BOX' then click on the blood box in the pop-up window.
    e. Captain selects 'ADD CONTROL NUMBER – CONTROL BEING ISSUED' and selects the matching ISBT number in 'CONTROL'
    f. Captain selects 'SUBMIT' then biometrically scans their finger again
    g. Blood Medic biometrically scans their finger to complete handoff then selects 'OK' when the confirmation pop-up appears
    h. Blood Medic logs out of Operative IQ.

Blood Check-In (ETOD)

1. Blood Medic should carry TIC/white inner compartment into the Narcotic Room to document the TIC check-in and return into Operative IQ.
    a. Log into Operative IQ by performing biometric scan of your finger.
    b. Select 'NARCOTICS' then select 'My CONTROL NUMBERS'
    c. Select the the tab 'BOX ID' then read and check each of the boxes under the TIC that you used, then click 'RETURN'
    d. Select the 'SUBMIT' button
    e. Biometric scan your finger – a confirmation pop-up will appear, click 'OK'
2. Document the blood product check-in and return into Operative IQ. **Be sure to scan both units of blood**.
    a. Select 'NARCOTICS' then select 'NARCOTIC SAFE'
    b. Select 'LOAD BOX'
    c. Click the TIC (TIC A, B, or C) that you are unloading
    d. Read and click each of the boxes next to the selected cooler then click 'NEXT'
    e. Biometric scan your finger – a confirmation pop-up will appear, click 'OK'
    f. Click 'LOG OUT' to exit Operative IQ

3. Place unused blood into the blood refrigerator. Place the portable temperature monitor and cooler (outer cooler bag + white inner compartment) on top of the blood refrigerator.
4. Return the TIC to the TIC freezer. Document the time and freezer temperature in the Blood Event Log Binder.

Ordering Replacement Blood

Logistics will make all requests for restocking.

1. 6232 must call The Blood Center (985-340-2343). Tell the TBC that a STAT delivery of LRBCs is needed.
2. 6232 will receive shipment of blood products from TBC courier as outlined in **Agency Receipt of Blood.**
3. 6232 will accept or refuse blood after verification and log new blood into Operative IQ as outlined in **Agency Receipt of Blood.**

Management of Overheated Blood Products

When any blood is reported as ≥ 6°C, EMS Logistics will perform the following:

1. Temporarily place blood product back into the blood refrigerator
2. Periodically (at least once every 3 hours) check the blood product temperature with a portable temperature monitor until the temperature returns to within normal range (1-6°C).
3. Visualize the blood and look for gross signs of hemolysis *(see Figure 6)*
    a. If the appearance is acceptable, return the blood product to the blood refrigerator and document the approval of reuse in the Blood Event Log Binder
    b. If the appearance is unacceptable,
        i. Using an orange label, write 'QUARANTINE' with a black Sharpie marker
        ii. Place blood in the blood refrigerator drawer labeled 'QUARANTINE - DO NOT USE'
        iii. Remove blood unit from Operative IQ.
        iv. Fill out the ***Record of Blood Components or Transfer form (Appendix E)*** provided by The Blood Center. Quarantined blood will be turned in for a credit.
        v. Order replacement blood by calling 985-340-2343. Tell TBC that you need a STAT delivery.
        vi. Document blood return and receipt in Blood Event Log Binder
        vii. Email EMSLogistics@nola.gov to notify of blood overheating/quarantine
4. Any blood product reported as ≥ 10°C should be quarantined by EMS Logistics as outlined above and immediately returned to The Blood Center.

Weekly Blood Equipment Check

Weekly check of blood equipment stock check will be performed every Tuesday by EMS Logistics Lieutenants or higher-ranking members

1. Replace temperature wheel and report any temperature excursions to the Deputy Chief of Logistics
    a. The name of the person and date should be written on the temperature wheel when the new one goes on and when the old one comes off.
    b. The temperature wheel should be scanned and placed into SharePoint -> EMS Logistics -> Documents -> Blood File
2. Download the data from each of the portable temperature monitors and save the spreadsheet on SharePoint -> EMS Logistics -> Documents -> Blood File
3. Check blood refrigerator alarm thresholds and document check in Blood Event Log Binder
    a. Take thermometer probe out and test thresholds in a cup of water
        i. Use hot water to test the high alarm
        ii. Use cold water to test the low alarm
4. Check the alarm thresholds on portable temperature monitors. The low alarm should be 1°C, and the high alarm should be set at 5.8°C. Document check in the Blood Event Log Binder
    a. Take thermometer probe out and test thresholds in a cup of water
        i. Use hot water to test the high alarm
        ii. Use cold water to test the low alarm
5. Check blood expiration dates and rotate products back to The Blood Center as needed.
    a. Leukoreduced packed red blood cells (LRBCs) are to be rotated every two weeks if not used.
    b. Units should be returned to TBC with a minimum of fourteen days prior to expiration to receive credit.
    c. Fill out the ***Record of Blood Components or Transfer*** form provided by The Blood center and call (985) 340-2343
    d. Order replacements: (985-340-2343). NOTE: Tell the TBC that you need a STAT delivery

Equipment Calibration

The thermometers on the Blood Refrigerator, TIC Freezer, and the portable blood temperature monitors should be calibrated every year in September.

Blood Refrigerator	**TIC Freezer**	**Blood Temperature Monitors**
Thermo Scientific Revco	Accucold	Traceable Excursion-Trac
Model # REB404A21	Model # ADA305AF	Model # 6430
SN# 1132282501210305	SN# ADA305AF20210400095	Monitor 1: SN# 200529665
Item# 30404R2A0ZAD0H0A		Monitor 2: SN# 210414509

Blood Refrigerator Malfunction

In the event of a malfunction or power failure to the Blood Refrigerator all attempts to keep the blood temperature between 1° and 5.8°C must be made.

- The Blood Refrigerator will alarm if the temperature goes over 5.5°C and if it drops below 1.5°C.
- Temporarily place blood into a blood box for short events.
- If the problem can't be resolved within an hour, transport blood to the Coroner's walk-in refrigerator located on their second floor.
- Ensure continuous temperature monitoring of the LRBCs to ensure storage at 1°-6°C while located in the Coroner's walk-in refrigerator.
- The master key to access the Coroner's building is located in KeyTracer.
- Notify EMSLogistics@nola.gov immediately.

TIC Freezer Malfunction

In the event of a malfunction or power failure to the TIC Freezer all attempts to keep the TICs cold must be made. The target TIC temperature is -18°C.

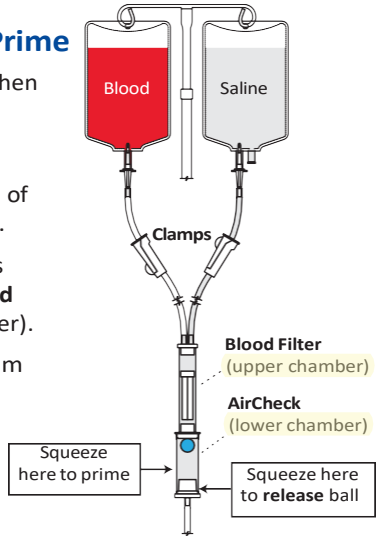
- Initially leave the TICs in the TIC Freezer while troubleshooting the malfunction.
- If the malfunction cannot be resolved within an hour, relocate the TICs to the freezer located in the second floor breakroom at EMS Headquarters.
- Notify EMSLogistics@nola.gov immediately.
- Note: TICs must stay below -18°C for a minimum of 8 hours (or below 4°C for a minimum of 48 hours) prior to use in the field.

New or Replacement Blood Equipment

1. Any new or replacement equipment must be logged into Blood Event Log Binder
    a. Log the what the device is
    b. Log the make and model
    c. Log the serial number
    d. Scan any calibration certificates and placed into SharePoint -> EMS Logistics -> Documents -> Blood File
2. Any discarded (old or broken) equipment must be logged into Blood Event Log Binder
    a. Log the what the device is
    b. Log the make and model
    c. Log the serial number

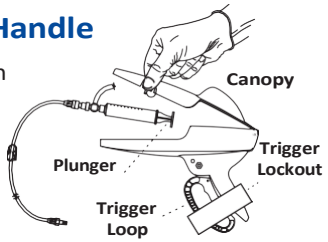
1 Set Up and Prime

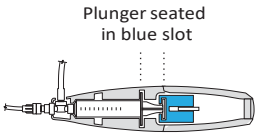
- Close both **Clamps** then spike both bags.
- Open saline clamp.
- Squeeze the middle of **AirCheck**® to prime.
- Squeeze until fluid is halfway up the **Blood Filter** (upper chamber).
- If ball is at the bottom of AirCheck (lower chamber), squeeze **"release"** until ball floats.

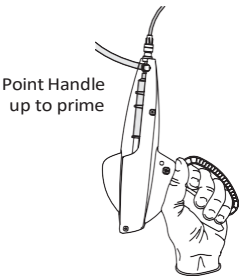


2 Syringe and Handle

- Squeeze tabs to open **Canopy**.
- Place syringe **Plunger** in blue slot with numbers up.
- Remove foam **Trigger Lockout.**
- Point Handle up and prime tubing by repeatedly squeezing the **Trigger Loop.**

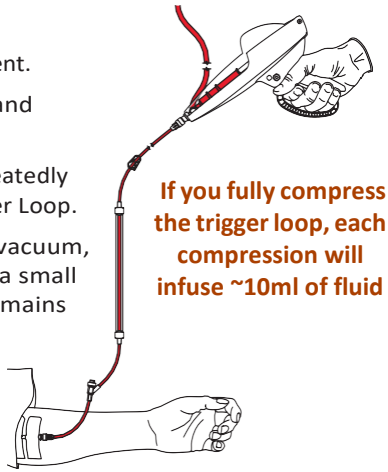






3 First Infusion

- Connect to the patient.
- Close saline clamp and open blood clamp.
- Infuse blood by repeatedly squeezing the Trigger Loop.
- To avoid creating a vacuum, stop infusing while a small amount of blood remains in the bag.
- Close blood clamp.



If you fully compress the trigger loop, each compression will infuse ~10ml of fluid

4 Additional Infusions

- Spike new bag, then open clamp.
- Squeeze AirCheck to prime.
- If no air is present, proceed with infusion.
- If air is present in tubing or ball is suctioned to the bottom, refer to **Resetting AirCheck** (see back page).

Important

- Cleared for use with blood, blood components (red blood cells or plasma), and crystalloid and colloid resuscitative fluids.
- When transfusing blood products, use a 22G catheter or larger.
- LifeFlow PLUS is compatible for use with all vascular access that is rated for contrast infusion pressures (300psi).

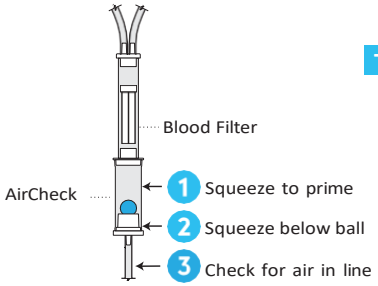
Consult IFU for full use instructions, indications, and warnings.

TRAINING VIDEO

TROUBLESHOOTING AND TIPS

RESETTING AIRCHECK

IF The ball is suctioned to the bottom of AirCheck, the Trigger Loop will not return. **Disconnect from the patient.**



THEN

1. Spike new bag. Open desired clamp and squeeze AirCheck to prime.
2. Squeeze where it says “release” until the ball floats.
3. Check for air in the line. Re-prime line if needed, then reconnect and infuse.

Troubleshooting

ISSUE	CHECKLIST
CANOPY WILL NOT CLOSE	1. Ensure blood tubing syringe is properly seated with numbers up. 2. Ensure canopy is properly aligned.
WILL NOT PRIME OR DIFFICULT TO START INFUSION	1. Confirm syringe Plunger is properly loaded inside blue slot. Remove and reload if necessary. 2. Ensure all appropriate clamps are open. 3. Ensure ball is floating. If it is not, squeeze “release” on the AirCheck until the ball floats. 4. Check distal clamp.
TRIGGER LOOP STOPS MOVING DURING INFUSION	1. Start at the top of tubing and check fluid bags, clamps, filter, and AirCheck per details above. 2. Check IV for occlusion. 3. Blood filter may be clogged. If so, get a new tubing set.
TRIGGER LOOP RETURNS SLOWLY	1. Tubing may need to be replaced if syringe has slowed or filter is clogged. 2. Do not force Trigger Loop open or closed if it does not move freely.

Tips and Reminders

General

- AirCheck should always remain completely filled and vertical. **FLOAT BEFORE YOU FLOW.**
- To avoid creating a vacuum, do not drain blood bag completely.
- For blood products, this device can be used on a single patient for up to 4 hours or until the filter clogs.

Syringe and Handle

- Trigger Loop provides tactile feel. If you notice a change in resistance, refer to troubleshooting checklist.
- The Trigger Loop is designed to break away if excessive force is applied. This is a safety feature.

For Crystalloids and Colloids

- For crystalloids and colloids, this device can be used on a single patient for up to 24 hours or maximum of 4 liters.
- If infusing saline with a 24G or smaller catheter, slow down between trigger squeezes to limit resistance.

GO SLOW FOR BETTER FLOW.

Appendix B: Post Transfusion Adverse Event Report Form

The Blood Center, New Orleans, LA **Post Transfusion Adverse Event Report Form**

Please Print the information required below. TBC Assigned number: _____

Reporting Hospital/Telephone Number: _____ Name: _____

Email Address: _____ Report Date: _____

Reported to TBC (Name of person receiving the report): _____

This form must be returned to The Blood Center upon initial notification of the Post Transfusion Adverse Event.

Section A: Patient Information

Patient ID #: _____ Gender: ☐ Male ☐ Female Age: _____

Transfusion Date(s): _____ Blood Component(s) & Number Transfused:

_____

_____

Blood Products from other facilities transfused in addition to TBC Blood Components: *Yes ☐ or ☐ No
*If yes, list the product codes, number of transfusions per product code and the dates of transfusion below.

_____

_____

_____

Date/Time Event occurred: ___/___/___; ___: ___ ☐ am ☐ pm

Underlying disease(s): _____

_____

Patient status prior to transfusion/patient course:

_____

_____

_____

Patient Transfusion and Pregnancy History

Prior transfusion: *Y ☐ N ☐ *Dates/blood component(s) _____

Any significant observations made of patient after prior transfusion(s):

_____

_____

_____

Prior pregnancies: *Y ☐ N ☐ N/A ☐ *If yes, how many: _____ 2nd ID of patient and units correct: Y ☐ N ☐

Pre-transfusion VS: BP _____ Pulse _____ Temp _____ RR _____ SaO_2 _____ %

VS @ time of reaction: BP _____ Pulse _____ Temp _____ RR _____ SaO_2 _____ %

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Appendix B: Post Transfusion Adverse Event Report Form

The Blood Center, New Orleans, LA **Post Transfusion Adverse Event Report Form**

Please Print the information required below. TBC Assigned number: _____

Signs and symptoms if present (check those that apply)

Anxiety	☐	Fever (>1° C or 2° F △)	☐	Hypotension or significant decrease in BP	☐	Shock	☐
Back pain	☐	Flushing	☐	Pain at IV site	☐	Tachycardia	☐
Chest pain	☐	Headache	☐	Nausea/vomiting	☐	Rash	☐
Chills/Rigors	☐	Hemoglobinuria/Dark Urine	☐	Bleeding from puncture sites	☐	Urticaria	☐
Cyanosis	☐	Red plasma	☐	Oliguria/anuria	☐	Wheezing	☐
Dyspnea	☐	Hypertension	☐	Diffuse Hemorrhage	☐	Other (specify)	☐
O_2 Sat	☐	X-Ray indicated	☐				

List components supplied by TBC suspected in event

Unit No.	Component	Blood Type	Unit No.	Component	Blood Type

Recipient laboratory results (provide those that are relevant to the event)

Pre-transfusion		Post-transfusion	
Blood type		Blood type	
Antigen phenotype		Antigen phenotype	
Antibody screen		Antibody screen	
Hemoglobin		Hemoglobin	
WBC		WBC	
Platelets		Platelets	
Bilirubin (direct/indirect)		Bilirubin (direct/indirect)	
LDH		LDH	
Reticulocytes		Reticulocytes	
BUN/Creatinine		BUN/Creatinine	
Urine Hemoglobin		Urine Hemoglobin	
Other (e.g. DAT)		Other (e.g. DAT)	

Section B: Suspected adverse event (check those that apply)

Acute hemolytic reaction	☐	Acute lung injury (TRALI) **(go to section C)**	☐
Delayed hemolytic reaction	☐	Circulatory overload (TACO) **(go to section C)**	☐
Febrile nonhemolytic reaction	☐	Graft-vs.-host disease (TAGVHD)	☐
Allergic or anaphylactic reaction	☐	Post-transfusion purpura	☐
Transfusion-associated bacterial sepsis	☐		

Transfusion-associated infection suspected (check the agent)

Hepatitis C Virus (HCV)	☐	Babesiosis	☐
Hepatitis B Virus (HBV)	☐	Malaria	☐
Human Immunodeficiency Virus (HIV 1/2)	☐	Chagas Disease (Trypanosoma cruzi)	☐
West Nile Virus (WNV)	☐	Syphilis	☐
Human T-Lymphotropic Retrovirus (HTLV I/II)	☐	Other (specify agent) _____	☐
Cytomegalovirus (CMV)	☐		

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Appendix B: Post Transfusion Adverse Event Report Form

The Blood Center, New Orleans, LA **Post Transfusion Adverse Event Report Form**

Please Print the information required below. TBC Assigned number: _____

For suspected transfusion transmitted infection specify both screening and confirmatory diagnostic test results supporting that suspicion

Pre-transfusion	Post-transfusion

Section C: For TRALI and TACO reports (check Y or N)

Acute onset	Y ☐	N ☐	Diagnosis of congestive heart failure	Y ☐	N ☐
Onset within 6 h of transfusion	Y ☐	N ☐	Cardiomegaly on chest x-ray	Y ☐	N ☐
PaO_2/FiO_2 <300	Y ☐	N ☐	Elevated B-natriuretic peptide	Y ☐	N ☐
O_2 sat <90%	Y ☐	N ☐	Elevated pulmonary capillary wedge pressure	Y ☐	N ☐
Required new mech. ventilator	Y ☐	N ☐	Low ejection fraction at cath. or on echo	Y ☐	N ☐

Risk factors for acute lung injury present in the patient before transfusion (check Y or N)

Aspiration	Y ☐	N ☐	Shock	Y ☐	N ☐
Preexisting pneumonia	Y ☐	N ☐	Multiple trauma	Y ☐	N ☐
Toxic inhalation	Y ☐	N ☐	Burn injury	Y ☐	N ☐
Lung contusion	Y ☐	N ☐	Pancreatitis	Y ☐	N ☐
Near drowning	Y ☐	N ☐	Cardiopulmonary bypass	Y ☐	N ☐
Sever sepsis	Y ☐	N ☐	Drug overdose	Y ☐	N ☐

Send chest x-ray reports (patient identifiers obscured) for suspect TRALI & TACO.

Please return the completed form with any supporting documentation to the address below.

Director of Quality Assurance and Compliance
1310 JW Davis Drive
Hammond, La 70403

Received by: _____ **Date:** ____/____/____

MD Review: _____ **Date:** ____/____/____

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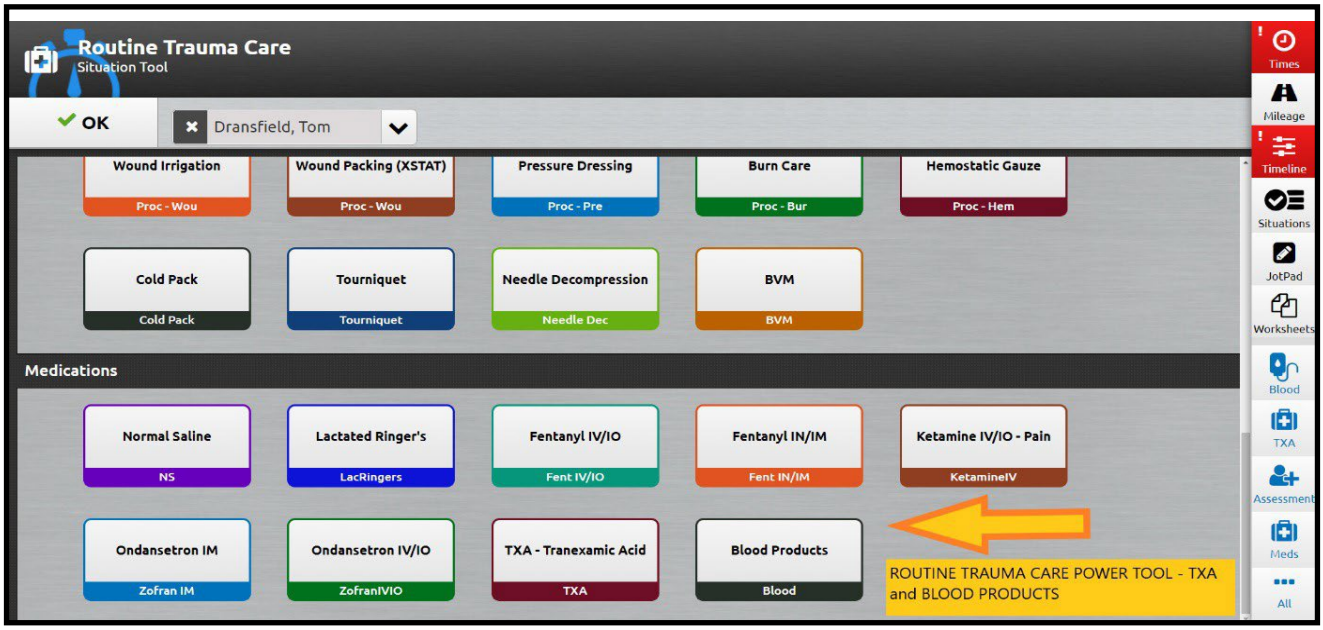
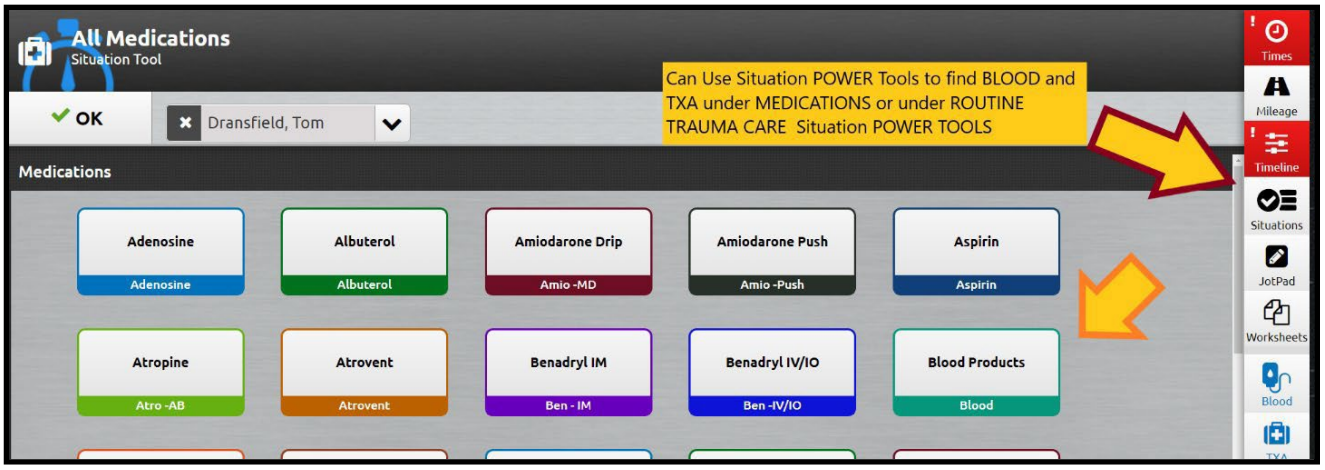
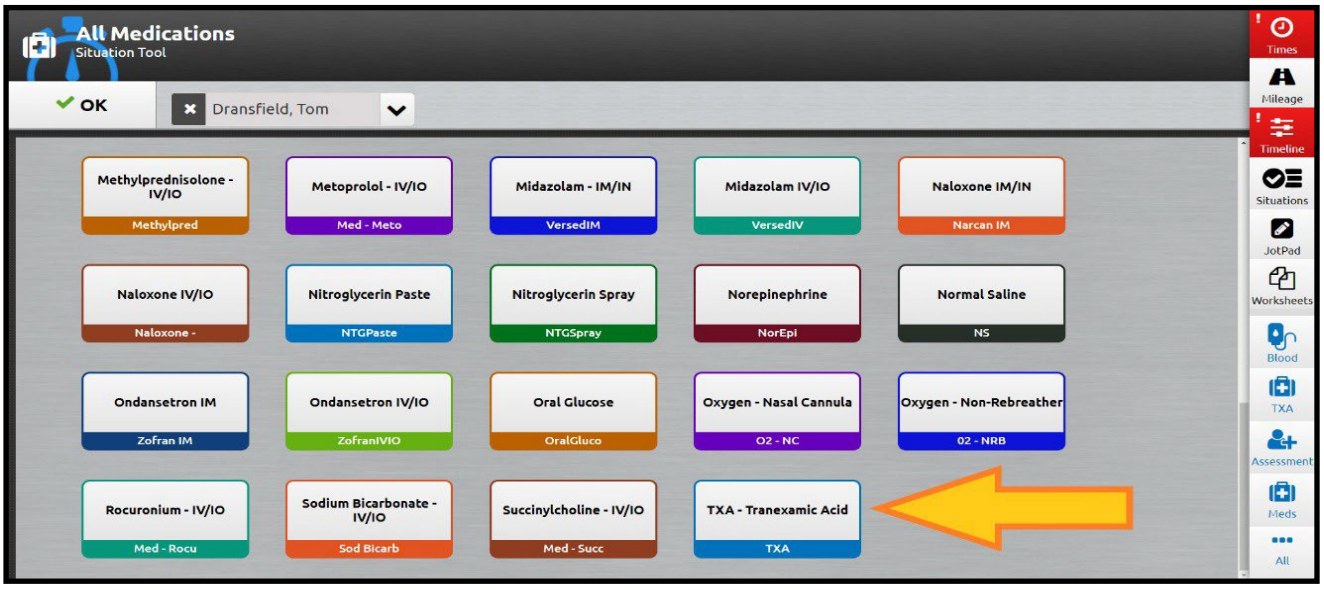
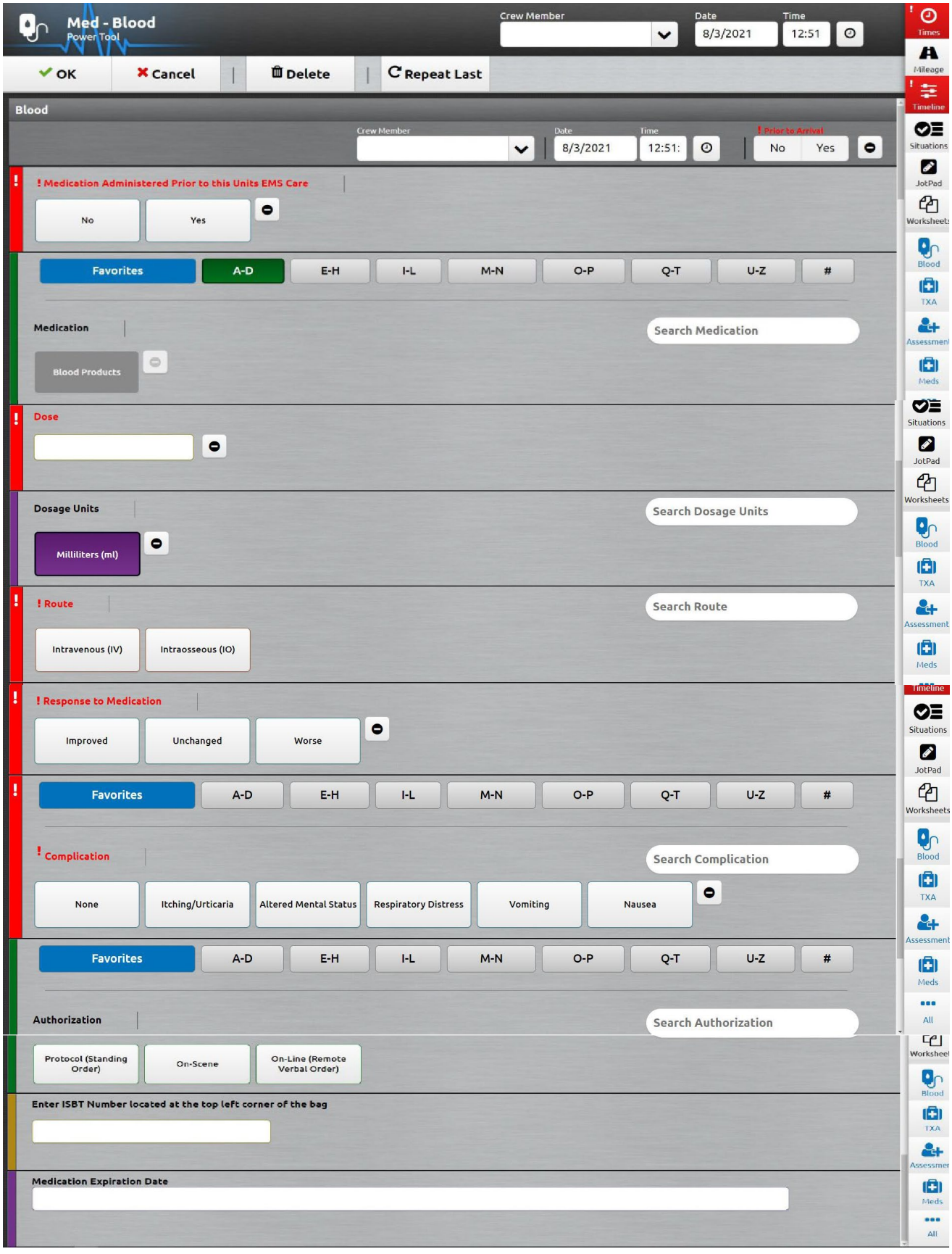
Appendix C: Situational Power Tool Examples



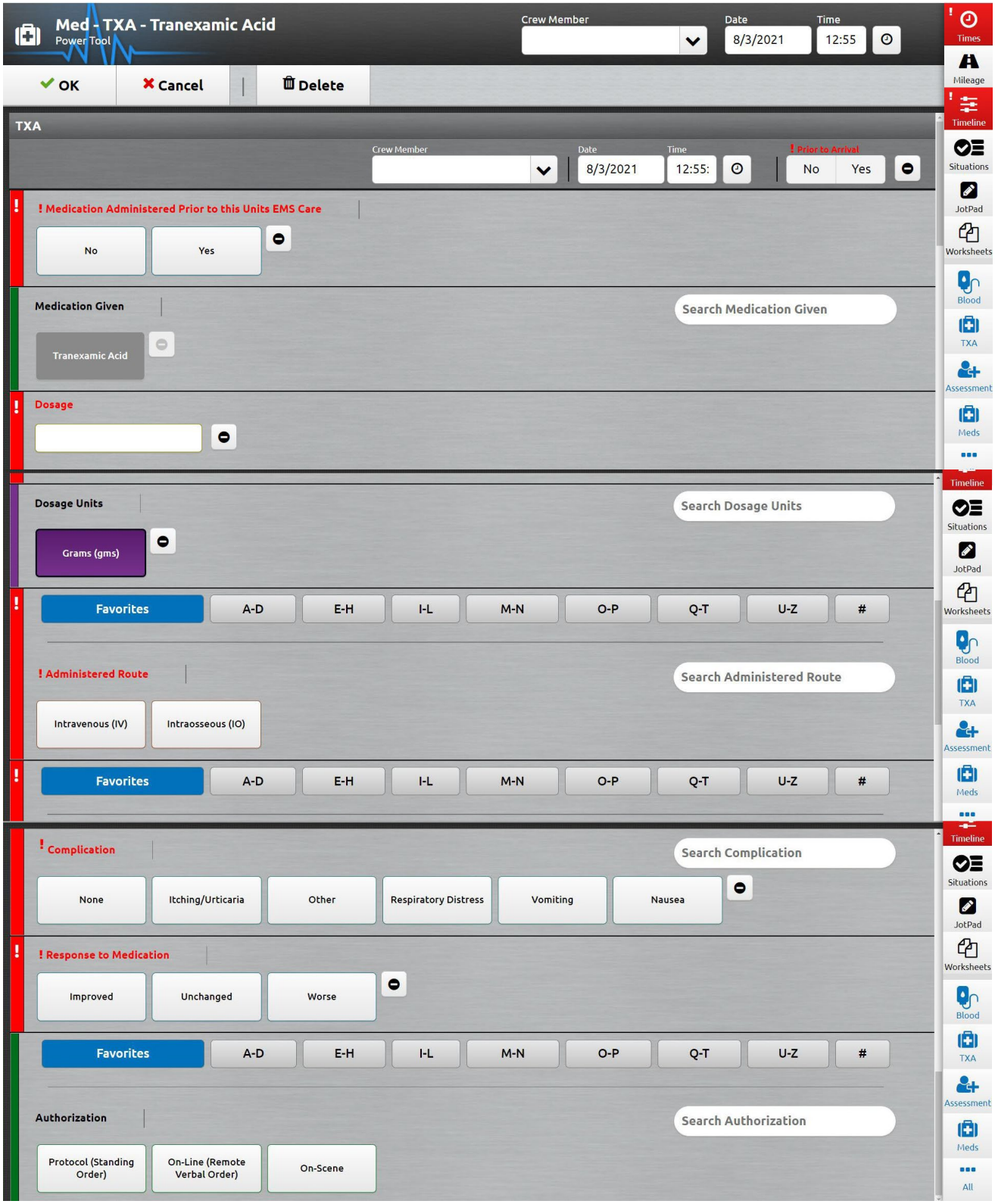




Appendix C: Situational Power Tool Examples



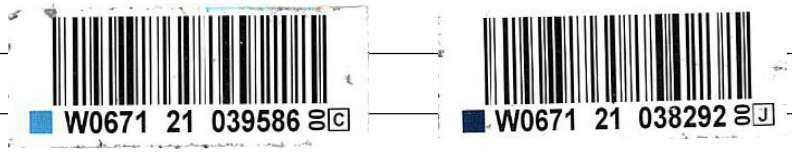
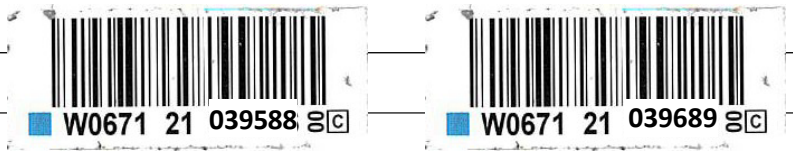
Appendix C: Situational Power Tool Examples



Appendix D

EXAMPLE ENTRYS

BLOOD EVENT LOG

Date - Time	Event
8/11/21 1511	2 units of blood received by TBC. Temp of units below 10C. A. Bouck
6232 receives new blood	
8/23/21 0710	BTOD - TIC A removed from freezer.
Start of shift	Freezer temp below -18C. B. Christy
8/23/21 0735	2 units of blood removed from blood
	fridge. Blood fridge temp 4.1C, graph
	4.1C. B. Christy
8/23/21 0900	2 units of blood administered on H956-21
Blood Administered	W0671210395860 and W0671210382920
	6232 notified B. Christy
8/23/21 0905	2 units of blood replaced. Blood removed
	from blood fridge. Blood fridge temp
	4.1C, graph 4.5C. B. Christy
8/23/21 0930	2 units of blood received by TBC. Temp of
	units below 10C. Blood on fridge. P. Lew
6232 restocks new blood	
8/23/21 1100	Blood thermometer began to alarm at 5.8
	thermometer at 5.9 upon arrival HQ
Portable thermometer alarms	blood removed from TIC and temporarily
	placed in blood fridge. TIC A placed back
	into freezer. TIC B removed from freezer.
	Freezer temp below -18C. B. Christy
8/23/21 1125	2 units of blood removed from blood

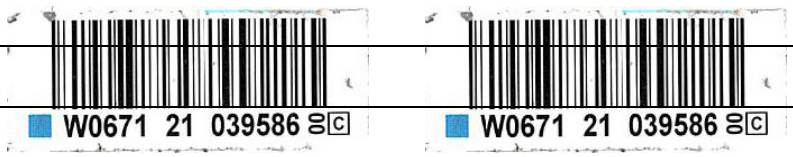
EXAMPLE ENTRYS

BLOOD EVENT LOG

Date - Time	Event
8/23/21 1125	fridge. Blood fridge temp 4.1C, graph
	4.1C. B. Christy
8/23/21 1850	ETOD - 2 units of blood placed back into
End of shift	blood fridge. Blood fridge temp 4.1C,
	graph 4.5C. B. Christy
8/23/21 1855	TIC B returned to freezer. Freezer temp
	below -18C. B. Christy
8/23/21 2236	Blood fridge alarm went off. Temp at 5.6
Blood fridge malfunction	6232 notified. K. Hoag
8/23/21 2238	2 units of blood temporarily moved to
6232 corrective action	coroner's 2nd floor fridge. Coroner's fridge
	temp 4.0 C. C. Martinez
8/23/21 2245	Blood fridge assessed; it was unplugged.
	Fridge plugged back into outlet. Temp
	stabilized, alarm stopped. Temp now 4.1.
8/23/21 2256	2 units of blood removed from coroner's
	fridge and placed back into EMS blood
	fridge. Blood fridge temp 4.1C, graph
	4.0C. 6260 emailed. C. Martinez
8/24/21 0510	BTOD - Freezer temp -1C. 6232 notified
Start of shift, freezer malfunction	Blood temporarily out of service. Archaga
8/24/21 0514	The 3 TICs were temporarily moved to
6232 corrective action	upstairs top load freezer. Freezer assessed;
	it was unplugged. Freezer plugged back
	Into outlet. Once freezer temp dropped
	below -18C, TICs returned to freezer. 6260
	emailed. A. Bouck
8/24/21 1314	TICs have been below -18 for 8 hours

EXAMPLE ENTRYS

BLOOD EVENT LOG

Date - Time	Event
8/24/21 1314	Notified 6210 that Blood can go back into
	Service. A. Bouck
8/24/21 1320	TIC A removed from freezer. Freezer temp
Blood going back out after, freezer malfunction	below -18C. A. Archaga
8/24/21 1345	2 units of blood removed from blood
	fridge. Blood fridge temp 4.2C, graph
	4.1C. A. Archaga
8/24/21 1600	Blood thermometer began to alarm at 5.8
	thermometer at 7C upon arrival HQ
	blood removed from TIC and placed in
Portable thermometer alarms	blood fridge quarantined drawer. 6232
Blood out of range	notified. TIC A placed back into freezer.
	TIC B removed from freezer. Freezer temp
	below -18C. A. Archaga
8/24/21 1625	2 new units of blood removed from blood
	fridge. Blood fridge temp 4.2C, graph
	4.1C. A. Archaga
8/24/21 1635	Both units of blood labeled Quarantined
6232 corrective action	W0671210396800 and W0671210396800
	placed in blood fridge quarantined
	drawer. 6260 emailed. A. Bouck
8/24/21 1650	2 units of blood received by TBC. Temp of
	units below 10C. Blood on fridge. A. Bouck
6232 restocks new blood	

Appendix E: Record of Blood Components Returned or Transferred

Record of Blood Components Returned or Transferred

The Blood Center
Hammond, LA | New Orleans, LA

Phone: (985) 340-2343 | Fax: (985) 340-2344

Note: Only one component type may be listed per form.

FROM: (Hospital /Facility ID) _____ Date: _____

TO: (Hospital /Facility ID):

_____ Total number of units: _____

RECORD INFORMATION BELOW AS REQUIRED (COMPLETE ALL FIELDS AS NECESSARY):

UNIT NUMBER	COMP TYPE	BLOOD TYPE	EXP. DATE	COMMENTS
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
16.				
17.				
18.				
19.				
20.				

Packed Date: _____ Time: _____ Shipped Date: _____

We certify that, while in our possession, the units listed above have been maintained at appropriate temperatures, as shown by temperature records maintained by us at a temperature of:

(check one) ☐ **1-6°C** ☐ **20 – 24°C, while continuously rotated** ☐ **-18°C or colder.**

Pre-issue inspection revealed no unit abnormal by color or appearance and no unit beyond expiration date, except as noted. To comply with FDA regulations, this document must be signed by hospital personnel to confirm the above statement. ***Credit CANNOT be issued for these units if this document is not completed and signed by hospital personnel. Please refer to return policy in Service Made Simple Manual for additional information.**

*Hospital Tech Signature: _____ Date: _____

TBC USE ONLY:

Receipt Date/ Time _____ /_____

Temperature _____ Initials _____ **Return #**_____

HS1F0610 ReturnForm 12/2017