UnityPoint Health Pekin
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Effective Date: 11/29/18
Date Reviewed/ Date Revised: 02/26/19

CRYOPRECIPITATE

I. PRINCIPLE

Each unit of cryoprecipitate is prepared by thawing a unit of FFP at 1 – 6° C. During the slow thaw, a white precipitate forms. This is the cryoprecipitate (cryo). The supernatant plasma is removed, leaving the cryo plus 10-15 ml of plasma in the bag. This material is then refrozen at -18° C within 1 hour and has a shelf life of 1 year. Cryo contains approximately 80-120 units of Factor VIII:C (the procoagulant activity), 40-70% of Factor VIII:vWF (von Willebrand factor) from the original unit, 250 mg/dl of fibrinogen and 20-30% of the Factor XIII from the original unit. Cryo may be indicated for the treatment of hemophilia A, von Willebrand's disease, congenital or acquired fibrinogen deficiency, Factor XIII deficiency and obstetric complications or other situations associated with consumption of fibrinogen, such as DIC.

II. POLICY STATEMENT:

A. Cryo is ordered from ARC and thawed upon a doctor's order to transfuse. It is also included to be ordered and transfused during a Massive Transfusion Protocol. American Red Cross offers single units and a (pre)pooled (5 singles pooled) unit of cryo. A minimum of 4 units per order is required for infusion. A single unit may be ordered in surgery if the product is to be used for a patch. Consult a pathologist with orders (for infusion) of less than 4. ABO compatible should be given whenever possible. In the case of an emergency, ABO incompatible may be given if ABO compatible units are not immediately available.

B. We are to keep 2 units of type AB (pre)pooled (5 singles pooled) cryo in stock at for Massive Transfusion Protocol

C. Thawed cryo has an expiration time of 6 hours. Cryo should never be thawed unless there is an order to give/use, or part of the Massive Transfusion Protocol set.

D. Pooled cryo has a 1 year expiration like plasma and cannot be returned to the ARC. UPH Methodist will be willing to take a transfer from us if we have some that are getting close to expiring. Check with them and transfer when the units have about 4 months left before expiring. Then order 2 new units to replace those transferred.

III. SPECIMEN

A. 1 large (10ml) EDTA tube. Patient must have a Blood Bank ID band. If patient has a current BB ID band with the blood type tested and reported, a new specimen need not be drawn.

IV. PROCEDURE:

A. Thawing Cryoprecipitate:

1. Place one cryo bag into a biohazard bag and then into a membrane pocket in the plasma thawer. If a blood product bag breaks or the plastic pocket leaks, follow the decontamination instructions in the maintenance procedure for the MT-202.

2. Set the timer for the proper thaw cycle time for the size bag being thawed by following the steps below. The average time for a (pre)pooled (5 single units pooled) unit of cryo is 16 minutes.
    a. The time/function display on the front of the MT-202 gives the function status and displays the time remaining on the thaw cycle. Maximum time entered is 99 minutes and 59 seconds. You can only reset the time when the instrument is at rest.
    b. Press the "RESET" button. The time/display function will flash "00:00"."
    c. Using the keypad, enter the desired thaw time.
    d. The new thaw time will appear on the time/function display.
3. Press "START." Pressing "START" twice saves your new thaw cycle time and the automatic thawing cycle will be activated. If an error was made in input and you want to start over, press "CLEAR." If you do not press "START" or "CLEAR" in the next 15 seconds, the MT-202 will revert back to the last saved thaw cycle. The pump will start, and the time/function display will have "FILL" flashing on its display. After filling, the thaw time will display a countdown until it reaches zero.
4. When thaw cycle reaches zero, it will beep once and the time/function display will display "DRN." The time/function display will then revert back to the display the total set time that you have entered.
5. A 10-second alarm sounds to let you know the cycle is completed and the cryo bag(s) are ready to be removed.
6. If the unit is not completely thawed, break up remaining frozen cryo with your fingers, replace the unit back in the membrane pocket, and set the timer for a few more minutes.
7. If for any reason you want to interrupt the thaw cycle:
    a. Press "STOP." The time/function will display "DRN."
    b. Then "INT" will display
    c. To resume the thaw cycle press "START" or press "CLEAR" if you want to cancel the cycle and reset the time.
8. At the end of the thaw cycle, remove from MT-202. If the bag of cryo is wet, determine if the cryo bag broke or the membrane leaked. If the membrane pocket leaked, remove it and replace with a new one. Thoroughly dry the cryo bag before administration. Check ports for possible contamination (clean with alcohol wipe if necessary).
9. If the bag of cryo has broken, place it into a bag for disposal using Universal Precautions. Do not dispose of the membrane pocket if it is not damaged. The membrane pocket may be decontaminated and reused. Refer to the decontamination procedure in Section 6.5 of the Thermogenesis Manual.

B. Testing to be added on and resulted in Sunquest:

C. Thaw unit in Sunquest by opening up the patient's order in Blood Order Processing (BOP). Click on the Allocation Tab. Then branch into Blood Component Prep (BCP) by clicking the green BCP button. Enter Thaw Code (Product Code for Cryo-5 pack is THCRYP and the Product Code for Cryo-single is THCRY). Hit Tab. Enter time and date thawed. Hit Tab. Click the green Continue button in the lower right hand corner of screen. Scan or type in unit number (the Component and Division# fields will fill in automatically). Hit Tab. Your new expiration date and time will be displayed at the bottom of the screen. Click the green Save button in the lower right hand corner of screen. A Preview Output/New Units box will pop up, click the Finish button. The unit will then automatically be allocated to that patient. Use the ( ]) key to place an "OK" in the Transfuse Status (TS) box.
D. Phone nursing unit and document by free texting, in the "Note" line in Sunquest (BOP), the time and the name of the person notified.
E. Cryo should be used as soon as possible, but no more than 6 hours after thawing.
F. Cryo is stored at room temperature.
G. Note new expiration date and time (6 hours after thawing) on label of cryo bag.
H. Write "Thawed" on the label.
I. Do not refreeze.
J. If cryo is not used before new expiration date, it is to be discarded in an approved biohazard waste container.
K. After checking over all your work, click Save, and the unit tag(s) will print to attach to the unit(s).

V. TECHNICAL NOTES:

A. Leaking or damaged units are to be double bagged and placed on the bottom shelf of the blood refrigerator for destruction. The unit must have a note attached to it describing the problem and a note is to be left for the supervisor.
B. Expired units are to be discarded by the receiving facility. Credit will not be given for expired units. Update any units discarded in Sunquest BSU. Refer to BSU procedure in the SQ BB Guide. Units discarded at UnityPoint Pekin are destroyed by autoclaving.
C. All units shipped out (transferred) must be updated in the computer. Refer to BSU procedure in the SQ BB Guide.

VI. DOSAGE CALCULATIONS:

If an order is placed to give cryo in an amount appropriate to the patient's size, the following formula is to be used. The patient must have had a recent fibrinogen assay performed and the physician must stipulate the desired rise in fibrinogen in milligrams (mg).

An average bag of cryo contains 250mg of fibrinogen.
Kg = 2.2 lbs
Obtain patient weight from nursing floor. Look in IQ for most recent fibrinogen and hematocrit (HCT) result.

Blood Volume = weight in Kg x 70ml/Kg

Plasma volume (PV) = blood volume x (1.0 – HCT)

$$\text{mg of fibrinogen required} = \frac{(\text{Desired fibrinogen level} - \text{Initial fibrinogen level}) \times \text{PV}}{100}$$

$$\text{Bags of cryo required} = \frac{\text{mg of fibrinogen required}}{250 \text{ (mg/bag of cryo)}}$$

Example: patient weight 200 lbs
HCT = 30%
Desired fibrinogen level = 300
Initial fibrinogen level = 100

$\frac{200}{2.2} = 91\text{Kg}$ 91Kg x 70ml/Kg = blood volume of 6370

6370 x (1.0 – 0.3) = 4459 (Plasma volume)

$\frac{(300-100) \times 4459}{100} = 8918$ mg fibrinogen required

$\frac{8918}{250} = 35.7\ (36)$ bags of cryo needed.

VII. REFERENCES

A. *AABB TECHNICAL MANUAL*, current edition, American Association of Blood Banks
B. *STANDARDS FOR BLOOD BANKS AND TRANSFUSION SERVICES*, current edition, American Association of Blood Banks
C. *BLOOD TRANSFUSION THERAPY - A Physicians Handbook*, current edition, American Association of Blood Banks
D. *CIRCULAR OF INFORMATION For the Use of Human Blood and Blood Components*, current edition, American Red Cross
E. *Nascimento, et al. Cryoprecipitate Therapy.2014 113 (6):922-934. (UPPK-0637.01)*

POLICY CREATION :	Date
Author: Jenny Turner, MLT (ASCP)	11/29/18
Medical Director: Kathryn Kramer, MD	11/29/18

MEDICAL DIRECTOR		
DATE	NAME	SIGNATURE
3/19/19	Lori Rnesh	LR DO
SECTION MEDICAL DIRECTOR		

REVISION HISTORY (began tracking 2011)			
Rev	Description of Change	Author	Effective Date
1	Added transfer to Methodist when 4 months left, added to keep 2 prepooled in stock, added to update any units discarded in SQ BSU. Add attachment.	Jenny Turner	02/26/19

Reviewed by

Lead	Date	Coordinator/ Manager	Date	Medical Director	Date
Jennifer Turner	3-15-19				

British Journal of Anaesthesia 113 (6): 922–34 (2014)
Advance Access publication 27 June 2014 · doi:10.1093/bja/aeu158

BJA

Cryoprecipitate therapy

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Editor's key points

- The authors review the evolving usage of cryoprecipitate, noting the uncertainty of appropriate dosing and optimal administration.
- They call for randomized controlled trials to help guide the use of cryoprecipitate and current, alternative therapeutic options.

Cryoprecipitate, originally developed as a therapy for patients with antihaemophilic factor deficiency, or haemophilia A, has been in use for almost 50 yr. However, cryoprecipitate is no longer administered according to its original purpose, and is now most commonly used to replenish fibrinogen levels in patients with acquired coagulopathy, such as in clinical settings with haemorrhage including cardiac surgery, trauma, liver transplantation (LT), or obstetric haemorrhage. Cryoprecipitate is a pooled product that does not undergo pathogen inactivation, and its administration has been associated with a number of adverse events, particularly transmission of blood-borne pathogens and transfusion-related acute lung injury. As a result of these safety concerns, along with emerging availability of alternative fibrinogen preparations, cryoprecipitate has been withdrawn from use in a number of European countries. Compared with the plasma from which it is prepared, cryoprecipitate contains a high concentration of coagulation factor VIII, coagulation factor XIII, and fibrinogen. Cryoprecipitate is usually licensed by regulatory authorities for the treatment of hypofibrinogenaemia, and recommended for supplementation when plasma fibrinogen levels decrease below 1 g litre^{-1}; however, this threshold is empiric and is not based on solid clinical evidence. Consequently, there is uncertainty over the appropriate dosing and optimal administration of cryoprecipitate, with some guidelines from professional societies to guide clinical practice. Randomized, controlled trials are needed to determine the clinical efficacy of cryoprecipitate, compared with the efficacy of alternative preparations. These trials will allow the development of evidence-based guidelines in order to inform physicians and guide clinical practice.

Keywords: blood; blood coagulation factors; coagulation protein disorders; cryoprecipitate coagulum; fibrinogen; transfusion

Concentrated antihaemophilic factor (AHF), or factor VIII (FVIII), was first produced in the 1940s by Edwin J. Cohn, via the fractionation of plasma with ethanol.[1] Modest amounts of this product were used as a treatment for haemophilia throughout the 1950s,[2] and in the early 1960s attempts were made to create an improved FVIII concentrate, which led to the discovery that cryoprecipitate, which forms when frozen plasma is allowed to thaw slowly at 1–10°C, is rich in fibrinogen, AHF, and factor XIII.[3] This product was first discovered and introduced by Pool and colleagues nearly 50 years ago, as a therapy for patients with AHF deficiency or haemophilia A;[4 5] however, its major use today is far removed from that for which it was originally intended. As a labile blood product derived from plasma, cryoprecipitate is enriched with fibrinogen and also high concentrations of FVIII, von Willebrand factor, and factor XIII. Its main use today is to replenish fibrinogen levels during coagulopathies associated with massive haemorrhage, in which fibrinogen decreases to a critical level[6 7] because of processes such as consumption through clotting, dilution, blood loss, or all.

Cryoprecipitate has been withdrawn from many European countries because of safety concerns such as the transmission of pathogens.[8 9] Instead, commercial fibrinogen preparations are available for fibrinogen replacement therapy.[10] Nevertheless, cryoprecipitate remains available for haemostatic therapy in several countries, including the USA and Canada, but Level 1 evidence in the form of prospective, randomized, controlled trials to support its efficacy is lacking. Here, we examine the clinical evidence and current guidelines for the use of cryoprecipitate to treat patients with acquired coagulopathy.

Preparation

Each unit (U) of cryoprecipitate is commonly prepared from 1 unit of fresh frozen plasma (FFP; plasma which is frozen