ACES Policy and Procedure Review and Sessions

Week 4—Blood, IV's, and Blood Draws

1. Vascular Access and Maintenance - per IV Therapy
2. Continuous Administration of Fluids Through a Central Catheter
3. SASH Method for Flushing IV Lines
4. Central Line Maintenance and Care
5. **Accessing** an Implanted Port— *IV Therapy and specially trained staff only*
6. What's Your Line Key Points
7. Blood Ordering Key Points
8. Blood Products Patient Information Form
9. Blood Product Administration/Summary Chart of Blood Products Administration: Leukopoor Blood, Packed Red Cells, Platelets or Fresh Frozen Plasma/ Adverse Reactions to Transfusions
10. Total Parenteral Nutrition (TPN) Administration
11. Dangers of D5W Article
11. Wound Care Braden Scale Information

A.M. Session — Team Presentations (See Matrix):

Peripheral and Central Lines / Blood draws

TPN—Total Parenteral Nutrition

Blood Administration

Wound Care / Braden Scale

IV Fluids/D5W Review

P.M. Session

GI Bleed Scenario

Medical Scenario

Trauma Scenario

Quiz

Evaluations

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WEEK 4 Fall 2009

SKILLS STATION MATRIX AND SIMULATION MATRIX

Time	All Groups Together
0800-0830	Pretest/Personality Styles
0830-0900	IV Therapy Overview
0900-0930	Team Assignments/ Worksheets
0930—0945	Break

TEAM Presentations

Group 1 0945-1015	Group 2 1015-1045	Group 3 1045-1115	Group 4 1115-1145	Group 5 1145-1215
Peripheral and Central Lines/ Blood draws	TPN	Blood Administration	Wound Care Braden Scale	IV Fluids

1215-1300	Lunch on your own
1315-1345	Group Scenario

Scenarios	GI Bleed	Trauma	Medical Patient
1345-1430	Group 1	Group 2	Group 3
1430-1515	Group 2	Group 3	Group 1
1515-1600	Group 3	Group 1	Group2

1600 –1620	Quiz
1620 –1630	Evaluations

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Vascular Access and Maintenance – Key Points per IV Therapy

An IV site is the most important and most invasive medication delivery route for a patient. PLEASE take care of it!

ASSESSMENT

- **Always wash your hands** before touching patient and when leaving the room.
- Observe IV site for redness or streaking up the vein as this is a sign of phlebitis. IV sites that exhibit redness, swelling, tenderness or drainage need to be changed. Check that dressing is clean, dry, and intact
- Observe entire length of IV tubing to check that Claves are attached, tubing is screwed on tight, or line is clamped where indicated.
- Ask the patient how the IV site feels.

ACCESSING LINES

- Always turn off IV infusions for 1 minute before doing blood draws. That way your lab results won't be altered be what is infusing.
- Always turn IV infusions back on after completing tasks.
- Always swab off Clave with an alcohol wipe for **15 seconds** and allow to dry before accessing or attaching IV tubing.
- If accessing **a central line for blood draws**, the line MUST be swabbed **twice** with an alcohol wipe for 15 sec and allowed to dry in between. This is especially important for blood cultures so the sample is not contaminated.
- Follow SASH policy for line flush – 2-3 ml of flush solution unless it is a midline or central line. If it is a PICC and you must flush more than 3 times per day use 10 unit/ml heparin.
- Peripheral locked lines are flushed with saline and locked with 3 ml of 10 unit heparin except 18g and 20g. These 18 and 20g peripheral lumens do well with only saline flushes. It is very important to use positive pressure and clamp during the last 0.5 ml to properly complete flush.

TROUBLESHOOTING /Frequently asking questions

- If the IV pump keeps alarming occlusion:
  - Is the tubing kinked? LOOK at the entire length of tubing!
  - Is the patient laying on the tubing?
  - Is the tubing clamped?
  - Is the drip chamber falling over and kinking the line?
  - Is the pressure gauge set too low?
  - Has the patient pulled on the tubing and kinked it at the catheter hub?
  - Has the alarm been going off so long or so frequently that the line has been stagnant and plugged? Give it a flush!

- IV Therapy is often called to <u>fix a line that is reported to have caused the pump to repeatedly alarm</u> – only to find that the reason the pump is alarming is that the *bag was empty* or *the medication dose was finished*. Staff assumed it was the same problem again and did not assess the situation by: ***reading*** *the alarm window* or ***looking*** *at the line* ***<u>each</u> time***.
- Call IV therapy to do dressing changes if the dressing looks soiled or wet. However, a small amount of blood under the dressing is OK especially if they are on heparin. The more we disturb the dressing the more the patient is going to bleed.
- If your patient is to take a shower, wrap the site with clear wrap and paper tape, then flush and lock the IV if possible. DO NOT pop the chamber open on the IV pump and leave the tubing attached without a flush and lock. When the tubing is pulled out it causes blood to back up into the line and the line to occlude.

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CENTRAL LINES /DIALYSIS CATHS

- **ALWAYS USE A 10ml SYRINGE on ANY CENTRAL LINE**. A syringe smaller than a 10 ml creates too much pressure inside the catheter which could cause the line to rupture, resulting in serious injury and even **death** to your patient.
- Many meds in the Acudose are not supplied in 10 ml syringes which means they must be transferred to a 10 ml syringe to administer through a central line / PICC. Example: the pain med syringes in the Accudose
- All central lines must have a filter and be on a pump. They also require a sterile transparent dressing. If a patient is admitted without a dressing please call IV therapy. The dressing is necessary to protect the patient from hospital germs.
- Central line dressings are done by IV therapy every seven days or as needed. If a dressing has loosened and the line is exposed that dressing needs a change.
- If the line is occluded try using a gentle **pull** to aspirate the occlusion. Aspirate several times to loosen the clot and pull it back into the syringe. Only after the clot is removed and syringe discarded should you attempt to gently push with a new flush. Do not force the flush as you may be releasing a deadly clot into the patient's system.
- Always flush and positive pressure clamp all the lines on multi-lumen catheters (even when not in use).
- If a line has had TPN running and that lumen needs to be used for a blood draw, flush the lumen with 20 ml NS before drawing blood. (See protocol)
- After a blood draw, always flush line with 20 ml NS, then heparin if locking line, or connect to IV fluids.
- Blood draws should be done from the most distal lumen on a multi-lumen catheter. The lumens have small print on them identifying them as proximal, medial and distal. If the line is not marked it may be color coded with red for blood draws.
- Coagulation studies (i.e. INR, heparin assay, etc) cannot be drawn from central lines as those lines are maintained with heparin and could affect the results of the tests.
- No Dilantin/phenytoin sodium through a central line. However, fosphenytoin is **not** Dilantin and can be used in a central line.
- If a PICC line or tunneled groshong is damaged and you are unsure if it can be repaired, clamp the line in a manner that won't damage the tubing and notify IV therapy ASAP

PORTS

- Only IV Therapy or specially trained staff can ***access (place the Huber needle through the skin into the port)*** ports. After the line has been accessed staff may utilize it to give fluids and meds etc.
- Any time a **port** is locked off 100 unit heparin is used.

DIALYSIS CATHETERS

- Dialysis patients usually have limited access for venipuncture. Fistulas tend to be placed in the non-dominant arm. IV sites are placed in the hands only on dialysis patients.
- Dialysis catheters are ONLY accessed with permission from the nephrologists. Even in the Emergency Department, permission must still be obtained before use. If obtained, IV therapy may then access catheter.

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ACES
Policy and Procedure Review

Key Points for Policy on: Continuous Administration of Fluids Through a Central Catheter (Groshong, Hickman, Subclavian, Jugular, PICC, Port-A-Cath, Femoral)
For complete policy description, go to Policies and Procedures (IV Therapy) on Memorial's Intranet.

Purpose: To administer continuous fluids, blood, and/or blood products as ordered by a physician.

Key Points:

- Prior to the administration of fluids through a central catheter the nurse will always check the physician order, gather primary I.V. tubing with a 0.2 Micron high pressure filter, infusion pump, wash hands, don non-sterile gloves, prime and date I.V. tubing for (72 hours). If a central line is going to be in place longer than 24 hours, be sure and place a primed luer lock extension on the central line before connecting the primed I.V. tubing to the catheter.
- After applying non sterile gloves, the nurse should clamp the central catheter and cleanse the catheter clave with an alcohol wipe for 30 seconds. Groshong and PICC catheter should not be clamped.
- Connect the primed I.V. tubing to the luer lock extension and open the clamps. Infusion pumps are mandatory for infusion of fluids through a central line catheter.
- Extensions and claves are changed at weekly dressing change by the I.V Therapy Nurse or sooner if:
    - Old blood present
    - Particulate matter present
    - Wear/tear on side port
- Document:
    1. IV solution,
    2. Flush solution or SASH, (if running I.V. and not compatible),
       on MAK and/or Electronic Medical Record

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IV Therapy

Continuous Administration of Fluids Through a Central Catheter (Groshong, Hickman, Subclavian, Jugular, PICC, Port-A-Cath, Femoral)

PURPOSE:

To administer continuous fluids, blood, and/or blood products as ordered by a physician.

EQUIPMENT:

1. Prescribed solution
2. Appropriate tubing
3. Confirm appropriate filter selection with pharmacy. Filters are required to prevent air emboli or unresolved medication into circulatory system.
4. Tape
5. Infusion pump
6. Single luer lock ext. tubing with clamp or “y” extension
7. Non-sterile gloves
8. Alcohol wipes

PROCEDURE:

1. Wash hands.
2. Prime and date tubing. Be sure to place luer lock extension on all central lines if patient is expected to stay longer than 24 hours.
3. Wash hands and don non-sterile gloves.
4. Clamp catheter when indicated. Groshong central line and PICC Groshong catheters should not be clamped.
5. Cleanse catheter clave with alcohol wipe for 30 seconds.
6. Connect IV tubing using luer lock connection after ensuring air is not present in IV tubing line.
7. Open clamps if present.
8. Set infusion pump at prescribed rate. Pumps and filters are mandatory on all central lines.
9. To administer blood or blood products, follow Blood Procedure.

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10. When tubing is changed, the extension is not changed unless:
    A. Old blood present
    B. Particulate matter present
    C. Wear/tear on side port
    D. Extensions and claves are changed at time of weekly dressing change\
    E. Tubing change every 96 hours or as required per solution administered i.e. TPN tubing is changed every 24 hours, etc.

11. Document flush solution/SASH or IV solution on MAK.

Effective Date:	07/31/1992		
Prepared by:			
Approved by:	IV Therapy / Nurse Manager Policy & Procedure Committee	Date:	07/01/1992
Reviewd by:	Connie Conklin, RN Nurse Manager, Orthy/Neuro/IV Tx	Date:	12/12/1994, 12/10/2000
Revised by:	Connie Conklin, RN Nurse Manager, Orthy/Neuro/IV Tx	Date:	09/07/1992, 01/10/1998, 05/03/1998, 01/25/2004, 01/28/2009
Approved by:	IV Therapy / Nurse Manager Policy & Procedure Committee	Date:	01/28/2009

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ACES
Policy and Procedure Review

Key Points for Policy on: Central Line Care/Maintenance (Includes PICC)
For complete policy description, go to Policies and Procedures (IV Therapy) on Memorial's Intranet.

Purpose: Care and maintenance of central lines utilizing the least amount of manipulation of the line. EXIT SITE CARE, NEW CATHETER CARE

Key Points:

Dressing Change for an Inpatient Central Line Catheter

- Prior to performing central catheter site care the nurse will gather a Central Line Dressing Tray, wash hands, don non-sterile gloves, and explain the procedure to the patient. Position the patient flat on back, remove the old dressing with non-sterile gloves toward the puncture site to prevent dislodging of the catheter. Document the entrance, exit, and tunnel sites and obtain cultures if there appears to be an infection; take patient temperature and notify physician.
- Open the Central Line Dressing Tray, don with the sterile gloves and mask in the tray. Cleanse the catheter site in a circular motion moving outward making a 2" circle beginning first with alcohol wipe followed by 2% chlorhexidine; allow the alcohol and chlorhexidine to dry. Stabilize the central catheter and cleanse the catheter from exit site to hub with alcohol; apply the skin prep (packet) but do not allow the skin prep to come into contact with the exit site and catheter tubing. Always loop the catheter to the outside without touching the uncleansed area, allow the catheter loop to exit dressing on the side or bottom, cover the catheter site with a transparent or gauze dressing depending on site status.
- A transparent dressing should cover the catheter hub up to but not on the extension of the central line catheter. Transparent dressings are replaced every 7 days and gauze dressings should be replaced every 24-48 hours; both dressing types should be replaced when damp, loosened, or soiled.
- Change clave every 7 days by vigorously cleansing the hub of the catheter with alcohol for 30 seconds before replacing with new primed clave. Date dressing change and clave replacement and document.

Drawing Blood from a Central Line Catheter Through a Clave With/Without Fluids Infusing

- Check physician orders, identify patient using two identifiers, explain procedure to patient, wash hands and don with non-sterile gloves before vigorously cleansing clave with alcohol for 30 seconds using two alcohol wipes.
- Stop infusion of fluids for at least 1 minute before drawing blood specimens. If the central line catheter is locked, flush the central line catheter with a Luer-Lok syringe containing 10 ml of normal saline, then draw back 8 ml of blood into the same syringe, remove the syringe while maintaining positive pressure and discard.
- Collect lab specimen with new syringe; remove the syringe while maintaining positive pressure, flush with two 10 ml(20 ml total) of normal saline using positive pressure to ensure that no blood remains in the side arm, line, or clave. If adding new clave—prime first. Follow with Heparin per protocol.

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IV Therapy

Central Line Care / Maintenance (Includes PICC)

PURPOSE:

Care and maintenance of central lines utilizing the least amount of manipulation of the line.
EXIT SITE CARE, NEW CATHETER CARE

EQUIPMENT:

Central Line dressing tray:

- 4x4s
- Alcohol swab sticks and wipes
- 2% chlorhexidine swab applicator
- Sterile gauze or sterile transparent dressing
- Tape
- Mask
- Gloves
- Sterile gloves
- Sterile drape
- Skin Prep – from unit supplies

PROCEDURE:

1. Get supplies together. Check patient allergies.
2. Wash hands with soap and water.
3. Explain procedure to patient.
4. Open kit; don sterile mask and gloves.
5. With non-sterile gloves, remove old dressing. Dressing is always removed toward puncture site to prevent dislodging of catheter.
6. Observe entrance, tunnel, and exit sites for redness, swelling, drainage, tenderness or warmth. If you think there is an infection, obtain cultures (see line culture procedure), finish changing the dressing, take patient's temperature and notify physician.
7. Remove gloves and wash hands again.
8. Don sterile gloves.
9. Cleanse skin around the catheter in a circular motion moving outward making a 2" circle. Beginning first with an alcohol swab stick followed by chlorhexidine.
10. **Allow the chlorhexidine to air dry.** For maximum effectiveness, chlorhexidine needs to dry.
11. Cleanse catheter from exit site to hub with alcohol wipe. Stabilize catheter during cleansing to prevent accidental removal.
12. Apply skin prep as appropriate and allow to dry **completely**. If skin prep is not **completely** dry, skin will tear when dressing is removed. Also, do not allow skin prep to come into contact with exit site and catheter tubing.
13. Loop the catheter to the outside without touching the uncleansed area. The loop protects from catheter dislodging. Allow the catheter to exit the dressing on the side, bottom, or top of dressing (depending on patient need), and cover with transparent or gauze dressing depending on patient's status. Side or bottom exit of catheter prevents moisture (showers,

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emesis, etc.) from entering dressing. The transparent dressing should cover catheter hub up to, but not on, the extension. This holds catheter secure and does not allow it to stretch or break.
    - Outpatients - If a line will not be accessed between physician visits, a separate transparent dressing may be applied covering end cap.
14. Dressings:
    - Transparent dressing: (dressing of choice) Place dressing adhesive side down and smooth over skin. Remove picture framing. Transparent is standard and is changed weekly and prn.
    - Gauze dressing: Lay gauze dressing over catheter, secure with tape on four sides. Gauze dressing may be used if excessive drainage is present – change every 48 hours.
15. Dressing Change Schedule: A small amount of dried blood under the dressing is not an indication for changing the dressing.
    - Transparent: Once a week (7 days) or replace when damp, loosened, soiled, or when inspection of site is necessary.
    - Gauze: Once a day (24 hours) if purulent drainage exists at site, or when inspection of site is necessary. Q 48 hours if drainage is due to bleeding.
16. Remove exit site sutures, including suture "wings" per physician order. If patient is neutropenic, consult oncology RNs prior to removing sutures. Keep sharp end of scissors away from catheter.
17. Change clave every 7 days by removing existing clave, cleanse hub of catheter with alcohol wipes vigorously for 30 seconds and place new clave.
18. Date dressing and clave.

LONG-TERM CATHETER CARE:

ENTRANCE SITE CARE

- Entrance site dressing: Remove dressing in 7 days. Replace dressing prior to 7 days if it becomes damp, loosened, or soiled.

EQUIPMENT:

FLUSHING THE CATHETER

- 10cc syringes (use nothing less than 10cc syringe)
- Alcohol wipes (2)
- Heparin, 10-100 unit per cc

PROCEDURE:

1. Wash hands.
2. Vigorously scrub clave (30 seconds) with alcohol wipes (15 seconds each).
3. Flush clave with 10cc normal saline pre-filled syringe, followed by Heparin 3-5ml
    - Rapid flushing (or push/pause method) is necessary to thoroughly clean the inside lumen.
    - When patient is discharged, instruct to use 3cc 100U Heparin for flushing unless condition warrants otherwise

IV BLOOD DRAWING THROUGH A CLAVE, CENTRAL LINE OR WITH A RUNNING IV:

1. Reminder do not draw coags through a central line that is maintained with heparin or if heparin drip is running. (See evidence below).
   If unable to obtain coag sample peripherally, notify physician.
1. IV extension should be in place if patient is hospitalized for 24 hours or longer.

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EQUIPMENT:

- Four 10ml pre-filled normal saline syringes
- Heparin 10-100u/ml
- Alcohol wipes (2)
- Sterile clave if indicated

PROCEDURE:

1. Wash hands.
2. Preparing Equipment:
   - Prime new, sterile clave with NaCl. If new clave is indicated.
3. Wash hands and don gloves.
4. Running IV:
   - Stop infusion
   - Vigorously scrub port proximal to patient for 30 seconds using alcohol wipes (15 seconds each wipe)
   - Flush with 10ml NaCl. Draw back 8ml blood in syringe and discard.
   - Collect lab specimen with new syringe.
   - Flush with 10 ml normal saline and resume infusion.
   - During entire procedure ensure clave and syringe tip are not contaminated.
5. Locked line
   - Clean clave with alcohol wipes, 30 second vigorous scrub using 2 alcohol wipes (15 seconds each wipe). Flush line with 10ml NaCl, then draw back 8ml blood into same syringe and discard. (Flushing prior to procedure is optional)
   - Collect lab specimen with new syringe. Flush appropriately with normal saline. If any blood remains in line, flush with another 10ml normal saline. Ensure no blood remains in side arm, line or clave.
6. If unable to draw from line:
   - Try to reposition patient, i.e., raise arm on side of line, turn head to opposite side of line, cough or hold breath, lower and/or raise HOB if feasible.
   - If still unable to draw; then,
     ⇒ Locked Line: Remove syringe from clave; remove and dispose of clave, draw directly from hub. Place new clave after draw.
     ⇒ Running IV: Disconnect IV tubing from IV catheter hub, cap tubing to keep sterile, draw directly from hub and reconnect IV tubing after draw is complete.
   - If still unable to draw blood:
     ⇒ Locked Line: Apply new sterile, clave and flush with 10cc NaCl and 3cc 100U Heparin.
     ⇒ Running IV: Reattach IV tubing to extension hub and adjust flow rate as per previous order.
     ⇒ Then notify physician for discussion of options which may or may not include use of a declottting agent. Inability to withdraw from lines is not always an indication for the use of a declotting agent.

TROUBLE-SHOOTING CATHETER PROBLEMS:

1. **Inability to flush**, as evidenced by resistance felt when exerting gentle pressure on the plunger of a 10cc syringe or IV fluid will not infuse.
   - Check for clamps, kinks, or twists in line.
   - Consult an IV Therapist or another RN with IV expertise.
2. **Leaking from catheter:**
   - Turn off IV solution immediately.
   - If chemotherapy infusing, follow chemo spill procedure 4.18.3.

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- Inspect lines for a tear, disconnection, or loose connection.
- If there is a tear, wrap area with sterile gauze, clamp line with smooth clamp between patient and tear (as close to tear as possible) to prevent blood loss or air embolus. Notify IV Therapy or Nursing Supervisor immediately. Line may occlude within 15 minutes. **Often line can be repaired.**

3. **Swelling around exit site:**
   - Assess area for discoloration, crepitus (air), or fluid leaking from exit.
   - If extravasation of chemotherapy is suspected, stop infusion immediately and follow extravasation procedure 4.18.4.
4. **Swelling of neck and face:**
   - Assess venous status from head, neck and affected arm, looking for distention of specific areas.
   - Assess Radiology report or Dept. for current CXR interpretation confirming line placement.
   - Notify physician (suggestion: 1) dye study to confirm line placement; 2) consider venous thrombosis).
5. **Air in IV line or extension:**
   - Stop infusion.
   - Inspect all connections.
   - Using a 10cc syringe withdraw air from side port closest to air pocket.
   - If air pockets continue to form, change IV tubing and/or extension.
6. **Break in line at exit site:**
   - Clamp line with smooth hemostat.
   - Cover with sterile gauze dressing and notify IV Therapist.

EVIDENCE:

"If any studies appear to be grossly inaccurate, redraw a blood sample from a peripheral vein (Almadrones, Godbold, Raaf, & Ennis, 1987; Mayo, Dimond, Kramer, & Horne, 1996; Winslow et al., 1995).

- Blood coagulation studies should be drawn peripherally unless the catheter is maintained with normal saline because heparin adheres to the internal catheter lumen and will alter the coagulation results. At some institutions, coagulation levels are drawn after other blood samples are obtained or after discarding 10 mL of blood; however, the literature does not support this practice.
- Some drugs (e.g., aminoglycosides, cyclosporine) can adhere to the catheter wall, which may obscure drug serum level testing (Huitemea, Holtkamp, Tibben, Rodenhuis, & Beijenen, 1999). Consider drawing these drug levels peripherally.

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Prepared by:			
Approved by:		Date:	
Revised by:	Nursing Policy and Procedure Committee	Date:	05/03/1998, 09/07/2003, 11/18/2004, 06/08/2007
Revised by:	Nursing Policy and Procedure Committee	Date:	05/03/1998, 09/07/2003, 11/18/2004, 06/08/2007, 12/12/2008
Approved by:	Nursing Policy and Procedure Committee	Date:	05/03/1998, 09/07/2003, 11/18/2004, 06/08/2007, 12/12/2008

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IV Therapy
IV Therapy
Use of In-Line Filters in IV Lines During Drug Administration

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POLICY:

1. All central IV lines shall have filters.
2. The following drugs only are to be filtered during administration:

Drug (Mfgr.)	Filter Pore Size (um)	Additional Comments
Alglucerase (Genzyme)	Unspecified	Reason for filtration is unclear
Amiodarone hydrochloride (Wyeth-Ayerst)	0.2	
Asparaginase (Merck)	5	
Diazepam (Roche)	0.22-0.5	Filtration necessary only for continuou
Digoxin Immune Fab (Glaxo Wellcome)	0.22	
Etopside (Bristol-Myers Oncology, Pharmacia & Upjohn)	0.22	Filtration necessary if drug concentrati >0.6mg/mL
Gemtuzumab (Mylotarg)	1.2	UV protection for bag
Infliximab (Remicade)	1.2	
Immune globulin (various sources)	1.5-5	Filtration necessary for infusion of Gar S/D (Hyland) and Polygam S/D (ARC, Hyland)
Lymphocyte immune globulin, antithymocyte globulin, equine (Pharmacia & Upjohn)	0.2-1 or 5	
Mannitol (various sources)	Unspecified, use of ≤5 has been reported	Filtration necessary if drug concentrati
Paclitaxel (Bristol-Myers Squibb)	≤0.22	
Pantoprozol (Protonix)	Use either filter provided by drug company or stocked filter (.20 or .22)	
Parenteral nutrient solutions without lipids	0.22	
Parenteral nutrient solutions with lipids	1.2	
Phenytoin sodium (Parke-Davis)	0.22	

Effective Date:	12/31/1986		
Prepared by:	Julia Patten		
Approved by:	IV Standards / Nurse Managers Policy & Procedure Committee	Date:	12/01/1986
Reviewd by:	Connie Conklin, RN Nurse Manager, Ortho/Neuro/IV Tx.	Date:	12/12/1994, 01/21/2004
Revised by:	Connie Conklin, RN Nurse Manager, Ortho/Neuro/IV Tx.	Date:	01/10/1990, 08/27/1993,

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ACES
Policy and Procedure Review

Key Points for Policy on: Accessing An Implanted Port - Regular or Power
For complete policy description, go to Policies and Procedures (IV Therapy) on Memorial's Intranet

Purpose: To gain access to an implanted port for infusion of IV fluids, medications or blood and blood products. May be located in chest, arms, or abdomen.

The Port-a-Cath will be accessed by RN's with demonstrated competency only

Key Points:

- Before accessing port: review the policy/procedure, check physician orders, gather equipment/supplies, explain procedure to patient, wash hands, position patient, verify with 3 identifiers to access and use power port for CT scans (power port purple wrist band, ID card or key chain card), apply patient mask.
- Don non sterile gloves and palpate the skin over the port and feel for septum, cleanse the skin with alcohol for 30 seconds and allow to air dry. May consider numbing the area as per physician order. Open sterile central line dressing tray, apply sterile mask, don with sterile gloves, aseptically prime the extension tubing and Huber needle with a 10 ml syringe of sterile saline, clamp extension tubing. Stabilize port and insert Huber needle at 90 degrees until it meets resistance, unclamp extension tubing, aspirate for blood return.
- If lab samples ordered, withdraw 8 ml of blood and discard, obtain lab samples then inject 20 ml of sterile normal saline, reclamp at the end of injection using positive pressure. Flush line with 5 ml of 100 units/ml of Heparin, reclamp at the end of injection using positive pressure.
- If Huber needle left in place for continuous or intermittent infusions, place sterile 2X2s under hub of Huber needle, apply skin prep and secure with steri-strips over needle keeping the needle perpendicular. Statlock and suture wing may be applied to further secure tubing, apply transparent dressing snugly leaving ends of extension tubing and clamp out of the dressings. Tape all junctions of tubing, tape circle of tubing with chevron to chest. If Power lac tubing and power port, remove sticker off package, attach to tubing to verify power access. Remove gloves and wash hands. Date and document.
- Change dressing every 5-7 days, date and document. Tubing change every 72 hours unless TPN, then change daily. Extension is not part of tubing and is not changed unless Huber needle changed.

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IV Therapy

Accessing An Implanted Port—Regular or Power

PURPOSE:

To gain access to an implanted port for infusion of IV fluids, medications or blood and blood products. May be located in chest, arms, or abdomen.

POLICY:

The Port-a-Cath will be accessed by an RN with demonstrated competency in accessing ports.

EQUIPMENT:

1. 1 - 5 ml 100 unit/ml Heparin flush
2. Vial normal saline 20 ml or 2 single sterile field normal saline flushes
3. Central line dressing kit
4. 3 - 10 ml luer lock syringes - if blood draw
5. 2 - 10 ml syringes with 19 gauge needle for drawing up saline flushes from vial
6. Clave
7. Sterile towel
8. Alcohol wipes
9. Steri-strips 1/2 inch x 4 inch
10. Stat- lock and suture wing for hospitalization securement prn
11. Noncoring needle (Correct needle for respective port ie. miniloc, power loc, etc.) IV Therapy has 20g noncoring in 1/2", 3/4", 1", 1 1/4" and 1 1/2". Power locs is 3/4" and 1 and 1 1/2" 20 g.
    Preferred numbing agent.

Before You Start the Procedure do the following::

1. Have an assistant available.
2. Place everything in the room and make space to work from near the head of the bed.
3. Check allergies. Ask what type of port and verify.

POINT OF EMPHASIS:

1. The entire procedure shall be done under sterile conditions.
2. Assistant will assist with filling syringe with NS so syringe remains sterile.
3. For children, Emla cream may be applied 1 - 2 hours before accessing to numb the area and this requires a physician order.
4. For adults, Ethyl Chloride spray may be used or Xylocaine.

PROCEDURE:

1. Place patient in comfortable position.
2. Palpate port site to locate septum. Note shape of port to determine type of port. Triangular shape indicates power port. Also note bumps on septum that also indicate power port.

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3. If accessing power port, also verify that patient has power port purple wrist band, ID card or key chain card. If none present check chart records, 3 identifiers are needed to be able to access and use power port for CT scans.
4. Explain procedure to patient and apply patient mask.
5. Wash hands.
6. Open sterile dressing tray kit and apply mask.
7. Put on sterile gloves.
8. Use Chlorahexadine swab to clean site and let dry.
9. Attach non-coring needle to clave. Flush air from tubing, clamp extension. Grippers come attached to non-coring extension tubing.
10. Apply patient preferred numbing agent at this time
11. Locate and stabilize port with 3 fingers of one hand.
12. Grasp huber needle with attachments in other hand, place needle perpendicular to port and enter skin at the chosen site within center of port with the hub in the direction you wish it to be left. Press firmly, keeping huber needle straight, until metal tip touches metal backing on port.
13. Open clamp, slowly pull back on syringe until you see blood to make sure you have accessed the port septum. Blood should return easily. Withdraw 6 ml of blood and discard in order to clear heparin from the port. If needed, obtain lab samples now. They inject the 20 ml normal saline slowly - reclamp at the end of injection using positive pressure technique.
14. Place folded 2x2 under hub of huber needled prn to level. Apply skin prep on skin where strips will be. Secure well with steri-strips over needle keeping needle perpendicular. Stat-lock and suture wing may be applied to tubing to further secure tubing.
15. Apply occlusive/transparent dressing snugly over entire site leaving ends of extension tub ing and clamp out of the dressings.
16. Wipe clave with alcohol wipe for 15 seconds and let dry. Do this twice prior to flushing with 5 ml of 100 unit Heparin using positive pressure. Be sure extension tubing is clamped before removing syringe.
17. Remove gloves, tape all junctions of tubings, tape circle of tubing with chevron to chest so no pulling or stress is on the noncoring needle.

- IMPORTANT: If this is Power loc tubing and power port take sticker off of package and attach to tubing so that Cat Scan and staff will know this is a verified power access.

18. Change dressing every 5 -7 days.
19. Reaccess every 5 - 7 days.
20. Document dressing date, length of needle and initials. Also chart on parenteral fluids sheet/ chart.
21. If port is accessed with no blood return, talk with floor RN or Physician as soon as possible. about verifying port function with either dye study or TPA.

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Prepared by:			
Approved by:	Nursing Policy and Procedure Committee	Date:	02/01/1988, 10/17/2008
Reviewd by:	Nursing Policy and Procedure Committee	Date:	12/12/1994, 12/10/2000, 01/25/2004, 12/20/2007, 10/17/2008
Revised by:	Nursing Policy and Procedure Committee	Date:	01/15/1991, 01/25/1998, 06/06/2007, 12/20/2007, 10/17/2008
Approved by:	Nursing Policy and Procedure CommitteeI	Date:	01/15/1991, 01/25/1998, 06/06/2007, 12/20/2007, 10/17/2008

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What's Your Line???

Groshong PICC

ALWAYS:

- ✓ Flush before and after intermittent medications with 10 mL NS—If line to be locked ↓
- ✓ Follow with 3 mL of 100 unit/mL Heparin—positive pressure flush with clamping
- ✓ If 3 or more flushes per day 1 mL of 10 unit/mL Heparin is adequate.

MAINTENANCE:

- ✓ If line locked, flush once weekly with 10 mL of NS, followed by 3 mL 100 unit/mL Heparin (or after intermittent medications).

BLOOD DRAWS:

- ✓ Turn all pumps off to all lumens prior to draw. Follow P&P for blood draw.
- ✓ **Always** follow draw with 20 mL NS. If locked, follow with 3 mL of 100 unit/mL.
- ✓ Positive pressure flush with clamping.

No Dilantin thru PICC Lines!!

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What's Your Line???

Per-Q-Cath PICC

ALWAYS:

- ✓ Clamp unused lines
- ✓ Flush before and after intermittent medications with 10 mL NS—If line to be locked ↓
- ✓ Follow with 3 mL of 100 unit/mL Heparin—positive pressure flush with clamping
- ✓ If 3 or more flushes per day 1 mL of 10 unit/mL Heparin is adequate.

MAINTENANCE:

- ✓ If line locked, flush with 3 mL of 100 unit/mL Heparin every 12 hours and/or after intermittent medications.

BLOOD DRAWS:

- ✓ Turn all pumps off to all lumenss prior to draw. Resume infusions after draw. Follow P&P for blood draw.
- ✓ **Always** follow draw with 20 mL NS. If line locked, follow NS with 3 mL of 100 unit/mL Heparin
- ✓ Positive pressure flush with clamping.

No Dilantin thru PICC Lines!!

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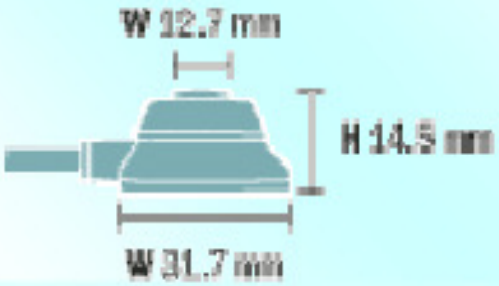
What's Your Line???

Port-A-Cath



ALWAYS:

- ✓ Flush before and after intermittent medications with 10 mL NS—<u>If line to be locked ↓</u>
- ✓ Follow with 5 mL of 100 unit/mL Heparin—positive pressure flush with clamping

MAINTENANCE:

- ✓ Flush with NS 10 mL followed by 5 mL 100 unit/mL Heparin every month (or before and after intermittent medications as instructed above.

BLOOD DRAWS:

- ✓ Follow P&P for blood draw.
- ✓ **<u>Always</u>** follow draw with 20 mL NS. If line locked, follow NS with 5 mL of 100 unit/mL Heparin to lock

No Dilantin thru Port-A-Cath!!

Spring 2010

What's Your Line???

Subclavian, Jugular, or Femoral IV Line

ALWAYS:

- ✓ Clamp unused lines
- ✓ Flush before and after intermittent medications with 10 mL NS—If line to be locked ↓
- ✓ Follow with 3 mL of 10 unit/mL Heparin—positive pressure flush with clamping
- ✓ If 3 or more flushes per day 1 mL of 10 unit/mL Heparin is adequate.

MAINTENANCE:

- ✓ If line locked, flush with 3 mL of 10 unit/mL Heparin every 12 hours and/or after intermittent medications.

BLOOD DRAWS:

- ✓ Turn all pumps off to all lumen PICC prior to draw. Resume after draw. Follow P&P for blood draw.
- ✓ **Always** follow draw with 20 mL NS. If line locked, follow NS with 3 mL of 10 unit/mL Heparin
- ✓ Positive pressure flush with clamping.

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What's Your Line???

Triple Lumen Power PICC

ALWAYS:

- ✓ Clamp unused lines
- ✓ Flush before and after intermittent medications with 10 mL NS—If line to be locked ↓
- ✓ Follow with 3 mL of 100 unit/mL Heparin—positive pressure flush with clamping
- ✓ If 3 or more flushes per day 1 mL of 10 unit/mL Heparin is adequate.

MAINTENANCE:

- ✓ If line locked, flush with 3 mL of 100 unit/mL Heparin every 12 hours and/or after intermittent medications.

BLOOD DRAWS:

- ✓ Turn all pumps off to all lumen PICC prior to draw. Resume infusions after draw. Follow P&P for blood draw.
- ✓ **Always** follow draw with 20 mL NS. If line locked, follow NS with 3 mL of 100 unit/mL Heparin positive pressure flush with clamping.

No Dilantin thru Power PICC

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IV Therapy

Guidelines for IV Catheter Maintenance

POINT OF EMPHASIS:

A. Use a 10 ml or larger syringe and flush vigorously but do not force. Maintain positive pressure.

B. **Types of Central Lines – all are to be maintained with heparin/saline using SASH method.**
- Groshong – blue catheter – PICC (peripherally inserted central catheter)
- Power PICCs - purple catheter
- Hickman or Broviac – white catheter – chest
- Subclavian, Jugular, Femoral
- Per-Q-Cath – white catheter – PICC
- V-Cath – white catheter - PICC
- Port-A-Cath –port implanted under skin

A. **LINE MAINTENANCE**
- **<u>Broviac</u>**
  i. Adult / Child
     - 5 ml 100 units Heparin every 7 days or after each use
     - If 3 or more flushes are needed per day and/or patient's platelet count is < 30,000, use 5 ml 10 unit/ml Heparin
  ii. Infant
     - 2ml 10unit/ml Heparin every 12
- **<u>PICC</u>**
  i. Adult / Child
     - As with Broviac
  ii. Infant
     - 3 ml 10 unit/ml Heparin every 8 hours or with each medication
- **<u>Peripheral Lines – Routine</u>**
  i. Medications
     - 5 ml NaCl before and after each medication (SASH method)
  ii. Maintaining a locked line:
     - Adult
       ⇒ 5 ml NaCl every12 hours or after each use. Exception: Patients with 22g and smaller (SASH method)
     - Peds
       ⇒ 5 ml 10u Heparin Q 12 Hours or after each use.
- **<u>Midlines</u> – 8 inches long – peripheral**
  i. Groshong
     - blue catheter
  ii. Per-Q-Cath
     - white catheter
  iii. Intracath
     - green catheter
  iv. Medications
     - 5 ml NaCl before and after each medication, then follow maintenance procedure below.

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v. Maintaining a locked line—Adult/Child
    - 5 ml 10 units Heparin every 12 hours or after each use.

- **Port-A-Cath – Implanted port**
    i. Reassess accessed port every 7 days (Peds may be exception)
    ii. Maintaining a de-accessed port – 5ml 100units/ml Heparin every 30 days

Effective Date:	02/28/1999		
Prepared by:	Julia Patten		
Approved by:	IV Therapy / Nurse Manager Policy & Procedure Committee	Date:	02/01/1999
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Revised by:	Connie Conklin, RN Nurse, Ortho/Neuro/IV Tx	Date:	01/10/2000, 12/12/2003, 12/20/2007
Approved by:	IV Therapy / Nurse Manager Policy & Procedure Committee	Date:	01/10/2000, 12/12/2003, 12/20/2007

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IV Therapy
IV Therapy
SASH Method of Flushing IV Lines

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PROCEDURE:

Flushing of IV Lines occurs every 8 hours.

	PERIPHERAL	MIDLINE	PICC	PORTS
SALINE	5-10 ml In a 10ml Syringe With Positive Pressure	5-10 ml In a 10ml Syringe With Positive Pressure	5-10 ml In a 10ml Syringe With Positive Pressure	
ADDITIVE MIXTURE (MEDICATION)	Infuse	Infuse	Infuse	Infuse
SALINE	5-10 ml In a 10ml Syringe With Positive Pressure	5-10 ml In a 10ml Syringe With Positive Pressure	5-10 ml In a 10ml Syringe With Positive Pressu	
HEPARIN	2ml 10units/ml For 22g or 24g ONLY	5ml 10units/ml	5ml 100units/ml 10ml Syringe or Larger *If 3 or more flushes are needed per day or platelet count is less that 30,000 use 5ml of 10 units Heparin*	

Positive Pressure Flush Technique for the Clave:

1. It is recommended to positive pressure flush the Clave Connector to prevent the backflow of blood into the catheter upon disconnection. This can be accomplished by removing the syringe from the port while continuing to flush with the last .25 ml in the syringe.
2. If the line has a clamp, this can also be done by closing the line with the clamp, while the last amount of flush is being administered, before the syringe is removed.

	01/31/2003		
Prepared by:			
Approved by:	Nursing Policy and Procedure Committee	Date:	01/02/2003, 10/06/2008
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Key Points: For Ordering Blood Products

Clarification of terms utilized on blood order slips:

Blood Type: patient is drawn and sample evaluated to determine patient blood type (i.e. A, B, O, +, -)

Band and Hold: patient is drawn and blood band placed on patient; patient blood sample is placed in fridge (on hold)

Type and Screen: patient is drawn and blood band placed on patient; blood type and antibody screen is performed on sample but there is NO crossmatched blood available. If antibody screen is positive or there is anything to cause the blood bank to be concerned, the floor is notified by the Blood Bank to request a crossmatch order from the physician. A Type and Screen can be converted to a crossmatch in a short amount of time in emergency cases without a redraw.

Type and Crossmatch: patient is drawn and blood band placed on patient; antibodies are tested and crossmatched. Blood bank completes the processing of the blood and places a certain number of units (as determined by the physician—i.e 4 units on hand, 2 units on hand, etc) in the Blood Bank fridge for that patient.

NOTE:

- Anything in red on the blood order slip requires the patient to have a blood band on their body (arm) - not on the bed!

- Anything in white on the order slip does not require a blood band on the patient

Key points: Completion of the Blood Transfusion Record

Section I - PRE-TRANSFUSION:

- All blood products require a physician order and patient consent.

- Physicians should be informing patients of need for transfusion, risks/benefits.

- Nurses reinforce physician recommendation by answering questions and providing a *Patient Education sheet/form* for *Blood and /or Blood Products*. This form reviews common questions and answers involving blood administration. It is form # 0180 - found in the Memorial Forms Catalog, and is provided to patients prior to their blood transfusion.

- Following receipt of patient education, the patient signs the *consent to transfusion* in **Section I** if able and not previously signed.

3. Staff must compare patient ID band with Name and Medical Record number on Transfusion Record
4. Staff must verify patient's Crossmatch Armband # - document this number on the Transfusion Record
5. Staff must verify/compare with the Transfusion Record the following:
    - Unit #,
    - Expiration date of blood component
    - Blood type and Rh

Staff performing the mandatory double check sign in **Section 1**—***one of which MUST be the person administering the component.***

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BLOOD AND/OR BLOOD PRODUCTS TRANSFUSION

(Fresh Frozen Plasma, Platelets, Cryoprecipitates)

Patient Information

What is a blood transfusion?

It is the introduction of blood into the circulatory system through a vein.

What does it do?

It can replace lost blood, increase the oxygen-carrying ability of your blood and may correct bleeding disorders.

Who administers it?

A registered nurse will administer the blood transfusion. Your vital signs will be closely monitored by the nursing staff. The length of your actual blood administration will be decided between your physician and nurse, based upon your physical condition.

Are there complications?

Immediate- Most blood transfusions are tolerated well. However, blood reactions can occur. Symptoms of a blood reaction are: itching, hives, fever, chills, chest pain, shortness of breath and blood in the urine. If you experience any of these symptoms, notify your nurse immediately.

Delayed- Rarely symptoms such as fever, fatigue or jaundice (yellow skin or eyes) may appear between 2-12 weeks following transfusion. These may be due to a late reaction to the transfusion or infection. If you experience these symptoms, notify your doctor or office nurse.

Where does Memorial Hospital obtain their blood?

All blood is supplied by the American Red Cross Blood Program through volunteer donations. Each unit is tested by known standard procedures before it is shipped to the hospital. The hospital and the American Red Cross performs the necessary pre-transfusion testing for various infectious disease markers, which includes extensive testing for HIV, hepatitis, and bacterial infections. The risk of contracting infection from a blood transfusion is currently extremely low-less than one in ten thousand. The lifesaving benefits of receiving a blood transfusion outweigh the very small risk of contracting an infectious disease. If your doctor recommends a transfusion, ask about the benefits and risks.

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General

Blood/Blood Products Administration and Transfusion Reaction

PURPOSE:

To safely administer whole blood, leukopoor blood, packed red blood cells, platelets or fresh frozen plasma.

EQUIPMENT:

- 250 ml or 500 ml bag of normal saline
- "Y" type blood administration tubing or appropriate pump tubing with standard blood filter (170 microns)
- When possible use a 20 gauge IV catheter or larger for IV site
- Product to be infused
- Infusion pump
- Current cross match band (If it is necessary to remove the patient's current cross match band, it must be replaced immediately by calling Lab.)

PROCEDURE:

1. Physician order required Verify physician order for blood product
2. Answer patient questions and provide education—Blood Product Transfusion Patient Education Form available in Memorial Forms Catalog
3. Setup for IV tubing. Multiple units may be infused through the same tubing.
   - Make sure all clamps are closed.
   - Insert one spike connecter from Y blood set into normal saline.
   - Open clamp to saline .
   - Prime line with normal saline and start saline.
   - Tubing must be changed at least every 4 hours, regardless of how many units of product have been transfused.
   - Tubing must be changed every time a different blood product is hung
3. Connect blood tubing at closest port to the patient. Blood should not be infused through a needle in a click lock fashion due to cell damage.
4. Observe IV site for signs of swelling, redness, hematoma or induration.
5. Request blood product from the blood bank. Once product arrives, inspect for the following:
   - Excessive air bubbles
   - Purplish/brown hue
   - Clots
   - Puncture in the bag
   - If problems with unit or unable to administer unit– return to Blood Bank with in 20 minutes
6. Obtain patient consent and record on pre-transfusion Section of YVMH Transfusion Record which arrives with the blood component
7. Perform and record baseline vital signs on the blood transfusion record.

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8. **Prior to starting transfusion, mandatory double check) by RN/RN, RN/LPN II, or RN/MD must occur (**one of the persons checking MUST be the person administering the blood component**). Checks to be included are:**
    - Patient's name
    - Medical record number
    - Cross match number - found on yellow sticker (3 letters and 4 numbers)
    - Expiration date of unit
    - Blood type and Rh
    - Unit number
    - Compatibility
  - If any discrepancies found while double checking send product back to the lab immediately

8. Hang the product:
   - Insert the remaining spike connector of the Y tubing into the blood product.
   - Close clamp to saline and open clamp to the blood product.
   - Prime the tubing to the point of IV entry of the patient. For the initial 15 minutes the rate should be **less than** or equal to **120ml/hour.** During this time watch for a blood transfusion reaction. (See end of policy for signs/symptoms of reaction)
9. At 15 minutes take vital signs and document on the blood transfusion record. Question the patient for signs/symptoms of reaction. If no signs/symptoms of reaction present, increase the rate of transfusion to 120ml- 300ml/hr or per doctor orders.
10. Follow doctor's orders for rate of transfusion. Usually RBC's in 1-2 hours and Plasma in 20-30 minutes. All blood products must be transfused within 4 hours of hang time.
11. Clear tubing between units with Normal Saline. This gives an opportunity to assess patency of blood filter, clears first unit of blood from tubing and helps to identify the unit responsible for a possible reaction.
12. Immediately upon completion of each product transfused, record a final set of vital signs and document on the transfusion record. Dispose of the empty blood bags and IV tubing.
13. Return the transfusion record to the patient's chart.

NOTE: Only saline should be infused with blood.

- No IV medications should be infused in the blood tubing. If need to give other IV medications, stop blood, flush with normal saline at port closest to patient, administer medication, flush with normal saline, restart blood.

POSSIBLE TRANSFUSION REACTION

A. If there is a reason to be suspicious of a reaction, vital signs can be checked any number of times. Initiate the following:
   1. Stop infusion but do not disconnect pending doctor's orders
   2. Keep IV site open and flush with 10ml normal saline at port closest to the IV site
   3. Obtain Vital signs
   4. Contact physician
   5. Notify the lab (they may want you to return unit to lab)

B. If reaction **not confirmed** continue transfusion at physician's discretion

C. If reaction is **confirmed** (by physician /blood bank /pathologist)
   1. Complete "Reaction" portion of Transfusion Record and chart in Nurse's Notes all pertinent information.
   2. Send Transfusion Record and if indicated the first urine specimen to the lab. Keep a copy of the Transfusion Record for the patient's chart.
   3. Lab may request sending of remaining blood and tubing to them.

C. Transfusion reactions fall in the following categories:
   - **ALLERGIC:** Usually mild: itching, urticaria, asthma; rarely anaphylactic.
   - **FEBRILE:** Shaking chills, fever, headache, nausea; less commonly, hypotension.
   - **HEMOLYTIC**: Similar to febrile reactions with additional symptomatology: apprehension, chest pain, shock, hemoglobinuria, abnormal oozing of blood, back pain.

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- **CIRCULATORY OVERLOAD:** Cough, shortness of breath, neck vein dilation, pulmonary congestion and edema.
- **HYPOTHERMIC:** Cardiac arrhythmias and cardiac arrest (extreme reaction to large amounts of cold blood).
- **DISEASE TRANSMISSION:** Hepatitis, malaria, HIV, syphilis, HTLV-I, cytomegalovirus (CMV), Graft-vs-Host.
- **TRANSFUSION-RELATED ACUTE LUNG INJURY (TRALI):** Respiratory distress, non-cardiogenic pulmonary edema, and severe hypoxemia.
- **POST-TRANSFUSION PURPURA:** Sepsis, severe rigors (especially if accompanied by cardiovascular collapse), increased temperature of greater than or equal to 40^{o}C, shock.

Patients should be educated on symptoms of:

- **Delayed Transfusion Reaction –which can occur up to 2 weeks post transfusion**
  Fever, with or without chills ; shaking chills ; pain at infusion site; pain in chest, abdomen, back , flanks; blood pressure changes; respiratory distress; hives, rash, redness or itching; nausea with or without vomiting; blood in urine; unusual bleeding tendencies; jaundice or yellowing of the skin and eyes

FOR ADDITIONAL INFORMATION, SEE TABLES BELOW :

- blood transfusion
- transfusion reaction
- blood administration

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BLOOD TRANSFUSION REACTION TABLE

CATEGORY	SYMPTOMS	TREATMENT	PREVENTION
Allergic Reactions (patients with history of allergies)	Urticaria, itching, asthma: rarely, anaphylaxis (1gA deficient patient)	Antihistamine PO or IM; epinephrine for acute asthma	If clerical checks are negative, medicate and continue transfusion. Patient may be pre-medicated or given washed red cells for future transfusions. Use 1gA deficient plasma for patients having anaphylaxis.
Febrile Reactions (patients with history of multiple transfusions or pregnancies)	Shaking chills, fever, headache, nausea, non-productive cough; less frequent are hypotension, chest pain, vomiting and dyspnea.	Acetaminophen or aspirin	Pre-medicate or give leukocyte-reduced products (use of leukocyte removal filters)
Hemolytic Reactions	Shaking chills, fever, hypotension, apprehension, headache, chest pain, shock, nausea, vomiting, dyspnea, flushing, abnormal oozing from cut or surfaces, hemoglobinuria, back pain, pain at infusion site, anuria	Treat hypotension and promote renal blood flow to maintain urine output at 100mL/hour (80-120 mg of intravenous furosemide)	Careful adherence to procedures at every step in the transfusion process from sample procurement to infusion of unit. Accurate record-keeping of patient transfusion history (especially clinically significant antibodies)
Circulatory Overload (Patients with compromised pulmonary or cardiac status)	Cough, shortness of breath, neck vein dilation, pulmonary congestion and edema, congestive heart failure, cyanosis, rapid increase in systolic blood pressure.	**STOP** Infusion: put patient in sitting position; administer diuretics and oxygen.	Give red cells, not whole blood. Administer slowly. Unit may be allocated and given in portions. Premedicate with diuretics.
Hypothermic Reactions	Cardiac arrhythmias, cardiac arrest	Use blood warmer, call physician, administer CPR, warm the patient	Warming blood – **CAUTION:** use warmer with alarm. **Do not warm blood over 42ºC**. Keep the patient warm. Contact House Supervisor to obtain warmer and appropriate tubing.
Disease Transmission	Hepatitis, malaria, HIV, CMV, Graft-vs-Host (GHV, onset up to six months post-transfusion), syphilis,	As appropriate for diagnosis	Careful screening and testing of donors. Prompt reporting of every possible transfusion-associated

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CATEGORY	SYMPTOMS	TREATMENT	PREVENTION
Disease Transmission (Continued)	HTLV-I, Yersinia enterocolitica.	As appropriate for diagnosis	hepatitis or AIDS case. Irradiation of products containing while blood cells for patients at risk of GVH. Use of leukoreduced or CMV negative products is recommended for persons at risk for CMV infections.
Transfusion-Relate Acute Lung Injury (TRALI)	Acute respiratory distress, severe bilateral pulmonary edema and severe hypoxemia (arterial oxygen tension commonly of 30-50 mmHg) associated with fever. Patient may have hypotension which is unresponsive to fluid administration. Symptoms occur within two to six hours of recent transfusion.	Rule out cardiogenic causes. Prompt and igorous respiratory support (oxygenation and/or mechanical ventilatory assistance are frequently needed).	Often caused by donor antibodies to HLA antigens or donor leutoaggultinins. May be recipient antibody induced (to donor WBC antigen), or may be due ot other conditions causing complement activation (older blood components). Leukoreduced products may help prevent future reactions in approximately 10% of cases.
Post-Transfusion Purpura	Bleeding or hemorrhagic symptoms five to ten days post-transfusion, hematuria, melena, markedly decreased platelet count.	High dose IVIG. Plasmapheresis may be effective. Request screening for platelet specific antibodies.	For future transfusions, use washed platelet products or deglycerolized red cells (both special orders) or avoid platelet antigen responsible (e.g., PLA1 [HPA-la]negative products for patient with anit-PLA1).

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Summary Chart of Blood Components and average volumes of each product.

Component and Rate of Administration	Major Indications	Not Indicated For	Special Precautions Crossmatch Needed	Hazards (see IV Guidelines: Adverse Reactions to Transfusions)
Red Blood Cells, Washed or Deglycerolized (no standard for leukocyte removal) *Available only by special order* **200 - 300 ml**	Where 90% or greater removal of plasma is indicated (severe allergic reactions; unusual IgA phenotype). Frozen/deglycerolized red cells may need to be used for rare blood types	See Red Blood Cells	Yes	See Red Blood Cells; hemolysis due to incomplete deglycerolization can occur
Red Blood Cells, Leukocytes Reduced 325 - 410 ml	Symptomatic anemia, febrile reactions from leukocyte antibodies, CMV-safe, reduced incidence of HLA allo-immunization	See Red Blood Cells**;** Leukocyte reduction should not be used to prevent GVHD	Yes	See Red Blood Cells; if using bedside leukocyte reduction filter, hypotensive reaction may occur
Whole Blood Autologous only **530 - 625 ml**	Symptomatic anemia with large volume deficit	Condition responsive to specific component; see Red Blood Cells	Must be ABO-identical; labile coagulation factors deteriorate within 24 hours after collection	See Red Blood Cells; circulatory overload
Frozen Plasma, Cryoreduced Plasma **Flow rate 5-10 mL/min** **180 - 330 ml**	Deficit of labile and stable plasma coagulation factors and TTP	Condition responsive to volume replacement; coagulopathy that can be more effectively treated with specific therapy	No	Infectious diseases; allergic reactions; circulatory overload
Cryoprecipitated AHF 10 - 15 ml/bag	Hypofibrinogenemia, Factor XIII deficiency, Hemophilia when factor concentrates not available	Conditions not deficient in contained factors	Frequent repeat doses may be necessary No Crossmatch needed	Infectious diseases; allergic reactions
Plateletpheresis ("Platelets, Pheresis" - Single Donor Platelets, HLA-Matched, or Leukoreduced Plateletpheresis 5-10 mL/minute 250 - 400 ml	Bleeding from thrombocytopenia or platelet function abnormality; Prevention of bleeding from marrow hypoplasia	Plasma coagulation deficits and some conditions with rapid platelet destruction (e.g., TTP) unless life threatening hemorrhage	**No**	Infectious diseases; septic/toxic, allergic, febrile reactions, GVHD
Granulocytes Special Orders 300 - 400 ml volume	Neutropenia with infection, unresponsive to appropriate antibiotics	Infections responsive to antibiotics, eventual marrow recovery not expected	Must be ABO-compatible. Use standard filters. **Should not use some filters (check manufacturer's instructions)**	Infectious diseases; allergic, febrile reactions, GVHD

Spring 2010

SOURCE:

Technical Manual, AABB, 15th edition, 2005 Standards for Blood Banks and Transfusion Services, AABB, 23rd edition, 2004

Circular of Information for the Use of Human Blood and Blood Components

KEY WORDS:

Effective Date:	02/15/2008		
Prepared by:	Tammy Smeback/Nurse Manager/Memorial Hospital		
Approved by:	Nursing Policy and Procedures Committee	Date:	03/12/2008
Reviewd by:	Nursing Policy and Procedures Committee	Date:	03/12/2008, 11/21/2008
Revised by:		Date:	
Approved by:	Nursing Policy and Procedures Committee	Date:	03/12/2008, 11/21/2008

Spring 2010

ACES
Policy and Procedure Review

Key Points for Policy on: Placement of Patients R/T Medication and Treatments
For complete policy description, go to Policies and Procedures (Medications) on Memorial's Intranet

Purpose: All patients receiving the following treatments shall be Assessed and Re-assessed at the level of a CCU patient.

Key Points:

- All patients receiving cardiotonic drugs: See policy for list of medications. Any pressor agents should be administered via a central line when possible. Any patient receiving dopamine or dobutamine requiring titration with frequent vital signs will be transferred to CCU.
- All patients receiving the following interventions &/or treatments:
    - Intubated and on the ventilator
    - Medically unstable suicidal patient
    - Pulmonary Artery Monitoring
    - ICP Monitoring
    - Hyperthermic or Hypothermic therapy
- All adult patients on the Diabetic Ketoacidosis Protocol with an Insulin drip infusion.
- All patients receiving selected intravenous infusions of anxiolytics, antipsychotics, and anesthesia adjuncts. See policy for list of medications.

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Medication Management

Medication

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Placement of Patients With Medications or Treatments Requiring Cardiac Monitoring

POLICY:

All patients receiving the following treatment shall be placed on a cardiac monitor and cared for by appropriately trained staff.

PURPOSE:

To ensure adequate cardiac monitoring of patients receiving the following treatment.

1. Amiodarone drip
2. Diltiazem drip
3. Lidocaine drip
4. Esmolol
5. Labetolol drip - except when used in Labor and Delivery to treat PIH (pregnacy induced hypertension) or HELLP (hemolysis elevated liver enzyme levels and low platelet count)
6. Other IV Beta Blockers for acute rate or blood pressure control
7. Nitroglycerin drip without titration
8. Cooling Blanket
9. Abcximab (Reopro)
10. Tirofiban (Aggrastat)
11. Epifibitide (Integrilin)
12. Furosemide drip or Bumetanide drip

Effective Date:	01/05/2000		
Prepared by:	Lynda Boggess/CCU NSO/Memorial		
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Medication Management

Medication

Placement of Patients Receiving Medications or Treatments Requiring Critical Care Monitoring

YAKIMA VALLEY MEMORIAL
AWARD WINNING HOSPITAL

POLICY:

All patients receiving the following treatments shall be Assessed and Reassessed at the level of a Critical Care Unit patient.

PURPOSE:

To ensure adequate monitoring of patients receiving the following Treatment.

1. Intubation – on ventilator
2. Patient at risk
3. Suicide attempt- (medically unstable). Medically stable patients will be admitted to Inpatient Psychiatry.
4. Pulmonary Artery(PA) line monitoring
5. Intracranial Pressure (ICP) monitoring
6. Receiving Hyperthermia or Hypothermia Therapy
7. Patient receiving the following cardiotonic drugs:
   Dopamine >5mcg/kg/min or requiring titration*
   Nitroglycerine drip *Requiring Titration
   Dobutamine – requiring titration*.
   Epinephrine
   Norepinephrine (Levofed)
   Nitroprusside
   Phenylephrine (Neosynephrine)
   Propofoll.
   Vasopressin drip
   Any paralytics
   Lorazepam drip (Ativan)
   Midazolam drip (Versed)
   Haloperidol (doses>10mg/hr)
   Thrombolytic agents for MI,
8. Stroke,
9. PE
10. Insulin drip - Adult patients on the Diabetic Ketoacidosis Protocol ***with the exception of pregnant patients being managed on the Family Birthplace.***

*Any pressors should be run via a central line when at all possible.

*Patient may remain on a medical/surgical unit or ACU (as per physician order) while receiving Dopamine at ≤5 mcg/kg/min. and infusing at a constant rate or Dobutamine at a constant rate, not requiring titration or frequent vital signs.

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General Nursing Policy and Procedure Manual
General Nursing
Total Parenteral Nutrition (TPN)/Hyperalimentation

YAKIMA VALLEY MEMORIAL
AWARD WINNING HOSPITAL

DEFINITION:

Hyperalimentation or Total Parenteral Nutrition (TPN) is the intravenous infusion of nutrients to the patient, sufficient to achieve positive nitrogen balance, promote healing, tissue repair and growth.

PURPOSE:

To administer metabolic and nutritional support via the parenteral route when the nutritional needs of the patient cannot be met by the enteral route. To ensure the safe administration of TPN which provides hypertonic glucose, electrolytes, amino acids, and other necessary nutrients necessary to sustain life.

EQUIPMENT:

1. Physician's order for TPN with specified solution and additives written on the *Adult Central Line Parenteral Nutrition Orders* form (found on Memorial Forms Catalog).
2. TPN solution prepared by Pharmacy according to Doctor's order
3. New IV tubing and filter:
   - If solution contains **lipids: use 1.2 Micron filter.**
   - If **no lipids** in solution: **use 0.22 Micron filter.**
4. IV Infusion Pump
5. Central Venous Catheter, positioned in patient's Superior Vena Cava (SVC); unless otherwise directed by physician.

PROCEDURE:

Prior to the start of TPN:

1. Obtain a Nutrition Consult
2. See that a recent Complete Blood Count (CBC), Complete Metabolic Panel (CMP), Magnesium, Phosphorus, and Serum Triglyceride levels are in the chart.
3. Scan the Physician orders found on the *Adult Central Line Parenteral Nutrition Orders* to Pharmacy prior to **1 pm**. Pharmacy will return a label for the TPN solution to the floor. The RN should verify the TPN label with the Physician's orders and notify Pharmacy as soon as possible with any discrepancies. If **no discrepancies found**, affix the TPN label to the back of the *Adult Central*

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Line Parenteral Nutrition Order form.

4. Pharmacy will send the labeled TPN solution to the floor. Nurses should inspect the bag:

- Solutions containing **lipids are opaque/milky in color**. If oil globules are present, return to Pharmacy.
- If TPN solution does **NOT** contain lipids, inspect bag in strong light for particles, cloudiness or crystals.
- If any of the above items present or leak noted, return solution to Pharmacy.

> **NOTE:** Lipid emulsions contain egg phospholipids as an emulsifier; therefore, they should not be used in patients with severe **egg allergies**. IV lipid emulsions are **contraindicated** in patients with severely elevated serum triglyceride levels.

5. Weigh and record patient weight prior to infusion. Record weight daily, at the same time of day with the same scale.

6. Monitor the patient's most recent laboratory values, including Phosphorus, Magnesium, CBC, CMP and serum triglycerides.

7. Refrigerate TPN solutions until getting ready to administer. Allow TPN to reach room temperature prior to administration, which takes approximately 1 hour. TPN solution should not be left out for more than 2 hours prior to hanging.

8. Ensure/maintain an accurate intake and output record daily.

9. Record blood glucose. Blood glucose determinations shall be done every 6 hours or as ordered by physician. Report hyperglycemia per physician orders on the *Adult Central Line Parenteral Nutrition Order* form.

10. Check temperature and vital signs according to unit routine.

11. Check the expiration date/time on the bag. Do not begin/ continue infusion after the expiration time indicated.

12. Hanging the Solution:

a. Wash hands.

b. Identify the patient using two identifiers, and verify the patient's name/identifiers on the TPN label.

c. Scan the label on the TPN bag into the Medication Administration System (MAK).

d. Using aseptic technique, spike the bag with IV pump tubing which has the correct size micron filter attached. Prime the tubing and flush **all** air from the tubing. Connect the tubing to the infusion pump, and set the flow to the rate ordered by the physician.

> NOTE: Rate of infusion should not exceed 100 mL/hour unless specified by the physician/pharmacy. If administration rate should fall behind, no attempt should be made to "catch up." The high osmolality can damage vessels and the high dextrose content will create

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fluctuation of glucose levels with rate changes.

NOTE: One bag of TPN/hyperalimentation solution shall not hang more than 24 hours after spiking bag. Any solution left after 24 hours shall be discarded. Tubing and filter shall be discarded every 24 hours as well. More frequent tubing change may be necessary, as well as filter replacement if plugged. Contamination danger is much higher after 24 hours.

e. Record the following information on the Parenteral Fluid Flow sheet:

- Date/time TPN solution started and stopped.
- TPN solution amount in mL
- Rate of administration
- Bottle number
- Document use of pump
- Signature of nurse

NOTE: Unless otherwise ordered, rate of delivery should be gradually increased (per Pharmacy) with first bag to avoid hyperglycemia. On termination, rate should be gradually decreased to avoid hypoglycemia. Do not interrupt TPN for surgery unless ordered by Anesthesia.

What to watch for:

1. If patient develops fever or chills:

A. Notify the physician immediately
B. Physician may order TPN/hyperalimentation solution to be discontinued.
C. Check temperature every 4 hours until it returns to normal.
D. Obtain appropriate cultures as ordered by the physician.

Report to the physician:

E. Hyperglycemia per physician orders
F. Weight loss / changes
G. Increased pulse or blood pressure
H. Increased temperature
I. Swelling and edema over catheter site
J. Distention of veins in neck, arms or hands
K. Pain in shoulder
L. Electrolyte imbalances
M. Convulsions, coma

2. If infusion starts to leak, both set and bag must be replaced immediately.

NOTE: BEWARE of AIR EMBOLISM - **AIR can be pulled into the central line if tubing is leaking or not clamped**

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prior to disconnecting! Signs and symptoms of air embolism include: hypoxia, hypotension, respiratory distress, changes in cardiac and neurologic status.

Treatment of Air Embolism includes:

A. Place patient in **Trendelenberg** position (head down) on **LEFT** side.
B. Administer oxygen
C. Monitor vital signs
D. Notify physician as soon as possible for further orders
E. Fill out a Quantros Report

3. If infusion must be interrupted, extreme care shall be used to maintain sterility.
4. It is recommended that TPN/Hyperalimentation line should not be used for any other IV meds or solutions.
5. If patient has only one lumen line available (central or peripheral) medications may be administered through an injection port or dual extension tubing using **sterile technique and flushing before and after med administration**. Check Pharmacy compatibility before administering through TPN line.

NOTE: If Pepcid is in TPN, be sure to D/C every 12 hour doses to prevent overdosing

6. If a night problem requires the solution to be taken down:
• Run Dextrose 10% for one hour at the same rate and then replace with standard IV fluid until TPN is resumed per *Adult Central Line Parenteral Nutrition Order* form.
7. Dressings at subclavian site are changed by IV Therapy according to policy, unless otherwise specified by physician.

Peripheral Parenteral Nutrition (PPN)

Parenteral solutions which are infused into a (18 g) peripheral (NOT CENTRAL) line. PPN should NOT be administered for longer than 7 days. PPN contains 10% Dextrose or less. Concentrations of Dextrose greater than 10% can damage peripheral veins. Solutions containing over 10% Dextrose concentration must be run in a central line.

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Prepared by:			
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You will be reviewing the TPN orders on 2 separate patients. Please compare the order with the label for each patient and answer the questions. If there is a problem with the order or label please document what steps you will take at the <u>bottom</u> of the page.

Pt #1 Hyperemesis: vomiting for several days, unable to eat

By what time does the new order for TPN have to be scanned to Pharmacy?

What time is TPN usually hung?

What labs need to be ordered if this is a Monday?

At what rate will you set the pump for this patient?

If there is a problem with the order or the label what do you do?

Pt #2 Perforated bowel

What type of tubing will you run the TPN through? When is it changed?

What size filter will you use? What color is it?

What rate will you set the pump at for this pt?

What labs will you be monitoring on this patient?

If your patient's TPN is interrupted what fluid do you run and for how long?

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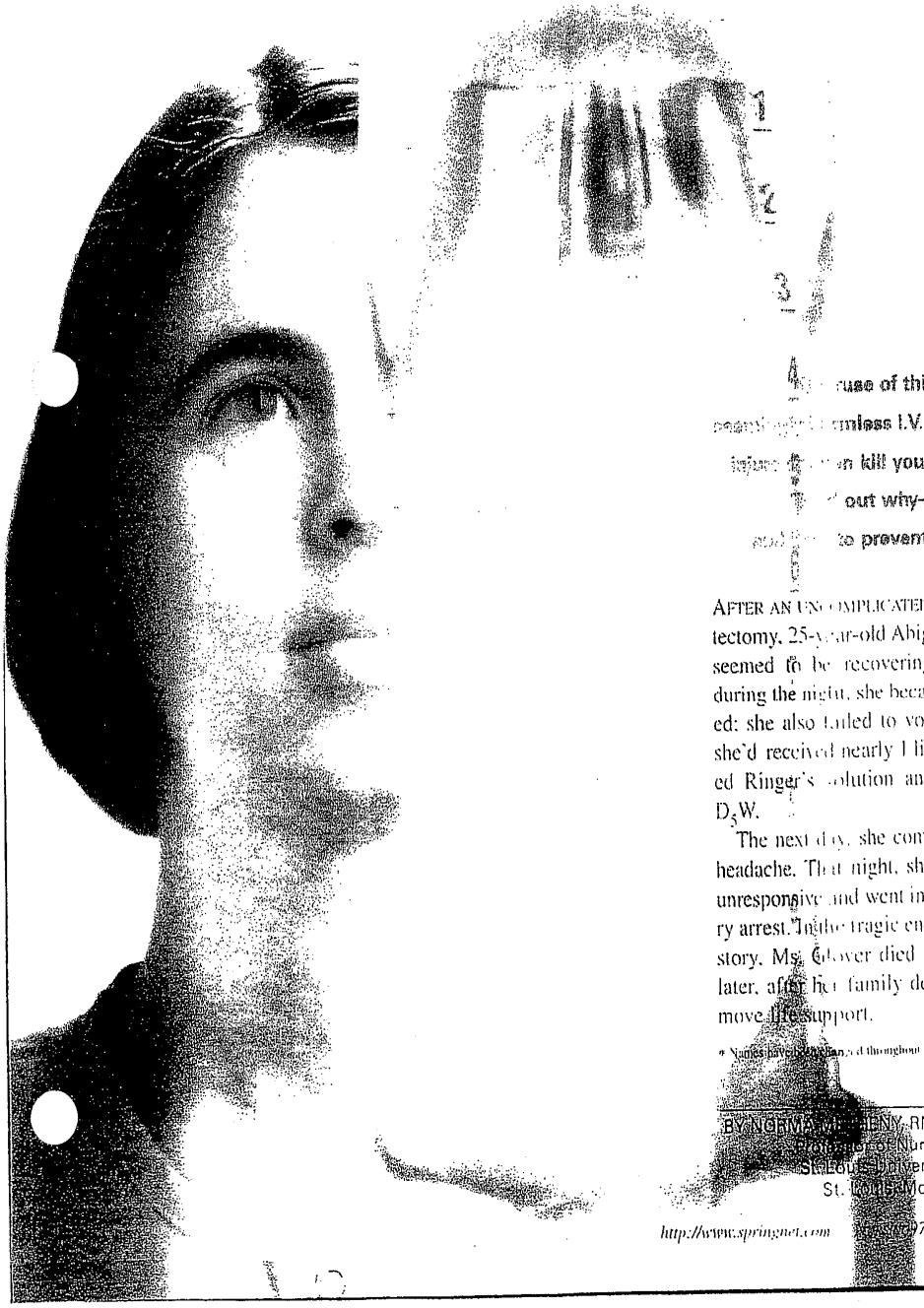

use of this
unless I.V. fluid could
n kill your patient.
out why—
o prevent harm.

AFTER AN UNCOMPLICATED CHOLECYSTectomy, 25-year-old Abigail Glover* seemed to be recovering well. But during the night, she became nauseated; she also failed to void, although she'd received nearly 1 liter of lactated Ringer's solution and 1 liter of D_5W.

The next day, she complained of a headache. That night, she was found unresponsive and went into respiratory arrest. In the tragic end to this true story, Ms. Glover died several days later, after her family decided to remove life support.

* Names have been changed throughout this article.

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Inappropriate use of D_5W has caused

The cause of death? Hyponatremic encephalopathy, or brain swelling caused by hyponatremia, the result of an excessive infusion of D_5W.

You may think that this intravenous (I.V.) fluid can do little harm, even when too much is given or when it's given too fast. But inappropriate use of D_5W has caused the deaths of numerous young women following simple surgical procedures.

In this article, I'll describe why D_5W can cause problems for any postoperative patient, why postoperative hyponatremia can be life-threatening to women of childbearing age, and the steps you can take to prevent serious problems. First, let's take a closer look at the fluid itself.

What's in the bag

An electrolyte-free fluid, D_5W contains 50 grams of glucose and provides about 170 calories per liter. But more important than what's *in* this fluid is what's *missing* from it—sodium. As D_5W is administered I.V., it dilutes the patient's serum and decreases the concentration of sodium in serum. The normal range is 136 to 146 mEq/liter; levels below 136 mEq/liter indicate hyponatremia.

The problem can be complicated by the body's normal physiologic response to the stress of surgery. As you recall, in the first 2 to 4 postoperative days, patients have higher-than-normal levels of antidiuretic hormone (ADH)—as much as 5 to 50 times their preoperative values. Pain, nausea, and vomiting can also increase ADH secretion.

A patient who receives a large volume of water (as is possible with D_5W) when her ADH level is high retains too much water, although this overload usually won't create visible edema. Most of the water from the diluted plasma moves into the cells. The resulting cellular edema is most dangerous in the brain, where tissue expansion is limited by the cranial vault.

The brain adapts to swelling by shunting blood and cerebrospinal fluid and by shifting sodium from the brain cells to extracellular areas. If the brain volume expands by more than 5%, your patient will develop cerebral herniation unless treated promptly.

Signs of trouble

Early symptoms of hyponatremic encephalopathy include nausea, vomiting, headache, and lethargy. If the condition isn't treated, the patient may develop muscular twitching, generalized seizures, coma, and respiratory arrest.

Postoperative hyponatremia can affect any patient but is much more serious in women of childbearing age. Premenopausal women who develop hyponatremic encephalopathy are about 25 times more likely to have permanent brain damage or die, compared with men and postmenopausal women.

Researchers believe that physiologic responses are one factor—in premenopausal women, estrogen stimulates ADH release and antagonizes the brain's ability to adapt to swelling. In men, androgens suppress ADH release and enhance the brain's ability to adapt to swelling.

Age is another factor. Although skull size remains constant in adulthood, brain volume declines progressively with age, allowing more room for brain expansion. That means younger women are at greater risk.

Also, the amount of cerebrospinal fluid increases with age, especially in men. This allows older individuals, especially men, to more effectively adapt to brain swelling by temporarily shunting cerebrospinal fluid out of the brain to decrease brain mass. The more fluid a person has to shunt, the more

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the deaths of numerous young women following simple surgical procedures.

potential he has to adapt to brain swelling.

A tragedy unfolds

Let's take a closer look at Ms. Glover's case and what you can do to prevent this type of situation from happening in your unit.

Ms. Glover's admission assessment was normal; her serum sodium level was 142 mEq/liter. She stood 5 feet 1 inch and weighed 97 pounds (44.1 kg).

In the postoperative unit, a nurse misinterpreted an I.V. fluid order, and Ms. Glover was started on an infusion of 1 liter of D_5W with 20 mEq of potassium chloride at 125 ml/hour. (She was to have received 5% dextrose in 0.45% sodium chloride solution, not plain D_5W.) At 3 p.m., her indwelling urinary catheter was removed.

At 8:30 p.m., Ms. Glover was awake, her vital signs were stable, her abdomen was flat, and her abdominal wound was dry. The nurse offered her the bedpan, but she said she didn't need it.

At 9:30 p.m., Ms. Glover reported nausea and was given a dose of antiemetic medication. At 12:30 a.m., according to the chart, she was still nauseated, but it was too soon to repeat the antiemetic. At 1:45 a.m., she was still nauseated and was given another dose of antiemetic. A second liter bag of D_5W with 20 mEq of potassium chloride was started at 2:30 a.m.

At 6:40 a.m. on the first postoperative day, the nurses notified Ms. Glover's physician of her condition. The physician ordered that the I.V. infusion be changed to 5% dextrose in 0.9% sodium chloride with 20 mEq of potassium chloride at 125 ml/hour--although the change wasn't made until 9:30 a.m. Blood was taken for a complete blood cell count, electrolytes, and liver profile.

At 9:30 a.m., Ms. Glover complained of a headache and was given an acetaminophen suppository. Soon afterward, the lab results returned, showing a plasma sodium level of 123 mEq/liter. There was no indication in the chart that the physician was notified of this result, and no one followed up on it.

Later that evening, Ms. Glover's roommate called the nurses' station and said that Ms. Glover was "shivering." But by the time the nurse arrived, Ms. Glover was nonresponsive with a bounding radial pulse and deep respirations. She soon turned cyanotic and stopped breathing. A code was called. Cardiopulmonary resuscitation was administered, and Ms. Glover was intubated. She was transferred to the intensive care unit and put on mechanical ventilation. Later, a computed tomography scan showed diffuse brain edema, and a follow-up sodium test showed a plasma level of 120 mEq/liter. Ms. Glover never regained consciousness and was removed from life support several days later.

What went wrong

If Ms. Glover's nurses had been more attuned to the symptoms of hyponatremic encephalopathy, and if they'd carefully assessed their patient, they might have been able to prevent this tragic sequence of events. Ms. Glover experienced classic warning signs.

First, her ***nausea*** didn't occur until *after* the D_5W had infused for several hours. Had anesthesia caused the nausea, it would likely have been present from the time she awoke. Another classic symptom--***headache***--became apparent later in the day.

The third warning sign was her ***fluid imbalance***--her intake was nearly three times greater than her output, which the nurses would have noticed if they'd monitored her fluid intake and urine output

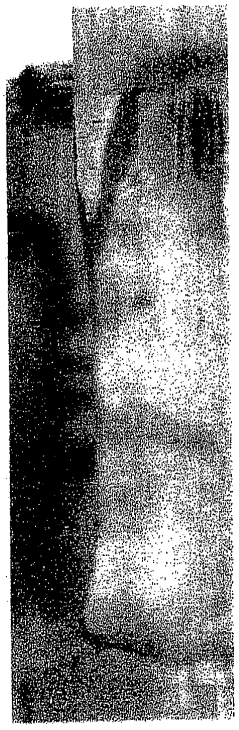

Photo by Steve Wilson

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Because hyponatremic encephalopathy can develop

closely. In addition, Ms. Glover was receiving a sodium-free fluid at a fast rate. Recall that Ms. Glover weighed just 93 pounds, and if the D_5W infusion hadn't been changed to 5% dextrose in 0.9% sodium chloride solution, she would have received 3 liters of D_5W in 24 hours.

Ms. Glover also hadn't produced much urine, so her bladder wasn't distended—the *small formation of urine* was secondary to the water-retentive effect of ADH.

Too much, too fast

In another true case, Beth Easton, 28, suffered respiratory arrest and died about 6 hours after returning to the postoperative unit after an uncomplicated total abdominal hysterectomy. The reason: hyponatremic encephalopathy, which can develop within hours.

On admission, Ms. Easton stood 5 feet 1 inch and weighed 114 pounds (51.8 kg). No admission lab data were obtained. During surgery, she received about 1,000 ml of 5% dextrose in lactated Ringer's solution; another 1,100 ml of plain lactated Ringer's solution was infused in the postanesthesia care unit. Her postoperative orders included "D_5W, 2,000 ml today," which the nurses didn't question and interpreted to mean that the entire amount should be infused before bedtime. (The physician should include the rate in an order for an I.V. solution—if he doesn't, question him.) Ms. Easton returned to the postoperative unit at 4 p.m. on the day of surgery. Between 4 p.m. and 10 p.m., she received 2 liters of D_5W. She was treated for pain during this time and for nausea that developed in the early evening.

The following are excerpts from her chart:

5:45 p.m.—Resting quietly with eyes closed. Respirations even and nonlabored.

6:30 p.m.—Completed 7 p.m. bag of I.V. fluid.

10:45 p.m.—Went into room to discontinue intermittent infusion. Awoke and found patient nonresponsive. No respirations or pulse. Skin pale, lips and nail beds cyanotic. Code called.

Although after the code was called, resuscitation efforts were attempted and Ms. Easton was pronounced dead. She had developed respiratory arrest quickly because the D_5W was given at a fast rate and over a short period of time—about 2 liters were infused over 5 hours. This evidently caused her serum sodium to dilute rapidly, leading to cerebral edema and herniation and respiratory arrest.

The nurses didn't pick up on their error regarding the infusion, and Ms. Glover's sodium level wasn't rechecked after the low result was reported early on the first postoperative day.

Finally, a definitive indicator of hyponatremia—***a plasma sodium level of 123 mEq/liter***—was noted about 10 hours before Ms. Glover's respiratory arrest.

Safeguarding your patient

Because hyponatremic encephalopathy can develop rapidly (see *Too Much, Too Fast*), prevention is the best treatment. During the first few postoperative days, patients shouldn't receive D_5W. Instead, an isotonic fluid (such as 0.9% sodium chloride or lactated Ringer's solution) should be prescribed. Even dilute sodium-containing fluids such as 0.45% sodium chloride solution can lead to hyponatremia if used excessively in the early postoperative period.

Monitor lab values for all postoperative patients receiving I.V. fluids. If your postoperative patient is receiving a hypotonic sodium-containing fluid (such as 0.45% sodium chloride), closely monitor the rate and watch her for symptoms of hyponatremia such as nausea, headache, and lethargy. If she exhibits these symptoms, a quick check of the serum sodium level will confirm or rule out hyponatremia.

Monitor intake and output carefully and compare the findings at the end of each shift for all patients receiving I.V. fluids. Look for fluid intake's greatly exceeding output. If a patient doesn't void within 4 hours after an indwelling urinary catheter is removed, assess her for bladder distension. If her bladder isn't distended (as was the case here), consider that she might be retaining water.

When a patient develops hyponatremic encephalopathy, you'll focus on preventing brain damage and death. The physi-

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rapidly, postoperative patients should receive an isotonic fluid instead of D_5W.

cian will likely prescribe hypertonic sodium chloride solution, such as 3% sodium chloride solution (which contains 514 mEq of sodium per liter), to raise the patient's serum sodium level. He'll use the patient's lean body weight and actual serum sodium concentration to calculate the amount of sodium needed to achieve the desired result.

The patient typically will be taken to a critical care or monitored unit, where a nurse will administer the hypertonic sodium chloride solution by infusion pump at a rate calculated to elevate the plasma sodium level about 1 mEq/liter/hour (too-rapid elevation of the sodium level—more than 25 mEq/liter in the first 48 hours of therapy—can cause brain damage). The nurse will check the serum sodium level about every 2 hours and continue the infusion until the patient becomes asymptomatic or the serum sodium level is 125 to 130 mEq/liter.

While the patient is receiving hypertonic sodium chloride solution, she'll be monitored carefully for pulmonary edema (manifested by labored breathing or crackles). The nurse will also watch for worsening neurologic symptoms (such as behavioral disturbances, quadriparesis, seizures, and unresponsiveness).

Being prepared

By understanding the dangers associated with D_5W and who's at greatest risk, you'll be alert to the early warning signs of hyponatremia and can keep more-serious problems from developing. ■

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