PharMerica
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Infusion Therapy

Policy and Procedure Manual

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INFUSION THERAPY POLICY & PROCEDURE MANUAL

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Administration of IV Fluids and Medications ***(continued)***

Pain Management ***(continued)***

Appendix C – Miscellaneous Devices - Instructions for Use *(continued)*

INTRODUCTION

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INTRODUCTION

The purpose of this manual is to provide a reference for the professional nurse delivering infusion therapy in the skilled nursing care setting.

The policies and procedures in this manual are based upon the most recent guidelines and standards set forth by the Joint Commission on Accreditation of Healthcare Organizations (JCAHO), the Infusion Nurses Society (INS), the American Society of Parenteral and Enteral Nutrition (ASPEN), and the Center for Disease Control (CDC).

This manual is to be used as a reference. It is not to be construed as a substitute for the professional judgment of health care professionals. **These are generic policies, which should be reviewed and modified as necessary to ensure a high standard of practice within your facility**. Each clinical situation is unique and constantly evolving, necessitating continued analysis and interpretation. Health care professionals administering infusion therapy have an obligation to be knowledgeable about the therapy/procedure/equipment being utilized and bear sole responsibility for properly applying these guidelines to clinical applications. PharMerica, Corp. is not liable for the failure of health care professionals to meet these standards.

While every effort has been made to ensure the accuracy and completeness of the information contained herein, this manual is not all-inclusive. Advances in techniques, the introduction of new products and equipment, as well as changes in governing standards necessitate periodic updates and revisions. The responsibility for ensuring accuracy of any provision and updating the information contained herein lies with the health care professional. PharMerica is not responsible for the currency of the information, errors or omission in the information or any consequences arising therefrom.

A “qualified” nurse shall be interpreted as a Licensed Practical Nurse, Licensed Vocational Nurse, Registered Nurse, or Advanced Practice Registered Nurse who has had appropriate education and training to perform the designated functions (with regard to IV therapy) in accordance with the State Nurse Practice Act, and has demonstrated competency in the performance of those tasks.

AUTHORIZATION SIGNATURE PAGE

_____ hereby approves the attached Infusion Therapy Manual as
Facility Name

of _____.
Date

_____
Medical Director – Print Name

_____
Medical Director – Signature

_____
Administrator – Print Name

_____
Administrator – Signature

_____
Director of Nursing Services – Print Name

_____
Director of Nursing Services – Signature

MANUAL REVIEW

This manual is reviewed and approved:

- Prior to implementation,
- At each update or revision, and
- Periodically as with other facility policies and procedures.
- It is the facility's responsibility to inform all nursing employees of any policy and procedure changes as deemed appropriate for their scope of practice.

_____	_____
Reviewer	Date
_____	_____
Reviewer	Date
_____	_____
Reviewer	Date
_____	_____
Reviewer	Date

REVISIONS

It is the responsibility of the LTCF to add updates/revisions to each copy of the manual in their facility.

Date	Section	Page No.	Explanation	Signature

ACKNOWLEDGEMENTS

The PharMerica IV Specialists listed below authored and developed this manual. PharMerica thanks them for their dedication and commitment to this project.

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GENERAL ADMINISTRATIVE AND CLINICAL POLICIES

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FACILITY RESPONSIBILITIES

Purpose

To delineate facility responsibilities when administering infusion therapy.

Policy

The facility instituting infusion therapy will:

1. Assure availability of the infusion therapy policy and procedure manual to all personnel administering or managing infusion therapy.
2. Be responsible for updating all copies of IV manuals in building whenever new updates or policies are sent.
3. The Medical Director and facility administration will approve infusion drugs, fluids and therapies ordered and administered in the facility.
4. Provide appropriate resource materials for personnel administering or managing infusion therapies.
5. Specify educational requirements for nursing staff including initial training and ongoing competency evaluations.
6. Designate who may perform specific procedures by license, job description, and/or special training based on state board of nursing scope of practice regulations and facility policies.
7. Maintain records of personnel qualified by education and experience who may provide infusion therapy in the facility.

ESTABLISHING AN APPROVED LIST OF FLUIDS AND MEDICATIONS

Purpose

To establish a list of fluids and medications appropriate for use in the facility per state regulations.

Policy

1. State regulations may require the facility to develop a list of continuous, intermittent and IV push medications to be administered within the facility.
2. Medications not on the approved list will be considered on an individual basis and approved by the Medical Director and/or Director of Nursing Services.
3. If needed, the facility will establish a specific list of drugs which may be given by the IV push method. The facility will designate by license and training, nurses who may administer IV medications by this route.
4. Specialty medications, (e.g., cardiovascular, chemotherapy, etc.) will be specifically approved by the facility.

SAMPLE LIST
INTRAVENOUS DRUGS AND SOLUTIONS

THIS SAMPLE LIST IS GENERIC AND IS NOT ALL INCLUSIVE. It is recommended that it should be reviewed and modified in regard to state specific regulations and/or facility resources and made facility specific with approval by the Medical Director/Director of Nursing Services. A separate specific list of drugs that may be given by the IV push method can be created if IV push administration is allowed by facility policy and/or required by state specific regulations.

Refer to reference texts and consult with the pharmacy to determine appropriate drug dilution and infusion rates for the skilled nursing care setting.

Intravenous Fluids

Dextrose 5% in 0.225% Sodium Chloride
Dextrose 5% in 0.45% Sodium Chloride
Dextrose 5% in Water
Dextrose 5% in 0.9% Sodium Chloride
Dextrose 10%
Dextrose 5% in Ringer's Lactate
0.9% Sodium Chloride
0.45% Sodium Chloride
Ringers Lactate (without Dextrose 5%)
Dextrose 5% in 0.45% Sodium Chloride with Potassium Chloride 20 mEq/L

Parenteral Nutrition
Intravenous Fat Emulsion (Lipids)

Electrolytes - Mixed in large volume IV fluids for continuous infusion with IV pump only.

Calcium Chloride
Calcium Gluconate
Magnesium Sulfate
Potassium Acetate
Sodium Phosphate
Potassium Chloride
Potassium Phosphate
Sodium Chloride
Sodium Acetate

Any electrolyte given by intermittent infusion method must be appropriately diluted for the skilled nursing care setting and administered using an electronic infusion pump to provide precise control of the infusion rate. **Electrolytes are NEVER given by IV push.**

Potassium is <u>extremely</u> irritating to veins and may cause cardiac arrhythmias:
Unless other limits are established by facility's medical director, the recommended limits for the administration of potassium to long term care residents without cardiac monitoring are:

No more than **40 mEq/liter**
No more than **60 mEq/24 hours**
No faster than **10 mEq/hour**

Remember to include potassium given by other routes (PO, G-tube, etc.) when calculating the hourly IV limit. ***If the resident is to receive more than 10 mEq IV potassium*** **(**Or 10 mEq potassium total, when accounting for additional potassium from other routes of administration**)** ***in a one hour period, cardiac monitoring is required***.

Each of the following medications must be administered separately. Except for medications added to TPN solutions, none of these drugs are given in combination in an IV solution. Consult the appropriate drug information resources for detailed monitoring parameters for each medication.

Anti-infectives

Acyclovir (Zovirax®)
Amikacin Sulfate (Amikin®)*
Amphotericin B (various)
Ampicillin (various)
Ampicillin Sulbactam (Unasyn®)
Anidulafungin (Eraxis®)
Azithromycin (Zithromax®)
Aztreonam (Azactam®)
Caspofungin Acetate (Cancidas®)
Cefazolin Sodium (Kefzol®)
Cefepime hydrochloride (Maxipime™)
Cefiderocol (Fetroja)
Cefotaxime Sodium (Claforan®)
Cefotetan Disodium (Cefotan®)
Cefoxitin Sodium (Mefoxin®)
Ceftaroline (Teflaro®)
Ceftazidime (Fortaz®)
Ceftazidime/avibactam (Avycaz™)
Ceftolozane/tazobactam (Zerbaxa™)
Ceftriaxone Sodium (Rocephin®)
Cefuroxime Sodium (Zinacef™)
Chloramphenicol (Various)
Cidofovir (Vistide)
Ciprofloxacin (Cipro®)
Clindamycin (Cleocin®)
Colistimethate (Coly-Mycin M)
Dalbavancin (Dalvance)
Daptomycin (Cubicin®)
Delafloxacin (Baxdela)
Doxycycline Hyclate (Vibramycin®)
Eravacycline di-hydrochloride (Xerava™)
Ertapenem (Invanz®)
Erythromycin Lactobionate (various)
Fluconazole (Diflucan®)
Foscarnet (Foscavir)
Gancyclovir (Cytovene)
Gentamicin Sulfate (Garamycin®)*
Imipenem/Cilastatin (Primaxin®)
Isavuconazonium (Cresemba)
Lefamulin (Xenleta)
Letermovir (Prevymis)
Levofloxacin (Levaquin®)
Lincomycin (Lincocin)
Linezolid (Zyvox®)
Meropenem (Merrem®)
Meropenem/vaborbactam (Vabomere™)
Metronidazole (Flagyl®)
Micafungin (Mycamine®)
Minocycline (Minocin®)
Moxifloxacin (Avelox®)
Nafcillin Sodium
Omadacycline ((Nuzyra)
Oritavancin (Kimyrsa, Orbactiv)
Oxacillin Sodium (various)
Penicillin G. Potassium (various)
Penicillin G. Sodium (various)
Peramivir (Rapivab)
Piperacillin sodium/Tazobactam (Zosyn®)
Plazomicin sulfate (Zemdri)*
Posaconazole (Noxafil)
Rezafungin acetate (Rezzayo)
Rifampin (Rifadin®)
Sulbactam Sodium/durlobactam Sodium (Xacduro)
Sulfamethoxazole/Trimethoprim (Bactrim™/Septra®)
Tedizolid phosphate (Sivextro)
Telavancin HCl (Vibativ®)
Ticarcillin Clavulanate (Timentin®)
Tigecycline (Tygacil®)
Tobramycin Sulfate (Nebcin®)*
Vancomycin Hydrochloride (Vancocin®)*
Voriconazole (Vfend)

* These medications should have levels monitored as well as BUN and creatinine as ordered by the physician.

Corticosteroids

Dexamethasone Sodium Phosphate (Decadron®)
Hydrocortisone Sodium Succinate (Hydrocortone®, Solu-Cortef®)
Methylprednisolone Sodium Succinate (Solu-Medrol®)

Vitamins

Multiple Vitamins
Vitamin B's
Vitamin C
Vitamin K

Diuretics

Bumetanide (Bumex®)
Furosemide (Lasix®)

Miscellaneous

Aminophylline (various)
Diphenhydramine hydrochloride (Benadryl®)
Famotidine (Pepcid®)
Fosphenytoin Sodium (Cerebyx®)
Insulin (Regular in TPN)
IV Iron (Venofer®, Ferrlecit®, Feraheme®, Injectafer®)
Levothyroxine Sodium
Lorazepam (Ativan®)
Metoclopramide hydrochloride (Reglan®)
Ondansetron hydrochloride (Zofran®)
Pantoprazole Sodium (Protonix®)
Phenytoin sodium (Dilantin®)
Prochlorperazine edisylate (Compazine®)
Sodium Bicarbonate

Supervised Infusions

If approved for use, special protocols must be followed during infusion.

1. Blood Product Derivatives
    - Albumin
    - Immune gamma globulin (IgG)
    - Clotting factors
2. All chemotherapy
3. Amiodarone HCL

4. Pentamidine Isethionate (Pentam®)
5. Amphotericin B (Fungizone®) and Liposomal Amphotericin (Ambisome®, Ablecet®)
6. Inotropic Medications
    - Dobutamine
    - Dopamine
    - Epinephrine
    - Norepinephrine
    - Milrinone
7. Gancyclovir Sodium
8. Heparin - continuous infusion
9. Opioids
    - Morphine sulfate
    - Hydromorphone hydrochloride (Dilaudid®)
    - Fentanyl
    - Methadone

    Continuous Infusions of Opioids with or without supplemental bolus injections must be administered with a PCA pump.
10. Monoclonal Antibody Infusions
    - Pemivibart (Pemgarda™)

Other (as approved by the Medical Director):

_____
_____
_____
_____

IV PUSH MEDICATIONS

- All IV push doses must be administered by a nurse with documented education and training in infusion therapy, including administration of medications via IV push, as designated by the facility, and as allowed by state regulations. *Your facility may choose to designate this task by license (e.g., RN only) or by job title (e.g., nursing supervisor only) or by specific individual licensed nurses with documented competency.

- The facility designated nurse administering an IV push medication will review appropriate drug reference text information and SECTION 5.10 – IV PUSH MEDICATION ADMINISTRATION policy and procedure prior to giving the dose.
- Suggested IV Push Medications:
  - Dexamethasone (Decadron®)
  - Dextrose 50% in Water
  - Hydromorphone (Dilaudid®)
  - Diphenhydramine (Benadryl®)
  - Furosemide (Lasix®)
  - Lorazepam (Ativan®)
  - Morphine Sulfate
  - Naloxone (Narcan®)
  - Promethazine (Phenergan®)
  - Hydrocortisone (Solu-Cortef®)
  - Methylprednisolone (Solu-Medrol®)
  - Diazepam (Valium®)

Approved DRUG	Maximum dose that may be administered by IV Push in this facility	MG/MIN Maximum injection rate	Nursing Considerations *Refer to drug reference text for complete information*

IV FLUID DRUG LIST APPROVAL

Date_____

Name_____

Title_____

Has modified and approved the specific list of IV fluids and medications at this facility. (See SECTION 2.2 – ESTABLISHING AN APPROVED LIST OF FLUIDS AND MEDICATIONS)

IV push medication is allowed and the facility's administration has designated a specific list of drugs that may be administered using the IV push method by designated nurses as allowed by state nursing scope of practice regulations.

YES NO

Signature_____

SCOPE OF PRACTICE AND COMPETENCY ASSESSMENT

Purpose

To determine scope of practice and competency assessment of nursing staff with the goal of safe, effective and appropriate infusion therapy.

Policy

1. Nurses administering infusion therapy and performing vascular access insertion and management must be qualified and competent based on their licensure and perform only duties within their scope of practice as identified by:
    - state laws, ordinances, and statutes
    - rules, regulations, guidelines, decision trees and position statements of state boards of nursing
    - standards of practice written by professional organizations

2. Measure competency by performance and not by a time or predetermined number of procedures.

3. Initial competency is assessed and documented before the skill is performed without supervision.

4. Ongoing competency assessment and documentation is determined by rules and regulations of the state board of nursing or by facility policy.

5. Documentation of completed continuing education and competency assessments should be available in facility or employee files.

DELEGATION OF RESPONSIBILITY FOR INFUSION THERAPY PROCEDURES

Purpose

To delineate safe and appropriate delegation of infusion therapy tasks.

Policy

Infusion therapy and vascular access procedures are delegated from a licensed professional to others in accordance with rules and regulations established by the state board of nursing or other appropriate regulatory agencies. Individuals accepting delegated responsibilities should only accept assignments for which they have documented competency.

In this state/at this facility, the following infusion therapy procedures may be performed:

Infusion Procedure	Not allowed by state	Not done at this facility	Infusion specialist RN only (on-call IV agency)	Designated RN only with special education	Designated RN or LPN with special education	Staff RN with general IV education	Staff LPN/ LVN with general IV education
Administration of IV fluids and routine IV medications through an existing peripheral IV catheter.							
Administration of IV fluids and routine IV medications through an existing central venous access device.							
Administration of hydration through an existing subcutaneous infusion set.							
Administration of medications that require special monitoring as designated on this facility's IV drug list (see General Policies).							
Administration of IV push medications as designated on this facility's IV drug list (see General Policies).							
Flushing peripheral venous access devices to maintain patency.							
Flushing central venous access devices to maintain patency.							
Admixing IV medications from the stock/emergency IV drug system.							
Insertion of a peripheral IV catheter.							
Insertion of a subcutaneous infusion set.							
Insertion of a midline catheter.							
Insertion of a PICC (peripherally inserted central catheter).							

Infusion Procedure	Not allowed by state	Not done at this facility	Infusion specialist RN only (on-call IV agency)	Designated RN only with special education	Designated RN or LPN with special education	Staff RN with general IV education	Staff LPN/ LVN with general IV education
Changing a central line dressing and needleless connector.							
Accessing/De-accessing an implanted venous port.							
Drawing labs via a central venous access device.							
De-clotting central venous access devices using tPA (Cathflo®).							
Programming/monitoring narcotic PCA infusions.							
Removal of a peripheral venous catheter.							
Removal of a midline catheter.							
Removal of a PICC catheter.							
Removal of a non-tunneled catheter.							

FACILITY STAFF NURSE RESPONSIBILITIES

Purpose

To delineate staff nurse responsibilities when administering infusion therapy.

Policy

The facility nurse administering or managing infusion therapy will:

1. Be aware of the legal requirements (state board of nursing regulations on scope of practice) and ramifications of the procedures they are performing.
2. Be aware of standards of practice for infusion therapy.
3. Be qualified by education and experience for performing specific procedures relative to infusion therapy.
4. Attend continuing education relating to infusion therapy per facility and state policies.
5. Know and adhere to facility specific policies and procedures for infusion therapy.
6. Have knowledge of all therapies being administered.
7. Know the effects, limitations, dosage and appropriate infusion rates of IV drugs and solutions.
8. Be aware of and use appropriate reference materials.
9. Be aware of how to contact pharmacy for assistance.
10. Provide appropriate documentation verifying proper care of the resident receiving infusion therapy.

FACILITY POLICIES AND PROCEDURES

Purpose

At the facility level, specific standards of care are set forth in the Policy and Procedure Manual. Policies and procedures are established by facilities to ensure safe care.

Policy

Policy and Procedure manuals define the types of therapies that may be provided, the standards of care, nursing education requirements, and competency processes for the facility.

1. The policies and procedures of a facility may be more stringent and duties may be more restrictive than what is permitted by state regulations, but may never be more lenient. For example, the State Board of Nursing may indicate that it is within the scope of practice for LPNs to flush central venous catheters in skilled nursing care facilities, but it is the individual facility's decision to allow or not allow LPNs to perform the procedure. On the other hand, if the State Board of Nursing prohibits LPNs from flushing central venous catheters in skilled nursing care facilities, then a facility may NEVER allow an LPN to perform that procedure.
2. Any employee of a facility is required to follow the policies put in place by that facility. If a prescriber order is not supported by the facility P&P manual, it is the nurse's responsibility to obtain approval from the facility administration prior to carrying out the order.
    a. *Example*: If you are the nurse on duty when the prescriber orders a drug to be given IV and the drug is NOT on the facility's approved drug list, you MUST notify your supervisor, so the appropriate steps can be taken.

HEALTHCARE PROFESSIONAL LIABILITY

- **Prescriber orders**: A Licensed Independent Prescriber's (LIP) order is a medical directive written by a physician or a non-physician who has been delegated prescribing authority. It authorizes specific medical care based on professional judgment of the ordering physician or delegate. The prescriber orders the medical care that is to be given but does not define the manner in which that care will be carried out. (Ex: it is the prescriber's responsibility to order IV fluid; it is not their responsibility to order the frequency with which the IV site will be changed.)
- **Nursing Responsibility**: The nurse is expected to observe the accepted and expected standards of care to provide safe and effective IV therapy to residents. Maintenance and monitoring of therapies are according to these standards and are not guided by a prescriber's order. Care is given according to facility's policies and procedures which are based on the INS standards of practice, CDC guidelines and other supporting research.
- **Rule of Personal Liability**: ***No nurse, LVN/LPN or RN, should perform any procedure that they have not been specifically trained to do***. Every person is liable for their own tortuous conduct (his or her own wrongdoing). Verbal assurance by the prescriber that they will assume responsibility provides no protection for the nurse. Nurses are liable for their own wrongdoings in carrying out prescriber's orders.

  The law expects that nurses have a basic understanding of any drug administered. This means knowledge of what the drug is intended to treat, its adverse effects and contraindications, the expected outcomes, its therapeutic and toxic doses, and its usual route. Unless an order is questionable, the law also expects that the nurse administer the drug as ordered.

IV THERAPY PREPARATION FOR STATE SURVEY

	YES	NO	NOTE
IV Education			
All of our nursing staff who are responsible for administering **or monitoring** any type of infusion therapy or vascular access device have completed an IV education class.	**YES**	**NO**	Please check your state board of nursing regulations on IV therapy education requirements.
A copy of a continuing education certificate is on file for each nurse who has attended IV training.	**YES**	**NO**	
We have a process to verify that any agency nurses who will be assigned to assess or monitor residents with IVs in place have met the state requirement for IV education.	**YES**	**NO**	Either the nurse or the agency should provide documentation of IV education (e.g., a continuing education certificate).
Competency Validation			
This facility has verified the competency of all staff who administer/monitor IV therapy or operate IV equipment. (Education & training can be provided by an outside agency, but only your facility can determine who is competent to perform specific procedures.)	**YES**	**NO**	Please check the requirements of all quality assurance agencies that survey your facility for specific competency validation requirements. Skills Validation Checklists can be found in the appendix of this manual.
We have a process to verify the competency of any agency nurses who will be assigned to care for residents with IVs in place.	**YES**	**NO**	At a minimum, agency nurses should: • Be aware that you have an approved IV drug and fluid list. • Be competent to operate the IV flow regulator and IV pump. • Know and follow the facility IV flush protocol and know how to use the IV equipment provided. • Understand and adhere to your facility's procedures and forms for documenting IV care.
IV Policies & Procedures			
All copies of the manual have been updated. Updates have been sent to the facility whenever changes to equipment or national practice guidelines have occurred.	**YES**	**NO**	

IV Policies & Procedures (continued)			
Our IV drug and fluid list has been reviewed by nursing administration and the medical director and has been modified as needed to ensure safe resident care in this facility.	**YES**	**NO**	Nursing staff should be aware of this list AND understand that they cannot administer any drug that is not on this facility's approved list without PRIOR approval from administration.
If any IV push meds are allowed, the DON and Medical Director have created a separate list of drugs that may be given by this route.	**YES**	**NO**	PharMerica provides a generic list, (see SECTION 2.2 – ESTABLISHING AN APPROVED LIST OF FLUIDS AND MEDICATIONS) however, this list must be reviewed, modified as needed, and approved by your facility's administration.
Documentation is complete and consistent.			
IV orders must be detailed and complete.	**YES**	**NO**	
All IV documentation is done in the same way using only facility approved forms.	**YES**	**NO**	

To ensure safe and consistent care and a trouble-free state survey, review IV documentation and nursing care for each resident receiving IV therapy on an on-going basis all year long.

IV THERAPY PRE-ADMISSION CHECKLIST

Will it be cost effective to provide IV Rx to this resident?	Y	N
• *What is the cost of this therapy? (Consult IV pharmacist.)*		
• *Does insurer reimburse this therapy in this setting?*	**Y**	**N**
• ***Prior to admission,** does the resident have the appropriate type of Vascular Access Device (VAD) in place for the type of therapy to be administered?*	**Y**	**N**
• *Will the referring facility place an appropriate VAD prior to pt. transfer?*	**Y**	**N**
• *Has nursing staff been educated for this therapy?*	**Y**	**N**
• *Are policies & procedures in place for this therapy?*	**Y**	**N**
• *Can the admission be scheduled for the day shift and/or postponed until needed resources are in place?*	**Y**	**N**

Will it be safe to administer this therapy in the LTC setting?	Y	N
Is the drug / solution approved for use in this facility?	**Y**	**N**
• *The drug list is located in the General Policies section of the IV Manual. Check to be sure that the list has been reviewed and the approval/signature page signed.* • *Facilities administering IV push medications should have a separate list of drugs that are approved to be administered by IV push and stating the maximum dose and the maximum injection rate for each drug.* • *If therapy is not on the approved list, consult with the DON prior to accepting the admission.*		
What are the potential side effects/adverse reactions for this therapy? • *Look up drug in an IV drug reference text.* • *Has nursing staff been trained to assess and manage complications?* • *Are the emergency resources necessary to manage potential adverse reactions immediately available?* • *Is community emergency response support available? (911)*		

Review Guidelines for VAD Selection
What type of IV therapy will this resident receive? • *Is this therapy a vein irritant or vesicant?*
Expected length of therapy? • *Might therapy be extended beyond this time frame?*
What is the condition of this resident's veins? • *Has resident received previous IV therapy that may have damaged peripheral veins?* • *Does this resident have restrictions on where IVs may be placed? No IVs in (R) (L) arm due to: (dialysis fistula) (breast surgery with axillary node dissection) (stroke) (_____)*
What is the skill level of nursing staff for inserting peripheral IVs? *All Novice A few skilled nurses Designated IV team / insert IVs frequently*

CONSENT FOR IV CATHETER INSERTION AND IV THERAPY

Purpose

To assure understanding by the resident and/or surrogate of the insertion of an IV cannula and the therapy being provided.

Policy

1. Resident and/or surrogate will be educated concerning the therapy to be initiated, type of IV catheter to be inserted, the reason for its use, and complications or side effects that may occur.
2. The IV insertion procedure will be explained to resident and/or surrogate.
3. Ensure that consent is voluntarily given and free from coercion, persuasion, or undue influence. The resident or surrogate has the right to refuse treatment.
4. Peripheral catheters, including midlines, may be inserted with verbal or written informed consent. For advanced procedures, such as PICC insertions, a written informed consent must be obtained. If resident is unable to give consent or surrogate is not available to sign a consent form, verbal consent from surrogate should be documented on a consent form with two signatures of Licensed Independent Practitioner or nursing staff.
5. Documentation of informed consent will be done in resident's medical record.

TRANSFER BY AMBULANCE OF RESIDENT RECEIVING INFUSION THERAPY

Purpose

To provide safe transfer by ambulance for those residents receiving infusion therapy.

Policy

1. Facilities transferring residents receiving infusion therapy will *adhere to state regulations* for the safe transport of residents by ambulance.
2. It is the administering facility's responsibility to ensure that the resident is properly monitored.

Procedure

The facility has a choice of:

1. Discontinuing the IV fluids and maintaining the catheter with the appropriate flush.
2. Sending a qualified person (such as an LPN/LVN or RN depending on state BON requirements) in the ambulance with the resident.
3. If state regulations allow, using an ambulance service that is licensed at the intermediate or paramedic level.

LATEX EXPOSURE

Purpose

1. To prevent allergic response to natural rubber latex products in sensitized healthcare workers and residents.
2. To prevent the sensitization of healthcare workers and residents to natural rubber proteins.

Definition and Considerations

- Dry natural rubber latex is manufactured from a milky fluid derived from the rubber tree. Some proteins in natural rubber latex can cause a range of mild to severe allergic reactions. Chemicals added to the rubber during processing may also contribute to skin irritation. Healthcare workers are at risk of developing latex allergy due to continued exposure.
- Latex proteins bind to the powder applied to latex gloves. Powdered gloves increase the amount of latex protein that reaches the wearer's skin. Powder from gloves assists in aerosolizing the latex proteins throughout the environment.
- Fruit allergies can create cross-reactions with latex including but not limited to avocado, mangoes, pears, bananas, citrus fruits, chestnuts and other tropical foods.

Policy

1. Latex free alternatives must be available for residents and healthcare workers with known sensitivity to latex products.
2. Products containing latex should be removed from all resident care settings to reduce the exposure to latex.
3. Consult with the Pharmacy as well as device manufacturers for information on the latex content of specific infusion therapy products.
4. Assess residents for increased risk or known latex sensitivity or allergy, history of asthma, environmental allergens, medications and food allergies.
5. Document environmental, food or medication sensitivities or allergies in the resident's medical record.
6. Instruct residents with latex allergy to recognize signs and symptoms of anaphylaxis, to wear a medical alert bracelet, to inform all health care providers and to carry epinephrine auto-injectors and ensure they are educated on the proper use.

References:

US Department of Health and Human Services. Public Health Service. Food and Drug Administration. *Medical Alert: Allergic Reaction to Latex-containing Medical Devices*. Rockville, MD: FDA, 1991.

National Institute for Occupational Safety and Health. Centers for Disease Control and Prevention. *Alert: Preventing Allergic Reactions to Natural Rubber Latex in the Workplace*. 1997.

Intravenous Nurses Society. *Standards of Practice*. 2024.

HAZARDOUS DRUG ADMINISTRATION

Purpose
To ensure safe handling of hazardous drugs

Policy
Safe handling of hazardous drugs, appropriate use of personal protective equipment and safe handling of waste practices are used at all times.

- Review the list of current hazardous drugs on the NIOSH National Institute for Occupational Safety and Health website.
  - www.cdc.gov/niosh
- Follow guidelines for handling hazardous drugs to protect clinicians and non-clinicians from unintentional exposure. Guidelines can be found in the publication "Managing Hazardous Drug Exposures – Information for Healthcare Settings."
  - www.cdc.gov/niosh/docs/2023-130/default.html
- Wear personal protective equipment (PPE) to protect the user from the anticipated routes of exposure and to protect others from environmental exposure. Remove PPE upon leaving the area where the hazardous drug is being handled.

Employ safety precautions when handling resident's body fluids and during resident care where contact with body fluids is anticipated for at least 48 hours after administration of the hazardous drug and until the known excretion time is exceeded.

- For additional Hazardous Drug Administration policies and procedures please refer to the PharMerica Nursing Care Center Policy and Procedure Manual.

ADVERSE EVENT

Purpose
To manage and document adverse events

Policy
Adverse events associated with infusion therapy and/or vascular access devices are documented and reported within the resident's health record and to the appropriate regulatory body when required.

- Document and track adverse events in accordance with organizational policy. Provide objective and specific facts about the event.
- Educate the resident and surrogate about signs and symptoms of complications or reactions that could signify an adverse event.
- Report adverse events associated with vascular access devices, infusion products/devices, and the administration of drugs, biologics, or infusates to the appropriate individuals based on the event:
    - Provider and other health care team members
    - Management personnel
    - Pharmacy
    - Advisory Organization (Institute of Safe Medication Practices)
    - Regulatory Organizations (FDA)
    - Accrediting Organizations (Joint Commission)
    - Drug and/or device manufacturer
- When possible, retain the defective device and return to the product manufacturer as part of the product incident report.
- Investigate adverse events to ensure prompt action and improve safety.

INFECTION CONTROL

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INFECTION CONTROL STANDARDS

Purpose

Apply infection prevention principles to reduce the risk of infusion-related infections.

Policy

Infection control standards of practice are followed

- **Hand Hygiene**
  - Hand hygiene is performed routinely during resident care activities.
  - Hands should be washed:
    - Before and after direct resident contact
    - After contact with body fluids, excretions, and mucous membranes
    - Before donning and after removing gloves
    - After touching the resident's surroundings
    - Before, during as required, and after all clinical procedures requiring Aseptic Non-Touch Technique (ANTT®) including insertion and removal of vascular access devices, management of vascular access devices and infusion administration.
  - Unless hands are visibly soiled or if the resident is suspected of a spore forming pathogen (Clostridioides difficile) or norovirus gastroenteritis, use of alcohol-based hand gels containing at least 60% ethanol or 70% isopropyl alcohol is encouraged.
  - Perform hand hygiene using alcohol-based hand gels for at least 20 seconds.
  - Use soap and water and wash hands for at least 20 seconds if the hands are visibly contaminated with blood or other body fluids, after providing care, or having contact with suspected or confirmed norovirus/rotavirus gastroenteritis or a spore-forming pathogen (e.g., Clostridioides difficile).

- **Standard Precautions**
  - Standard precautions are used during all resident care procedures that potentially expose the clinician to blood and body fluids, secretions, non-intact skin and mucous membranes.
    - Perform hand hygiene
    - Use appropriate personal protective equipment during procedures in which contact with blood or body fluids is anticipated or there is the potential for splash or spray of blood or body fluids.
      - Single use disposable gown
      - Gloves that fit and extend over the wrist of the gown
      - Eye protection/face shield

- **Aseptic Technique**
    - A set of infection prevention actions aimed at protecting residents from infection during invasive clinical procedures and management of indwelling medical devices. A generic term that is often used interchangeably with the terms clean, sterile or non-touch technique.

- **Aseptic Non-Touch Technique (ANTT®)**
    - A comprehensive definition of aseptic technique that is based on Key-Part and Key-Site protection. It is achieved by integrating standard precautions, hand hygiene, use of personal protective equipment, aseptic field management, sterile supplies, and non-touch technique.
        - Key-Site – Any portal of entry into the resident
        - Key-Part – The part of the procedure equipment that, if contaminated, is likely to contaminate the resident. (e.g., Syringe tip, male luer end or spike of the administration set, IV catheter needle tip, etc.)
    - Aseptic Non-Touch Technique (ANTT®) is applied to all infusion related procedures including vascular access device insertion, management, and administration of infusion medications and solutions.
    - Standard ANTT® – A combination of standard precautions and protection of Key-Parts and Key-Sites individually using non-touch technique that is straightforward and short in duration.
    - Surgical ANTT – A combination of standard precautions and an approach of protecting Key-Sites and Key-Parts using sterile drapes and barrier precautions. Used for clinically invasive procedures such as surgery, and CVAD insertion.
    - Clinicians who administer infusions and manage vascular access devices are educated in ANTT. Training materials are available at no cost upon request at www.ANTT.org.

INFECTION PREVENTION MEASURES

Purpose
Apply infection prevention principles to reduce the risk of infusion-related infections.

Policy
Infection prevention measures are implemented for all infusion therapy procedures to prevent infusion and vascular access device related infections

- **Skin Preparation**
  - IV site shaving is prohibited due to the possibility of introducing skin organisms if dermabrasion or nicking occurs. Excessive hair at the site may be carefully removed using scissors or clippers. Depilatories should not be used because of the potential for allergic reaction or irritation.
  - Scissors should be used with caution and away from any midline or central venous access device.
  - All IV sites must be prepped with an appropriate antimicrobial solution using Aseptic Non-Touch Technique (ANTT®).
  - The preferred skin antiseptic is >0.5% chlorhexidine in alcohol solution.
  - Alcohol may be used prior to the primary prep solution to remove skin oils and increase dressing adherence. Allow the alcohol to dry before applying primary prep solution.
  - If the resident is allergic to the primary prep solution, a 60-second prep with 70% isopropyl alcohol may be done.
  - ALL ANTISEPTICS MUST BE DRY BEFORE VENIPUNCTURE OR APPLYING DRESSING. Alcoholic chlorhexidine should dry for at least 30 seconds.

  *See Section 3.3 for antiseptic comparison chart.

- **IV Catheter Dressings**
  - A sterile dressing is utilized as an infection control measure.
  - Transparent, semi-permeable membrane (TSM) dressings are changed a minimum of every 7 days and PRN whenever the dressing integrity becomes disrupted, becomes wet, loose, or soiled or if skin integrity is compromised under the dressing.
  - If a gauze dressing is necessary, change every 48 hours or sooner if the dressing becomes compromised.
  - If, upon initial insertion of midlines and central venous access devices, gauze dressings are placed, then the dressing should be removed after 24-48 hours and replaced with a TSM dressing.
  - Chlorhexidine impregnated gauze dressings (Biopatch®/GuardIVa) may be left in place and replaced every 7 days along with transparent dressing change.

- **Administration Sets**
  - The administration set for a primary continuous infusion is changed every 96 hours and immediately upon suspected contamination or when the integrity of the set has been compromised.
  - The administration set for a primary intermittent infusion is changed every 24 hours and immediately upon suspected contamination or when the integrity of the set has been compromised. If the resident has had a peripheral infusion and subsequently, has a central line placed, all previous administration sets used must be discarded and new sets used
  - Secondary administration sets may be considered continuous if not disconnected from primary set. The secondary set is changed along with the primary set. If the secondary set is disconnected from the primary set, it is considered intermittent and must be changed every 24 hours.
  - Administration sets must be changed whenever the IV site is changed.
  - Sets used for TPN or PPN administration with or without lipids will be changed every 24 hours.
  - Administration sets used to infuse intravenous fat emulsions (lipids) separately should be changed every 12 hours.
  - For administration set, bag or cassette changes when using ambulatory infusion pumps for pain management, refer to SECTION 9 – PAIN MANAGEMENT policies and procedures.
  - Inline filters or extension sets with filters are changed along with the administration set.

- **Needleless Connectors**
  - Needleless connectors are changed no more often than every 96 hours but at least every 7 days.
  - Needleless connectors are changed:
    - If removed for any reason
    - If there is residual blood or debris within the needleless connector
    - After a routine blood draw
    - Prior to drawing a sample for blood culture from the catheter
    - Upon suspected contamination.
  - Needleless connectors are vigorously scrubbed with an antiseptic wipe before accessing. Allow a drying time of 5 seconds after scrubbing the needleless connector with a 70% isopropyl alcohol swab before accessing the catheter. If using an alcohol-based chlorhexidine wipe, allow 20 seconds of drying time prior to accessing the needleless connector.
  - Needleless connectors must be swabbed between each entry into the connector, including attaching syringes of flush solution or attaching the administration set.

- **Alcohol Sponge Caps**
  - Disinfectant sponge caps containing 70% alcohol may be used as a passive disinfection process.
  - Follow manufacturer's directions for use of the specific cap used in the facility.
  - Once removed, discard used disinfection caps. Do not reattach to the needleless connector.

- **Catheter Removal**
  - *Short and long peripheral IV catheters* will be removed immediately upon suspected contamination or if sign and symptoms of complications occur. Remove also if it is no longer included in the plan of care or has not been used for 24 hours or more.
  - *Midline catheters.* Removal of a midline catheter should be determined by completion or change of therapy administered, presence of complications or dysfunction. Midline catheters should be removed if the tip location is no longer appropriate for the prescribed therapy.
  - *Central Venous Access Devices* are removed by physician order at the end of prescribed therapy or if complications occur.

- **Mixing IV medications in the nursing facility**.
  - According to USP 797 standards of emergency compounding, "If anything is reconstituted, added, or otherwise manipulated outside the IV hood in a cleanroom setting, the maximum time that may elapse between the initiation of the mixing process (first vial puncture) and the time the infusion is started on the resident is 60 minutes."
  - All personnel involved in the process must document the time, their name or initials and must label all containers with that information plus the name, concentration and dosage of all components.
  - When adding medications such as MVI to a TPN bag they may NOT be added more than one hour prior to hanging the bag.
  - Mixing of medications in the nursing facility may be done for "first dose" availability from an emergency drug system. When possible, these medications should be mixed from single dose vials. If a single dose vial is punctured it may be used for a maximum of 1 hour after initial entry. Any remaining medication in the single dose vial should be discarded.
  - Using a single dose vial for multiple doses of a medication on more than one resident is prohibited.

- **Obtaining Cultures**
  - Culture purulent exudate from a peripheral or central access device exit site according to physician's orders.
  - Culture the tip of short term central venous access devices and PIV catheters that are suspected of being the source of a catheter associated blood stream infection.

- **Sharps Management**
  Reduce the risk of needlestick injury associated with parenteral injections, vascular access devices and blood sampling by:
  - Use of safety engineered devices for all IV insertions and administration set connections.
  - Do not recap, break or bend sharps.
  - Activate built-in safety controls during use.
  - Sharps will be disposed of in a puncture resistant, leak-proof, tamper-proof container.
  - Identify, report and document exposure to potentially infectious materials or injury from sharps.

ANTISEPTIC COMPARISON CHART

Antiseptic	Mechanism of Action	Nursing Considerations
Alcohol	Denatures proteins & dissolves lipids which causes cell membrane to disintegrate	• Rapid effect, broad spectrum of activity; however, has no residual efficacy. • Repeated use may affect skin integrity due to drying effect. Stings if applied to open wound. • Primary use is to remove skin oils to improve the adherence of tapes and transparent dressings. • Usually applied prior to the application of the primary antiseptic (or combined in solution with PVP or CHG.
Povidone Iodine *(Iodophor, PVP)* in an ***aqueous*** based solution) *Common brand name: Betadine*	Penetration of cell. Substitution of cell contents with free iodine	• Broad spectrum of activity when properly applied. • Iodine based products have minimal residual effectiveness once dried. • Aqueous PVP provides a slow release of free iodine. A minimum of 2 min of skin contact time is required to ensure full antimicrobial effectiveness of this product. • Alcohol based PVP formulations and 2% tincture of iodine have a more immediate antimicrobial effect and will dry faster due to the alcohol component. • Ideally, Iodophor/PVP/2% tincture of iodine is allowed to dry completely and is not removed prior to dressing application. • Allow to dry for 1.5 to 2 minutes before dressing application or invasive procedure. • Iodophor/PVP formulations may cause less skin irritation than tincture of iodine. • Efficacy of iodine component is diminished by presence of organic matter (e.g., blood, wound drainage, pus, etc.). • Topical or systemic allergic response is possible. Screen for iodine allergy prior to use.
Povidone Iodine *(Iodophor/PVP)* in an ***alcohol*** based solution) *Brand: Persist*	Denaturing of proteins and substitution of cell contents with free iodine	
Tincture Of Iodine *(2% iodine* in an ***alcohol*** based solution)		
Chlorhexidine (CHG) ***aqueous*** *based formulations*	Disruption of cell membrane	• The preferred skin antiseptic agent is >0.5% chlorhexidine in alcohol solution. • Broad spectrum of activity with a superior residual effect (hours to days). • Alcohol based formulations have a rapid effect, aqueous based solutions may require slightly longer skin contact/drying time. • Allow to dry for at least 20 seconds before dressing application or invasive procedure. Efficacy is not affected by organic matter. • Should be allowed to dry on skin prior to dressing application. Superior residual effectiveness and rapid drying time (especially of alcohol-based formulation) allow a one-step prep. • Allergic response is rare but possible. Screen for CHG allergy prior to use. • Also available as a small foam dressing that may be applied to the IV insertion site after the skin prep has dried. A transparent dressing is then applied. The disk provides a sustained antimicrobial effect of the CHG for up to 7 days. May reduce the incidence of catheter related blood stream infection in high-risk populations (e.g., immunocompromised individuals, dialysis catheters, epidural catheters, etc.). • Do not get in eyes or ears. May be ototoxic.
Chlorhexidine (CHG) ***alcohol*** *based formulations* *Common brand name: Chloraprep*	Dual action: Denatures proteins and causes cell membrane disruption	
Chlorhexidine (CHG) impregnated foam disk *Brand name: Biopatch®*		

VASCULAR ACCESS DEVICES AND INFUSION THERAPY PROCEDURES

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GUIDELINES FOR CHOOSING INFUSION DEVICES

Policy

The appropriate vascular access device is selected based on the prescribed therapy, anticipated duration of therapy, resident's vasculature, age, comorbidities and preference for type and location of venous access.

SUBCUTANEOUS INFUSION DEVICE

Recommended Uses:

- Short-term hydration (hypodermoclysis) when the resident has poor peripheral veins for IV access.
- Improve hydration status to make it possible to insert venous access.
- Short-term hydration for terminally ill residents with bowel obstruction caused by pain meds.
- Safer than an IV infusion for hydrating residents with dementia.
- Narcotic infusion.

Limitations:

- Residents receiving anticoagulant therapies are poor candidates for a subcutaneous infusion.

Subcutaneous infusions are not appropriate for:

- Rapid fluid replacement.
- Rapid replacement of electrolyte losses.
- Potassium concentration is limited to 20-40 mEq/L.

PERIPHERAL IV CATHETER

Any IV catheter that does not reach the vena cava is a <u>peripheral</u> IV device.

Recommended Uses:

- Isotonic (or mildly hypotonic or hypertonic) hydration.
- Non-irritant, non-vesicant, non-hyperosmolar (<900mOsm/L) solutions with a short duration of therapy.

Short Peripheral IV Catheter

- Less than 3 inches in length.
- Short term, non-irritant, non-vesicant, non-hyperosmolar (<900mOsm/L) therapies.
- Remove when clinically indicated for unresolved complication, discontinuation of infusion therapy or the catheter is no longer necessary for the plan of care.

Long Peripheral IV Catheter

- 3 inches or greater in length.
- Short term, non-irritant, non-vesicant, non-hyperosmolar (<900mOsm/L) therapies.
- Choose when the vessel is difficult to palpate or visualize.

- Ultrasound guidance is recommended for insertion to ensure that two thirds of the catheter lies within the vessel.
- Specialized training required for insertion.
- Remove when clinically indicated for unresolved complication, discontinuation of infusion therapy or the catheter is no longer necessary for the plan of care.

Midline IV Catheter

- 3-8" in length.
- Midline catheters do not extend past the axilla when inserted in the vessel.
- Longer term, non-irritant, non-vesicant, non-hyperosmolar (<900mOsm/L) therapies.
- Do not use midline catheters for **continuous** vesicant therapy, parenteral nutrition, or infusates with extremes of pH or osmolarity.
- Use caution with **intermittent** vesicant administration due to risk of undetected phlebitis and extravasation. Increase resident assessment and observation of catheter site when administering intermittent infusions of known irritant and vesicant medication.
- Specialized training is required for insertion.
- Ultrasound guidance is recommended for insertion.
- Remove when clinically indicated for unresolved complication, discontinuation of infusion therapy or the catheter is no longer necessary for the plan of care.

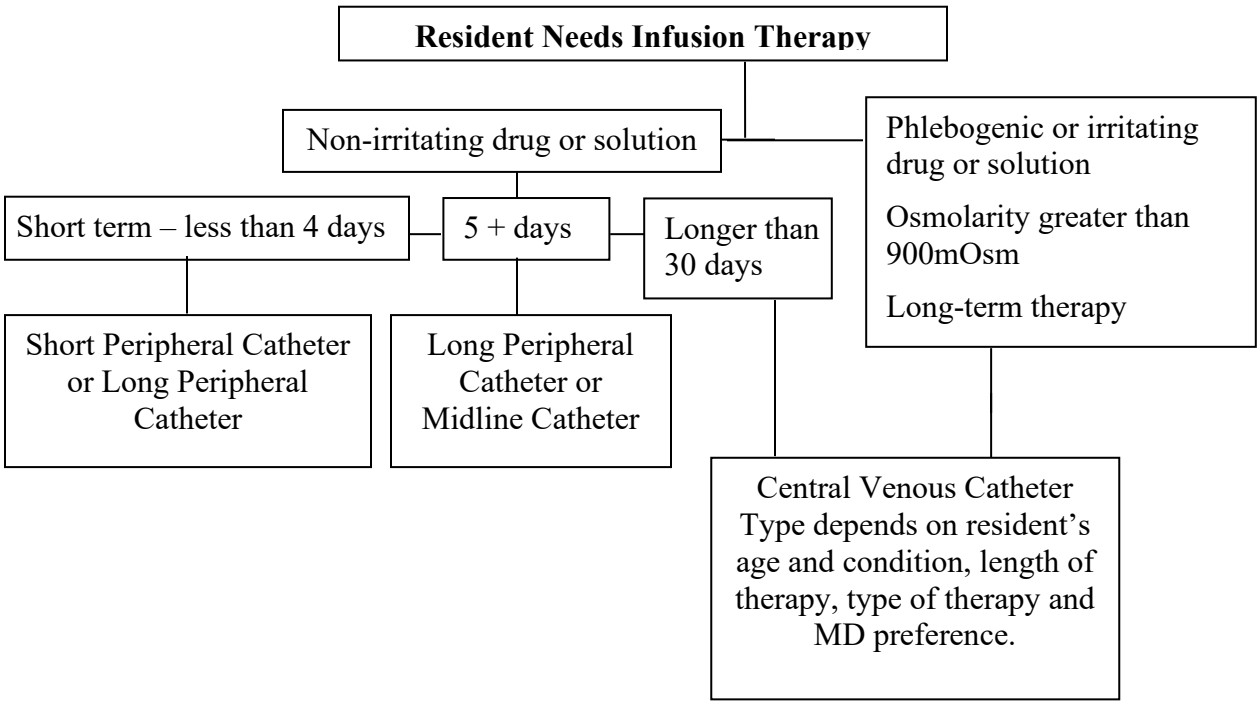
CENTRAL VASCULAR ACCESS DEVICE (CVAD)

- **Catheter tip location must be confirmed by radiology report or other approved method of tip confirmation prior to use.**
- Ideal catheter tip location is in the lower 1/3 of the superior vena cava at the cavoatrial junction.

Recommended Uses:

- Any therapy that is expected to continue for more than 4 weeks.
- All therapies including parenteral nutrition, irritant and vesicant therapies.
- Remove when clinically indicated for unresolved complication, discontinuation of infusion therapy or the catheter is no longer necessary for the plan of care. Consult with physician prior to removal.
- **NOTE: FOR RESIDENTS WITH A DIAGNOSIS OF CHRONIC KIDNEY DISEASE (CKD) VESSEL PRESERVATION IS IMPERATIVE. APPROVAL FROM THE RESIDENT'S NEPHROLOGIST MUST BE OBTAINED PRIOR TO INSERTION OF A MIDLINE OR PICC CATHETER.**

CATHETER SELECTION DECISION TREE


Resident Needs Infusion Therapy
Non-irritating drug or solution
Phlebogenic or irritating drug or solution
Osmolarity greater than 900mOsm
Long-term therapy
Short term – less than 4 days
5 + days
Longer than 30 days
Short Peripheral Catheter or Long Peripheral Catheter
Long Peripheral Catheter or Midline Catheter
Central Venous Catheter
Type depends on resident's age and condition, length of therapy, type of therapy and MD preference.

SHORT PERIPHERAL IV CATHETER

Safety products are used for all devices.

1. Polyurethane over the needle catheter.

INDICATIONS

- Short-term therapy. Immediate access.
- Per INS (Infusion Nurses Society) standards of practice, therapies not appropriate for infusion through a peripheral catheter include **continuous** vesicant therapy, parenteral nutrition, or infusates with an osmolality of 900 mOsm/L or greater.
- Use caution and increase site surveillance if administering known irritants or vesicants.

CONSIDERATIONS

- Remove the short peripheral IV catheter if it is no longer necessary for the plan of care, when clinically indicated based on findings from site assessment or clinical signs and symptoms of systemic complications or if it has not been used for more than 24 hours.
- When choosing a site, consider type and duration of therapy, condition and location of vein.
- Select the smallest gauge peripheral catheter that will accommodate the prescribed therapy.
- It is recommended to:
  - Assess the insertion site minimally every 4 hours.
  - Assess every 1-2 hours for residents who are sedated or have cognitive deficits.
  - Assess every hour or more for residents receiving intermittent infusions of vesicant medications.

LONG PERIPHERAL IV CATHETER

INDICATIONS

- Short-term therapy.
- Indicated when peripheral vessels are difficult to palpate or visualize.
- Per INS (Infusion Nurses Society) standards of practice, therapies not appropriate for infusion through a peripheral catheter include **continuous** vesicant therapy, parenteral nutrition, or infusates with an osmolality of 900 mOsm/L or greater.

CONSIDERATIONS

- Remove the long peripheral IV catheter if it is no longer necessary for the plan of care, when clinically indicated based on findings from site assessment or clinical signs and symptoms of systemic complications or if it has not been used for more than 24 hours.
- When choosing a site, consider type and duration of therapy, condition and location of vein.
- Select the smallest gauge peripheral catheter that will accommodate the prescribed therapy.
- Ultrasound guidance is recommended and specialized training is required for insertion.
- Ensure that 2/3 of the catheter lies within the vessel.
- It is recommended to:
  - Assess the insertion site minimally every 4 hours.
  - Assess every 1-2 hours for residents who are sedated or have cognitive deficits.
  - Assess every hour or more for residents receiving intermittent infusions of vesicant medications.

PERIPHERAL IV SITE SELECTION

Site Selection Guidelines:

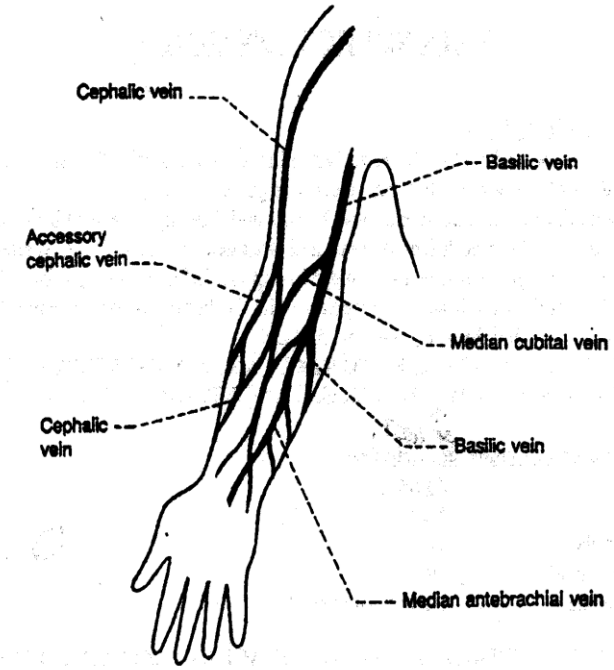
1. Use the venous site most likely to last the full length of the prescribed therapy.
2. Consideration should be given to using short peripheral IV catheters only for infusing non-irritant, non-vesicant, non-hyperosmolar (<900 mOsm/L) solutions with a short duration of therapy.
3. Use sites in the non-dominant arm if possible.
4. Select a catheter that has the smallest outer diameter and is the least invasive device needed for the prescribed therapy.
5. Avoid the following:
    - Ventral surface of the wrist due to pain on insertion and potential for nerve damage.
    - Areas of flexion at the wrist or antecubital fossa.
    - Areas where valves in the veins are observed or palpated.
    - Compromised areas such as open wounds, areas of bruising, previously infiltrated or extravasated sites.
    - Veins that are phlebitic, sclerosed or engorged.
6. Avoid the upper extremity on the side of breast surgery with axillary node dissection.
7. Avoid any extremity with lymphedema.
8. Avoid any extremity with an arteriovenous fistula.
9. Avoid the affected extremity from a CVA/stroke.
10. Avoid the lower extremities due to the risk of tissue damage, thrombophlebitis and ulceration.
11. For residents with chronic kidney disease avoid unnecessary venipuncture in an extremity intended for potential placement of a dialysis catheter or arteriovenous fistula.

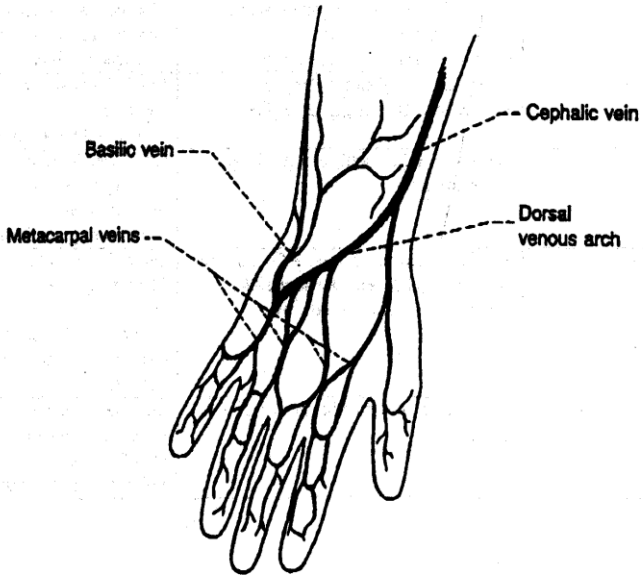
SITE SELECTION CHART (SEE VENOUS DIAGRAM FOR VEIN LOCATIONS)

SITE	REASON FOR SELECTION	CONSIDERATIONS
Metacarpal veins	Veins easily accessible. Use for short-term infusions only.	Veins are small and good stabilization is necessary.
Accessory cephalic vein	Large vein. Excellent for venipuncture. Does not impair mobility.	Can be used for short peripheral IV insertion below the antecubital fossa. May be used for midline placement.
Cephalic vein	Large vein. Excellent for venipuncture.	Proximity to elbow may decrease joint movement. Can be used for short peripheral IV insertion below the antecubital fossa. May be used for midline or PICC placement above the antecubital fossa.
Basilic vein	Large vein. Excellent for venipuncture.	May be used for midline or PICC insertion above the antecubital fossa. Can be used for short peripheral IV insertion below the antecubital fossa. Site may be painful for venipuncture due to penetration of dermal layer of skin where nerve endings are located.
Antecubital veins	May be used in an emergency only when no other veins are accessible. Large veins facilitate blood draws.	Difficult to stabilize. Median cephalic crosses in front of brachial artery. **A short peripheral IV started in this area should be changed to another location as soon as possible**.
Median antebrachial vein	A last resort when no other means are available.	Many nerve endings in area may cause painful venipuncture or may be damaged by infiltration. Infiltration occurs easily in this area.

VEIN LOCATION DIAGRAM

Superficial veins of the forearm and the dorsal aspect of the hand.





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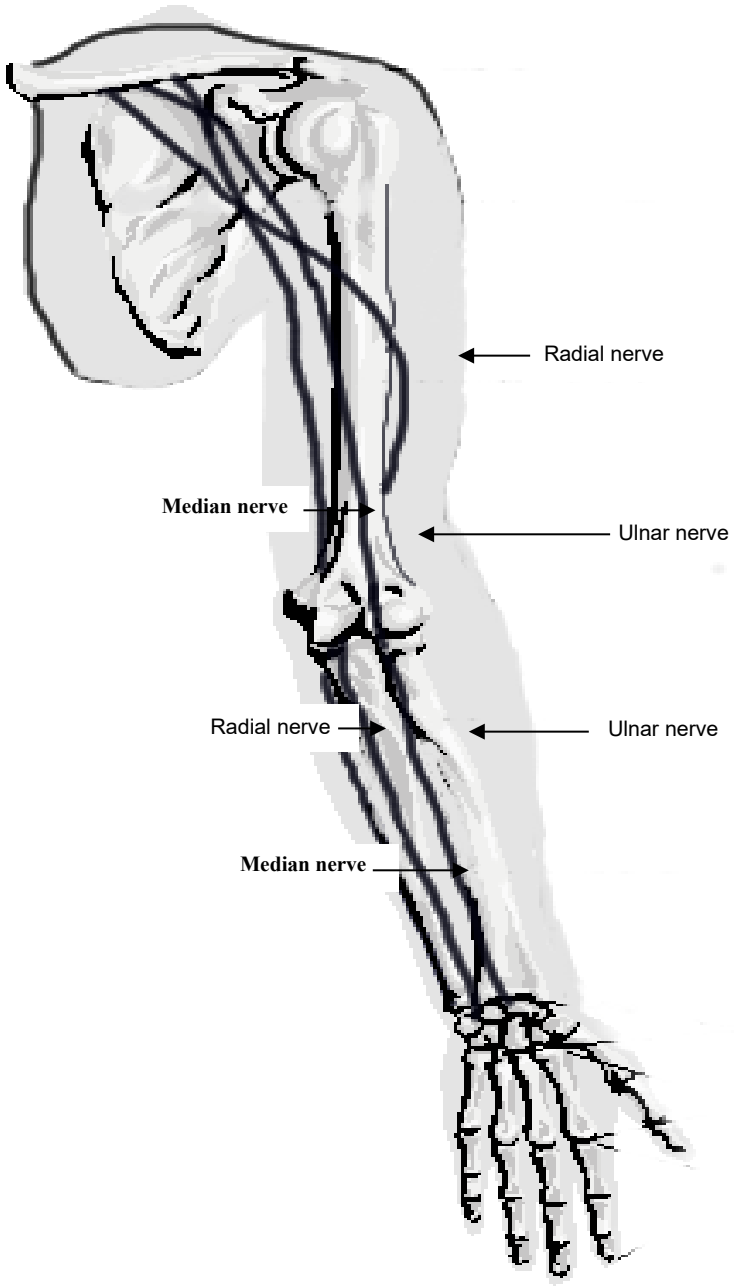
UPPER EXTREMITY PERIPHERAL NERVES



INSERTING A SHORT PERIPHERAL IV CATHETER

Purpose

To safely and aseptically insert a peripheral IV 3" in length or less for the continuous or intermittent infusion of parenteral solutions and medications.

Policy

A nurse with documented education and training in infusion therapy and as allowed by state regulations and facility policy, may insert short peripheral IV catheters.

1. Nurses may perform venipuncture on hands and forearms in the elderly. Use of lower extremities is not recommended.
2. Intravenous catheters may never be inserted into an extremity that has a functional A-V fistula or shunt. If an IV must be placed in the affected side of a resident who has had breast surgery with axillary node dissection, the prescriber must write a specific order that allows use of that extremity.
3. INS standards recommend no nurse attempt a venipuncture more than twice and no more than 4 total attempts per resident. If facility staff is unsuccessful after 2 total attempts, escalate to a clinician with a higher skill level.
4. A new catheter is used for each venipuncture attempt. A needle or stylet is never re-inserted into the catheter after removal.
5. Safety engineered devices will be used for all short peripheral IV catheter insertions.
6. Choose the smallest gauge catheter that will accommodate the prescribed therapy and resident need. A 22 to 24 gauge catheter is adequate for most infusions and helps to prevent insertion related trauma.
7. Aseptic non-touch technique (ANTT®) will be used throughout the procedure.

Equipment

Assemble supplies on a clean surface. Tape used for catheter stabilization under the IV dressing should be the sterile tape that is provided in the IV start kit. Do not place cut pieces of tape on furniture, bed or clothing.

- IV Start kit.
- Extension set with clamp and needleless connector.
- Pre-filled Saline flush syringe.
- IV Safety Catheter.

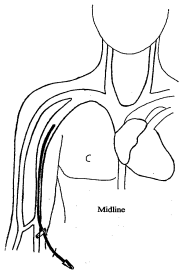
Procedure

1. Verify order and correctly identify resident.
2. Explain procedure to resident. Obtain verbal consent.
3. Perform hand hygiene.

4. Cleanse the needleless connector on the extension set and allow to dry.
5. Attach pre-filled saline flush syringe to the extension set and prime.
6. Apply tourniquet and assess resident's venous access. Consider drug or solution to be administered, condition of resident's veins, and duration of therapy. Select appropriate vein for insertion. Avoid areas of flexion. Start as distally as appropriate. Dilate vein. Methods of vein dilation includes:
    - Place limb below heart level.
    - Apply warm compresses to increase vasodilatation
    - Apply tourniquet 4-6" above puncture site. Do not apply too tightly. A blood pressure cuff may be used as an alternative to the tourniquet. Inflate the cuff and then deflate to just below diastolic pressure.
    - Have resident open and close fist several times if possible.
7. Remove tourniquet.
8. Don gloves.
9. Cleanse insertion site with antiseptic solution per manufacturer's guidelines using a back and forth scrubbing motion. Allow prep to dry completely prior to venipuncture.
10. Re-apply tourniquet 4-6" above the intended venipuncture site.
11. If vein palpation is necessary after application of antiseptic solution, don sterile gloves.
12. Stabilize the vein below the insertion site by holding skin taut.
13. Insert catheter according to manufacturer's recommendations.
14. Remove tourniquet.
15. Remove needle or stylet.
16. Attach extension with attached flush syringe to catheter and flush per policy.
17. Secure catheter with the sterile tape provided in the IV start kit, apply dressing and label with date time and initials.
18. Dispose of waste per OSHA, CDC, and facility guidelines.
19. Remove gloves and perform hand hygiene.
20. Document procedure in resident's chart.

    Suggested charting:
    - Date and time.
    - Resident/family teaching.
    - Verbal consent.
    - Condition of site/extremity PRIOR to IV insertion.
    - Location of site.
    - Prep solution used and 'applied using aseptic non-touch technique.'
    - Brand, gauge, length and lot # of IV catheter.
    - Verification of blood return.
    - Number of insertion attempts.
    - Flush used.
    - Resident's response to procedure.

PERIPHERAL MIDLINE CATHETER



- Inserted in the upper arm through the basilic, cephalic, median cubital or brachial veins of the upper arm.
- Catheter tip does not extend past the axilla.
- Length varies by manufacturer.
  Usually 6-8" in length.

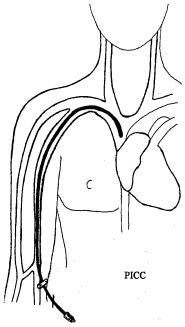
INDICATIONS

- Intermediate term therapy lasting greater than 5 days.
- Must have upper arm vein of adequate size to allow insertion and threading of catheter.
- Allows for longer dwell time than short peripheral catheters. (Reduces resident discomfort and nursing time related to IV starts.)
- Per INS (Infusion Nurses Society) standards of practice, therapies not appropriate for infusion through a peripheral midline catheter include **continuous** vesicant therapy, parenteral nutrition, or infusates with extremes of pH or osmolarity.
- Use caution with **intermittent** vesicant administration due to risk of undetected phlebitis and extravasation. Increase resident assessment and observation of catheter site when administering intermittent infusions of known irritant and vesicant medication.
- Avoid midline catheter placement when the resident has a history of thrombosis, hypercoagulability, decreased venous flow to the extremities or chronic kidney disease requiring vein preservation.

CONSIDERATIONS

- Can be placed by Midline and/or PICC Certified RN.
- Measure circumference of upper arm before insertion as a baseline and when clinically indicated to assess for the presence of edema and possible deep vein thrombosis. Measure 10 cm above the insertion site.
- Measure external length of Midline catheter (catheter only – not the hub, extension set or needleless connector) at insertion. Measure with each dressing change and when clinically indicated if catheter dislodgement is suspected. Compare to measurement obtained at insertion.
- Assess the insertion site and surrounding area for signs and symptoms of complications at a minimum every 24 hours.
- A prescriber order for insertion may be required based on state regulations.
- Verbal consent is required from resident or Durable Power of Attorney.

PERIPHERALLY INSERTED CENTRAL LINE CATHETER (PICC)



- Inserted above the antecubital area through the basilic, median cephalic, brachial or cephalic veins of the upper arm.
- Catheter tip is threaded into the lower 1/3 of the superior vena cava (SVC). Ideal tip location is at the cavoatrial junction immediately above the right atria.
- Polyurethane or silicone material.
- Single, double or triple lumen catheters are available.

INDICATIONS

- Intermediate or long term when central venous access is necessary.
- Upper arm vessels must be of adequate size and free of irritation to allow insertion and threading and to ensure good blood flow around catheter after placement.
- Infusion of irritant, vesicant or hypertonic medications or solutions. May be used for parenteral nutrition.
- Avoid placing PICC catheters in residents with chronic kidney disease.

CONSIDERATIONS

- Must be placed by PICC certified personnel.
- A prescriber's order is required for insertion.
- Written informed consent is required. If resident is unable to give consent or Power of Attorney (POA) is not available to sign a consent form, verbal consent from POA should be documented on a consent form with two signatures of Licensed Independent Practitioner or nursing staff.
- Verification of correct tip placement should be completed by x-ray or other approved technologies before starting an infusion. If resident is admitted with a catheter in place, obtain a written report of tip verification as part of the pre-admission screening process.
- Measure circumference of upper arm before insertion or on admission as a baseline and when clinically indicated to assess for the presence of edema and possible deep vein thrombosis. Measure 10 cm above the insertion site.
- Measure external length of PICC catheter (catheter only – not the hub, extension set or

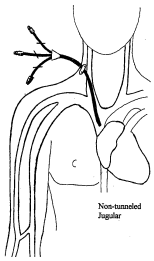
needleless connector) at insertion or on admission, with each dressing change, and when clinically indicated if catheter dislodgement is suspected. Compare to measurement obtained at insertion.

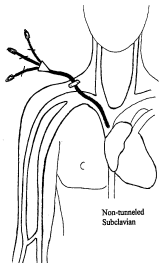
PICC Catheter Tip Location Verification

- Tip location of a PICC catheter is determined by x-ray or by other approved imaging technologies prior to initiation of infusion therapy or when clinical signs and symptoms suggest tip malposition.
- The original tip location should be documented in the resident's medical record.
- The desired tip location is in the lower 1/3 of the superior vena cava at the cavoatrial junction. Avoid tip locations in the veins distal to the superior vena cava as they are associated with higher rates of complications.
- Methods used for identifying tip location during the insertion procedure are preferred due to greater accuracy, prevention of a delay in start of therapy and lower costs.
- Use of ECG technology is the preferred method of identifying tip location during insertion.
- ECG tip confirmation technology is not appropriate for use in residents with pacemakers or residents with atrial arrhythmias (lack of P wave present).
- Document the tip location by including a copy of the ECG tracing or chest x-ray report in the medical record.

NON-TUNNELED CENTRAL CATHETER

Subclavian, Jugular and Femoral Insertion Sites





- Subclavian or jugular catheters are inserted percutaneously into the subclavian or jugular vein with the tip in the SVC. Placed by physician or an advanced practice clinician with training and competency and sutured in place.
- Femoral catheters are placed in the femoral vein in the groin with the tip threaded up into the inferior vena cava above the level of the diaphragm.
- Most are multi-lumen. Lumens are usually staggered in length and of different gauge sizes.

INDICATIONS

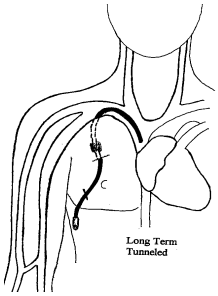
- Infusion of irritant, vesicants or hyperosmolar medications or solutions. May be used for parenteral nutrition.
- Generally used when other central venous access is not possible (i.e., PICC).

CONSIDERATIONS

- An x-ray report verifying placement in SVC or IVC is necessary before starting infusion.
- Measure external length of catheter at insertion, with each dressing change, and when clinically indicated if catheter dislodgement is suspected. Compare to measurement obtained at insertion.
- Tissue inflammation due to suture placement is common and may compromise catheter securement.
- Dislodgement can result in significant blood loss and air embolism due to pressure changes within the thoracic cavity.
- Due to increased risk of infection and other complications, it is recommended that these catheters should be used for as short a time as possible and removed when therapy is completed.
- Femoral catheters have a higher risk of infection due to the types of skin flora/contaminants that may be present at the insertion site.

TUNNELED CENTRAL CATHETER

Hickman™, Broviac™, Hohn®, Cook®, Leonard™



- Placed surgically. From point of vein entry (usually subclavian or jugular), the catheter is tunneled through subcutaneous tissue and exits through the skin several inches from vein entry.
- A Dacron cuff on the tunneled portion helps to secure catheter in place (tissue grows into the Dacron mesh). *Hohn® catheters have no dacron cuff. They are held in place with sutures. Appropriate for shorter term use than cuffed catheters.*
  Some catheters also have an antimicrobial cuff (Vita-Cuff®).

INDICATIONS

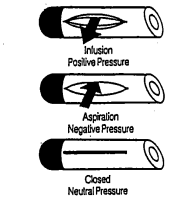
- Intermediate or long-term therapy when central venous access is necessary.
- Infusion of irritant, vesicant or hyperosmolar medications or solutions. May be used for parenteral nutrition.

CONSIDERATIONS

- Due to surgical placement, only an MD or advance practice clinician (Nurse Practitioner, Physician's Assistant), if allowed by state regulations, may remove tunneled catheters.
- Newly inserted catheters may have a cut-down site near the clavicle and sutures by the exit site.
- Obtain information regarding type of catheter and length, and tip placement.

VALVED CATHETER

Can be tunneled catheter, PICC, or implanted port.



Groshong™

PASV

Bard PowerPICC SOLO™

- *Groshong*™ devices have a patented tip that is closed and rounded. It has a small slit valve near the tip which opens when either positive or negative pressure is exerted. The valve closes as soon as the pressure is stopped.
- If the valve is working properly, passive reflux of blood into the catheter cannot occur.
- *PASV* devices have a valve located inside the hub of the catheter that prevents passive reflux of blood into the catheter.
- The PowerPICC SOLO™ catheter valve controls the flow of fluids to provide clamp-free infusion therapy. Positive pressure into the catheter (gravity, pump, syringe) will open the valve, allowing fluid infusion. When negative pressure (aspiration) is applied, the valve opens allowing for the withdrawal of blood into a syringe. Routine clamping of the catheter outside the body is not needed.

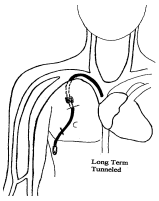
INDICATIONS

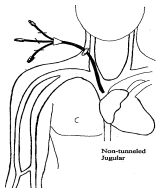
- Valved implanted ports, may be indicated for individuals who need vascular access and:
  - Have coagulopathies.
  - Have a diagnosis of heparin induced thrombocytopenia.
  - Are receiving anticoagulant therapy.

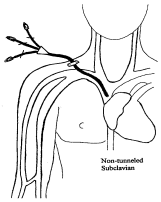
CONSIDERATIONS

- If the catheter valve is compromised (e.g., passive backflow of blood is observed in the catheter lumen) maintain patency per type of device.
- Clamping the catheter when not in use is not necessary and may damage the catheter.

CATHETERS FOR DIALYSIS OR APHERESIS







- CVADs used for dialysis are similar in design to other CVADs but have larger gauge lumens to allow for the high flow rates that are required during dialysis. While there are a multitude of catheter brands, there are two basic types: percutaneously inserted non-tunneled or tunneled cuffed catheters.
- Usually dual lumen, rarely triple lumen. The volume of each lumen will be printed on the catheter near the hub.
- Ideal tip location for a dialysis or apheresis catheter is mid-right atrium.

INDICATIONS

Used for hemodialysis while an individual is waiting for a permanent dialysis AV fistula or graft to be surgically constructed and healed. These catheters may also be required for long term use when all possible sites for AV fistula placement have been exhausted as a result of a life-long need for dialysis treatments.

These catheters are also placed for apheresis. Typically, apheresis treatments are done to facilitate stem cell harvest prior to bone marrow transplant or to remove plasma containing harmful antibodies that result from some autoimmune processes (e.g., hemolytic anemia, idiosyncratic thrombocytopenia, etc.).

It is not unusual for tunneled apheresis catheters to be left in place for the administration of routine IV therapies after the apheresis process is no longer needed. Obtain orders for site care and flushing as per standard tunneled catheter guidelines.

CONSIDERATIONS

Due to the large diameter, dialysis catheters have a higher risk of air embolism and significant blood loss if the catheter should become dislodged, damaged, or the needleless connector loosens. Percutaneously inserted, non-tunneled catheters carry a greater risk than tunneled devices.

- Check pre-admission to be certain your facility accepts this specific catheter type.
- Check to ensure that the percutaneous catheter is securely sutured in place pre-admission and on return from dialysis.
- Measure the external length at insertion and when clinically indicated if dislodgement is suspected.
- Check routinely to be sure the needleless connectors are secure, and clamps are closed.

There are no standard protocols for the care of these devices. Obtain specific orders for each resident on admission.

- If order states: "Dressing change and flush by dialysis center only," the LTCF nurse is still responsible for monitoring the site from a safety and infection control standpoint.

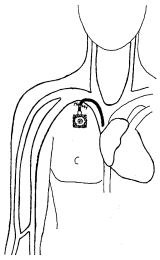
It is never appropriate to reinforce an IV site dressing that has become compromised.

- The site should be cleaned and a new sterile dressing applied ASAP.
- For this reason, it is recommended that the LTCF obtain an order to allow at least a PRN dressing change. Unless otherwise specified in the order or in the dialysis center's protocol, follow your standard dressing protocol.
- Some dialysis dressing protocols still call for ointment at the insertion site. Ointment melts and may cause skin irritation and loosening of the dressing and has little sustained antimicrobial effectiveness. Antimicrobial Disc (a sterile dry chlorhexidine impregnated disc) BioPatch or Guardiva may be placed at the insertion site prior to application of the transparent dressing to reduce the risk of infection. Antimicrobial discs have sustained effectiveness for up to seven days.

If the skilled nursing facility is responsible for flushing the catheter:

- Nurses must have education and competency assessment in the procedure.
- The MD order must specify the flush solutions, volume, heparin concentration, frequency, and the flushing technique (i.e., withdrawal of heparin residing in the catheter).
- High concentrations of heparin are usually used to maintain patency. For this reason, it is more common to use a withdraw and re-instill method rather than flushing the heparin into the blood stream. **For example:** (for each lumen)
    - Withdraw 6 mL (a combination of the heparin dwelling in the catheter and blood) and discard.
    - Flush with 10-20 mL 0.9% saline.
    - Instill heparin 5000 units/mL equal to the volume printed on the catheter lumen, plus 0.2 mL to fill the needleless connector.

IMPLANTED VASCULAR ACCESS PORTS



- Placed surgically. Distal end of catheter is attached to a plastic or titanium port with a self-sealing silicone septum. The port is implanted under the skin and is accessed through the skin with a special non-coring needle. Catheter tip is in the SVC. Can be single or double injection ports. Each port has a separate septum and must be flushed individually.
- The port body can be placed either in the upper chest or the inner portion of the arm (PAS port) just above or below the antecubital space.

INDICATIONS

- Intermediate or long-term therapy (several weeks to years) when central venous access is necessary for intermittent therapy.
- Infusion of irritant, vesicant or hyperosmolar medications or solutions. May be used for parenteral nutrition.

CONSIDERATIONS

- Always use a non-coring needle to access an implanted port. Use the smallest gauge possible. 22g is recommended for most therapies. Port depth varies. Choose appropriate length of non-coring needle.
- Change non-coring needle and dressing every 7 days if accessed.
- Non-coring needle extension tubing must have a needleless connector attached if the non-coring needle is to remain in place for infusion.
- When not accessed, no dressing is required.
- Flush each port septum every 30-90 days when not in use (see flush chart for type and volume of flush). Extending maintenance flushing to every 3 months has been found to be safe and effective in maintaining patency.

ACCESSING/DE-ACCESSING AN IMPLANTED PORT

Purpose

To safely access or de-access an implanted port.

Policy

A nurse with documented education and training in infusion therapy including care of central venous catheters, as designated by the facility, and as allowed by state regulations may access or de-access an implanted port. The nurse must demonstrate competency in accessing or de-accessing an implanted port.

1. Non-coring safety needles will be used for port access and will be changed every 7 days and PRN if port is in use.
2. If port is not in use, it must be accessed, flushed, and de-accessed a minimum of once every 30-90 days based on physician order.
3. Prior to accessing an implanted port, observe/palpate for swelling, pain, erythema, drainage or other signs of complications. If present, do not access port and consult with health care team for further evaluation.

Equipment

- CVAD dressing change tray.
- Clean gloves.
- Right angle non-coring safety needle with pre-attached extension set.
- Needleless connector.
- 10 mL saline flush syringes (3-4).
- 5 mL heparin flush (100 units per mL) syringe.
- 2 additional pairs of sterile gloves may be needed.

Procedure

To De-Access the Port:

1. Assemble equipment.
2. Perform hand hygiene.
3. Don gloves.
4. Before removing needle, verify patency by aspirating for blood return.
    a. Swab needleless connector with alcohol swab and allow to dry.
    b. Connect saline flush syringe and aspirate for a blood return.
    c. Flush with 20 mL saline using turbulent flushing technique and remove syringe.
    d. Swab needleless connector with alcohol and allow to dry.
    e. Flush with appropriate heparin flush.
5. Remove dressing.

6. Stabilize port and remove needle, activating safety mechanism per manufacturer's instructions.
7. Place needle is an approved sharps container
8. Apply Band-Aid® or sterile 2x2 dressing.
9. Dispose of waste per OSHA, CDC, and facility guidelines.
10. Remove gloves.
11. Perform hand hygiene.
12. Document procedure and resident tolerance in nurse's notes or flowsheet.

To Access the Port:

1. Assemble equipment
2. Perform hand hygiene.
3. Open CVAD dressing change tray, open non-coring needle and needleless connector and drop onto sterile field.
4. After opening sterile supplies onto the sterile field, don sterile gloves and attach the needleless connector to the non-coring needle extension tubing.
5. Attach flush syringe to the needleless connector. *(Only the fluid path is sterile on most syringes. The outside of the syringe is not sterile.)* Prime tubing. Place non-coring needle on edge of sterile field with syringe on non-sterile area.***You have a non-sterile syringe attached to a sterile needle and tubing. The needle that will be under the dressing must remain sterile. Do not touch it with the hand that has touched the syringe.***
6. Remove gloves, perform hand hygiene, and don new pair of sterile gloves.
7. Perform skin antisepsis with appropriate antiseptic solution and allow to completely air dry.
8. Stabilize port by placing a finger on either side of port. With your dominant hand, pick up the non-coring needle with the flush syringe attached, taking care not to touch the syringe. Hold needle perpendicular to septum. Insert needle through the skin and into the port septum until it touches back of port. This will require pressure to push needle through septum.
    - If, after touching the back of the port, the wings are too far off the skin, a sterile, folded 2 x 2 gauze may be placed under the wings to minimize needle movement within the septum.
9. Check for proper placement by opening clamp and aspirating for blood return in tubing.
10. When blood return is seen, flush with normal saline, 10-20 mL using turbulent flushing technique.
11. Flush with heparin lock flush as indicated if not resuming an infusion.
12. If flushing for maintenance, remove needle, apply pressure if needed, wipe with alcohol, and apply Band-Aid® or sterile 2x2 dressing.

13. If port is to remain accessed, apply transparent dressing and tape securely. Do not cover insertion site with gauze.
14. Label dressing with date, time and initials.
15. Start/resume therapy.
16. Dispose of waste according to OSHA, CDC, and facility guidelines.
17. Remove gloves.
18. Perform hand hygiene.
19. Document procedure and resident tolerance in nurses' notes or flow sheet.

Special Considerations:

If the needle is too short, change it to a longer one. A needle that is too short may be pulled partially out of the port by resident movement. This could result in infiltration of the IV drug or solution.

If you are accessing an implanted port and are unable to obtain a blood return:

- Check to ensure the non-coring needle is long enough to touch the bottom of the port chamber.
- Check to ensure the needle is in the center of the chamber septum. (The septum is the thick, highly compressed silicone plug that covers the chamber.) If the needle is too close to the edge of the chamber, this silicone covering may occlude the needle bevel.
- Change the needle if needed and try again.
- Try to GENTLY flush while palpating to check for infiltration. Ask the resident if the flush injection causes any discomfort.
- If you can flush with minimal resistance AND there are no signs of infiltration, but you still cannot obtain a blood return. Flush the port per protocol to maintain patency and notify the physician. Do not use the port for infusion until a dye study can be done to assess the reason for the withdrawal occlusion.
    - Note that most withdrawal occlusions are caused by a fibrin sheath or flap that is on the outside of the catheter tip. When you pull back, the flap is pulled over the tip of the port's catheter and this prevents blood return. However, infusion is not obstructed.
    - Withdrawal occlusions in implanted ports may also be caused by a free-floating clump of clot or drug precipitate inside the port chamber. In some cases you can pull back and easily obtain a blood return, but cannot flush the port. In this case, the clump gets pushed against the opening between the port chamber and the catheter when infusion or flushing is attempted, but the process of aspiration moves the clump away from this opening.

MAINTAINING PATENCY OF PERIPHERAL AND CENTRAL VASCULAR ACCESS DEVICES

IV Flush Policy and Procedure

Purpose

To maintain the patency of all peripheral and central vascular access devices (VADs).

Policy

Vascular access devices are aspirated for a blood return and flushed prior to each infusion to assess catheter function and prevent complications. Vascular access devices are flushed after each infusion to clear the infused medication from the catheter lumen.

1. A prescriber's order is needed for all IV flushes.
2. All vascular access devices should be flushed routinely when not in use to maintain patency.
    - Each lumen of a multi-lumen catheter must be flushed individually.
3. Single use flushing systems are used.
4. Vascular access devices should never be forcefully flushed. Patency is assessed using a 10 mL syringe to reduce the risk of catheter damage.
5. Flush vascular access devices with 0.9% preservative free sodium chloride.
6. If the medication to be given is incompatible with 0.9% sodium chloride,
    - Flush pre- and post-infusion with D5W to prevent drug interaction (See Diagram 1).
    - Follow the D5W flush with the appropriate saline flush to maintain patency.
7. There may be clinical reasons to use heparin flush for individual residents. Examples include: a resident that is hypercoagulable due to disease process or one who has a seizure or spasticity disorder that causes blood to reflux into the catheter. Heparin should be the exception and not the rule for flushing. If the decision is made to flush a central venous access device with heparin flush a volume of 5 mL and a strength of 10 u/mL should be used. Implanted ports are flushed with 5 mL of heparin flush with a strength of 10 u/mL while accessed and 100 u/mL when de-accessing at the end of therapy unless it is a valved port which would be flushed with normal saline only.
8. To succeed with saline flushing, a needleless connector with an anti-reflux design must be placed on the hub of EVERY lumen of EVERY vascular access device/catheter**.**
9. All connections (IV tubing or syringes) will be made via the needleless connector, NEVER directly to the catheter hub.

10. When a resident is admitted with an IV in place, always change any pre-existing needleless connector to the brand provided by the pharmacy.

12. Variations from recommended flush are based on physician orders.

    *NOTE: If scope of practice regulations do not allow LPN/LVNs to flush IV catheters and if there is no 24 hour RN coverage in the building, flush protocols may vary to allow for heparin flushing by an RN once a day.

13. Antimicrobial lock solution may be ordered in residents with long term central venous access devices or residents with a history of catheter related blood stream infections. Antimicrobial lock solutions contain concentrated antibiotics and may be combined with heparin. Use standardized formulations with a physician's order. Consult with the pharmacy regarding compatibility and stability of the solution used. Aspirate all antimicrobial locking solutions from the CVAD lumen prior to use. Do not flush the solution into the resident's bloodstream as this could increase the development of antibiotic resistance.

Equipment

- Gloves.
- Preservative free 0.9% sodium chloride prefilled syringes.
- Heparin flush syringe(s) if indicated for the specific device.
- Alcohol wipes.
- If vials are used, they must be preservative free, and discarded after each use. *Single use flush products are recommended by CDC and INS.*

Procedure

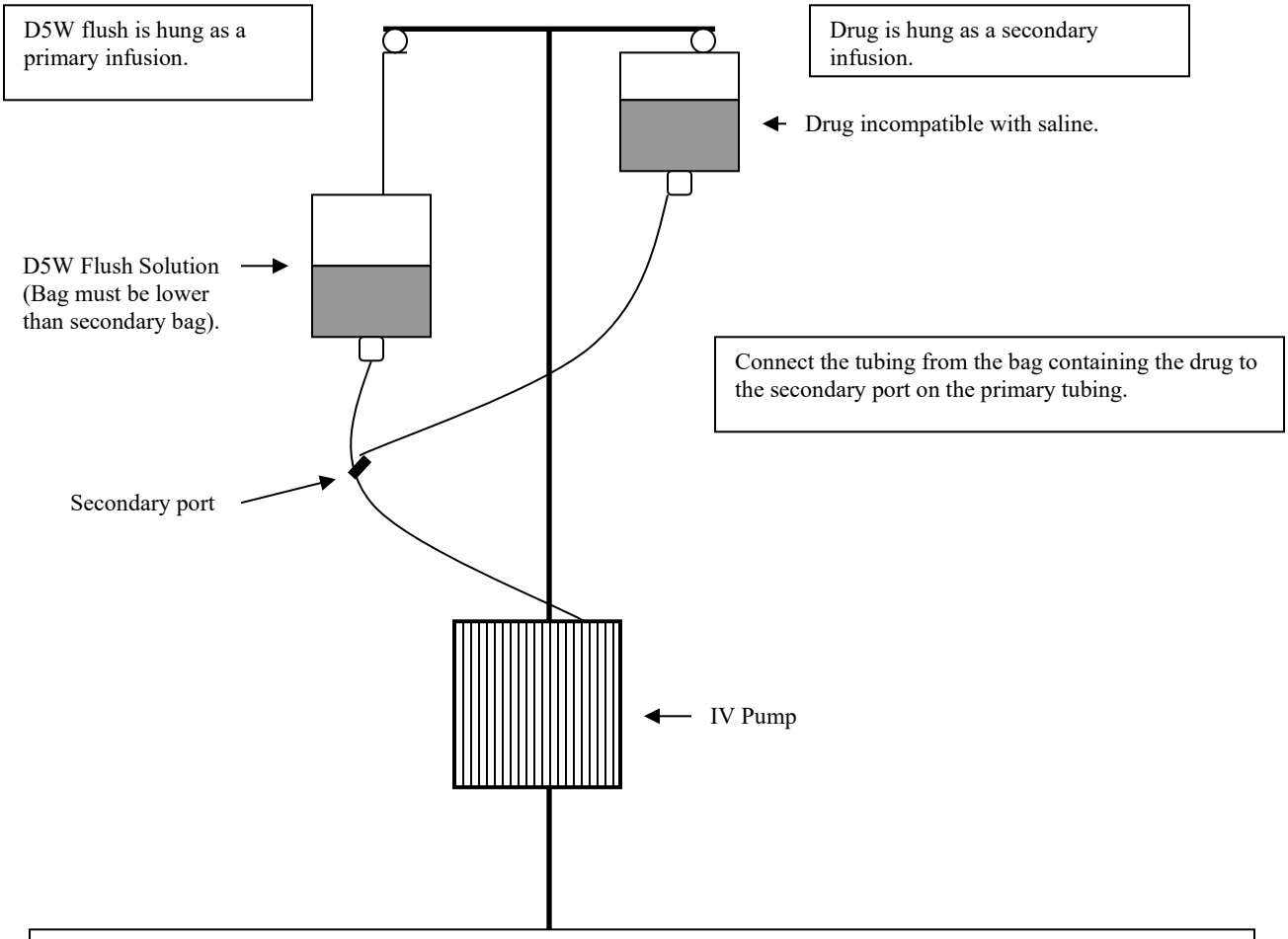
1. Obtain prescriber order for appropriate flush solutions.
    - Refer to the Flush Chart. *The flush orders must be written as a complete medication order.*
2. Perform hand hygiene.
3. Gather supplies.
4. Don gloves.
5. Disinfect needleless connector with alcohol swab.
6. Attach syringe of 0.9% sodium chloride using aseptic non-touch technique.
7. Open clamp if present.
8. Inject 0.9% sodium chloride into the vascular access device.
    - Note any resistance or sluggishness of flow.

- Never inject against resistance.
- A pulsatile flushing technique of short boluses interrupted by brief pauses may be effective in better catheter clearance.

9. Repeat for each individual lumen as needed.
10. Remove gloves and perform hand hygiene.
11. Dispose of waste per OSHA, CDC, and facility policy.
12. Document the flush in the resident's medication record.

Diagram 1.

Flushing with D5W When Infusing Drugs Incompatible With Saline (i.e., Synercid®, Amphotericin B)



- Flush with at least 20 mL of D5W before and after administration of drug.
- Follow the post administration D5W flush with the appropriate 0.9% sodium chloride flush as indicated for the specific type of vascular access device in use. Refer to the flush chart for specific flush guidelines.
- Do not allow dextrose solutions to reside in the catheter as it provides nutrients for biofilm growth.
- If administering more than one dose per day, you may re-use the same tubing for 24 hours. Follow the instructions for priming secondary tubing.

FLUSH CHART

Type of IV Device	**Pre-Use**	**Post-Use**	**Minimum Intervals** for flushing <u>each</u> lumen (whenever lumen is "locked" with no infusion currently running):
Short Peripheral IV Catheter (length < 3 inches) **Long Peripheral IV Catheter** (length > 3 inches)	**10 mL saline**	**10 mL saline**	**10 mL SALINE every 8 hours +PRN**
Midline, PICC **Subclavian, Jugular or Femoral CVC** Percutaneous insertion / non-tunneled **Tunneled Catheter** (e.g., Hickman® / Broviac® type)	**10 mL Saline**	**10 mL saline** Flush with 20 mL saline: after TPN or anytime there is blood in the catheter or IV tubing	**10 mL SALINE every 8 hours +PRN**
<u>All</u> Valved Devices – (all PASV® or Groshong®, PowerPICC SOLO™ brand VADs) Note that valved products are available as Midlines, PICCs, Tunneled Catheters and Implanted Ports	**10 mL Saline**	**10 mL saline** Flush with 20 mL saline: after TPN or anytime there is blood in the catheter or IV tubing	**10 mL SALINE every 8 hours +PRN** **Valved Implanted Ports:** **IF ACCESSED**: 10 mL SALINE DAILY +PRN **IF NOT ACCESSED:** FLUSH **EVERY 30-90 DAYS BASED ON PHYSICIAN ORDER WITH 20 mL OF SALINE**.
Implanted Port (venous ports only)	**10 mL Saline**	**10 mL saline** followed by **50 units heparin** (5 mL of 10 units/mL) if remaining accessed. If de-accessing port final heparin flush should be 500 units (5 mL of 100 units/mL)	**IF ACCESSED AND NOT IN USE:** 10 mL SALINE FOLLOWED BY 50 UNITS HEPARIN (5 mL OF 10 UNITS/mL) **DAILY.** **IF NOT ACCESSED:** 20 mL SALINE, FOLLOWED BY 500 UNITS HEPARIN (5 mL OF 100 UNITS/mL) **EVERY 30-90 DAYS BASED ON PHYSICIAN ORDER**.
Post Parenteral Nutrition, Blood Reflux, or Transfusion.	**Flush with 20 mL saline** (Followed by heparin flush if indicated per device type <u>and</u> if not resuming infusion immediately.) Follow this protocol for Midlines, and all central venous access devices regardless of the reason for blood reflux.		
Dialysis or Plasmapheresis Central Venous Catheters	Protocols vary greatly. Obtain specific orders prior to flush or dressing change. Catheter care is usually managed by dialysis nurse only. Document assessment of the dressing routinely. Be sure that clamps are closed and needleless connectors are secure if they are outside the dressing.		

Specific Prescriber's Orders are required for all flushes.

DRESSING CHANGE FOR VASCULAR ACCESS DEVICES

Purpose

To prevent local and systemic infection related to the IV catheter.

Policy

A sterile dressing is maintained on all peripheral and central vascular access devices to protect the site, provide a microbial barrier, and to provide vascular access device securement.

1. Aseptic non-touch technique (ANTT®) is adhered to when providing site care and dressing changes on all vascular access devices.
2. Short peripheral catheter dressings are changed every 7 days or when the integrity of the dressing is compromised. Change the dressing if moisture, drainage or blood is present or for further assessment if infection is suspected.
3. Central venous access device and peripheral midline dressings are changed every 7 days and immediately if the integrity of the dressing is compromised, if moisture, drainage or blood is present, or for further assessment if infection is suspected.
    - Transparent semi-permeable membrane dressings are changed every 7 days and PRN.
    - If a chlorhexidine impregnated gauze sponge (BioPatch®/Guardiva) is applied under the transparent dressing, change every 7 days.
    - If a resident is allergic to the transparent dressing and a gauze and tape dressing is used over the site, the gauze dressing must be changed every 48 hours and PRN. Gauze underneath a transparent semi-permeable membrane dressing is considered a gauze dressing.
4. Initial dressings after catheter placement will be changed PRN if saturated, and 24-48 hours post insertion of midlines, PICCs, or other central venous access devices if gauze is present under the dressing and/or there is blood/drainage under the dressing. Initial dressing with Biopatch®/Guardiva at the site may be left in place for 7 days unless it is saturated or the dressing is otherwise compromised.
5. A dressing is changed immediately if:
    - The dressing is non-occlusive or soiled.
    - There is drainage or moisture under the dressing.
    - There are signs of irritation or inflammation at the insertion site.
6. Masks will be worn when changing a midline or CVAD dressing.
7. If using an engineered stabilization or securement device (example - StatLock™) it must be changed with each dressing change.
8. Do not use rolled bandages with or without elastic properties to secure any type of vascular access device.

Equipment

- IV Start Kit (for short peripheral catheters).
- Central Line Dressing Change Kit (for midlines and central catheters).
- Engineered stabilization device if applicable.
- Clean gloves.
- Sterile gloves (for midlines and central lines).

Short Peripheral Catheter Dressing Change Procedure:

1. Perform hand hygiene. Don clean gloves.
2. Explain procedure to resident.
3. Using clean gloves, remove old dressing.
    - Use care to prevent skin tear, shearing, or bruising.
    - Press skin away from dressing vs. pulling up on dressing.
    - Stretch TSM dressings to side.
    - Work from the edge of the dressing toward the insertion site while stabilizing the catheter to minimize catheter movement.
    - Use alcohol to help loosen adhesive.
4. Assess site for:
    - Erythema.
    - Induration.
    - Swelling.
    - Drainage.
5. Remove hair as needed to ensure dressing adherence.
    - Clip very carefully with sterile scissors. Do not shave.
    - Avoid damage to catheter, skin, or anchoring sutures.
6. Using aseptic no-touch technique (ANTT®), prep site with alcohol to remove skin oils, followed by the primary antiseptic (Chloraprep™). See Appendix C for manufacturer's guidelines.
7. Clean an area larger than dressing to be applied.
8. If resident is allergic to primary antiseptic, a second alcohol prep may be used for 60 seconds to prep site.
9. Allow prep solutions to dry completely prior to applying dressing.
10. Apply tape from IV start kit or securement device if applicable.
11. Apply transparent dressing. Do not stretch film while applying dressing (stretching will cause skin tears and can cause intense itching).
12. Smooth dressing from center out to edges to prevent air pockets.
13. Reinforce edge of dressing where catheter exits using tape provided in kit as it increases catheter stability.

14. Secure catheter and IV tubing using tension loop taping to prevent tension on device or sutures.
15. Remove gloves and perform hand hygiene.
16. Apply label on dressing with date and nurse's initials. Do not write directly on TSM dressing with pen or marker.
17. Dispose of waste following OSHA, CDC, and facility guidelines.
18. Suggested charting:
    - Site assessment.
    - Prep used.
    - Type of dressing.
    - Catheter securement
    - Resident response to procedure.

Midline and Central Venous Access Device Dressing Change Procedure:

1. Perform hand hygiene. Don sterile gloves and mask.
2. Explain procedure to resident.
3. Using first pair of sterile gloves, remove old dressing.
    - Use care to prevent skin tear, shearing, or bruising.
    - Press skin away from dressing vs. pulling up on dressing.
    - Stretch TSM dressings to side.
    - Work from the edge of the dressing toward the insertion site while stabilizing the catheter to minimize catheter movement.
    - Use alcohol to help loosen adhesive.
4. Assess site for:
    - Erythema.
    - Induration.
    - Swelling.
    - Drainage.
    - If sutures are present: MD/NP should be notified if sutures are no longer intact. If sutures are not intact, the catheter must be secured with steri-strips or other securement device (i.e., StatLock™).
    - Measure external length of catheter.
    - Measure upper arm circumference 10 cm above the insertion site and compare to the baseline documented measurement if signs of complications are noted.
5. Remove hair as needed to ensure dressing adherence.
    - Clip very carefully with sterile scissors. Do not shave.
    - Avoid damage to catheter, skin, or anchoring sutures.

6. Remove gloves.
7. Perform hand hygiene and don second pair of sterile gloves.
8. Using aseptic non-touch technique (ANTT®), prep site with alcohol to remove skin oils, followed by the primary antiseptic (Chloraprep™). See appendix C for manufacturer's guidelines for application.
9. Clean an area larger than dressing to be applied.
10. If the resident is allergic to primary antiseptic (Chloraprep™), obtain prescriber's order for specific prep. Recommendations include:
    Betadine
    Alcohol
11. Allow prep solutions to dry completely prior to applying dressing.
12. Apply sterile tape or securement device if applicable (i.e., StatLock™).
13. Apply transparent dressing. Do not stretch film while applying dressing (stretching will cause skin tears and intense itching).
14. Smooth dressing from center out to edges to prevent air pockets.
15. Reinforce edge of dressing where catheter exits using tape provided in kit. Increases catheter stability.
16. Secure catheter and IV tubing using tension loop taping to prevent tension on device or sutures.
17. Remove gloves and perform hand hygiene.
18. Apply label on dressing with date and nurse's initials. Do not write directly on TSM dressing with pen or marker.
19. Dispose of waste following OSHA, CDC, and facility guidelines.
20. Suggested charting:
    - Site assessment.
    - Measured external length of the catheter.
    - Prep used.
    - Type of dressing.
    - Catheter securement (integrity of sutures, other devices).
    - Resident response to procedure.

NEEDLELESS CONNECTOR CHANGE

Purpose
To safely and aseptically change the needleless connector.

Policy
A needleless connector with an anti-reflux design must be placed on the hub of every lumen of every vascular access device.

1. All connections (IV tubing or syringe) will be made via the anti-reflux needleless connector, never directly to the catheter hub.
2. Change pre-existing needleless connectors to the brand provided by the pharmacy when resident is admitted with an IV in place.
3. Needleless connectors are changed no more often than every 96 hours but at least every 7 days or PRN if the needleless connector is removed for any reason, if there is residual blood within the needleless connector, prior to drawing a sample for blood culture from a vascular access device, if the connector is leaking, cracked or damaged, or upon suspected contamination.
4. Needleless connectors on TPN/PPN infusions should be changed every 96 hours.

Equipment
- Luer locking needleless connector.
- Saline flush syringe.
- Antiseptic wipes.
- Non-sterile gloves.
- mask

Procedure
1. Explain procedure to resident.
2. Perform hand hygiene and don gloves and mask.
3. Clamp catheter.
4. Scrub the replacement needleless connector with an alcohol swab and allow to dry.
5. Attach saline flush syringe and prime needleless connector with saline. Leave saline syringe attached.
6. Remove the needleless connector on the IV catheter.
7. Using an alcohol swab, vigorously scrub the IV catheter hub and allow to dry.
8. Securely attach the replacement needleless connector onto catheter.
9. Open clamp on catheter. Flush with saline.
10. Resume infusion or clamp catheter.
11. Remove gloves. Perform hand hygiene.
12. Dispose of waste following OSHA, CDC, and facility guidelines.
13. Document procedure.

EXTENSION SET WITH ATTACHED NEEDLELESS CONNECTOR CHANGE

Purpose

To safely and aseptically change the extension set with attached needleless connector on a short peripheral, midline or central venous catheter.

Policy

If an extension set is added as part of the original midline or central venous access device insertion procedure under sterile conditions, it may be considered a permanent part of the catheter and changed only if contaminated or damaged. Extension sets added post-insertion are changed every 7 days or PRN.

Extensions sets with needleless connector attached to short peripheral catheters on insertion are changed when the catheter is changed or PRN if contaminated or damaged.

Equipment

- Extension set.
- Needleless connector.
- Saline flush syringe.
- Antiseptic swabs (3).
- Non-sterile gloves.
- Mask.

Procedure

1. Explain procedure to resident.
2. Perform hand hygiene and don gloves and mask.
3. Attach needleless connector to an extension set if they are provided as two separate pieces.
4. Scrub the replacement needleless connector with the first alcohol swab and allow to dry.
5. Attach flush syringe to needleless connector and prime extension set.
6. Clamp the midline or central venous access device and remove the extension set.
7. Using an alcohol swab, vigorously scrub the IV catheter hub and allow to air dry.
8. Attach the new extension set securely onto the catheter.
9. Open clamp on catheter and flush.
10. Resume infusion or clamp catheter.
11. Remove gloves. Perform hand hygiene.
12. Dispose of waste following OSHA, CDC, and facility guidelines.
13. Document procedure.

DRAWING BLOOD FROM A CENTRAL VENOUS ACCESS DEVICE

Purpose

To obtain blood specimens when the resident has a central venous catheter in place.

Policy

A nurse with documented education and training in central line care, including blood draws, as designated by the facility, and as allowed by state regulations may draw blood from a central venous access device. The nurse must demonstrate competency with equipment and technique.

1. All infusions being administered through the catheter must be stopped before the blood sample is obtained.
2. Do not draw PTT (partial prothrombin time) through a lumen being flushed with heparin. Do not draw electrolytes through a lumen being used to administer PPN/TPN or other electrolyte solutions. Do not draw drug levels through a lumen being used to deliver the drug.
3. Choose the appropriate CVAD lumen for obtaining samples based on the largest lumen or the configuration of the lumen exit sites. For catheters with a staggered lumen exit at the tip, the sample should be drawn from the lumen exiting at the point farthest away from the heart and above other lumen exits used for infusion. Follow CVAD manufacturers' directions for use for these decisions.

Equipment

- Non-sterile gloves.
- Mask.
- Empty 10 mL sterile syringes. (number determined by the volume of blood needed).
- Pre-filled saline flush syringes (5).
- Heparin flush syringe if appropriate.
- Antiseptic swabs.
- Vacutainer tubes.
- Blood transfer safety device (to safely transfer blood to tubes). See Appendix C.
- Biohazard lab specimen bag.
- Needleless connector.

Procedure

1. Obtain prescriber's order.
2. Stop infusions at least one minute prior to drawing blood.
3. Perform hand hygiene.
4. Don mask and gloves.
5. Label the first flush syringe with a piece of tape marked "discard."

6. Scrub needleless connector on lumen to be used for blood draw with an alcohol swab and allow to dry. Connect the syringe of saline flush labeled as the "discard syringe". (If a multi-lumen catheter, one lumen should be designated for blood draws.)
7. Unclamp catheter.
8. Aspirate for positive blood return and then flush catheter with 10 mL saline using pulsatile flushing technique. Leave the flush syringe attached, wait 30 seconds, then draw back 6-10 mL of blood with the same syringe. This first "discard" draw is to remove the flush solution from the catheter before obtaining the lab sample. The tape on the syringe will prevent you from confusing the discard with the lab sample.
9. Scrub needleless connector with an alcohol swab and allow to dry.
10. Using a new empty sterile syringe, draw the volume needed for the lab tubes and withdraw blood until all specimens are obtained. Transfer to correct vacutainer tubes using safety equipment.
11. Follow lab polices for order of filling blood tubes and for processing and storage requirements.
12. Scrub needleless connector with an alcohol swab and allow to dry.
13. Attach a pre-filled normal saline syringe and flush catheter using turbulent flushing technique with 10 mL saline. Clamp catheter.
14. Change needleless connector per policy and procedure.
15. Scrub needleless connector with alcohol swab, allow to dry and attach a pre-filled normal saline syringe.
16. Open clamp. Flush again using turbulent flushing technique with 10 mL of saline. Follow with appropriate heparin flush if drawing blood from an implanted port or resume infusion.
17. Remove gloves and perform hand hygiene.
18. Label specimen containers.
19. Dispose of waste per OSHA and CDC guidelines.
20. Document procedure.

NOTE* *If you encounter difficulty withdrawing blood:*

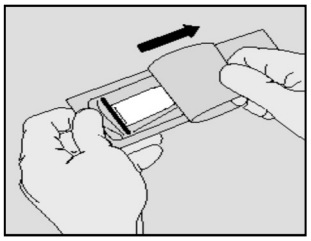
- Position the resident flat in bed.
- If using a syringe, use a syringe with a volume less than 10 mL.
- Turn resident to opposite side.
- Extend arm on side of IV catheter out to the side or over the resident's head.
- Have the resident cough or perform Valsalva maneuver.
- Try flushing again using brisk/turbulent (NOT FORCEFUL) technique (see flushing techniques).
- Notify physician if unable to obtain blood. The physician may want to instill a thrombolytic agent to regain patency. Check with your nursing supervisor or DON.

BD Vacutainer® Blood Transfer Device

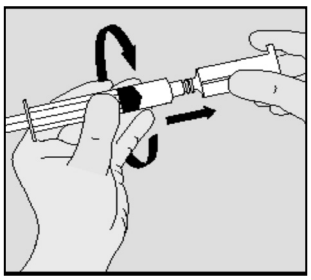
In terms of potential for blood borne pathogen exposure and needlestick injury, one of the highest risk procedures that nurses perform is drawing blood for laboratory tests from central venous access catheters/devices (CVADs). The most problematic part of this procedure can be the process of transferring the lab sample from a syringe into the Vacutainer tube.

The BD Blood Transfer Device will reduce the risk of needlestick injury and bloodborne pathogen exposure during this procedure.

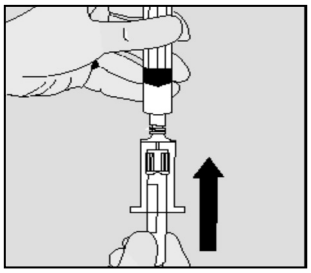
- Transfer blood to lab tube as follows:



Open package of Blood Transfer Device.



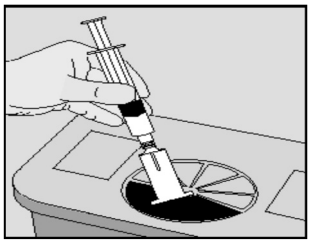
Screw syringe containing lab sample onto the Blood Transfer Device.



Push lab tube firmly into the Blood Transfer Device until the needle in the device punctures the stopper on the top of the lab tube.

Hold the syringe/Blood Transfer Device assembly as shown to allow blood to be drawn into the tube.

Place resident ID label on tube and send to lab.



Dispose of syringe and Blood Transfer Device in sharps container per facility policy.

CENTRAL VENOUS CATHETER – DECLOTTING

Purpose

To provide guidelines and standardization of procedure to restore patency to central venous catheters.

Policy

A nurse with documented education and training in infusion therapy, as designated by the facility, and as allowed by state regulations may attempt to restore patency to an indwelling central venous catheter by using appropriate thrombolytic agent.

Equipment

- 3 mL syringe.
- Thrombolytic agent.
- 10 mL syringes.
- Pre-filled normal saline syringes.
- Preservative free sterile water.
- Gloves.
- Dressing change kit.
- Alcohol pads.
- Needleless connector.

Catheter Clearance with t-PA (Alteplase®)

Recombinant tissue plasminogen activator (t-PA) is FDA approved for use to re-establish patency of venous access devices /catheters (VADs) with thrombosis related catheter occlusion. R t-PA dissolves clots and fibrin by triggering fibrinolysis. R t-PA is available in a 2 mg vial specifically packaged for catheter clearance under the brand name of Cathflo® Activase®.

Cathflo® Activase® should not be administered to residents with known hypersensitivity to alteplase or any component of the formulation. It should be used with caution in the presence of known or suspected infections in the IV catheter. Dissolving an intraluminal clot in an infected catheter may release bacteria into the systemic circulation.

Policies

1. t-PA (Cathflo®) may be used to restore the patency of all types of Central Venous Access Devices/Catheters (CVADs). (If a short peripheral IV catheter or midline catheter is occluded it should be replaced.)

2. Sluggish (< 3 mL in 3 seconds) catheter lumens should be treated with t-PA as soon as possible. It is not necessary to wait until the catheter is fully occluded. The sooner any fibrin buildup in a catheter lumen is treated the better the outcome.
3. t-PA will be used by order of a Licensed Independent Practitioner only after ruling out other causes of catheter obstruction including external mechanical obstruction (catheter kinking, IV tubing clamped or kinked, etc.) or lipid/drug precipitate.
4. For multi-lumen catheters, each occluded/sluggish lumen must be treated individually. Be sure that the order specifies to treat all occluded lumens.
5. Test each lumen of catheter for patency. If a lumen is resistant to flushing, eliminate other possible causes of occlusion before proceeding. t-PA will only restore patency if the occlusion is caused by fibrin buildup in the catheter lumen(s).
6. Assess whether drugs or solutions that have been administered through this catheter lumen are known to cause precipitation (e.g., Dilantin, parenteral nutrition, etc.). Examine the IV tubing to see if any drug precipitate is present.
7. Residents should be screened for allergy to the product prior to use and monitored for complications after any catheter clearance procedure.
8. t-PA must be reconstituted with ***preservative free sterile water for injection***, ***USP, to a concentration of 1 mg/mL***. *(Do NOT use bacteriostatic water.)*
9. t-PA is preservative free and MUST be reconstituted using strict aseptic technique to minimize the potential for contamination.
10. t-PA will be sent from the pharmacy as a 2 mg/2 mL dose vial (Cathflo® Activase®) - Reconstitute exactly as per manufacturer's directions.
11. Draw dose up in a 10 mL syringe.

Procedure

1. Scrub the needleless connector and attach a pre-filled saline flush syringe. Open clamp. Gently work the saline syringe plunger back and forth to assess for blood return. This may clear a new occlusion. If blood return is restored, discard syringe (so that you do not re-inject clotted material). Flush catheter with 20 mL of saline using turbulent flush technique.

2. If you cannot flush at all, change the needleless connector using aseptic technique, then try again. (The internal portion of the needleless connector may have been damaged if the tip of a syringe or IV tubing was forced into the cap at an angle.)
3. Remove the dressing and assess for kinks in the catheter. Clean the site per protocol, then reposition and re-secure the catheter as needed so that it does not kink with arm movement. Apply a new sterile dressing.

4. If a lumen remains sluggish or completely occluded after the steps above, obtain a prescriber's order to "Administer a 2 mg/2 mL dose of t-PA (Cathflo®) into each occluded or sluggish IV catheter lumen per facility protocol. May repeat x 1 for each lumen that remains occluded/sluggish after the first dose."
5. RECONSTITUTE THE DRUG USING PRESERVATIVE FREE STERILE WATER EXACTLY PER MANUFACTURER'S INSTRUCTIONS.
6. Scrub the needleless connector of the occluded catheter lumen with alcohol.
7. Attach a t-PA filled syringe to the needleless connector. Hold the t-PA filled syringe in a vertical position (plunger up) throughout the procedure.
8. Open the catheter clamp.
9. If the catheter is sluggish, but you can still push some fluid through: GENTLY try to instill the t-PA. You may have to work the syringe plunger back and forth several times before you get the entire dose into the catheter. DO NOT FORCE.
10. If there is a total occlusion, pull back on the syringe plunger to create negative pressure (vacuum) within the catheter, then gently release the syringe plunger and allow the vacuum to pull the t-PA into the catheter lumen.
11. You may have to repeat Steps 7 and 8 several times in order to get all of the t-PA into the catheter. ***Be patient and persistent. It may take 10-15 minutes for this process***.
12. If you reach a point where only part of the dose has entered the catheter and it seems that you are not making progress: leave the syringe attached, clamp the catheter, secure the syringe to the resident with tape (pad with sterile gauze as needed to be sure the syringe/needleless connector connection remains clean and protected). Return in 15-30 minutes and attempt to work more of the t-PA into the catheter as in Steps 5, 6, 7, 8 and 9.
13. Once all/most of the drug is within the catheter lumen, clamp the catheter with the syringe attached. Secure the syringe to the resident with tape (pad with sterile gauze as needed to ensure that the syringe/cap connection remains clean and protected).
14. Wait 1 hour then check for blood return. If the catheter is still occluded/sluggish, re-inject any t-PA that was aspirated as per Steps 7, 8, 9, and 10. Clamp the catheter and wait another hour. Then try to obtain a blood return again.
15. If unable to aspirate after 2 hours, pull back as much of "sludge" as you can from the catheter and discard the first dose syringe.
16. Repeat the entire procedure using a new dose of t-PA/Cathflo®. If the catheter lumen remains occluded after 2 doses of t-PA, notify MD/NP. The VAD will probably need to be replaced.
17. If blood can be aspirated, withdraw 5-6 mL and discard. Flush with **20 mL** 0.9% NaCl using a gentle pulsing method to increase turbulence within the catheter.

18. Clamp the catheter and change the needleless connector per policy.
19. Scrub the new needleless connector with alcohol, attach 10 mL saline and flush again. (Then flush with heparin if indicated for the specific type of VAD. See SECTION 5.6 – Flush Chart.)
20. Document procedure.

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3. Blaney M, Shen V, Kerner J, et al, for the CAPS Investigators. Alteplase for the treatment of central venous catheter occlusion in children: results of a prospective, open-label, single-arm study (the Cathflo Activase Pediatric Study). *J Vasc Interv Radiol.* 2006;17:1745-1751.
4. Ng R, Li X, Tu T, et al. Alteplase for the treatment of occluded peripherally inserted central catheters: safety and efficacy in 240 patients. *J Vasc Interv Radiol.* 2004;15:45-49.
5. Moureau N, Poole S, Murdock MA, et al. Central venous catheters in home infusion care: outcomes analysis in 50,470 patients. *J Vasc Interv Radiol.* 2002;13:1009-1016.
6. McKnight S. Nurse's guide to understanding and treating thrombotic occlusion of central venous access devices. *Medsurg Nurs.* 2004;13:377-382.
7. Cathflo® Activase® (ALTEPLASE) 2 mg, product information, Genentec, Inc.
8. See http://www.cathflo.com for complete prescribing information, free access to the clinical efficacy and safety studies cited above, and a wide selection of clinical resource tools.

CATHETER REMOVAL

Purpose

To safely remove an intravenous catheter.

Policy

A vascular access device is removed on the order of a licensed independent practitioner when the therapy is complete, when clinically indicated or when deemed no longer necessary for the plan of care.

1. A nurse with documented education and training in infusion therapy, as designated by the facility, and as allowed by state regulations may remove short peripheral IV catheters.
2. A nurse with documented education and training in infusion therapy including midline catheter care, as designated by the facility, and as allowed by state regulations may remove a midline catheter.
3. A nurse with documented education and training in infusion therapy including care of central venous catheters, as designated by the facility, and as allowed by state regulations may remove a PICC or central venous, non-tunneled catheter. The nurse must demonstrate competency in the removal of either catheter.
4. It is not within the scope of practice for nurses to remove tunneled catheters or implanted ports.
5. Resistance during removal is possible. Never pull against resistance as the risk of catheter breakage or vein wall damage can occur.

Short Peripheral Catheters

Equipment

- Non-sterile gloves.
- Sterile 2x2 gauze.
- Band-Aid®/tape.

Procedure:

1. Perform hand hygiene. Don gloves.
2. Explain procedure to resident.
3. Remove dressing.
4. Grasp catheter wings or hub; gently pull until catheter is out. Apply gentle pressure to site with 2x2. Apply Band-Aid®/tape.

5. Inspect catheter for damage.
6. Discard waste according to OSHA, CDC, and facility guidelines.
7. Remove gloves.
8. Perform hand hygiene.
9. Document procedure including catheter length and integrity and patient's tolerance to procedure.

Midline and PICC Catheters

Equipment

- Non-sterile gloves.
- CVAD dressing change tray.
- Suture removal kit (if sutures in place).
- Petroleum (Vaseline®) gauze or sterile petroleum-based ointment. (Do not use Betadine ointment as it is water-based and will dry out.)

Procedure

1. Explain procedure to resident. Place resident in supine flat or Trendelenburg position unless contraindicated.
2. Perform hand hygiene. Don non-sterile gloves.
3. Remove old dressing. Discard appropriately.
4. Remove gloves and perform hand hygiene.
5. Open central line dressing change tray; put on mask and place plastic backed drape from the dressing change tray under the resident's arm. Open suture removal kit if needed. Open petroleum gauze onto dressing tray or squeeze sterile ointment onto gauze.
6. Don sterile gloves. Clean site with appropriate antiseptic solution per policy.
7. Remove sutures if applicable.
8. Grasp catheter wings or hub and remove with a gentle pulling motion. Pull out approximately 2", release grip, reposition grip near insertion site, pull another 2", reposition grip. Repeat until catheter has been removed. If resistance is felt, reposition resident's arm and make another attempt. If still unable to remove, clamp catheter, apply a dressing and notify physician.
9. Once catheter is out, apply gentle pressure at the insertion site with sterile, dry gauze until bleeding stops. Apply sterile ointment or Vaseline® gauze to the insertion site.
10. Apply an air occlusive dressing. Leave the air occlusive dressing in place for a minimum of 48 hours or per prescriber's order.

11. Assess length and integrity of catheter and inspect catheter tip. Catheter tip should be straight or beveled. An uneven or ragged tip could indicate catheter breakage and must be addressed immediately.
12. Dispose of waste per OSHA, CDC, and facility guidelines.
13. Remove gloves.
14. Perform hand hygiene.
15. Document procedure including catheter length and integrity and resident's tolerance to the procedure.

Central Venous Non-Tunneled Catheter (Subclavian, Jugular, Femoral)

Equipment

- Non-sterile gloves.
- Sterile gloves.
- Central line dressing change tray.
- Suture removal kit (if sutures still in place).
- Petroleum (Vaseline®) gauze or sterile petroleum-based ointment. (Do not use Betadine ointment as it is water based and will dry out.)
- Several packages of 2x2 sterile gauze sponges.

Procedure

1. Verify order to discontinue catheter and verify that catheter removal by a nurse is within the scope of practice.
2. Explain procedure to resident. Place resident flat or in Trendelenburg position with head turned away from insertion site.
3. Perform hand hygiene. Don non-sterile gloves.
4. Remove old dressing; discard appropriately. Observe site for pinkness, redness, clear or purulent drainage; observe for unusual swelling or discoloration at chest, neck or shoulder.
5. Remove gloves and perform hand hygiene.
6. Open central line dressing change tray; put on mask. Open petroleum gauze onto dressing tray or squeeze sterile ointment onto gauze. Open suture removal kit if needed.
7. Don mask and sterile gloves. Clean site with appropriate antiseptic solution per CVAD policy. Allow to air dry.
8. Remove sutures if applicable.
9. Remove catheter gently using air embolism precautions:

- The resident MUST hold his/her breath or perform Valsalva maneuver (hold breath while bearing down as if for bowel movement) as the catheter is removed and until the site it occluded. (This keeps the pressure in the vessel higher and prevents air from entering the tract through the skin when the catheter is removed.)
- If resident is unable to cooperate, remove catheter during exhalation.

10. Once catheter is out, apply gentle pressure at the insertion site with sterile, dry gauze until bleeding stops.
11. Following the same air embolism precautions, apply ointment or Vaseline® gauze at the insertion site and cover with sterile gauze.
12. Apply an air occlusive dressing over the gauze. Leave the air occlusive dressing in place for a minimum of 48 hours or per prescriber's order. (It will take some time for the tract from the skin into the vein to seal completely, the risk of air embolism remains after the catheter has been removed if this tract opens up and there is no ointment and dressing at the site.)
13. Label the dressing with date and time of catheter removal.
14. Resident is to remain supine for 30 minutes post removal.
15. Assess length of catheter and inspect catheter tip. Catheter tip should be straight or smooth beveled. An uneven or ragged tip could indicate catheter breakage and should be addressed immediately.
16. Dispose of waste per OSHA, CDC, and facility guidelines.
17. Remove gloves.
18. Perform hand hygiene.
19. Document procedure including catheter length and integrity and resident's tolerance to the procedure.

INFUSION THERAPY PROCEDURES SUMMARY

PROCEDURE	MINIMUM FREQUENCY (and PRN)	CONSIDERATIONS
TRANSPARENT MEMBRANE DRESSING		Change immediately if: Loose, not occlusive, moisture accumulation, drainage, redness, or irritation. Initial dressings will be changed PRN if saturated, and 24-48 hours post insertion of midlines, PICCs, and CVADs if there is gauze present under the dressing or drainage is noted.
Peripheral	Every 7 days.	
Midline	Every 7 days.	
PICC or CVAD	Every 7 days.	
Implanted port	Every 7 days and with every non-coring safety needle change.	
GAUZE DRESSINGS	Every 48 hours.	
NEEDLELESS CONNECTOR	On admission change connector to type used in facility.	
With administration of routine meds/fluids	Weekly.	Integrity of valve/diaphragm is influenced by frequency of use, fluid composition, and viscosity. Change needleless connector immediately if it is compromised.
With administration of Parenteral Nutrition	Every 96 hours.	
If there is blood in the connector or if it is cracked, leaking or damaged.	Immediately.	e.g., Post labs/transfusion/back-flow of blood.
EXTENSION TUBING (with clamp) Add to <u>any</u> external catheter that has no clamp (except Groshong™, PowerPICC SOLO™ and other similar valved catheters)	If extension set is added as part of original central venous access device insertion procedure under sterile conditions, it may be considered a permanent part of the catheter and changed only if contaminated or damaged. Sets added post-insertion are changed weekly or PRN.	Use air embolism precautions if indicated.

PROCEDURE	MINIMUM FREQUENCY (and PRN)	CONSIDERATIONS
ADMINISTRATION SET/IV TUBING		
Continuous	Every 96 hours.	
Intermittent	Every 24 hours.	Any tubing disconnected between infusions. Attach a single use sterile cap to the end of the IV tubing when disconnected if using again within 24 hours.
Parenteral Nutrition Infusion Lipids only infusion	Every 24 hours. Every 12 hours.	
Secondary	With primary tubing.	***Do not disconnect from primary tubing between doses.*** Back-prime tubing from primary by holding the secondary bag below the level of the primary bag until drip chamber on secondary tubing is 1/3-1/2 full.
FILTERS	Change with IV tubing.	Use air-eliminating type.
0.22 micron	Routine meds/fluids.	Completely bacteria retentive.
1.2 micron	Parenteral nutrition/lipids in bag.	Removes precipitates that may be masked by lipid emulsion.
No filter	Medications that cannot be filtered.	
SOLUTION CONTAINER	Within 24 hours after being spiked.	Inspect bag; verify label and expiration date prior to hanging.

ADMINISTRATION OF IV FLUIDS AND MEDICATIONS

Table of Contents

INTRAVENOUS FLUID AND DRUG ADMINISTRATION GENERAL POLICIES

1. You must have a Licensed Independent Practitioner's order for all IV infusions.
2. Telephone orders are to be signed by the prescriber according to facility policy.
3. Upon receipt of the medication, store as indicated on the label, or per manufacturer's recommendations.
4. The nurse shall assess the following:
    - The appropriateness of the prescribed therapy.
    - The resident's age and condition.
    - The dose.
    - The route.
    - The rate of the solution/medication ordered.
5. The nurse shall consult the appropriate drug reference book and have knowledge of the solution/medication including:
    - Indications.
    - Actions.
    - Side effects.
    - Adverse reactions.
    - Appropriate nursing interventions.
6. When there is an increased risk for the development of anaphylaxis due to either the resident's history or solution properties, special precautions should be employed for resident safety (See Allergic/Anaphylaxis protocol section 6).
7. Prior to administration, the nurse will verify the resident's identity and consent for treatment.
8. The expiration date of solutions/medications should be ascertained prior to administration.
9. The nurse will verify that the container's label coincides with the prescriber's order. Verify contents, dose, prescribed rate, and expiration date of the solution.
10. The nurse should monitor the resident for therapeutic response, recognize indications of untoward reactions, and implement nursing interventions as indicated. Monitoring of residents should be ongoing.
11. Remove bags with volume of 1000 mL or less from refrigerator at least 60 minutes before administration. For larger volume bags, remove 2-3 hours before administration.
12. After spiking the bag of solution/medication, it must be infused or discarded within 24 hours.
13. Prior to infusion the nurse should aspirate for a blood return to determine patency and then flush resident's IV catheter with appropriate flush solution as ordered.

SETTING UP A PRIMARY INFUSION (HYDRATION or MEDICATION)

Purpose

To correctly and aseptically set up the primary IV bag and administration set.

Policy

The professional nurse with documented IV education, as designated by the facility, and as allowed by state regulations may set up a primary infusion.

1. IV bags and administration sets will be changed according to Standards of Practice and CDC infection control guidelines (refer to SECTION 4.24 – INFUSION THERAPY PROCEDURES SUMMARY CHART).

Equipment

- IV bag containing medication or fluids for hydration.
- Infusion pump if indicated.
- Primary IV administration set.
- Antiseptic wipes.
- *If intermittent IV*: Saline flush syringes (2).
  Heparin flush syringe (1) (if VAD requires use of heparin).

Procedure

1. Verify label on IV bag with prescriber's order. Attach label (with date, time, and nurse's initials) to administration set and bag.
2. Perform hand hygiene. Don gloves.
3. Close the clamp on the administration set. Spike bag. Hang on hook on IV pole. *(After spiking the bag of solution/medication, it must be infused or discarded within 24 hours.)*
4. Squeeze drip chamber until ¼ - ½ full.
5. Open clamp. Prime the administration set via gravity or if using IV pump to prime, insert administration set into the pump and follow manufacturer's instructions to prime. Close clamp.
6. Scrub needleless connector on resident's catheter with antiseptic wipe and allow to dry.
7. Attach flush syringe, aspirate for a blood return to determine patency and then flush resident's IV catheter with appropriate flush solution as ordered.
8. If using pump, insert the administration set into pump according to manufacturer's directions.

9. Program pump.
10. Scrub needleless connector on resident's catheter with antiseptic wipe and allow to dry.
11. Attach primed administration set to the needleless connector.
12. Open clamps on the administration set and begin infusion.
13. If administering intermittent medication, when infusion is complete, clamp the administration set and disconnect from resident's catheter. If the set will be used again within 24 hours place a single use sterile cap on the end when infusion is complete.
14. Scrub needleless connector on resident's catheter with antiseptic wipe and allow to dry.
15. Flush catheter with appropriate flush solution as ordered.
16. Document according to facility procedure.

SETTING UP A SECONDARY INFUSION

Purpose

To correctly and aseptically set up the secondary IV bag and secondary administration set.

Policy

The professional nurse with documented IV education, as designated by the facility, and as allowed by state regulations may set up a secondary infusion.

1. IV bags and administration sets will be changed according to Standards of Practice and CDC infection control guidelines (refer to SECTION 4.25 – INFUSION THERAPY PROCEDURES SUMMARY CHART).
2. ***COMPATIBILITY BETWEEN THE PRIMARY AND SECONDARY INFUSION MUST BE VERIFIED PRIOR TO INITIATING THE INFUSION***. Secondary medications that are incompatible with the primary infusion cannot be piggy-backed.

Equipment

- Secondary IV administration set.
- IV bag with medication.
- Antiseptic wipe.

Procedure

1. Verify label on IV bag with prescriber's order. Attach label (with date, time, and nurse's initials) to administration set and bag.
2. Perform hand hygiene. Don gloves.
3. Clamp secondary administration set and spike secondary IV bag. Prime secondary set and hang bag on IV pole.
4. Hang the primary solution bag on hook provided with secondary administration set. *Secondary bag must be higher than primary bag.*
5. Swab upper port on primary administration set with antiseptic wipe and let dry.
6. Attach secondary set to upper port on primary set.
7. Open clamps.
8. Program pump for secondary infusion according to directions and begin infusion.
9. When secondary infusion is complete, the primary infusion will resume at its programmed rate.
10. Close the clamp on the secondary set and confirm primary infusion has resumed.
11. Document medication administration according to facility protocol.

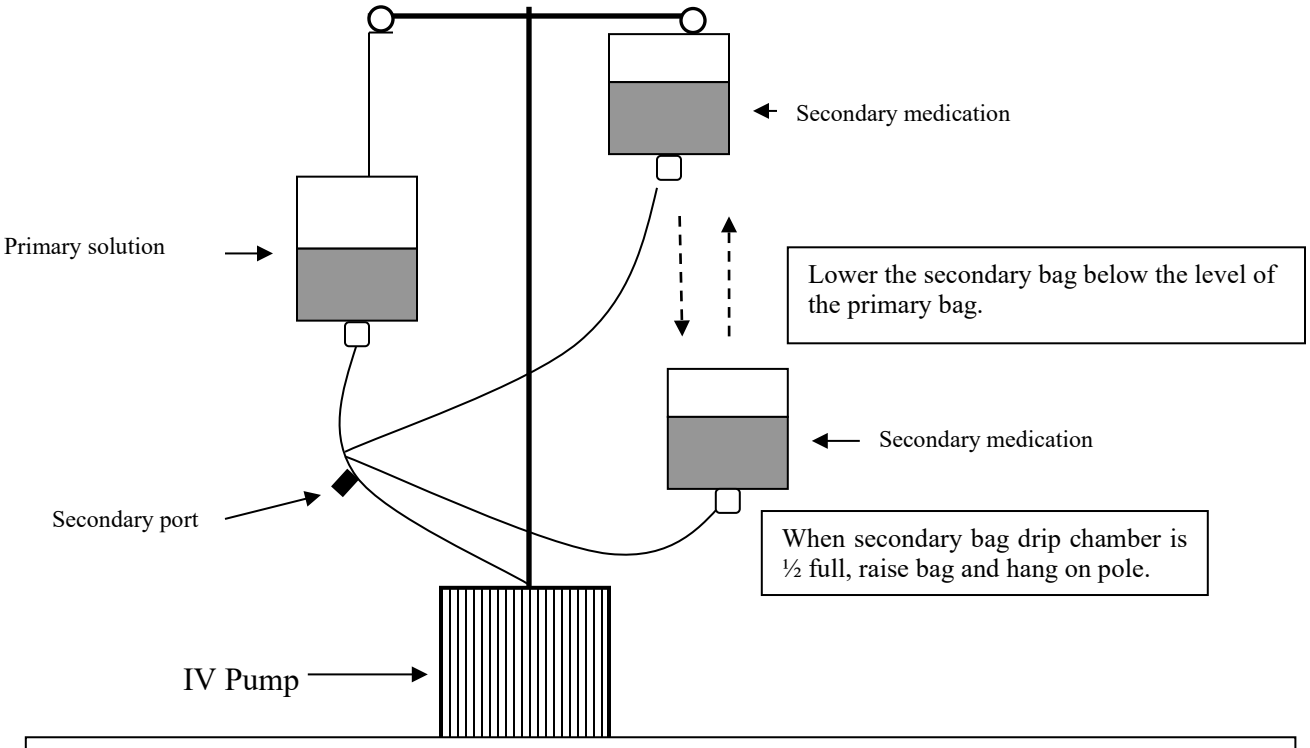
Back-Priming Secondary Administration Set:

Multiple (compatible) medications can be given through the same secondary set by back-priming instead of disconnecting the secondary set from the primary.

Advantages:

- Allows secondary set to remain <u>continuously</u> connected for the duration of the primary set usage.
- Allows the use of a <u>single</u> secondary set to deliver <u>all</u> medications that are compatible with the primary solution.
- Facilitates priming/removing air from the secondary set without loss of drug.
- Maintains as close to a closed IV system as possible.
- Reduces the risk of contamination.

Spike the secondary bag.
Connect the set from the secondary bag containing the drug to the secondary port on the primary administration set.
Open all clamps.



If administering more than one dose per day of secondary drug, you may re-use the same set for 96 hours. Disconnect the drip chamber from empty bag, spike new bag and follow above instructions.

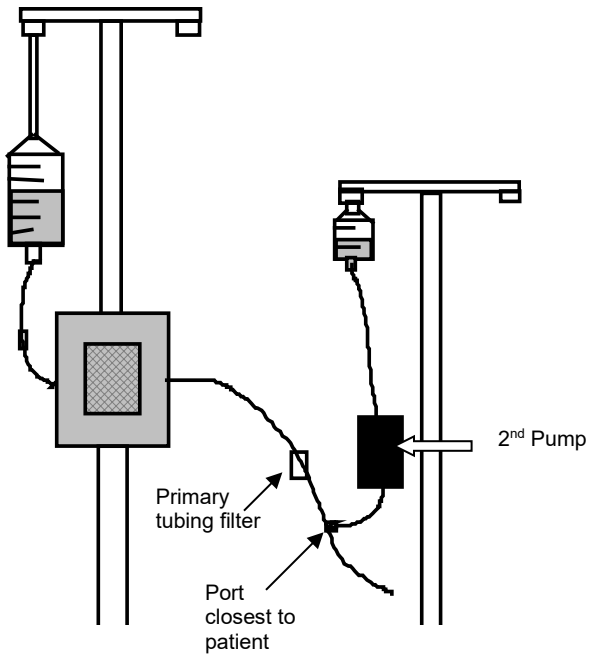
If administering different medications that are compatible with the primary solution, perform the back flush PRIOR to removing the previous empty bag. Back flush any residual medication from the secondary set into the empty bag. Discard previous bag and attach the existing secondary set to the new secondary medication.

RUNNING TWO PUMPS SIMULTANEOUSLY

There are times when the resident will be receiving two different therapies at the same time (i.e., hydration via the primary pump, and morphine via a PCA pump or TPN via one pump and lipids via a second pump).

The administration set from the second pump is attached to the y-site below the primary pump and each pump is programmed separately.

Do not use secondary administration sets for the second pump. Use whatever primary set is appropriate.



ADMINISTRATION SET CHANGE

Purpose

To prevent contamination and systemic infection related to administration sets.

Policy

Administration sets (IV administration tubing) are changed at established intervals depending on the type of administration (intermittent or continuous) and the type of infusate.

1. Administration sets will be DEHP free.
2. Administration sets will have luer-lock connections to ensure a secure connection.
3. Administration sets are attached to the fluid or medication bag and primed via gravity, or per manufacturer's guidelines if using the IV pump to prime the tubing, prior to administration.
4. Use vented administration sets for solutions supplied in glass containers.
5. Use an administration set with a 1.2-micron filter for administration of parenteral nutrition and/or fat emulsion (lipids).
6. Use of an administration set with a 0.2-micron air-eliminating, particle-eliminating filter is encouraged to assist in the prevention of air embolism, phlebitis and infection.
7. For intermittent administration sets that are used more than once in a 24-hour period, attach a new single use sterile cap on the end of the set after each intermittent use. DO NOT attach the exposed end of the set to a side port on the same set (looping) or to any other device not specifically designed to keep the exposed end of the tubing clean between doses.
8. Label the administration set with the date, and time hung, date set is due to be replaced, and initials.
9. Frequency of changes:
    a. Change the administration set whenever a peripheral or central catheter is inserted or reinserted.
    b. Change the administration set whenever contamination is suspected.
    c. Change continuous **primary** and **secondary** sets every 96 hours.
    d. Change intermittent **primary** and **secondary** sets every 24 hours.
    e. Change Parenteral Nutrition (TPN) sets every 24 hours.
    f. Change Intravenous Fat Emulsion (Lipids) sets if administered separately from the TPN every 12 hours.
    g. Change blood administration sets at the end of 4 hours.

Equipment

- Appropriate administration set.
- Clean gloves.
- Bag of infusate.
- Alcohol swabs.

Procedure – Primary Administration Set Change

1. Perform hand hygiene.
2. Don clean gloves.
3. Open administration set and close all clamps.
4. Remove cover from tubing port on the bag of infusate and remove cover from the spike of the administration set and aseptically insert the spike into the bag of infusate.
5. Hang the infusate on the IV pole and squeeze the drip chamber until approximately half full.
6. Open clamps and prime the administration set via gravity and then close clamps.
7. If using IV pump to prime tubing, place the tubing into the pump and prime per manufacturer's guidelines.
8. If set was primed via gravity, insert the administration set into infusion pump and open all clamps.
9. Swab the end of the needleless connector on the IV catheter with an alcohol swab and allow to dry.
10. Remove sterile cover from the end of the administration set and attach to the needleless connector on the IV catheter.
11. Begin infusion per physician's order.
12. Label the administration set with date, time and initials.
13. Remove gloves and perform hand hygiene.

Procedure – Secondary Administration Set Change

1. Perform hand hygiene.
2. Don clean gloves.
3. Open administration set and close all clamps.
4. Remove cover from tubing port on the bag of infusate and remove cover from the spike of the administration set and aseptically insert the spike into the bag of infusate.

5. Hang the infusate on the IV pole and squeeze the drip chamber until approximately half full.
6. Open clamps and prime the administration set and then close clamps.
7. Lower the primary infusion bag with hanger provided in the secondary administration set package.
8. Swab the upper injection port on the primary administration set with an alcohol swab.
9. Remove sterile cover from the end of the secondary administration set and attach to the upper injection port on the primary set.
10. Program the pump with the secondary infusion parameters and begin infusion
11. Label the administration set with date, time and initials.
12. Remove gloves and perform hand hygiene.

CALCULATIONS

Purpose

To assure accurate flow rate on all infusions not utilizing a pump or to verify accuracy of rate when using a pump.

Policy

Flow rate calculations will be done on all infusions utilizing gravity or rate control devices other than a pump.

Procedure

1. To determine drops per minute.
    - Determine the drop factor of the IV administration set. (Can be found on administration set packaging)
    - Follow formula:

      $$\frac{\text{Volume of infusion (in mL)}}{\text{Time of infusion (in minutes)}} \times \text{drops/mL (drop factor)} = \text{drops/min}$$

2. To determine mL/hour.

   $$\frac{\text{Volume of infusion (in mL)}}{\text{Time of infusion (in hours)}} = \text{mL/hr}$$

FLOW CHART

Drip Chamber Drop Sizes

(*select your drip chamber size*)

*HOURS TO DELIVER 1000 mL	**mL/HR**	**10 Drops/mL** DROPS/MIN (DPM)	**15 Drops/mL** DROPS/MIN (DPM)	**20 Drops/mL** DROPS/MIN (DPM)	**60 Drops/mL** DROPS/MIN (DPM)
	5			2 DPM	5 DPM
	10	1 DPM	2 DPM	3 DPM	10 DPM
	20	3 DPM	5 DPM	7 DPM	20 DPM
	30	5 DPM	8 DPM	10 DPM	30 DPM
	40	7 DPM	10 DPM	13 DPM	40 DPM
	50	8 DPM	12 DPM	17 DPM	50 DPM
	60	10 DPM	15 DPM	20 DPM	60 DPM
	70	12 DPM	17 DPM	23 DPM	70 DPM
*12 hours	83	14 DPM	21 DPM	28 DPM	83 DPM
	90	15 DPM	22 DPM	30 DPM	90 DPM
*10 hours	100	16 DPM	25 DPM	33 DPM	100 DPM
* 8 hours	125	22 DPM	31 DPM	42 DPM	
	150	25 DPM	38 DPM	50 DPM	
	175	29 DPM	44 DPM	58 DPM	
	200	33 DPM	50 DPM	67 DPM	
	250	42 DPM	62 DPM	83 DPM	

mL/hour rate chart

	Time	30 minutes	1 hour	90 minutes	2 hours	4 hours	6 hours	8 hours	12 hours	24 hours
Volume										
1000 mL					500 mL/hr	250 mL/hr	167 mL/hr	125 mL/hr	83 mL/hr	42 mL/hr
500 mL			500 mL/hr	333 mL/hr	250 mL/hr	125 mL/hr	83 mL/hr	63 mL/hr	42 mL/hr	21 mL/hr
250 mL		500 mL/hr	250 mL/hr	167 mL/hr	125 mL/hr	63 mL/hr				
100 mL		200 mL/hr	100 mL/hr	67 mL/hr	50 mL/hr					
50 mL		100 mL/hr	50 mL/hr	34 mL/hr	25 mL/hr					

INFUSION RATE CONTROL

Purpose

To provide for the safe administration of intravenous fluids and medications.

Policy

The selection of type of flow control device used is based upon the type of therapy to be given, the rate control requirements and any possible infusion related risks.

1. An infusion pump is required for administration of parenteral nutrition and medications with potential rate related complications.
2. Intermittent administration of IV medications and continuous administration of IV fluids through central venous access devices should be administered with an infusion pump. Consideration may be given to using a flow control regulator until a pump becomes available if allowed by facility policy. Frequent nursing observation is required.
3. An infusion pump is *recommended* for peripheral administration of continuous IV fluids.
4. Intermittent administration of IV medications through a peripheral line may be given either with an infusion pump or gravity flow control regulation device if allowed by facility policy.
5. Administration sets with anti-free-flow mechanisms are used with electronic infusion pumps.

See flow regulation summary chart on next page.

Procedure

Electronic Infusion Pump

These are generic instructions. Follow manufacturers' guidelines for the specific electronic infusion pump you are using.

1. Open the designated administration set that is compatible with the electronic infusion pump and close the clamps.
2. Spike the fluid or medication bag and fill the drip chamber ½ full.
3. Prime the administration set and close the clamps.
4. Insert the administration set into the pump per the manufacturer's guidelines.

5. Turn the pump on and program the pump according to the directions for administration on the fluid or medication label.
6. Scrub the needleless connector on the resident's IV catheter and allow to dry.
7. Attach an appropriate flush syringe and aspirate for a blood return then flush the IV catheter.
8. Scrub the needleless connector on the resident's IV catheter and allow to dry.
9. Connect the administration set to the needleless connector and open all clamps.
10. Start the electronic infusion pump and confirm that fluid or medication is infusing.

Flow Control Regulator

These are generic instructions. Follow manufacturers' guidelines for the specific flow regulator you are using.

1. If using a flow control regulator extension set, connect the distal end of the administration set to the flow control regulator extension set and close all clamps.
2. Spike the fluid or medication bag and fill the drip chamber on administration set 1/2 full. Open clamps on the administration set. Turn the dial on the flow control regulator to *fully open* position. Prime the administration set.
3. Turn dial on the flow control regulator to OFF.
4. Scrub the needleless connector on resident's IV catheter with antiseptic wipe and allow to dry.
5. Attach the appropriate flush syringe and aspirate for a blood return and then flush the catheter.
6. Scrub the needleless connector on the resident's IV catheter with an antiseptic wipe and allow to dry.
7. Connect the administration set to resident's IV catheter.
8. Leaving all clamps on the primary administration set open, turn the dial on the flow regulator to desired mL/hr.
9. Calculate the drops per minute for the correct infusion rate and CONFIRM RATE BY COUNTING DROPS.

Flow Regulation Summary Chart

TYPE OF INFUSION	ELECTRONIC INFUSION PUMP	GRAVITY FLOW REGULATOR	MAY USE FLOW REGULATOR UNTIL PUMP ARRIVES	RATIONALE / CONSIDERATIONS
Continuous hydration through a peripheral IV catheter	YES	NO	YES	Age related physiologic factors ↑ risk of fluid overload/CHF in elderly residents.
Intermittent med only, not rate critical, through a peripheral IV catheter	YES	YES	YES	Based on nursing judgment. Assess risks associated with medication and resident specific factors.
Rate critical infusion through a peripheral or central venous access device	YES	NO	NO	Gravity infusion would require <u>continuous</u> nursing observation and verification of infusion rate.
Continuous IV fluid and intermittent IV medication infusions through Midlines and all Central Venous Access Devices, including PICCs	YES	NO	YES (Except as noted) **Frequent nursing observation is required.**	Need to maintain long term catheter patency. Fibrin accumulation on inner surface of IV catheter <u>significantly</u> increases risk of device related infection. Risks and costs associated with declotting or replacing CVAD/PICC.
Parenteral nutrition:				Increased risk of infection if system is opened to change to pump set up. Inaccurate rates due to ↑ fluid viscosity. Lipid interacts with some plastic materials that might be part of flow regulator. Risk of catheter occlusion.
Partial (PPN) Dextrose < 10%	YES	NO	NO	
Total (TPN) Dextrose > 10%	YES	NO	NO	
Lipid infused separately	YES	NO	NO	

IV MEDICATION ADMINISTRATION USING AN ELASTOMERIC DEVICE

Purpose

To establish guidelines for the safe and proper administration of IV medications via the elastomeric medication delivery systems as an alternative to standard IV piggyback or intermittent delivery systems via an electronic infusion pump.

Policy

Nurses with designated knowledge of the function of elastomeric devices may infuse medications and fluids via this device as designated by state regulations and facility policy.

1. Elastomeric medication delivery systems are designed for the intermittent IV administration of medications or IV fluids.
2. Elastomeric devices offer a single-use, fixed-rate, positive-pressure system for the delivery of medications. The technology provides a dependable, accurate flow rate and built-in safety features.
3. Elastomeric devices offer residents a medication delivery system that is comfortable, and portable. No IV pole, electric cords, or batteries are required.
4. Elastomeric devices are available in a wide variety of flow rates to suit medication therapy and resident needs.
5. Elastomeric devices come with calibrated, pre-attached tubing, which attaches to the needleless connector on the resident's catheter.
6. When elastomeric devices are utilized by a pharmacy, the pharmacy staff will prepare and label the medication in the pharmacy.

7. Examples of Elastomeric pumps include:
   Baxter InterMate®.
   Alaris ReadyMate®.
   Hospira Dosi-Fuser®.
   BBraun Easy Pump®.

Equipment

- Elastomeric device with medication or fluids.
- Alcohol swabs.
- Saline flush syringes.

Procedure

1. Remove the device from refrigeration and allow to warm to room temperature.
2. Perform hand hygiene and don gloves.
3. Open the clamp on the device and prime the attached tubing. Close the clamp.
4. Scrub the needleless connector with alcohol swab and allow to dry.
5. Attach flush syringe and aspirate for a blood return then flush the IV catheter.
6. Scrub the needleless connector with alcohol swab and allow to dry.
7. Attach the elastomeric device tubing to the needleless connector. Open the clamp and allow the infusion to begin.
8. Frequent observation by the nurse to determine when infusion is complete is important so that IV catheter is flushed promptly to avoid potential occlusion.
9. When the infusion is complete, clamp the IV catheter and disconnect the elastomeric device.
10. Scrub the needleless connector with alcohol swab and allow to dry.
11. Attach flush syringe and aspirate for a blood return then flush the IV catheter.
12. Dispose of the elastomeric device per CDC, OSHA and facility policies.

TROUBLESHOOTING:
Do not use the device if:

a. The inside “balloon” has burst or is split.
b. There is any sign of leaking.
c. There is a split or break in the tubing.
d. The expiration date on the label has passed.
e. The name on the label is not correct.

Contact the pharmacy for a replacement if any of the above situations has occurred.

If the container leaks or bursts during infusion:

a. Immediately clamp the IV catheter and close the clamp on the tubing.
b. Disconnect the container.
c. Replace the cap on the end of the tubing.
d. Notify the pharmacy for a replacement container.
e. If the medication comes in contact with skin, immediately wash the skin with warm, soapy water.
f. Make a note of the container's lot number and save the container for return if asked to do so by the pharmacy.
g. Flush the IV catheter per policy.

If the infusion does not infuse:

a. Remember that elastomeric devices flow very slowly, so make sure enough time has elapsed to determine a no-flow situation.
b. Make sure the container is at room temperature.
c. Check that the IV catheter is unclamped, and that the clamp on the delivery tubing is open.
d. Make sure there are no kinks in the delivery tubing or IV catheter.
e. If the medication is still not flowing, clamp the IV catheter, and close the clamp on the device.

   Disconnect the container, place a single use sterile cap on the end of the delivery tubing.

   Flush the IV catheter with saline to determine patency.
f. If the catheter is patent, contact the pharmacy to replace the elastomeric device.
g. If catheter is not patent, follow procedure for catheter clearance or replacement.

RECONSTITUTING AND ADDING MEDICATIONS TO AN IV BAG

Purpose

To ensure safety, accuracy, and drug stability when reconstituting IV medications and/or adding a medication to a bag of IV fluid.

Policy

Reconstituting and adding medications to an IV bag will be done by the professional nurse with documented IV education, as designated by the facility, and as allowed by state regulations.

1. IV medication that is supplied in powdered form must be reconstituted prior to adding it to the IV bag.
2. The nurse who administers the medication will be the same nurse who reconstituted the medication.
3. The nurse reconstituting a medication must be aware of drug stability issues and administer the dose within the appropriate time frame. Consult with the IV pharmacist as needed.
4. After reconstituting and adding medication to an IV bag the infusion must be started within one hour.
5. Drugs may be reconstituted using either a syringe or reconstitution device.
6. Any medication in a break away glass ampule must be drawn up using either a filter needle or filter straw. Change to a standard sharp before adding medication to the bag.

Equipment

Syringe Method	*Liquid Medications*	*Reconstitution Device*
IV bag	IV bag	IV bag
Alcohol swabs	Alcohol swabs	Alcohol swabs
Medication vial	Medication vial and syringe with needle or medication ampule and syringe with filter needle and regular needle	Medication vial
Diluent vial		Reconstitution device
Syringe		
Needle 1” or longer	2x2 gauze	

Procedure

1. Confirm prescriber’s order and consult with IV pharmacist as needed.
2. Perform hand hygiene. Don gloves.
3. Assemble needed supplies and prepare medications in a clean area using a General Aseptic Field (ANTT®)

4. Check drug vial label and/or package insert for:
    - Correct drug.
    - Formulated for IV use.
    - Expiration date.
    - Appropriate diluent (e.g., sterile water for injection or sterile sodium chloride 0.9%).
5. Reconstitution Procedure:
    a. Reconstituting powdered IV drug:
        - Clean medication port on IV bag with alcohol and allow to dry. Take precautions to prevent contamination of the port after cleaning.
        - Remove covers from the medication and diluent vials and scrub vial stoppers with alcohol (use a new alcohol wipe for each vial). Allow to air dry.
        - Using an empty syringe inject air into diluent vial and withdraw required amount of solution.
        - Remove syringe from diluent vial. Insert needle into medication vial and inject diluent.
        - Keeping syringe in vial, gently mix until medication is dissolved.
        - When completely dissolved, withdraw desired amount of medication.
        - With needle attached to syringe insert needle into medication port and inject medication.
        - Remove needle and activate safety feature of the needle and dispose of syringe and needle in appropriate puncture proof container.
        - Gently agitate bag to mix. Be sure solution is thoroughly mixed prior to infusion.
        - Begin infusion within one hour.

    b. Reconstitution Device (i.e., B Braun Add-Ease, Baxter Minibag Plus or Baxter Vial-Mate®): refer to specific manufacturer's instructions (see APPENDIX C for instructions).

    c. IV medication in solution:
        - Swab medication port on IV bag with alcohol swab and allow to air dry. Take precautions to prevent contamination of the port after cleaning.

    If drawing up medication in solution from an ampule:
        - Attach a filter needle or straw to an empty syringe.
        - Clean the outside of the ampule with an alcohol swab at the neck of the ampule where it will break.
        - Using a 2x2 gauze around the neck of the ampule break the ampule and discard the gauze and top of the ampule into a sharps container.

- Draw up required amount of medication into syringe.
- Remove the filter needle/straw and attach a standard sharp before adding medication to bag.
- Insert needle into medication port on IV bag and inject medication.
- Remove needle and activate the safety feature of the needle and discard in a sharps container.
- Gently agitate bag to mix. Ensure solution is thoroughly mixed prior to infusion.
- Begin infusion within one hour.

If drawing up medication in solution from a vial:

- Clean the top of the vial with an alcohol swab and allow to dry.
- Insert needle into vial and draw up correct amount of medication into the syringe.
- Insert needle into medication port on IV bag and inject medication.
- Remove needle and activate the safety feature of the needle and discard in a sharps container.
- Gently agitate bag to mix. Be sure solution is thoroughly mixed prior to infusion.
- Begin infusion within one hour.

6. Dispose of equipment appropriately.
7. Label IV bag with resident's name, medication added, dose, rate of infusion, date, time, and initials.
8. Administer and document.

IV PUSH MEDICATION ADMINISTRATION

Purpose

To safely administer small volume IV bolus medications.

Policy

IV medications approved for bolus administration will be administered by the professional nurse with documented IV education, as designated by the facility, and as allowed by state regulations.

1. IV medications approved for bolus administration by the facility may be administered by nurses who have documented infusion therapy education. IV push administration may be limited by state regulations or facility policy.
2. Nurses administering IV push medications are responsible for understanding the indications, usual dosage range, infusion rate, actions, potential side effects, and appropriate interventions should side effects occur.
3. A drug reference text must be available for use by nurses administering IV push medications.

Equipment

- Correct dose of medication in syringe.
- Saline flush syringes (2).
- Heparin flush syringe (1) (if heparin is indicated).
- Alcohol wipes.

Procedure

1. Verify prescriber's order and consult with IV pharmacist as needed.
2. Review lab work and resident's condition. Obtain baseline vital signs as needed.
3. Review administration guidelines for the specific drug in an appropriate reference text:
    - Usual dose.
    - Safe IV administration rate.
    - Appropriate dilution.
    - Potential for allergic/anaphylactic reactions.
    - Side effects.
    - Age related precautions.
    - Compatibility with IV solution.
    - Precautions specific to IV push administration.
4. Explain procedure to resident.
5. Perform hand hygiene. Don gloves.

To administer directly through the IV catheter:

6. Scrub needleless connector with alcohol and allow to dry.
7. Attach saline flush syringe to needleless connector, aspirate for a blood return and flush. Remove syringe.
8. Scrub needleless connector with alcohol and allow to dry.
9. Attach medication syringe to needleless connector and administer the medication following specific recommendations of drug reference book or prescriber/pharmacy instructions regarding rate of administration. Remove syringe.
10. Scrub needleless connector with alcohol and allow to dry.
11. Attach saline flush syringe to needleless connector and flush the catheter **at the same rate** the medication was administered to infuse the last bit of the drug that remains in the catheter and/or extension set. Remove syringe.
12. Flush with heparin if indicated for type of vascular access device.

To administer through the Y-site of the IV tubing: COMPATIBILITY BETWEEN THE PRIMARY INFUSION AND THE DRUG TO BE GIVEN IV PUSH MUST BE VERIFIED.

1. Open IV clamp to be sure IV flows freely.
2. Scrub the administration set injection port closest to IV site with alcohol and allow to dry.
3. Attach medication syringe to port and administer the medication following specific recommendations of drug reference book or prescriber/pharmacy instructions regarding rate of administration, stopping intermittently to allow IV fluid to flow. Remove syringe.
4. Allow IV solution to flush medication from catheter.
5. Return infusion to prescribed infusion rate.

HIGH RISK/RATE CRITICAL MEDICATIONS

Purpose

To ensure the safe and accurate delivery of high-risk medications that require accurate titration.

Policy

A nurse with documented education and training in infusion therapy and as allowed by state regulations, may administer IV medications that have been approved by the facility administration.

1. All high risk/rate critical infusions will be controlled using an electronic infusion pump. Examples of rate critical infusions include, but are not limited to:
   Amphotericin
   Heparin
   Insulin
   Potassium
   Inotropic Medications (See Policy 6.11 for Inotropic Medication Policy)
   - Dobutamine
   - Dopamine
   - Milrinone

   Each nurse caring for a resident receiving a rate- or volume-critical infusion will:
   - Review drug/solution information in an appropriate reference text.
   - Obtain baseline vital signs.
   - Review resident history including allergies.
   - Obtain/review lab results necessary for safe infusion (see specific drug guidelines in appropriate reference text).
   - Clarify orders with prescriber as needed.
   - Consult with pharmacist as needed.

This chart is a quick reference guide. You MUST consult a drug reference book for complete administration and monitoring guidelines.

All high risk/rate critical infusions will be controlled using an electronic infusion pump.

Drug	Description	Considerations
Amphotericin	Antifungal. Used to treat severe, systemic fungal infections.	• Confirm correct formulation (lipid based vs. conventional). • An initial test dose must be given. • Administration set filter must be larger than 1 micron. Use administration set with 1.2-micron filter. • May premedicate with NSAID, APAP, diphenhydramine, or hydrocortisone. • Severe adverse reactions may occur. Monitor vital signs at least every 30 minutes. Fever, shaking chills, hypotension may appear 1-2 hours after start of infusion and should subside within 4 hours of stopping drug. • Amphotericin is incompatible with sodium chloride. Flush the IV catheter with 5 - 10 mL D5W before and after the infusion and after the final D5W flush follow with a normal saline flush to clear the D5W from the catheter.
Heparin	A natural occurring anticoagulant that acts by potentiating the activity of antithrombin III.	• The administration set used for heparin infusion will not be used for administration of any other medication or fluid. • Blood for PTT will be drawn from the opposite arm. Never draw lab samples through the catheter used for the heparin infusion. Apply pressure dressing after peripheral blood draw. • Monitor for bleeding or excessive bruising.
Insulin	Used to treat diabetic ketoacidosis.	• Administer only regular insulin via the IV route. Give as IV push or continuous infusion. Intermittent infusion is not recommended. • Ensure potassium levels are WNL prior to administration. • Monitor blood glucose and electrolytes at regular intervals during administration. • Monitor fluid and electrolyte status, blood pressure and heart rate and renal function.

Drug	Description	Considerations
Potassium		• Do **NOT** administer undiluted or by IV push; may cause fatal cardiac arrest. • *Unless other limits are established by facility's medical director,* recommended limits for the administration of potassium to long term care residents without cardiac monitoring are: No more than **40 mEq/liter**. No more than **60 mEq/24 hours**. No faster than **10 mEq/hour**. • Remember to include potassium given by other routes (po, G-tube, etc.) when calculating the hourly IV limit. ***If the resident is to receive more than 10 mEq IV potassium*** **(**Or 10 mEq potassium total, when accounting for additional potassium from other routes of administration***) in a one-hour period, cardiac monitoring is required.*** • Solutions containing more than 40mEq/liter are given via central venous access device. Cardiac monitoring is required.
Inotropic Medications • Dopamine • Dobutamine • Milrinone	See Policy 5.11	• Administered through a central venous access device. Extravasation can cause tissue damage. • Given as a continuous infusion as ordered, using an infusion pump. • The administration set used for inotropic medication infusion will not be used for administration of any other medication. • Dobutamine - admixture may turn pink due to drug oxidation. No loss of potency if used within 24 hours. • Milrinone - an initial loading dose is given followed by a continuous infusion. • Milrinone - Do not give furosemide through same IV line. Precipitation will occur. • Monitor blood pressure and heart rate at established intervals. Monitor for pulmonary congestion, edema, renal function and toxicities. See Policy 5.11 for more information. • Dopamine – correct hypovolemia prior to use to prevent tissue ischemia.

ADMINISTRATION OF INOTROPIC MEDICATIONS

Purpose

To lend direction and to ensure continuity in the use of intravenous inotrope therapy (milrinone, dobutamine, dopamine).

Policy

A nurse with documented education and training in infusion therapy and as allowed by state regulations, may administer inotropic medications that have been approved by the facility administration.

Reference

Lexidrug Drug Information

Definition/Action

Inotropic agents are direct-acting agents whose primary activity results in the reduction of heart failure symptoms in end-stage residents. While the agents in this class have different mechanisms of action (PDE-3 inhibitor (milrinone); beta-adrenergic agonist (dobutamine); sympathetic nervous system stimulant (dopamine)); all of them serve to treat heart failure symptoms by increasing cardiac output, decreasing pulmonary capillary wedge pressure and mean pulmonary arterial pressure. Milrinone also causes vasodilation and is the only agent of the 3 that is neutrally chronotropic (no effect on heart rate), making it the agent of choice in heart failure due to ischemic cardiac disease. Inotropes have been shown to improve quality of life in end-stage heart failure residents by reducing morbidity and decreasing heart failure-related hospital admissions but have not definitively demonstrated an improvement in CHF-related mortality.

Indications

Inotrope therapy is indicated for support in the treatment of adults with decompensated heart failure due to depressed contractility, which may result from organic heart disease, cardiac surgical procedures, acute myocardial infarction, drug-induced cardiomyopathy, and other causes. Inotropes are indicated for Stage IV/Class D heart failure residents and may be used either as palliative care ("end-stage management") or as a bridge to cardiac replacement therapies such as LVAD or heart transplant.

Contraindications

1. **Milrinone:** Hypersensitivity to Milrinone or any component of the formulation.
2. **Dobutamine:** Residents with hypertrophic cardiomyopathy with outflow tract.

obstruction (formerly known as idiopathic hypertrophic subaortic stenosis (IHSS)), hypersensitivity to dobutamine, sulfites, or any other component of the formulation.

3. **Dopamine:** Pheochromocytoma, uncorrected tachyarrhythmia, ventricular fibrillation, or known hypersensitivity to dopamine, sulfites or any component of the formulation.

Precautions

1. Dopamine/Dobutamine:
    a. Use caution in residents with tachycardia or uncontrolled arrhythmias. Both agents increase heart rate, and sudden cardiac death has been reported in residents with uncontrolled arrhythmias.
    b. Use caution in residents with ischemic heart disease, as increased heart rate may worsen ischemic disease by increasing myocardial oxygen demand.
    c. Use caution in residents with uncontrolled hypertension; both agents may increase both systolic and diastolic blood pressure.
2. Milrinone:
    a. Arrhythmias: Ventricular arrhythmias, including non-sustained ventricular tachycardia and supraventricular arrhythmias, have been reported. Observe closely for arrhythmias in this very high-risk resident population; sudden cardiac death has been observed. Due to the prolonged half-life as compared to other inotropic agents, ventricular or atrial arrhythmias may persist even after discontinuation of milrinone especially in residents with renal dysfunction. Ensure that ventricular rate is controlled in atrial fibrillation/flutter before initiating; may increase ventricular response rate. In heart transplant candidates, institute appropriate measures to protect resident against risks of sudden cardiac death.
    b. Electrolyte abnormalities: Correct electrolyte imbalances, primarily hypomagnesemia and hypokalemia, prior to use and throughout therapy to minimize the risk of arrhythmia.
    c. Hypotension: Milrinone may cause symptomatic hypotension. Due to longer half-life and renal excretion, exercise extreme caution in residents with low blood pressure and recommend dose reductions in residents with renal dysfunction.

Adverse Reactions

Ectopic heartbeats		Nausea, vomiting, headache
Increased heart rate, palpitations		Tingling sensation, paresthesia
Angina, chest pain		Hypokalemia
Hypotension		Phlebitis

Drug Interactions

1. **Dobutamine**: atomoxetine, calcium Salts, cannabinoid-containing products, cocaine, COMT inhibitors, doxofylline, guanethidine, Iobenguane I 123, linezolid, sympathomimetics, tedizolid.
2. **Dopamine**: Alpha1-Blockers, atomoxetine, cannabinoid-containing products, chloroprocaine, clozapine, cocaine, COMT inhibitors, doxofylline, ergot derivatives, guanethidine, hyaluronidase, inhalational anesthetics, Iobenguane I 123, linezolid, lurasidone, MAOIs, SNRIs, spironolactone, sympathomimetics, tafenoquine, TCAs.
3. **Milrinone**: Anagrelide, Riociguat.
   - **Do not give furosemide through same IV line as milrinone. Precipitation will occur.**

Usual Dosage

- **Dobutamine:** 2-10**mcg**/kg/min
- **Dopamine:** 5-15**mcg**/kg/min (lower doses are preferred)
- **Milrinone:** 0.125-0.75**mcg**/kg/min

Administration

1. Inotrope therapy is administered by IV infusion using an infusion pump.
2. Inotropic concentrate for injection must be diluted to a final volume of at least 50 ml. Inotrope therapy may be diluted with the following fluids: D5W, 0.9% NS, and Ringer's Lactate. The concentration of inotrope therapy administered depends on the dosage and fluid requirements of the individual resident. Concentration should not exceed 5000 mcg/ml for dobutamine.
3. Standard concentrations for final finished compounded products (milrinone 0.2 mg/mL, dobutamine 2-4mg/mL) should be used whenever possible to limit the potential for medication errors.
4. Prevent drug incompatibilities: Inotrope therapies are not compatible with heparin, therefore prior to initiating a dobutamine infusion, a flush of normal saline should be administered to clear the access device of heparin.
5. Prevent bolus injection of inotrope therapy: If flushing of catheter is necessary, temporarily stop the infusion, aspirate a minimum of 5 mL blood from the venous access device prior to flushing with normal saline and then restart the infusion

Nursing Considerations for Administration

1. It is recommended that therapy be initiated, and dose titrated in the hospital, with the resident's condition stable and/or arrhythmias under control.

2. A Central Venous Access Device is the preferred access device type for infusion of inotropic medications.
3. Insert a short PIV catheter (less than 1.25 inches in length) if the CVAD becomes occluded or otherwise is unusable, in order to assure continuity of the infusion. Initiate planning for insertion within 24 hours of a replacement CVAD.
4. Do not infuse inotropic medications through midline catheters or long peripheral IV catheters (greater than 1.25 inches in length) as there is increased risk of extensive tissue damage due to the depth of the catheter.
5. Confirm patency of the vascular access device with positive blood return prior to beginning the infusion.
6. Draw labs from a peripheral venipuncture so that the continuous medication infusion is not interrupted or inadvertently bolused with flushing after a blood draw.
7. Follow Aseptic Non-Touch Technique (ANTT®) for the specific vascular access device used.

Suggested Monitoring Parameters

Monitor daily:

- Vital signs, cardiopulmonary status, weight, I and O, assess for peripheral edema, phlebitis, angina/chest pain, nausea, vomiting, headache, tingling sensation, paresthesia, dizziness and dyspnea or shortness of breath.

Additional monitoring weekly or bi-weekly:

- Serum creatinine, BUN, Potassium, Sodium, Magnesium, BNP.

Monitoring parameters:
Inotrope therapies are relatively potent agents and are reserved for use in residents with severe heart failure. Close supervision of residents is essential during inotrope infusions. The parameters to monitor prior to and during inotrope therapy:

- Heart rate: The heart rate should be measured prior to and 3 to 10 minutes after starting inotrope therapy. The heart rate should not increase by more than 10 - 15 beats/min. If the heart rate increases to a greater degree, taper down the rate immediately on the dose of inotrope therapy and notify the physician.
- Blood pressure: The systolic blood pressure should be measured prior to and three and 10 minutes after starting inotrope therapy. The blood pressure should not change by more than 10 mmHg. If the blood pressure fluctuates to a greater degree, decrease the rate and notify the physician.
- Respiration: Monitor the resident's breathing and document the quality, rate, depth, and pattern of respiration. If respiration is extremely labored, consider pulmonary congestion and consult the prescriber.
- Pulmonary congestion: Prior to and after initiating inotrope infusion, listen to the lungs

for pulmonary congestion and document location where rales, rhonchi, wheezes, or rubs are heard. Pulmonary congestion is often noted as a discrete popping or crackling sound which is caused by fluid in the small airways or alveoli.

- Weight: Weigh daily and record weight in chart. Follow the resident's weight as a function of fluid status and note changes on a weekly basis. If resident is gaining weight steadily, consider the possibility of hypervolemia. Fluid retention can worsen heart failure. If this exists, consult the physician who will consider restricting fluid intake and increasing diuretics. If diuretic doses are altered, recheck electrolytes and supplement with potassium if necessary. Most diuretics cause potassium loss. A serum potassium of less than 3.5 mEq/L can cause digoxin toxicity and precipitate arrhythmias.

Chronic heart failure residents' weights fluctuate often, and as a result it is not always necessary to change the pump rate relative to the weight change in the resident.

If resident weight fluctuates >10%, then the clinician will need to determine any symptom changes (such as increased headache, dizziness, nausea, "just don't feel right"), and will communicate this to the physician for a possible rate change.

- Peripheral edema: Prior to and after inotrope infusion, assess the resident's lower extremities, neck, and abdomen for signs of peripheral edema. Note the degree, location, and appearance of edematous areas. Often after starting inotrope infusions, there is increased fluid loss due to improved cardiac output and reperfusion of the kidneys. Therefore, signs of pulmonary edema may improve after the drug is infused.
- Electrolytes: The electrolytes should be checked periodically throughout therapy, especially if the urination is excessive or if diuretics are instituted.
- Catheter site: Monitor the catheter site for signs of extravasation, or infection. If extravasation occurs, discontinue the infusion and consult the physician. Apply cool compresses for 24 hours to localize the drug, to decrease capillary blood flow, and to slow the rate of cell metabolism. If the catheter site looks infected, re-evaluate sterile catheter care techniques and consult the physician for further orders.
- Adverse effects: Monitor the resident for signs of adverse effects such as heart palpitations, skin rash, angina pectoris, and shortness of breath. Consult the physician if symptoms develop.

Procedure

1. Verify physician's order – present on chart and correctly written
2. Review medication in appropriate drug reference for recommended rate of infusion and potential side effects.
    a. Check label for the correct medication name, route of administration, and expiration date.
    b. Verify resident's height and weight.
    c. Verify the correct dose and dose calculations for resident's weight and the correct rate of administration with a second nurse or pharmacist.
    d. Verify the infusion pump settings with a second nurse.

3. Verify resident's identification.
4. Perform hand hygiene.
5. Assemble equipment on a clean work surface.
6. Don gloves.
7. **Initiation of a New Inotropic Medication infusion:**
    a. Cleanse needleless connector with an alcohol swab and allow to air dry.
    b. Attach a flush syringe and aspirate the catheter to obtain a positive blood return Flush with 10 mL normal saline.

    Initiation of an ongoing Inotropic Medication Infusion:
    a. Time the weekly dressing change and needleless connector change to coincide with medication bag and tubing change.
    b. Stop the current infusion and disconnect from the resident's catheter.
    c. Cleanse needleless connector with an alcohol swab and allow to dry.
    d. Attach an empty 10 mL syringe to the needleless connector and aspirate 5 mL from the catheter and remove syringe and discard in appropriate biohazardous waste container.
    e. Cleanse the needleless connector with alcohol swab and allow to dry.
    f. Attach a syringe of normal saline flush and flush catheter with 10 mL normal saline and remove syringe.
    g. Clamp the catheter, cleanse the junction of the catheter hub and the needleless connector and allow to dry.
    h. Remove the needleless connector and cleanse the catheter hub with an alcohol swab and allow to dry.
    i. Attach a new needleless connector to the catheter hub.
8. Initiate the infusion
    a. Open new administration set and clamp the tubing.
    b. Spike the medication bag, open clamps, prime the set and re-clamp.
    c. Insert the administration set into the IV pump.
    d. Verify pump settings a second time.
    e. Cleanse the needleless connector with an alcohol pad and allow to dry.
    f. Connect the administration set to the needleless connector and open the clamp on the IV catheter and the administration set.
    g. Start the infusion.
9. Remove gloves and perform hand hygiene.
10. Documentation:
    a. Date and time.
    b. Verification of drug, dosage and pump settings with second nurse.
    c. IV site assessment.
    d. Needleless connector change and dressing change (if performed).
    e. Flush solutions administered.
    f. Resident assessment, response to therapy and resident teaching.
    g. Note any complications identified with necessary interventions.

SUBCUTANEOUS HYDRATION (HYPODERMOCLYSIS)

Purpose

To replace fluids, electrolytes and nutrients when oral intake or intravenous infusion is not possible or contraindicated.

Policy

Hypodermoclysis may be initiated by the licensed professional nurse who has documented education in administering this therapy as designated by the facility, and as allowed by state regulations.

1. Hypodermoclysis may be contraindicated for residents with severe coagulopathy, low platelet count, or other conditions where subcutaneous therapy might result in extensive bleeding under the skin.
2. A prescriber's order is required prior to initiating therapy. The order should specify:
    - Date and time.
    - Parenteral solution (including volume and additives).
    - Infusion rate.
    - Subcutaneous route of administration.
    - Specify whether the hourly volume is to be infused through 1 site or divided between 2 subcutaneous sites.
    - Duration and/or frequency of therapy.
3. There are limitations for hypodermoclysis administration:
    - The fluid must be isotonic to body fluids.
    - The fluid must contain electrolytes.
    - The infusion of electrolyte free solutions or hypotonic fluids can lead to serious circulatory overload and CHF.
    - The administration of hypertonic fluids may be harmful to tissue.

    Solutions that may be administered by hypodermoclysis:
    - 0.9% Sodium Chloride (NS) (308 mOsm/L)
    - 5% Dextrose with 0.45% Sodium Chloride (406 mOsm/L)
    - 2and ½% Dextrose with 0.45% Sodium Chloride (281 mOsm/L)
    - Lactated Ringers (273 mOsm/L)
    - Ringer's Solution (309 mOsm/L)
    - 2 and ½% Dextrose with 0.5% LR (264 mOsm/L)

Solutions that may NOT be given by clysis:

- Hypertonic Saline (3%, 5%).
- Hypertonic electrolyte solutions (D-5-NS, D-5-LR).
- Electrolyte free solutions (Dextrose 5% in water and Dextrose 10% in water).
- Amino Acids.
- Fat Emulsion.

4. Parenteral solutions must be discarded if not used within 24 hours after spiking the bag.
5. Infusion needle sets may be capped and left in place between intermittent infusions if there is no erythema, inflammation, drainage or pain at the insertion site.
6. Subcutaneous infusion needles will be changed as clinically indicated based on-site assessment.
7. Administration sets used for continuous infusion may be changed when the subcutaneous site is changed; sets used intermittently and disconnected between intermittent infusions should be changed every 24 hours.
8. The flow rate should be checked and the subcutaneous site assessed every hour and PRN during infusions and at least once per shift if not in use.
9. Check the site for erythema, induration, leaking of fluid, bruising, excessive swelling (e.g., skin taut and shiny), local bleeding, or pain reported by the resident.
10. Restart the infusion through a new site if any of these complications occur.
11. If infusing through one site, consider splitting the volume through two infusion sites.
12. The resident should be assessed at established intervals and PRN during infusion for signs of fluid overload. Monitor pulse, BP, lung sounds, mental status, etc.
13. Continue assessments after the completion of the infusion as indicated by the resident's response to therapy or as ordered by prescriber.

Equipment

- Parenteral hydration solution as ordered by prescriber.
- Small gauge (e.g., 27-gauge X 3/8") subcutaneous infusion set(s). Note that size may vary depending on brand used.
- Central line dressing change kit containing prep and dressing supplies if not included with the administration set.
- IV administration set with flow control regulator.
- Needleless connector (if needed based on the subcutaneous infusion set used).

Procedure

1. Perform hand hygiene. Don gloves.

2. Explain the procedure to the resident.
3. Examine and assess potential subcutaneous infusion sites. Usual sites include:
    - Lateral or anterior thigh.
    - Lateral abdomen.
    - Upper hips.
    - Infraclavicular area.
4. Insert subcutaneous infusion device (follow policy and procedure 5.14 Insertion of a Subcutaneous Infusion Device).
5. Begin infusion.

SUGGESTED CHARTING:

Insertion:

- Informed consent.
- Prep solution.
- Location of needle placement(s).
- Type, length and gauge of needle.
- Type of dressing (e.g., transparent dressing or gauze and tape).
- Parenteral solution including volume and additives.
- Infusion rate and type of flow control.
- Resident's condition at initiation of therapy including mental status as appropriate.

Assessments:

- Flow rate.
- Condition of site(s).
- Condition of dressing (e.g., dressing dry, occlusive, and intact OR dressing changed and site re-prepped).
- Lung sounds.
- Pulse, BP.
- Temperature every shift or as ordered.
- Mental status changes if any.
- Nursing interventions as appropriate.

Completion of therapy:

- Subcutaneous set removed (site cleaned with alcohol and dry sterile dressing applied).
- Chart condition of dressing if leaving needle in place (e.g., dry, occlusive and intact OR changed and site re-prepped).
- Condition of infusion site.
- Physical assessment/resident's response to therapy.

INSERTION OF A SUBCUTANEOUS INFUSION SET

Purpose

To enable the nurse to correctly initiate and maintain a subcutaneous (SC) infusion.

Policy

Insertion of a subcutaneous infusion set may be initiated by the licensed professional nurse who has documented education as designated by the facility, and as allowed by state regulations.

1. The subcutaneous route may be chosen as an alternative route to IV if vascular access is limited or will be too difficult to maintain. Consideration will be given to the appropriateness and duration of therapy.
2. A prescriber's order is required.
3. All continuous subcutaneous infusions will be given via an infusion pump (resident-controlled analgesia) or a gravity flow regulator (hypodermoclysis).
4. A pump specifically designed for resident-controlled analgesia must be used for all subcutaneous narcotic infusions.
5. Before initiating a subcutaneous infusion, the resident's skin integrity will be assessed. Selected site should be one with adequate subcutaneous tissue for absorption along with intact skin. Preferred sites are thighs, abdomen, chest and upper arms. Choose sites away from bony prominences and resident's waistline.
6. Subcutaneous infusion devices may be left in place between intermittent infusions if there is no erythema, inflammation, drainage, or pain at the insertion site. NO flushing is required.
7. Subcutaneous infusion sets will be changed when clinically indicated based on-site assessment. Observe site for redness, leakage, drainage, and induration. (Higher flow rates or concentrated drugs may necessitate more frequent site change.)
8. Subcutaneous needles will be of the smallest gauge and length needed to appropriately deliver the drug or fluid.
9. Subcutaneous insertion sites will be secured and covered with a transparent dressing. Change dressings with site change or PRN.

Procedure if using Quick Set Subcutaneous Infusion Set for Hypodermoclysis

Equipment

- Quick set subcutaneous infusion set with attached extension set. (See Appendix C for Quick Set Instructions for Use).
- Central line dressing change kit.
- Needleless connector.
- Saline flush to prime set.
- Tubing with integral flow control regulator.
- Ordered IV fluid.

1. Explain procedure to resident. Obtain verbal consent.
2. Perform hand hygiene and don gloves.
3. Open the quick set infusion device. Attach the needleless connector to the end of the subcutaneous administration set.
4. Clean the needleless connector with an alcohol swab and allow to dry.
5. Attach a saline syringe to the needleless connector and flush the set. Do not remove flush syringe.
6. Select a site for insertion on the abdomen, thigh, deltoid, or anterior chest wall. Take resident positioning and activities of daily living into consideration when selecting the SC site.
7. Cleanse the selected area with alcohol swabstick and chlorhexidine prep from the central line dressing change kit. Clean an area larger than the dressing to be applied. Allow to dry completely.
8. Remove paper backing from infusion set. Remove one side half-way first. Remove other side entirely and then remove rest of the first half.
9. Twist off the blue needle guard to expose the infusion set needle.
10. Insert the quick-set infusion set using a 90-degree angle. Smooth down adhesive.
11. Remove the introducer needle. Hold sides of infusion set down, then gently pull introducer needle out.
12. Fold needle hub over until it snaps into place, dispose into sharps container.
13. Aspirate with the attached syringe to make sure no blood return is present in the tubing. If blood is present on aspiration, remove the catheter and choose an alternate site. Do not flush saline into the subcutaneous tissue with the attached syringe.
14. Apply transparent dressing from the central line dressing change kit. Tape extension tubing to prevent dislodgement of the device.

15. Label dressing with date, time and initials.
16. Dispose of waste per OSHA, CDC, and facility guidelines.
17. Open Flow Control Regulator tubing and close the clamps.
18. Spike the bag of IV fluid with the tubing, open clamps and prime the set then close the clamps.
19. Cleanse the needleless connector with alcohol and allow to dry.
20. Connect the tubing to the needleless connector.
21. Set the flow regulator dial to the desired rate.
22. Calculate the drops per minute and count adjusting the dial to confirm the correct rate of infusion.
23. Remove gloves and perform hand hygiene.
24. Document procedure. Include date and time of insertion, location of site, type and size of subcutaneous needle, type of dressing applied and resident education and response to the procedure.

Procedure if using Aqua C Subcutaneous Infusion Set for Hypodermoclysis

Equipment

- Aqua-C infusion kit,
- IV start kit.
- Ordered IV fluid.

1. Explain procedure to resident. Obtain verbal consent.
2. Perform hand hygiene and don gloves.
3. Open the Aqua C sterile package and remove the contents.
4. Cleanse the selected subcutaneous site with alcohol swab and chlorhexidine prep from the IV start kit. Clean an area larger than the dressing to be applied. Allow to dry completely.
5. Close the clamps on the tubing. Remove end cap on the tubing spike and insert it into the solution container.
6. Carefully remove the Aqua-C needle set from the plastic tube.
7. Remove the needle guard prior to placement. (The undersurface of the set (needle side) has an adhesive backing with no liner.)
8. Connect the Aqua-C needle to the 82” (20 drop) IV set.

9. Prime the tubing and Aqua-C needle set, until you can see drops from both needles of the Aqua-C.
10. Close the dial-a-flow controller and insert the Aqua-C into the resident at the chosen site.
11. Apply the transparent dressing provided.
12. Calculate the drops per minute and count adjusting the dial to confirm the correct rate of infusion.
13. Remove gloves and perform hand hygiene.
14. Document procedure. Include date and time of insertion, location of site, type and size of subcutaneous needle, type of dressing applied and resident education and response to the procedure.

INTRAVENOUS FLUIDS: USE IN MAINTENANCE AND CORRECTION OF IMBALANCES

SOLUTION	ELECTROLYTES	INDICATIONS	NURSING CONSIDERATIONS
Dextrose 5% in 0.45% Sodium Chloride (Hypertonic)	Sodium 77 mEq/L Chloride 77 mEq/L	• Dehydration. • Nutrition: Supplies carbohydrates as calories (1L = 170 Kcal). • DKA (BG ≤250 mg/dL).	• Very common hydration solution. • Use with caution in edematous residents with cardiac, renal or hepatic disease.
Dextrose 5% in Water (Isotonic)	None	• Dehydration. • Drug delivery. • Nutrition. • Hypoglycemia.	• Prolonged infusions can cause electrolyte imbalances. • May cause water intoxication and cerebral edema. Always use an infusion pump for rate control. • Monitor electrolytes. • High infusion rates can lead to osmotic diuresis.
Dextrose 5% in 0.9% Sodium Chloride (Hypertonic)	Sodium 154 mEq/L Chloride 154 mEq/L	• Dehydration with hyponatremia or hypochloremia. • Temporary treatment of circulatory insufficiency and shock cause by hypovolemia.	• Monitor electrolytes • Continuous infusions expand the intravascular compartment and can lead to circulatory overload.
Dextrose 10% in Water (Hypertonic)	None	• Nutrition. • Hypoglycemia.	• See 5% Dextrose in Water. • Irritant, can cause extravasation
0.45% Sodium Chloride (Hypotonic)	Sodium 77 mEq/L Chloride 77 mEq/L	• Dehydration with hyponatremia or hypochloremia.	• Contraindicated for residents with head injury or residents at risk for third space fluid shifts. • Ideal for use in diabetes.
0.9% Sodium Chloride (Isotonic)	Sodium 154 mEq/L Chloride 154 mEq/L	• Extracellular fluid loss with both hyponatremia and hypochloremia. • Metabolic alkalosis with fluid loss. • Drug delivery. • Administration of blood and blood products. • Used to expand fluid volume.	• Not a good maintenance fluid. Does not supply free water. • Monitor electrolytes. • Only solution that can be used with blood transfusions.
Ringers Lactate (Isotonic)	Sodium 130 mEq/L Potassium 4 mEq/L Calcium 3 mEq/L Chloride 109 mEq/L	• A roughly isotonic solution that contains multiple electrolytes in approximately the same concentration as found in plasma. • Used in treatment of hypovolemia, burns, and fluid lost as bile or diarrhea. • Mild acidosis.	• Excessive administration may lead to metabolic alkalosis. • Contains no magnesium. May need to be given as a supplement. • Use with caution in residents with hypercalcemia, cardiac conditions, T2DM, and renal/hepatic impairment.

ASSESSMENT, DOCUMENTATION AND COMPLICATIONS

Table of Contents

ASSESSMENT OF THE RESIDENT RECEIVING IV THERAPY

Purpose

To enable the nurse administering infusion therapy to recognize and utilize appropriate intervention for infusion related problems or complications.

Policy

Residents receiving infusion therapy will be monitored at established intervals based on prescribed therapy, and age and condition of resident and type of IV catheter.

1. Parameters to be monitored:
    - Fluid container.
    - Administration set.
    - Secure luer connections.
    - Flow rate.
    - Electronic infusion device.
    - IV site dressing.
    - Medication being infused – Is it a vesicant or irritant?
    - Type of Vascular access device – Is it appropriate for the type of infusion?
    - Insertion site.
    - Resident's intake and output.
    - Resident's ability to verbalize issues with the infusion or IV access.
    - Resident response to therapy.
2. Visually inspect the entire infusion system from the solution container progressing down the administration set to the catheter insertion site. Check for integrity of the system and the dressing, correct infusate, accurate flow rate, and for expiration dates of the infusate, the dressing and the administration set.
3. Assess vascular access device function by aspirating for a blood return and flushing prior to each intermittent use (intermittent medication administration) and as clinically indicated with continuous infusions.
4. Assess the catheter insertion site and surrounding area for redness, tenderness, swelling, and drainage by visual inspection and palpation through the intact dressing.
5. Recommended **minimum** assessment of midlines and central venous access devices is once every 24 hours.
6. Recommended **minimum** assessment of short peripheral catheters is every 4 hours. Assess every 1-2 hours for residents who have cognitive deficits or residents receiving vesicant medications.
7. Assess resident's ability to verbalize complications with the infusion or IV access.

8. Measure the external length of the midline or central venous access device and compare to the length documented at insertion, during each dressing change and when catheter dislodgement is suspected.
9. Measure upper arm circumference at time of catheter insertion or admission into the facility and then when clinically indicated to assess the presence of edema and possible deep vein thrombosis. Measure 10 cm above the insertion site.
10. The nurse administering intravenous fluids or medications will recognize and utilize appropriate intervention for any IV related problems or complications.
11. Document any IV related problems or complications according to facility documentation policies and procedures.
12. Assess and document resident's response to therapy.
13. Assess the continued need for a vascular access device and remove when no longer necessary for the plan of care.

DOCUMENTATION

Purpose

To assure safe continuum of care for the resident receiving infusion therapy and to provide a legal document verifying proper care of the resident receiving infusion therapy.

Policy

Document initial and ongoing assessments and interventions, expected side effects and unexpected adverse events that occur with actions taken, the resident's response to therapy and the plan of care for infusion therapy.

1. Documentation should be accurate, complete, chronological, objective, legible and timely.
2. Follow specific institutional policies regarding frequency of documentation and format used. Electronic medical records systems or paper medical records with narrative notes, check off flow sheets, or a combination of both may be used for proper documentation.
3. Documentation should include:
    - Informed consent if appropriate.
    - Assessment of site and surrounding tissue for complications.
    - Condition of dressing.
    - Type of catheter, including size, length and number of lumens, and specify particular lumens being dedicated for TPN, Lab draws etc.
    - Any treatment done to the catheter or site.
    - Catheter patency.
    - Correct therapy, dose, and rate of infusion.
    - Effectiveness of therapy. The reason for therapy will determine the specific assessment required.
    - Type of infusion equipment utilized (i.e., pump, flow control regulator, elastomeric device etc.).
    - Peripheral catheter insertion procedure (see insertion policy for documentation requirements).
    - If catheter is removed, explain the reason for removal, condition of site, and condition of catheter.
    - Education provided to resident.
    - Resident's ability to verbalize complications with the infusion or IV access.
    - Resident's response to therapy.
    - If the vascular access device is left in place after therapy is complete, routinely assess the need to leave the catheter in place and document an ongoing assessment of site evaluation, care, and maintenance.

COMPLICATIONS OF IV THERAPY

Purpose

To enable the nurse administering infusion therapy to recognize and utilize appropriate intervention for infusion related problems or complications.

Policy

The nurse is competent to recognize signs and symptoms of vascular access device complications during insertion, management, and removal.

Infiltration: An infiltration is the inadvertent administration of a non-vesicant solution or medication into the surrounding tissue.

Extravasation: An extravasation is the inadvertent administration of a vesicant solution or medication into the surrounding tissue.

Infiltration and extravasation can be caused by catheter dislodgment; perforation of vein wall; leakage of infusate at the point where the catheter enters the vein or capillary fluid leakage.

Description	Intervention	Prevention
Swelling, skin tightness, coolness, blanching or redness at the insertion site or fluid leakage at the insertion site. Extravasation may cause blister formation. Resident may report pain, burning or stinging at the insertion site or along the fluid pathway.	▪ Stop the infusion immediately. ▪ Assess the area distal to the VAD site for capillary refill, sensation and motor function. ▪ Aspirate for a blood return. ▪ Do not flush the catheter. ▪ Remove the peripheral IV catheter or implanted port needle. ▪ Elevate extremity. ▪ Notify the physician and obtain treatment orders if indicated. ▪ May contact the pharmacy for recommendations based on the medication infiltrated or extravasated. ▪ Follow MD orders for specific treatment of extravasations based on the drug that extravasated. ▪ Change all IV tubing after any complication occurs. ▪ Document size and amount of infiltration. ▪ May outline the area with a skin marker to monitor.	▪ Avoid areas of flexion when starting IV's. ▪ Avoid insertions below previous venipuncture sites. ▪ Use securement dressing or device to secure catheter and to avoid catheter movement. ▪ Use larger veins for infusion of irritating drugs or solutions. ▪ **Do not infuse vesicant medications via long peripheral catheters or midline catheters.** ▪ Monitor site at established intervals.

Infiltration Scale

TABLE 1

INS Infiltration Scale

Grade	Clinical Criteria
0	No symptoms
1	Skin blanched Edema < 1 inch in any direction Cool to touch With or without pain
2	Skin blanched Edema 1–6 inches in any direction Cool to touch With or without pain
3	Skin blanched, translucent Gross edema > 6 inches in any direction Cool to touch Mild–moderate pain Possible numbness
4	Skin blanched, translucent Skin tight, leaking Skin discolored, bruised, swollen Gross edema > 6 inches in any direction Deep pitting tissue edema Circulatory impairment Moderate–severe pain Infiltration of any amount of blood product, irritant, or vesicant

Extravasation Staging and Treatment

Stage	Assessment	Treatment Options
Stage 1	• Painful infusion site • No erythema • Localized swelling (1%-10% of extremity above or below site)	• Remove cannula • Elevate extremity • Warm/cold compresses
Stage 2	• Painful infusion site • Slight swelling at site (up to 25% of extremity above or below site) • Slight erythema (localized to the central area of extravasation) • Good pulse below site • Brisk (1-2 seconds) capillary refill below site	• Remove cannula • Elevate extremity • Warm/cold compresses • Consider antidote
Stage 3	• Painful infusion site • Moderate swelling at site (25%-50% of extremity above or below site) • Marked erythema (extends beyond central area of extravasation) • Blanching (for vasopressor extravasation only) • Good pulse below site • Brisk (1-2 seconds) capillary refill below site • Skin cool to touch	• Leave cannula in place, using a 1 mL syringe, aspirate as much fluid as possible • Remove cannula unless it is needed for antidote administration • Elevate extremity • Warm/cold compresses • Consider antidote
Stage 4	• Painful infusion site • Severe swelling at site (more than 50% of extremity above or below site) • Very marked erythema (extends beyond borders of swelling) • Blanching (non-vasopressor extravasation) • Decreased or absent pulse • Prolonged capillary refill > 4 seconds • Skin cool to touch • Skin breakdown including blistering or necrosis	• Leave cannula in place, using a 1 mL syringe, aspirate as much fluid as possible • Remove cannula unless it is needed for antidote administration • Elevate extremity • Warm/cold compresses • Consider antidote • If swelling of the site is tense and skin is blanched, obtain surgical consult

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Phlebitis: ***Inflammation of the vein's tunica intima.***
There are three types:

Mechanical – Irritation of the vein caused by inappropriate catheter to vein ratio (large diameter catheter in a small vessel with inadequate blood flow around the catheter), by movement of the catheter within the vein, by insertion trauma or catheter material and stiffness.

Chemical – Irritation of the vein caused by the properties of the infusate. The infusate can be too concentrated (hyperosmolar), contain particulate matter, or the rate of infusion may be too fast.

Bacterial – Due to bacterial contamination of the infusate, contamination of IV site, or contamination of supplies used in IV therapy.

Post-infusion phlebitis can occur after the catheter is removed due to any of the above factors.

Phlebitis is rated according to the following scale: (Infusion Nurses Society Standards of Practice)

Grade	Clinical Criteria
0	No symptoms.
1	Erythema at access site with or without pain.
2	Pain at access site with erythema and/or edema.
3	Pain at access site with erythema. Streak formation. Palpable venous cord.
4	Pain at access site with erythema. Streak formation. Palpable venous cord >1 inch in length. Purulent.

Based on Infusion Nurses Society Standards of Practice

Mechanical Phlebitis

Description	Intervention	Prevention
▪ Redness, warmth, induration along the course of the vein. ▪ Pain at the insertion site or along the course of the vein. ▪ Edema may be present.	***(Short peripheral)*** ▪ Remove IV. Restart in another vein in opposite extremity. ▪ Apply warm compress. Provide analgesics as needed. ▪ Change all IV tubing. ▪ Document signs and symptoms and degree of phlebitis, along with interventions, monitoring and physician notification. ***(Midline or PICC)*** ▪ Elevate extremity, apply warm, moist compresses. Provide analgesics as needed. Monitor for 24-48 hours. If symptoms persist past 48 hours consider removing the catheter. ▪ Change all IV tubing. ▪ Document degree of phlebitis and signs and symptoms along with interventions, monitoring and physician notification.	▪ Avoid areas of flexion when starting IV's. ▪ Choose the smallest catheter for the prescribed therapy. ▪ Stabilize catheter with tape or a stabilizing device to avoid catheter movement. ▪ Use appropriate size catheter for vein diameter to insure good blood flow around the catheter. ▪ Monitor site at established intervals.

Chemical Phlebitis

Description	Intervention	Prevention
▪ Redness, warmth and induration along the course of the vein. ▪ Pain at the insertion site or along the course of the vein. ▪ Edema may be present.	***(Short peripheral)*** ▪ Remove IV. Restart in another vein in opposite extremity. ▪ Change all IV tubing. ▪ Document degree of phlebitis and signs and symptoms along with interventions, monitoring and physician notification. ***(Midline or CVAD)*** ▪ Assess degree of phlebitis according to scale. If a scale of 1, stop IV, elevate extremity, apply warm, moist compresses. ▪ Evaluate therapy and the need for a different type of access device, different medication, changing the dilution of the medication or slower rate of infusion. ▪ Remove catheter as necessary. ▪ Change all IV tubing. ▪ Document degree of phlebitis and signs and symptoms along with interventions, monitoring and physician notification.	▪ Administer irritating medications through a large vein. ▪ Consider administering irritating medications at a slow rate if giving peripherally. ▪ Use particle eliminating filters on IV tubing. ▪ Use appropriate size catheter for vein diameter to ensure good blood flow around the catheter and hemodilution of the drug as it exits the catheter tip. ▪ Allow skin to thoroughly dry after application of antiseptic solution.

Bacterial Phlebitis

Description	Intervention	Prevention
▪ Redness, tenderness, warmth, induration along the course of the vein. ▪ Swelling may be present. ▪ Purulent drainage may be present. ▪ Fever.	***(Short peripheral)*** ▪ Remove PIV. Restart IV in another vein in opposite extremity. ▪ Change all IV tubing. ▪ Notify MD. ▪ Document degree of phlebitis and signs and symptoms along with interventions, monitoring and physician notification. ***(Midline or CVAD)*** ▪ Follow MD orders regarding drawing blood cultures and removal and culture of catheter. ▪ Culture site if local infection is suspected. ▪ Document degree of phlebitis and signs and symptoms along with interventions, monitoring and physician notification.	▪ Follow Aseptic Non-Touch Technique (ANTT®) infection prevention guidelines with all procedures. ▪ Avoid contamination of sterile connection points and fluid path. ▪ Do not remove extremity hair by shaving – may use safety scissors, if necessary, prior to initiation of IV.

Thrombosis: Formation of a blood clot within a vessel**.**
Thrombophlebitis: Blood clot formation with phlebitis. When a phlebitis develops, platelets adhere to the irritated tunica intima and a clot can form.

Description	Intervention	Prevention
▪ Central venous access device related DVT may be clinically silent and not produce any overt signs and symptoms. ▪ Clinical signs and symptoms are related to obstruction of venous blood flow and may include: • Pain in the extremity, shoulder, neck or chest. • Edema in the extremity, shoulder, neck or chest. • Erythema in the extremity. • Engorged peripheral veins on the extremity, shoulder, neck or chest wall. • Difficulty with neck or extremity motion.	▪ Follow MD orders regarding possible anticoagulant therapy and catheter removal.	▪ Choose catheter with the least risk of thrombosis. PICCS are associated with higher rates of DVT than other types of central venous access devices. ▪ For PICCs – insert the smallest French catheter with the least number of lumens necessary for the prescribed therapy. ▪ Ensure that central venous access device catheter tip is located in the lower 1/3 of the superior vena cava. Tips located in the mid to upper vena cava are associated with a greater risk of DVT. ▪ Measure upper arm circumference after insertion 10 cm above the proposed insertion site and measure when clinically indicated to assess the presence of edema and possible DVT. ▪ Encourage mobilization of the catheterized extremity performing ADLs, gentle limb exercise and adequate hydration.

Infection:

Description	Intervention	Prevention
▪ Erythema. ▪ Edema. ▪ Pain or tenderness. ▪ Induration at the exit site. ▪ Purulent drainage. ▪ Body temperature elevation.	▪ Remove IV dressing, culture drainage. ▪ Remove PIV. ▪ Do not remove a functioning central venous access device based solely on temperature elevation when there is the absence of confirmatory evidence of catheter related infection. ▪ Notify MD for orders regarding treatment, cultures or removal of the catheter. ▪ Change IV bag and tubing if infection is suspected.	▪ Follow infection control guidelines.

Anaphylaxis: A severe, life threatening, systemic reaction to the infusion of a substance to which the body has built up antibodies**.**

Description	Intervention	Prevention
▪ Itching or swelling of the lips, tongue, throat, hands or feet. ▪ Visual or auditory disturbances. ▪ Sudden headache, shortness of breath, profuse sweating, palpitations. ▪ Sudden drop in blood pressure. ▪ Respiratory/cardiac arrest.	▪ Discontinue infusion immediately but maintain patent IV line. ▪ Call 911. ▪ Administer epinephrine and oxygen per MD order. ▪ Initiate CPR if needed. ▪ Transport resident to hospital. ▪ Notify physician.	▪ Prior to administering any medication: • Check history of the resident, including potential for cross sensitivities, allergy history, previous drug reactions, and asthma. ▪ Monitor resident closely during the initial three doses of any antibiotic for at least 15-30 minutes. ▪ Remember that while risk is highest with the first dose(s), allergic response may occur at any time during therapy.

Air Embolism: Most commonly associated with central venous catheters. Occurs when air inadvertently enters the venous system.

Description	Intervention	Prevention
▪ Chest pain. ▪ Sudden onset of dyspnea. ▪ Gasping. ▪ Continued coughing. ▪ Breathlessness. ▪ Tachypnea. ▪ Wheezing. ▪ Cyanosis. ▪ Low back pain. ▪ Hypotension. ▪ Tachyarrhythmias. ▪ Altered mental status. ▪ Altered speech. ▪ Loss of consciousness. ▪ Loud churning murmur over the precordium.	▪ Close off point of entry. ▪ Place resident on left side in the Trendelenburg position. ▪ Monitor vital signs. ▪ Administer oxygen as needed. ▪ Implement emergency response system (911). ▪ If cardiac arrest – perform CPR if resident's advance directive allows. ▪ Notify MD. ▪ *If catheter is damaged:* • As above and apply clamp between damaged area and chest. ▪ *If catheter is dislodged completely:* • As above and apply air occlusive dressing.	*Any time the IV catheter is open to the environment:* ▪ Make sure catheter clamp is closed prior to changing administration sets or needleless connectors. ▪ Position resident correctly and instruct resident to perform Valsalva maneuver upon request when removing central venous access devices. After catheter is removed apply pressure with a with a sterile dry gauze pad. Then apply a sterile petroleum-based ointment with a sterile dressing for at least 24 hours to seal the skin vein tract. ▪ Make sure all lumens not in use on a catheter are clamped. ▪ Never use scissors, hemostats or razors near the catheter. ▪ Use luer lock connections on all tubing and devices. ▪ Prime all administration sets. DO NOT leave unprimed administration sets attached to solution containers.

Catheter Embolism: Occurs when a portion of the catheter inadvertently breaks off and floats into the vascular system.

Description	Intervention	Prevention
Ranges from no symptoms to those associated with a massive pulmonary embolism. Signs of catheter dysfunctions such as the inability to aspirate blood with localized pain and/or subcutaneous swelling may be an indication of catheter embolism. Assess also for signs of pulmonary embolism should the embolized catheter move into the central circulation: ▪ Cyanosis. ▪ Hypotension. ▪ Shortness of breath. ▪ Tachycardia. ▪ Loss of consciousness.	▪ If peripherally inserted central catheter or midline is suspected of embolizing, applying pressure over the vein may decrease the potential for the fractured catheter to migrate into the central circulation. Consider immediate application of a tourniquet above the venipuncture site when catheter embolization is directly observed. ▪ Notify the physician. ▪ Complete bed rest. ▪ Monitor vital signs. ▪ X-ray will be done to determine location of catheter fragment. ▪ Prepare for transport to hospital.	▪ Correct insertion technique. ▪ Never use scissors to remove dressing. ▪ Never reinsert a stylet or introducer needle into the catheter. ▪ Flush using the correct size syringe. ▪ Never force flush a catheter.

Catheter Migration: Occurs when the catheter tip moves from one location to another.

Description	Intervention	Prevention
▪ Resident complains of gurgling in the ear or pain in the ear or neck. ▪ Inability to flush the catheter may occur. ▪ Arrhythmias may occur if the tip migrates into the right atrium or ventricle.	▪ Discontinue the infusion. ▪ Notify the physician. ▪ X-ray verification of tip placement will need to be done. (Tip placement may be inappropriate for therapy being done.)	▪ Cannot always be prevented. May be caused by excessive coughing or vomiting.

Catheter Dislodgment: Catheter movement into or out of the insertion site indicating tip movement to a suboptimal position. May be partial with the catheter tip remaining in the venous system but in a suboptimal location or total with the catheter tip removed completely from the venous system.

Description	Intervention	Prevention
▪ Change in measured external length of catheter.	***Midline catheters***: May still be used if at least 3 inches remain in vein and there are no other complications (leaking, phlebitis, etc.). ***PICCs & other CVADs:*** ▪ Notify MD. ▪ Stop infusion if indicated and maintain catheter patency. ▪ X-ray recommended prior to resuming therapy.	▪ Measure external catheter length baseline on insertion, at each dressing change, and when clinically indicated if dislodgement is suspected. ▪ During dressing change, peel transparent film toward insertion site to prevent pulling catheter out (e.g., peel up toward site, not down). ▪ Evaluate catheter securement routinely: • Sutures or other securement device intact. • Anchor tapes secure. • Dressing dry and intact. ▪ If dressing is loose or anchoring device is not secure, change dressing and secure, change dressing and secure catheter as needed using Steri-Strips™, StatLock™, etc.

Catheter Occlusion: Obstruction of a vascular access device lumen preventing or limiting the ability to flush or administer solutions through a lumen or withdraw blood.

Description	Intervention	Prevention
▪ Inability to draw blood or sluggish blood return. ▪ Sluggish flow. ▪ Inability to flush or infuse through the catheter. ▪ Frequent occlusion alarms on electronic devices. ▪ Infiltration/extravasation or swelling/leaking at the insertion site. ▪ May be caused by blood clot, drug precipitate or fibrin sheath.	▪ Check for external mechanical causes such as kinked or clamped catheter, clogged filter or needleless connector. ▪ Observe the catheter and administration set for visible precipitate. ▪ Observe for visible blood in the catheter or add on devices. ▪ Do not leave an occlusion untreated because another lumen is patent. This can lead to colonization of bacteria and potential infection of the catheter. ▪ If thrombus is suspected as the cause of the occlusion instillation of tPA into the catheter for 30 minutes to 2 hours is recommended to restore catheter patency. Instillation of tPA should be done only by the nurse who has been trained and determined competent in the procedure, with documentation and as state nurse practice act allows. See Policy 4.22 – Central Venous Catheter - Declotting.	▪ Use proper flushing and locking procedures including the appropriate sequence of catheter clamping and final syringe disconnection based on the type of needleless connector used to reduce the amount of blood reflux into the catheter lumen. ▪ Check for compatibility of drugs and solutions to prevent drug precipitate from forming. ▪ Recognize the risk of lipid residue occlusion when infusing parenteral nutrition formulas.

ALLERGIC / ANAPHYLACTIC REACTIONS

Purpose

To enable the nurse administering infusion therapy to recognize and utilize appropriate intervention when an allergic or anaphylactic reaction is identified.

Policy

The nurse is competent to recognize signs and symptoms of an allergic or anaphylactic reactions and to intervene appropriately.

An allergic response is an inappropriate or exaggerated immune response which occurs in susceptible individuals who have been previously exposed to an antigen. Reactions may occur immediately after the second or subsequent exposure to the offending antigen. Anaphylaxis should be considered when the signs/symptoms are generalized or are serious or life-threatening in nature (hypotension, respiratory distress, significant swelling of tongue/lips, etc.).

Risk Factors:

1. Allergic reactions are not related to dose or route of medication, however intravenous antibiotics, especially penicillins, have the highest incidence of allergic reactions and/or anaphylaxis.
2. Cross sensitivity may develop against other medication classifications when there is a history of allergy. For example, individuals who are sensitive to penicillins have a higher risk of allergy to cephalosporins.
3. Residents with a history of allergic reaction to insect bites, foods or medication have an increased incidence of developing an anaphylactic reaction.
    - Obtain resident history of allergy to eggs, chicken, wheat, soy, milk products, yeast products and iodine, and antibiotics and other medications.
    - Request specific details of the allergic event. Residents may confuse common medication side effects with allergic reaction. Common medication side effects such as flush, headache, dizziness, fever and GI symptoms are not indicative of allergy.
    - Be aware that some food products are utilized in the manufacturing or development of certain medication. Allergy to these foods is a contraindication to the administration of related medications.

Precautions:

1. Early signs of anaphylaxis can resemble a mild allergic reaction, and it is often difficult to predict whether initial, mild symptoms will progress to become an anaphylactic reaction.
2. Symptoms of anaphylaxis often occur within 15-30 minutes of exposure, though it can sometimes take several hours for symptoms to appear.
3. Previous reaction to any antibiotic may be predisposing factor to anaphylaxis.
4. Because anaphylaxis requires immediate treatment, diagnosis is primarily made based on recognition of clinical signs and symptoms, including:
    - Respiratory: sensation of throat closing, stridor (high-pitched sound while breathing), shortness of breath, wheeze, cough, trouble swallowing/drooling, nasal congestion, rhinorrhea, sneezing.
    - Gastrointestinal: nausea, vomiting, diarrhea, abdominal pain, cramps.
    - Cardiovascular: dizziness; fainting; tachycardia (abnormally fast heart rate); hypotension (abnormally low blood pressure); pulse difficult to find or "weak"; cyanosis (bluish discoloration); pallor; flushing.
    - Skin/mucosal: generalized hives; widespread redness; itching; conjunctivitis; or swelling of eyes, lips, tongue, mouth, face, or extremities.
    - Neurologic: agitation; convulsions; acute change in mental status; sense of impending doom (a feeling that something bad is about to happen).
    - Other: sudden increase in secretions (from eyes, nose, or mouth); urinary incontinence.
5. Request an order for medications to treat an allergic/anaphylactic response prior to initiation of therapy.
6. Assure necessary medications to treat an allergic/anaphylactic response (diphenhydramine, epinephrine 1:1000) are available at the facility.
7. Know the location of facility emergency supplies: oxygen, suction, emergency drug box.
8. Obtain baseline vital signs if resident is receiving first or second dose of medication associated with anaphylaxis. Monitor vital signs at established intervals.

ALLERGIC REACTION PROTOCOL
(Non-Anaphylactic)

***** *Allergic reaction may occur at any time during the administration of a medication, or symptoms may not be seen until several hours after completion of a dose.*

Purpose

To provide proper intervention for allergic reactions to IV medication.

Protocol

1. Prior to IV medication administration, the nurse will review the resident's prior response to medications and ascertain allergies.
2. Residents will be monitored at established intervals during infusion for signs of an allergic reaction including rash; hives; itching; localized erythema; slight shortness of breath or wheezing.

Procedure

1. Stop the infusion and flush the catheter to maintain patency.
2. Notify physician.
3. Administer diphenhydramine (Benadryl®) as ordered.
4. Restart medication if clinically indicated, according to physician's order.

ANAPHYLAXIS PROTOCOL

**Anaphylactic shock may occur extremely rapidly; however, cases of occurrence 12-24 hours after medication administration have been reported. In some cases, a return of symptoms could occur as much as 8 hours after the initial response.*

Purpose

To provide emergency treatment for a resident experiencing an anaphylactic reaction until resident transfer and/or further physician orders are obtained.

Protocol

1. All nurses administering IV medications will be aware of this protocol . The Medical Director, Director of Nursing and other facility staff as applicable, will approve it for use.
2. Orders for epinephrine will be obtained prior to infusion of antibiotics and other drugs for which anaphylaxis is a known side effect and for those residents with an allergy history who may be at risk for anaphylaxis.
3. Prior to IV medication administration, the nurse will review resident's prior response to medication and ascertain allergies.
4. During IV medication administration, the nurse will observe and evaluate the resident for signs of anaphylaxis:
    a. Respiratory – dyspnea, wheezing, cyanosis.
    b. Cardiovascular – sudden hypotension, thready pulse, diaphoresis, pallor, dizziness, chills, anxiety.
    c. Gastrointestinal – nausea, vomiting, abdominal cramping, diarrhea.
    d. Dermatologic – pruritus, erythema, urticaria, angioedema.

Procedure

If anaphylaxis is suspected:

1. Stop the infusion immediately and flush the catheter. Maintain a patent IV device.
2. Notify emergency medical services and resident's physician.
3. Administer epinephrine hydrochloride (Adrenalin) 1:1000 aqueous solution IM (as ordered by physician). Usual dose is 0.3 mg IM.
4. Start 0.9% normal saline infusion through new tubing (if ordered by physician).

5. Monitor resident's vital signs every 2-5 minutes. If resident becomes hypotensive, place supine and elevate legs.
6. Continue to monitor resident until emergency medical services arrive.
7. If symptoms increase, repeat same dose of epinephrine after an interval of five (5) minutes or if symptoms persist after first injection, repeat same dose of epinephrine in 20 minutes. Do not administer more than two (2) doses of epinephrine in either case.
8. In the event of a cardiac or respiratory arrest, if not against resident's Advance Directive, begin basic life support.
9. Document occurrence and actions in progress notes.
10. Complete an incident report and submit to appropriate person.

PARENTERAL NUTRITION

Table of Contents

PARENTERAL NUTRITION GENERAL POLICIES

Definition

- Parenteral nutrition can be either partial or total depending on the resident's nutritional needs.
- Partial Parenteral Nutrition (PPN) is the administration of a nutritional solution providing extra calories that does not replace total intake.
- Total Parenteral Nutrition (TPN) is the infusion of a parenteral nutrition solution containing high concentrations of dextrose, amino acids, lipids, electrolytes, vitamins and trace elements that will meet the resident's total nutritional needs.

Purpose

To provide either partial or total nutrition for residents requiring nutritional support.

Policy

A nurse with documented education and training in infusion therapy, including parenteral nutrition administration, and central venous access device management as designated by the facility and as allowed by state regulations, may administer parenteral nutrition.

1. Strict aseptic non-touch technique (ANTT®) must be used when manipulating all parenteral nutrition solutions and all venous access devices.
2. It is recommended that parenteral nutrition is initiated in an acute care hospital where residents can be stabilized before being transferred to a long-term care facility.
3. The parenteral nutrition order should be provided to the pharmacy prior to the resident's arrival at the facility. Consult with the pharmacy to ensure timely delivery of the solution.
4. Due to the high osmolality of parenteral nutrition solutions, it is recommended that all solutions with final osmolality greater than 900 mOsm/L should be administered through a central venous access device with tip placement in the lower 1/3 of the superior vena cava.

   NOTE: A copy of a radiology report or other approved technologies verifying catheter tip location is required before use of any central venous catheter. The ideal location for all central venous catheter tips is in the lower third of the superior vena cava (SVC) at the cavoatrial junction.
5. An infusion pump will be used for the administration of parenteral nutrition.
6. If the central venous catheter has more than one lumen, the same lumen should be used consistently and labeled for "*Parenteral Nutrition Only.*"

7. The licensed independent practitioner's (LIP) order for parenteral nutrition must include:
    - Total volume to be infused.
    - Type and concentration of carbohydrate source.
    - Type and concentration of amino acid source.
    - Electrolyte, trace element, and vitamin additives.
    - Type and concentration of lipids (and whether this is to be added to the bag or infused separately).
    - Total infusion time, ramp up time for the first bag, ramp down time if the infusion is cycled daily.

    Residents receiving parenteral nutrition must also have an order for 10% dextrose, including rate and length of infusion should the infusion be interrupted for any reason. If the central venous access device (CVAD) is inadvertently damaged or removed, insert a peripheral catheter for infusion of the 10% dextrose until the prescriber can be contacted for further orders.
8. If necessary to stop a parenteral nutrition infusion, a rate greater than 50 mL/hour should be ramped (tapered) down over a period of time, usually ½-1 hour.
9. Parenteral nutrition will be filtered.
    - Solutions without lipids will be filtered using a 1.2-micron filter.
    - Solutions with lipids added will be filtered with a 1.2-micron filter.
    - Independent lipid infusions not mixed with the primary parenteral nutrition solution will be filtered with a 1.2-micron filter.
10. A parenteral nutrition bag may hang for 24 hours. The 24-hour time period begins when the bag is spiked with the administration set. After 24 hours the solution is expired and must be discontinued.
11. TPN should remain refrigerated and protected from light. Remove the bag from refrigeration approximately one hour for every liter of fluid in the bag to warm to room temperature prior to hanging.
12. Lipid only bags are not to be refrigerated. Do not shake lipid bags.
13. The administration set used to administer parenteral nutrition is good for 24 hours and must be changed with each bag change.
14. Lipid infusions administered separately should be piggybacked into the parenteral nutrition infusion below the filter of the primary administration set. Lipids administered independently of the parenteral nutrition solution can infuse for 12 hours and then are considered expired and must be discontinued. Administration sets used exclusively for lipid infusions must be discarded after 12 hours.

15. Parenteral nutrition can be either continuous or cycled (given over a period of time less than 24 hours).
16. Cycled parenteral nutrition schedules will be ordered by the physician. **NOTE:** *Cycled TPN must be ramped to prevent possible dextrose-related complications.*
17. The central venous catheter will be flushed according to type of catheter. See SECTION 4.17 – FLUSH CHART.
18. TPN can be administered either as a: "two-in-one" or a "three-in-one" or total nutrient admixture formula.

TWO-IN-ONE	**THREE-IN-ONE**
• Formula contains **amino acids**, **carbohydrates**, and micronutrients. • Lipids are administered as a piggyback below the 1.2-micron filter of the primary infusion administration set.	• Formula contains **lipids** as well as **amino acids, carbohydrates**, and micronutrients.

19. The complete parenteral nutrition formula will be documented on the medication administration record.
20. Flush any Central Venous Access Device lumen used for Parenteral Nutrition immediately after each use with 20 mL saline. This includes flushing the catheter before hanging the new bag and tubing each day. If not resuming infusion immediately, follow with the appropriate heparin flush if indicated for the specific type of vascular access device.

INITIATING PARENTERAL NUTRITION INFUSION

Purpose

To infuse parenteral nutrition appropriately and safely per physician's orders.

Policy

The professional nurse with documented education and training in infusion therapy, including parenteral nutrition administration, as designated by the facility and as allowed by state regulations* may initiate a parenteral nutrition solution. Parenteral nutrition will be administered via an infusion pump following strict aseptic non-touch technique (ANTT®). ***Cycled TPN and the initial infusion of continuous TPN will be ramped due to possible dextrose-related complications.***

Equipment

- One (1) bag Parenteral Nutrition solution.
- Alcohol wipes.
- Administration set with 1.2-micron filter.
- Normal saline flush syringe.
- Infusion pump.

Procedure

1. Strict aseptic non-touch technique (ANTT®) must be used when manipulating all parenteral nutrition solutions and all venous access devices.
2. Remove parenteral nutrition from the refrigerator one hour per liter prior to administration. DO NOT use any artificial means of warming the solution.
3. Check label on bag for correct formula against physician orders. (Double-checking/ verification with two nurses may be required depending on state and facility requirements.) Before hanging the bag, label the bag with the date, time and nurse's initials.
4. Perform hand hygiene and don gloves.
5. Add medications to bag as ordered. Infusion of the parenteral nutrition must be started within one hour of adding medications to the bag. Attach a label to the bag documenting the medications added.
6. Assemble administration set. Remove protective cap on bag and tubing spike. Spike bag. Prime tubing to gravity or per pump manufacturer's guidelines if priming via the IV pump. (Bag expires 24 hours after it is spiked with the tubing.). Label the administration set accordingly.

7. Load tubing into pump and program according to instructions.
8. SCRUB the needleless connector of the lumen on central venous access device to be used for parenteral nutrition with alcohol and allow to dry.
9. Connect a normal saline flush syringe and aspirate for a blood return.
10. Flush with 10 mL normal saline and remove the flush syringe.
11. SCRUB the needleless connector again with alcohol and allow to dry.
12. Attach the primed administration set.
13. Open all clamps. Begin infusion.
14. Document administration on medication administration record.

ADDING MEDICATIONS TO PARENTERAL NUTRITION

Purpose

To correctly and safely add medications to a parenteral nutrition solution.

Policy

The professional nurse with documented education and training in infusion therapy, including parenteral nutrition administration, as designated by the facility and as allowed by state regulations* may add medications to a parenteral nutrition solution.

1. Medications will be added using strict aseptic non-touch technique (ANTT®).
2. All additives will be checked against the prescriber's order.
3. Only those medications with limited stability (e.g., some multivitamin preparations, insulin, H_2 inhibitors, vitamin K, etc.) may be added at the facility.
4. No additives are to be injected into a partially infused bag of parenteral nutrition or lipid infusions.
5. Consult with pharmacy for appropriate sequence of adding medications.
6. Mix bag thoroughly (do not shake) after each addition and before adding another drug or electrolyte.
7. Label the bag with all medication additives. The nurse who adds the medication must initial the label.
8. Infusion of the parenteral nutrition solution must begin no later than one hour after the medications are added to the bag.

*Some states may <u>not</u> allow medications to be added in the facility or may limit who can perform this procedure by licensing category.

Equipment

- One (1) bag Parenteral Nutrition solution.
- Alcohol wipes.
- Medications to be added to the solution.
- Appropriate syringes and needles.

Procedure

1. Perform hand hygiene and don gloves.
2. Draw additives up in individual labeled syringes using strict aseptic non-touch technique. (ANTT®). If using a multi-dose vial (i.e., regular insulin) date, time and initial vial and store appropriately.
3. Cleanse injection port on parenteral nutrition bag with alcohol swab for 60 seconds and allow to dry. Take care that the injection port does not touch counter after cleaning.
4. Carefully insert needle of first additive into port and instill medication into the bag. Gently rotate bag to mix.
5. Repeat steps 3 and 4 until all medications have been added to the bag.
6. Dispose of syringes and needles in appropriate sharps container.
7. Remove gloves and perform hand hygiene.

FAT EMULSIONS (LIPIDS) GENERAL POLICIES

Definition

Fat emulsions are administered to provide a concentrated source of calories and/or to prevent essential fatty acids deficiency to residents unable to take in or tolerate oral and/or enteral feedings.

Purpose

To provide for the safe administration of fat emulsions when administering independently of parenteral nutrition.

Policy

The professional nurse with documented education and training in infusion therapy, including administration of parenteral nutrition formulas, as designated by the facility and as allowed by state regulations* may administer lipid emulsions.

1. The physician's order must include:
    - Percentage of lipid – available in 10% and 20% solutions.
    - Volume and frequency.
    - Rate of administration.
    - The pharmacy can assist with fluid composition and rate recommendations.
2. Lipids are administered:
    - Via a central venous access device. Lipids are a moderate risk vesicant as documented in the 2024 INS vesicant list.
    - In conjunction with parenteral nutrition via Y-connector or injection port <u>below the filter</u> of the primary solution container (as close to injection site of I.V. access as possible). The lipids are infused simultaneously with the TPN via a second infusion pump. DO NOT stop the TPN while the lipids are infusing.
    - As part of a 3 in 1 TPN solution (if included in the main bag, see previous policies).
3. Emulsions will be checked for signs of instability (i.e., inconsistent texture, discoloration, or separation of ingredients).
4. Never shake or add anything to the fat emulsion bag.
5. Do not refrigerate lipids, unless part of three-in-one solution.
6. Lipids must be administered using an administration set with a 1.2-micron filter.
7. Lipids must be administered using an infusion pump.

8. Lipids administered separately expire after 12 hours and the administration set used should be discarded after 12 hours.

Equipment

- One (1) bag lipid emulsion.
- Alcohol wipes.
- Administration set with 1.2-micron filter.
- Normal saline flush syringe.
- Infusion pump.

Procedure

1. Strict aseptic non-touch technique (ANTT®) must be used when manipulating all parenteral nutrition solutions and all venous access devices.
2. Check label on bag and verify against physician orders. (Double-checking/verification with two nurses may be required depending on state and facility requirements.) Before hanging the bag, label the bag with the date, time and nurse's initials.
3. Perform hand hygiene and don gloves.
4. Assemble administration set. Remove protective cap on bag and administration set spike. Spike bag. Prime administration set to gravity or per pump manufacturer's guidelines if priming via the IV pump. (Bag expires 12 hours after it is spiked with the tubing.) Label the administration set with the date and time.
5. Load the set into the pump and program according to instructions.
6. SCRUB the side port of the primary parenteral nutrition administration set below the filter with alcohol and allow to dry.
7. Connect the lipid emulsion administration set to the side port of the primary parenteral nutrition administration set below the filter.
8. Open all clamps. Begin infusion.
9. Document administration on medication administration record.

PARENTERAL NUTRITION PROCEDURES SUMMARY CHART

PROCEDURE	CHANGE FREQUENCY
Parenteral Nutrition bag.	Every 24 hours
Administration set (for continuous parenteral nutrition without lipids).	Every 24 hours
Administration set (for continuous parenteral nutrition tubing with lipids).	Every 24 hours
Administration set (for cycled parenteral nutrition).	With bag change
Needleless connector.	Every 96 hours
CVAD Dressings.	Weekly and PRN
Administration set (for lipid only infusion)	Every 12 hours

Flush any Central Venous Access Device lumen used for Parenteral Nutrition immediately after each use with 20 mL saline. This includes flushing the catheter before hanging the new bag and administration set each day. If not resuming infusion immediately, follow with the appropriate heparin flush if indicated for the specific type of vascular access device.

SEE SECTION 4.17 – FLUSH CHART

MONITORING AND ASSESSMENT OF THE RESIDENT RECEIVING PARENTERAL NUTRITION

Purpose

To monitor the resident for safe administration of parenteral nutrition and identify signs and symptoms of complications.

Policy

Follow Licensed Independent Practitioner's orders for monitoring the resident receiving TPN.

Recommended assessments include:

- Weight.
- Vital signs.
- Abdominal assessment.
- Blood glucose checks with sliding scale insulin as ordered by LIP.
- Monitor hydration status and record intake and output.
- Lab monitoring as ordered by the LIP. Parenteral nutrition orders will be adjusted accordingly. Report results to the pharmacy.

  Recommended lab tests include:

CBC	Electrolytes
Blood glucose	BUN
Serum creatinine	Liver function studies
Serum albumin	Total protein
Magnesium	Amylase
Phosphorous	Calcium
Pre-Albumin	TIBC (transferrin) *may be done monthly*

It is the responsibility of the facility to promptly notify appropriate individuals should an assessment warrant provider notifications or further orders.

Accurate and timely documentation of assessments and provider notifications should occur.

PARENTERAL NUTRITION COMPLICATIONS

PROBLEM	SYMPTOMS	CAUSE	ACTION	PREVENTION
Hyperglycemia	Nausea/Vomiting. Weakness. Thirst. Headache. Elevated glucose. Polyuria. Anxiety.	TPN infused too rapidly. Infection.	Check blood sugar levels. Administer insulin per sliding scale. Notify physician.	Use appropriate rate control to prevent a too rapid infusion. Taper rate up gradually when initiating infusion. Note that hyperglycemia may be an indication of a developing blood stream infection.
Hypoglycemia	Sweating. Pallor. Palpitations. Nausea. Headache. Shakiness. Blurred vision. Lightheadedness.	TPN stopped abruptly.	Check blood sugar levels. Notify physician. Hang 10% dextrose per prescriber's order.	Monitor blood glucose levels. Taper rate down gradually when stopping infusion.
Infection	Redness, drainage at insertion site. Temp. >101°. Chills. Sweating. Lethargy. ↑ glucose.	Poor aseptic technique. Contaminated TPN. Contaminated tubing.	Notify physician.	Proper technique when handling TPN, tubings, and catheter.
Catheter Blockage	Infusion will not run. Unable to flush.	Crystallized TPN. Fibrin clot.	Notify physician. Refer to P&P for catheter occlusion.	Proper flushing of catheter. Proper storage of TPN. Use appropriate filter.
Electrolyte Imbalances: Hyper/Hypokalemia Hyper/Hyponatremia Hyper/Hypochloremia Hyper/Hypomagnesemia Hyper/Hypocalcemia	Increased irritability. Confusion. Decreased level of consciousness. Weakness. Muscle weakness. Cardiac arrhythmias. Restlessness. Nausea and vomiting. Paresthesia.	Resident's reaction to electrolyte additives in TPN.	Notify physician of signs and symptoms and abnormal lab values.	Careful monitoring of lab values. Assessment for signs and symptoms of imbalances.

PROBLEM	SYMPTOMS	CAUSE	ACTION	PREVENTION
Essential Fatty Acid Deficiency	Dry, scaly skin. Impaired wound healing. Decreased platelet count. Bleeding.	Occurs when essential fatty acids inadequate in resident's diet.	Notify physician. Administer fat emulsion as ordered.	Resident should have order for fat emulsion at least 1-3 times per week.
Trace Mineral Deficiency	**Zinc deficiency:** diarrhea, dermatitis, hair loss. Loss of taste and smell. Impaired wound healing. **Chromium deficiency:** Weight loss. Glucose intolerance. Diabetic neuropathy. **Copper deficiency:** Anemia. Leukopenia. Hyporeninemia. **Magnesium deficiency:** Weight loss. Dermatitis. Nausea, vomiting. Slow growth. **Iodine deficiency:** Thyroid enlargement.	Occurs when trace elements inadequately supplied.	Notify physician of signs and Symptoms and/or irregular lab values.	Administer trace elements as ordered.

CHEMOTHERAPY POLICIES AND PROCEDURES

Table of Contents

GENERAL POLICIES AND PROCEDURES IN CHEMOTHERAPY ADMINISTRATION

Purpose

To safely administer and provide appropriate monitoring of antineoplastic medications and/or solutions in the long-term care setting.

Policy

ONLY REGISTERED PROFESSIONAL NURSES WHO HAVE COMPLETED A SPECIALIZED EDUCATION AND COMPETENCY PROGRAM (ACCORDING TO ONCOLOGY NURSING SOCIETY GUIDELINES AND STATE AND FACILITY REGULATIONS) SHOULD BE ALLOWED TO ADMINISTER ANTINEOPLASTIC THERAPY IN THE LONG-TERM CARE SETTING.

Definition

Chemotherapy is the administration of medication designed to inhibit or prevent the growth of cancer cells. The aim of treatment may be either cure or reduction of tumor burden to improve quality of life.

Facility Responsibilities

1. It is the responsibility of the facility to ensure that any registered nurse administering chemotherapy or caring for the
2. resident receiving chemotherapy has the knowledge, skills, and documented proof of competency prior to assuming care of a chemotherapy resident.
3. A chemotherapy-qualified registered nurse will be on the premises at all times, while chemotherapy is infusing.
4. The facility must have an established IV program.
5. The facility is responsible for obtaining necessary supplies prior to initiating therapy.
6. The facility must provide for the disposal of chemotherapy waste.
7. The facility must provide for a quality assurance program to evaluate the safe administration of the program.
8. It is recommended the facility involve Dietary, Housekeeping, and Social Service Departments in the planning of care for residents receiving chemotherapy.
9. All nursing staff employees and ancillary departments will be made aware of their potential exposure to cytotoxic matter.

CHEMOTHERAPY PRE-ADMINISTRATION

Purpose

To provide the nurse with resident and drug information and to assure adequate resident education.

Policy

ONLY REGISTERED PROFESSIONAL NURSES WHO HAVE COMPLETED A SPECIALIZED EDUCATION AND COMPETENCY PROGRAM (ACCORDING TO ONCOLOGY NURSING SOCIETY GUIDELINES AND STATE AND FACILITY REGULATIONS) SHOULD BE ALLOWED TO ADMINISTER ANTINEOPLASTIC THERAPY IN THE LONG-TERM CARE SETTING.

1. The nurse administering antineoplastic therapy will review the resident's history including:
    - Recent treatment, including surgery, prior antineoplastic therapy, radiation, and biologic or hormonal therapy.
    - Medical and surgical history as appropriate including allergies.
    - Psychosocial status of the resident, significant others and family.
    - Physical performance status.
2. The nurse administering antineoplastic therapy will:
    - Verify that written informed consent has been obtained.
    - Assess level of resident understanding, anxiety, other potential barriers to learning as well as desired level of decision making and participation in care.
    - Address various resident educational topics:
        a. Treatment plan.
        b. Treatment goals.
        c. Drug names.
        d. Side effects and rationale for frequency of laboratory tests.
        e. Administration of pre-medications or other medications or hydration.
3. The nurse administering antineoplastic therapy will perform the following pre-administration procedures:
    - Accept ONLY written orders for antineoplastic therapy.
    - Verbal orders may be accepted only for holding therapy or discontinuing therapy.
    - Compare written orders to formal drug protocol.
    - Orders must include:
        a. Name of drug.
        b. Dose per body surface area (mg/m^2).

c. Total dose to be given.
d. Route and mode of administration including infusion rate.
e. Frequency of administration of doses.
f. Specific monitoring parameters.
g. All other adjuvant medications being given, including dose and administration instructions.
h. Protocols for extravasation management, if appropriate.
    - Identify all expected side effects or toxicities for the drug(s) being administered and a plan for management.
    - The physician's order and approved protocols for the management of extravasation or hypersensitivity reactions must be available before administering chemotherapy.

- Check the drug container for accuracy of resident name, route, antineoplastic agent, dose, volume, administration instructions and drug expiration (this should be checked by two nurses).

4. The nurse administering antineoplastic therapy will assess the resident prior to each treatment cycle:
    - Review current labs and diagnostic tests.
    - Review current medication list.
    - Consult with pharmacist to review drug interactions with any changes in the resident's medication list.
    - Review resident's medical history including co-morbidities.
    - Review risk factors for adverse reactions and expected side effects and presence of new signs and symptoms of toxicity.
    - Review allergies.
5. The nurse administering antineoplastic therapy will implement safeguards to reduce the risk of medication errors:
    - Use standardized orders, standardized dosage calculations, established dosage limits.
    - Perform an independent double check with two nurses to verify antineoplastic order.
    - Monitor cumulative antineoplastic dose to ensure that the drug is discontinued when the maximum lifetime dose is reached.

CHEMOTHERAPY ADMINISTRATION

Purpose

To assure correct administration of antineoplastic agents.

Policy

ONLY REGISTERED PROFESSIONAL NURSES WHO HAVE COMPLETED A SPECIALIZED EDUCATION AND COMPETENCY PROGRAM (ACCORDING TO ONCOLOGY NURSING SOCIETY GUIDELINES AND STATE AND FACILITY REGULATIONS) SHOULD BE ALLOWED TO ADMINISTER ANTINEOPLASTIC THERAPY IN THE LONG-TERM CARE SETTING.

1. The nurse administering chemotherapy will:
    - Work within the designated medication handling area.
    - Have a chemotherapy spill kit and chemotherapy waste receptacle readily available.
    - Use a disposable, absorbent, plastic-backed pad underneath the work area to absorb droplets of the drug that inadvertently may be spilled on the work surface.
    - Wear a protective gown made of lint free, low permeability fabric with a solid front, long sleeves, and tight-fitting elastic or knit cuffs.
    - Wear powder free, disposable double gloves that have been approved for use with chemical waste (i.e., nitrile).
    - Change gloves after each use, tear, puncture, or medication spill or after 30 minutes of wear.
    - Wear a NIOSH approved respirator mask, eye, and face protection.
    - Prime all administration sets with a non-drug containing fluid prior to adding chemotherapy drugs. **Do not prime with drug.**
2. Vesicant antineoplastic agents given intermittently may be administered through a short peripheral or central venous catheter (Preferred).
3. Peripheral vesicant antineoplastic administration requires **continuous** observation of the site throughout the infusion.
    - Limit peripheral administration of vesicant medications to IV push or infusions lasting no more than 30 minutes.
    - Remain with the resident during the entire infusion.
    - **DO NOT** use an infusion pump for peripheral vesicant administration.
    - Choose a large, smooth, palpable vein for PIV insertion.
    - Choose the smallest gauge catheter possible.
    - Avoid the following IV sites: dorsal surface of the hand, wrist, antecubital fossa, near a joint, lower extremities, areas distal to recent venipunctures (including lab draws), and in the limb where there is impaired sensation, circulation or lymphatic drainage or history of lymph node dissection.

- Do not use an IV site that is greater than 24 hours old.
- **Assess and verify blood return prior to the infusion and every 2-5 mL for IV Push and every 5 minutes during an infusion.**

4. Vesicant antineoplastic agents given as a **continuous** infusion must be administered through a **central venous catheter**.
    - Do not infuse continuous vesicant antineoplastic medications through long PIV catheters or midline catheters.
    - The rate must be controlled using an electronic infusion pump.
    - Confirm and document a blood return prior to vesicant administration and during the infusion at established intervals (recommend every 5 minutes).
    - Do not administer if signs of inflammation, swelling or venous thrombosis are present.
    - Ensure proper placement and stabilize the non-coring needle within implanted vascular access ports.
5. All connections used for the administration of chemotherapy agents must have luer-locking tips.

CHEMOTHERAPY ADMINISTRATION GUIDELINES

Type of Administration	Considerations
IV Push	Check for patency, verify blood return and observe site for complications before drug administration.
	Attach syringe to Y-site on the administration set closest to resident. Do not pinch the set during administration. **Maintenance IV should be flowing during chemotherapy administration.**
	When administering a vesicant, verify blood return every 2-5 mLs during administration with gentle aspiration.
	Stop infusion if change in sensation, pain, burning, stinging, or swelling occurs at the IV site, or if unable to obtain blood return.
Continuous	Vesicant agents should NOT be administered continuously through a short peripheral IV, long peripheral IV, or midline catheter but should be given through a central venous catheter using an infusion pump.
Intermittent Piggyback	If giving a vesicant, check condition of IV site every 5 minutes by aspirating through the Y-port closest to the IV catheter. Site checks may need to be readjusted depending on rate or volume of infusion.
	Vesicants should be administered one at a time unless the protocol stipulates that they be given simultaneously.

EXTRAVASATION

Purpose

To establish appropriate treatment of an extravasation of a vesicant chemotherapeutic agent.

Policy

1. Extravasation will be treated according to the protocol for the specific vesicant drug being administered. Obtain specific physician's orders prior to initiating chemotherapy treatment.
2. An extravasation kit will be available when vesicant medication is being administered.

Procedure

1. Stop the infusion immediately and notify the physician.
2. Do not flush the vascular access device.
3. Disconnect the administration set and attempt to aspirate the drug as follows:
    - For peripheral IV catheters, use tuberculin syringes then remove the catheter.
    - If extravasation is the result of needle dislodgment in a port, leave the needle in place and attempt to aspirate the residual drug. If unsuccessful, remove the needle from the port.
    - For all other central lines, attempt to aspirate with a 3 mL syringe.
    - Avoid application of pressure to the area.
    - Elevate the extremity to encourage lymphatic reabsorption.
    - Do not use the affected extremity for subsequent IV insertion until resolved.
    - Assess insertion site and surrounding tissue.
        - Assess the area distal to the site for capillary refill, sensation, and motor function.
        - Using a skin marker, outline the area suspected of infiltration or extravasation to assess progression.
        - Photograph the area to identify progression or exacerbation of the tissue injury according to facility policy.
        - Estimate the volume of solution that has escaped into the tissue.
4. Activate the appropriate treatment protocol.
5. Monitor site for any changes or delayed reactions.
6. Document:
    - Approximate amount of drug and fluid involved in extravasation.
    - Site appearance prior to treatment of extravasation.
    - Interventions and response.

NURSING ASSESSMENT OF EXTRAVASATION VERSUS OTHER REACTIONS

Assessment Parameter	Extravasation		Irritation of the Vein	Flare Reaction
	Immediate	Delayed		
Pain	Severe pain or burning that lasts minutes or hours and eventually subsides; usually occurs while the drug is being given and around the needle site.	Hours-48	Aching and tightness along the vein.	No pain.
Redness	Blotchy redness around the needle site; it is not always present at time of extravasation.	Later occurrence.	The full length of the vein may be reddened or darkened.	Immediate blotches or streaks along the vein which usually subside within 30 minutes with or without treatment.
Ulceration	Develops insidiously; usually occurs 48-96 hours later.	Later occurrence.	Not usually.	Not usually.
Swelling	Severe swelling; usually occurs immediately.	Hours-48	Not likely.	Not likely; wheals may appear along vein line.
Blood Return	Poor or no blood return.		Usually.	Usually.
Other	Change in quality of infusion.	Local tingling and sensory deficits.		Urticaria.

From *Cancer Chemotherapy Guidelines and Recommendations for the Management of Vesicant Extravasation, Hypersensitivity, and Anaphylaxis* (p.11) by Oncology Nursing Society, 1992.

SAFE HANDLING OF CYTOTOXICS

Purpose

To provide for safe handling of cytotoxic drugs, supplies and equipment.

Policy

All drugs should be labeled "cytotoxic hazard" and should be checked before transport from storage area to ensure that the package is intact.

1. Administration:
    - Protective apparel will be worn, including a gown with long sleeves and closed, knit cuffs and two pairs of powder free gloves that have been approved for use with chemical waste (i.e., nitrile). One pair of powder free gloves should be worn under the cuffs of the gown and one pair should be worn over the cuffs of the gown.
    - A disposable, absorbent pad will be placed under the area where the drug is being administered.
    - Hands must be washed before and after handling the drug; avoid direct contact with the drug, and always wear gloves when handling it.
    - Surfaces that come in contact with the drug must be washed with soap and water; dispose of toweling in a chemotherapy waste receptacle.
    - It is the individual institution's responsibility to develop policies regarding the administration of chemotherapy by pregnant personnel.
    - Luer-lock fittings are required for administration sets and syringes.

2. Handling Body Fluids after Chemotherapy Administration:
    - Standard precautions are used when handling blood, vomitus, or excreta of residents who have received chemo within the past 48 hours. A gown and goggles are worn when appropriate and if splashing is expected.
    - For incontinent adults, a protective ointment will be applied to the incontinent brief area to avoid painful chemical burns when voiding. The skin must be cleaned well with each incontinent brief change and incontinent briefs should be changed frequently.
    - The toilet will be covered and then flushed twice after disposing of body excreta from residents who have received chemotherapy within the past 48 hours.

3. Linen Disposal:
    - Standard precautions must be used when handling linens soiled with blood or body fluids.
    - Linens contaminated with chemotherapy or excreta from residents who have received chemotherapy within the past 48 hours should be contained in specially marked impervious bags. Linens should be pre-washed separately and then added to facility laundry for a second wash.

4. Supplies and Equipment:
    - All supplies will be disposed of according to facility policy for bio-hazardous waste materials.
    - Needles, syringes and breakable items must be placed in a puncture proof container marked "bio-hazardous waste."
    - A specially designated container for disposal of chemotherapy equipment will be available in every area where the drugs are prepared or administered.
    - Contaminated reusable items (i.e., pumps, etc.) are washed by trained personnel wearing double surgical powder free gloves.

5. Accidental Exposures:
    - Appropriate personal protective equipment (gown, gloves, eye protection, masks) should be worn for the following:
        a. Withdrawing needles from vials.
        b. Transferring drugs using needles or syringes.
        c. Opening ampules.
        d. Expelling air from a drug-filled syringe.
        e. Injecting the drug.
        f. Changing IV bags or administration sets of continuous infusions.
        g. Priming administration sets.
        h. Handling leakage from administration sets, syringe or connection site.
    - In the event of an accidental exposure, contaminated gloves or gown will be removed immediately and discarded in a hazardous waste container. Wash the contaminated skin with soap and water. If an eye is involved, flood the eye with water or isotonic eye wash for at least five (5) minutes. Dispose of contact lenses if applicable. Obtain a medical evaluation as soon as possible and document the incident according to facility policy.

6. Spills:
    - A commercially prepared spill kit will be available at all times in the facility. Follow manufacturer's instructions provided in kit. Spills must be immediately identified with the warning sign provided in kit.
    - Spills of less than 5 mL are to be cleaned immediately by trained personnel wearing double powder free gloves and gown. Ensure that absorbent gauze pads or plastic-backed absorbent paper is used followed by a thorough cleansing with a detergent. (Clean three (3) times followed by clean water.) Dispose of all materials in receptacles labeled "bio-hazardous waste."
    - Spills of over 5 mL will be covered with an absorbent pad. Personnel will wear double gloves, gown, goggles and respirator (available in spill kit). After spill is

absorbed into pad, the area will be cleaned with a detergent solution followed by clean water. All materials will be disposed of in receptacles labeled bio-hazardous waste.

- If spills occur on a carpeted surface, the spill will be absorbed as much as possible with absorbent toweling. The surface is then cleaned three (3) times with soap and water. Carpet cleaners will not be used on spills because they may trigger a chemical reaction. All materials will be disposed of in receptacles labeled “bio-hazardous waste.”
- All spills must be documented and reported according to facility policy. (If a large spill, OSHA may get involved.)

PAIN MANAGEMENT

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IV ADMINISTRATION OF CONTINUOUS ANALGESIA

Purpose

To provide for the safe infusion of analgesics at a constant rate using the IV route.

Policy

A nurse with documented education and training in infusion therapy, including IV analgesia administration, as designated by the facility and as allowed by state regulations, may administer IV analgesia.

1. A central venous access device is recommended to decrease vein irritation and guarantee continuity of therapy.
2. Pain assessment is to be completed before the start of therapy.
3. The Licensed Independent Prescriber will order all medication and appropriate dosage for pain management. If dosage is to be titrated up or down, the prescriber MUST specify the amount and frequency of making such adjustments to the rate or bolus doses.
4. A double check by a second clinician using independent verification is recommended prior to initiation of the PCA and when the solution container, drug or rate is changed. Give special attention to drug, concentration, dose, and rate of infusion according to the order and as programmed into the electronic infusion device in order to reduce the risk of adverse outcomes and medication errors.
5. An order for administration of alternative medications should be obtained in the event that the infusion is unexpectedly interrupted and cannot be resumed immediately. The order should include drug; dose; route; frequency.
6. A response to treatment will be monitored and documented at established intervals in the medical record.
7. All continuous infusions and bolus doses will be administered via infusion pump (a locked device may be required by state policy).
8. The resident's vital signs, blood pressure, and LOC (level of consciousness) will be monitored on initiation or dosage change of a medication and at established intervals.
9. Naloxone hydrochloride (Narcan®) should be available in the event of *acute and unexpected over-sedation.* (Individuals who are dying may have a normal increasing respiratory depression and Narcan® is not appropriate for use in this situation.)
10. Administration set changes will be done with bag/cassette changes.

Equipment

- Medication cassette/bag.
- Pump.
- Appropriate administration set.
- Alcohol pads.
- One (1) pre-filled sodium chloride flush syringe.
- Gloves.

Procedure

1. Explain procedure to resident, obtain informed consent.
2. Perform hand hygiene and don gloves.
3. Gather equipment.
4. Review medication label and confirm correct resident name, drug name, concentration, dose, rate, route, and expiration date. Verify with second licensed clinician.
5. Confirm correct pump settings with second licensed clinician.
6. Connect administration set to bag or cassette and then connect to the pump and prime the tubing.
7. Assess IV site for any signs or symptoms of complications.
8. Assess resident's respiratory status, blood pressure, level of consciousness (LOC), and level of pain.
9. For an initial infusion - Scrub the needleless connector on IV catheter and allow to dry.
10. Attach a normal saline flush syringe, aspirate for blood return to check for catheter patency, then flush catheter with 10 mL preservative free 0.9% sodium chloride.
11. For subsequent bag or cassette changes - **DO NOT FLUSH THE CATHETER BETWEEN BAG CHANGES AS A BOLUS OF NARCOTIC MAY OCCUR.**

    In order to check patency of the catheter between bag changes:
    - Scrub the needleless connector with an alcohol swab and allow to dry.
    - Attach an empty 10 ml syringe and aspirate the narcotic out of the catheter until a blood return is determined positive.
    - Dispose of the syringe in an appropriate biohazard container.
    - Scrub the needleless connector with an alcohol swab and allow to dry.
    - Flush the catheter with 0.9% sodium chloride flush.
12. Scrub the needleless connector with an alcohol swab and allow to dry.
13. Connect the administration set to the needleless connector on IV catheter.
14. Start the infusion at the prescribed rate.
15. Remove gloves and perform hand hygiene.
16. Monitor for desired and possible side effects of medication. This is especially important when increasing or decreasing doses. Be prepared to decrease or stop infusion or give naloxone hydrochloride (Narcan®). Monitor for LOC, respiratory depression and assess pain level at established intervals and document according to facility policies.

SUBCUTANEOUS ADMINISTRATION OF CONTINUOUS ANALGESIA

Purpose

To provide for the safe infusion of analgesics at a constant rate using the subcutaneous route (SC).

Policy

A nurse with documented education and training in infusion therapy, including subcutaneous analgesia administration, as designated by the facility and as allowed by state regulations, may administer analgesia via the subcutaneous route.

1. The subcutaneous route may be chosen as an alternative route to IV if vascular access is limited or will be too difficult to maintain (see SECTION 5.14 – INSERTION OF A SUBCUTANEOUS INFUSION SET).
2. The pain assessment is to be completed before the start of therapy.
3. A response to treatment will be monitored and documented at established intervals.
4. The prescriber will order all medication and appropriate dosage for pain management.
5. A double check by a second clinician using independent verification is recommended prior to initiation of the PCA and when the solution container, drug or rate is changed. Give special attention to drug, concentration, dose, and rate of infusion according to the order and as programmed into the electronic infusion device in order to reduce the risk of adverse outcomes and medication errors.
6. An order for administration of alternative medications should be obtained in the event that the infusion is unexpectedly interrupted and cannot be resumed immediately. The order should include drug, dose, route, and frequency.
7. All continuous infusions will be administered via infusion pump (a locked device may be required by state policy).
8. The resident's vital signs, blood pressure, and LOC (level of consciousness) will be monitored on initiation or dosage change of a medication and at established intervals.
9. Sites for subcutaneous infusion may include thighs, abdomen, deltoid, or pectoral areas.
10. A maximum recommended rate is 2-3 mL/hr. Infusion rates faster than 3 mL/hr may cause site irritation, depending on drug concentration. If the site is red, hard, painful to resident, or leaking, a site change is required.
11. Subcutaneous infusion sites should be changed when clinically indicated based on assessment of the site.
12. A transparent dressing should be used over the infusion site. Date, time, and initial the dressing.

13. Naloxone hydrochloride (Narcan®) should be available in the event of *acute and unexpected over-sedation.* (Individuals who are dying may have a normal increasing respiratory depression and Narcan® is not appropriate for use in this situation.)

Equipment

- Medication cassette/bag.
- Pump.
- Appropriate administration set.
- Quick Set Subcutaneous infusion set.
- Alcohol pads.
- One (1) pre-filled sodium chloride syringe.
- Central line dressing change kit (for gloves, prep and dressing).

Procedure

1. Explain procedure to resident, obtain informed consent.
2. Perform hand hygiene and, don gloves.
3. Gather equipment.
4. Review medication label and confirm correct resident name, drug name, concentration, dose, rate, route, and expiration date. Verify with second licensed clinician.
5. Confirm correct pump settings with second licensed clinician.
6. Connect administration set to bag or cassette and then connect to the pump and prime the tubing as necessary.
7. Assess resident's respiratory status, blood pressure, level of consciousness (LOC), and level of pain.
8. **Follow the policy/procedure in section 5.14 on insertion of the Quick Set subcutaneous infusion set steps 1-16.**
9. Scrub the needleless connector on the subcutaneous infusion set and allow to dry.
10. Connect tubing from pump to the subcutaneous infusion set.
11. Start the infusion at the prescribed rate.
12. Remove gloves and perform hand hygiene.
13. Monitor for desired and possible side effects of medication. This is especially important when increasing or decreasing doses. Be prepared to decrease or stop infusion or give naloxone hydrochloride (Narcan®). Monitor for LOC, respiratory depression and assess pain level at established intervals and document according to facility policies.

PREPARING AN EPIDURAL CATHETER FOR ADMINISTRATION OF ANESTHETIC/ANALGESIC

Purpose

To assure safe access of an epidural catheter for the administration of analgesia or anesthesia.

Policy

1. **ONLY NURSES WITH DOCUMENTED EDUCATION AND TRAINING IN EPIDURAL ANALGESIA ADMINISTRATION, AS DESIGNATED BY THE FACILITY AND AS ALLOWED BY STATE REGULATIONS, MAY PREPARE AND ADMINISTER EPIDURAL ANALGESIA.**
2. Sodium chloride used to attain access must be **preservative-free**. Preservatives may cause severe neurotoxicity.
3. **DO NOT USE ALCOHOL OR PHENOL FOR ANY PROCEDURE.** Potential migration of alcohol into the epidural space may result in neural damage. Alcohol is not used as a skin prep, on the catheter needleless connector or on the vial of sodium chloride.
4. Use only povidone iodine for prep. Solutions that contain alcohol must not be used.
5. ***IV FILTERS USED FOR THE ADMINISTRATION OF EPIDURAL MEDICATION MUST BE SURFACTANT-FREE. CLARIFY WITH MANUFACTURER IF NECESSARY TO ASSURE THAT FILTERS ARE SURFACTANT-FREE.**
6. Filter is to be clearly marked "Epidural" or "Do Not Inject."
   ** Filters manufactured by Abbott and Baxter since 1998 are surfactant-free.*

Equipment

- 0.22-micron filter (surfactant-free).
- Needleless connector.
- Central line dressing kit **OR**
  - Sterile gloves.
  - Mask.
  - Sterile 2x2 gauze.
  - Sterile 4x4 gauze.
  - Povidone iodine swabsticks (3).
- Second pair of sterile gloves.
- 0.9% sodium chloride (preservative-free).
- 3 mL syringe.
- Tape.

For implanted ports:

- Safety non-coring needle with extension.

Procedure:

External Catheters	*Implanted Ports*
Assemble supplies: Prepare sterile field using drape or 4x4 from central line kit. Open 0.22-micron filter and needleless connector onto sterile field.	**Assemble supplies:** Prepare sterile field using drape or 4x4 from central line kit. Open 0.22-micron filter and needleless connector onto sterile field. Open non-coring needle onto field.
Prepare flush, needleless connector and filter: ***Sterile syringes*** ▪ Open 3 mL syringes onto sterile field. ▪ Don sterile gloves. ▪ Attach needleless connector to filter and set down on sterile field. ▪ Put aside (on sterile field) 2x2 gauze pad. ▪ Draw up 2 mL preservative free sodium chloride into each of the 3 mL syringes. ▪ Return one syringe to sterile field. ▪ Inject the contents of second syringe onto 2x2 gauze pad and discard empty syringe. ▪ Remove gloves. ▪ Don second pair of sterile gloves. ▪ Connect saline syringe to needleless connector, prime filter and extension to remove all air. Return equipment to sterile field, leaving syringe attached. ***Non-Sterile syringes*** ▪ Draw up 2 mL preservative free sodium chloride into each of 3 mL syringes (omit this step if using pre-filled syringes). ▪ Don sterile gloves. ▪ Attach needleless connector to filter and set down on sterile field. ▪ Put aside (on sterile field) 2x2 gauze pad. ▪ Connect one syringe to needleless connector, maintaining sterility of needleless connector and filter. Prime filter and extension to remove all air. ▪ Set syringe down with syringe barrel mostly off of sterile field. Needleless connector and filter will be on sterile field. ▪ Inject contents of second syringe onto 2x2 gauze pad and discard empty syringe. ▪ Remove gloves.	**Prepare flush, needleless connector and filter:** ***Sterile syringes*** ▪ Open 3 mL syringes onto sterile field. ▪ Don sterile gloves. ▪ Attach needleless connector to filter. Connect filter to non-coring needle and set down on sterile field. ▪ Draw up 2 mL preservative free sodium chloride into a 3 mL syringe. ▪ Remove gloves. ▪ Don second pair of sterile gloves. ▪ Connect saline syringe to needleless connector, prime filter and extension to remove all air. Return equipment to sterile field, leaving syringe attached. ***Non-Sterile syringes*** ▪ Draw up 2 mL preservative free sodium chloride into each of 3 mL syringes (omit this step if using pre-filled syringes). ▪ Don sterile gloves. ▪ Attach needleless connector to filter and set down on sterile field. ▪ Connect syringe to needleless connector, maintaining sterility of needleless connector and filter. Prime filter and extension to remove all air. ▪ Set syringe down with syringe barrel mostly off of sterile field. Injection cap and filter will be on sterile field. ▪ Remove gloves.

External Catheters	***Implanted Ports***

Prepare catheter/site
▪ Remove needleless connector on catheter and clean around hub with saline soaked 2x2 gauze.
▪ Attach assembled filter, needleless connector and syringe to catheter hub.
▪ Attempt to aspirate from catheter.
  o No fluid should be present if catheter has not been previously accessed.
  o Aspiration should yield a maximum of 1 mL fluid if a continuous infusion has been interrupted; do not re-instill aspirated fluid.
  o The presence of blood or more than 1 mL clear fluid indicates the catheter has migrated out of the epidural space. **Do not use the catheter. Notify physician.**
▪ Remove syringe from needleless connector. **Do not instill contents of syringe into epidural space.**
	Prepare site
	▪ Clean around port with povidone iodine swabstick, starting at center and moving outward. Repeat x2 (total of 3). Allow two minutes to dry.
	▪ Stabilize port septum, insert non-coring safety needle into the septum until needle touches back of port chamber. If the back of the chamber cannot be reached, when needle is fully advanced, re-prep site and attempt insertion using a longer needle.
	▪ Attempt to aspirate from catheter.
	  o No fluid should be present if catheter has not been previously accessed.
	  o Aspiration should yield a maximum of 1 mL fluid if a continuous infusion has been interrupted; do not re-instill aspirated fluid.
	  o The presence of blood or more than 1 mL clear fluid indicates the catheter has migrated out of the epidural space. **Do not use the catheter. Notify physician.**
	▪ Remove syringe from needleless connector. **Do not instill contents of syringe into epidural space.**

Dressing ▪ Change dressing weekly by cleaning area with povidone iodine x 3. ▪ Apply occlusive dressing, either gauze or transparent membrane may be used. ▪ Label dressing with date and time of insertion and initials of person performing procedure. ▪ Document procedure.	**Apply Dressing** ▪ Apply occlusive transparent dressing. ▪ Label dressing with date and time of insertion and initials of person performing procedure. ▪ Change dressing and non-coring safety needle weekly or PRN. ▪ Document procedure.

ADMINISTRATION OF EPIDURAL ANESTHETIC/ANALGESIC

Purpose

To assure safe administration of anesthesia or analgesia through an epidural catheter.

Policy

1. **ONLY NURSES WITH DOCUMENTED EDUCATION AND TRAINING IN INFUSION THERAPY, INCLUDING EPIDURAL ANALGESIA/ANESTHESIA ADMINISTRATION, AS DESIGNATED BY THE FACILITY AND AS ALLOWED BY STATE REGULATIONS, MAY ADMINISTER EPIDURAL ANALGESIA/ ANESTHESIA. THE NURSE WILL BE KNOWLEDGEABLE OF SIDE EFFECTS AND WILL REPORT IMMEDIATELY TO THE PHYSICIAN IF ANY COMPLICATIONS BECOME APPARENT.**
2. Initial dose of epidural analgesia or anesthesia will be administered by, or under the direct supervision of, a physician who is trained in the management of epidural devices.
3. A physician's order will be obtained for medication, concentration and rate of infusion (if applicable).
4. The physician will be notified if any of the following occur:
    - Catheter dislodgment.
    - Numbness or tingling in legs.
    - Inadequate pain relief.
    - Respiratory depression.
    - Nausea or vomiting.
    - Excessive bleeding at site.
    - Uncontrolled pruritus.
    - Signs or symptoms of infection.
    - Urinary retention.
5. **Alcohol is contraindicated in conjunction with epidural catheters.** Potential migration of alcohol into the epidural space may result in neural damage. Alcohol is not used as a skin prep, on the catheter needleless connector, or on the vial of medication.
6. An infusion device/pump will be used for the administration of continuous infusion of epidural analgesia/anesthesia.
7. All pumps and administration sets will be clearly marked "Epidural."

8. **ALL MEDICATION ADMINISTERED BY THE EPIDURAL ROUTE WILL BE PRESERVATIVE-FREE**. All admixtures sent by the pharmacy will be labeled to indicate that no preservative is present. Medications which are not marked as **preservative-free** are not to be administered until clarification is attained.
9. *All epidural medication must be administered through a 0.22-micron filter unless contraindicated. IV filters used for the administration of epidural medication must be surfactant-free. Clarify with manufacturer if necessary to assure that filters are surfactant-free.
10. IV access must be available at all times in the event naloxone (Narcan®) is required.

* *Filters manufactured by Abbott and Baxter since 1998 are surfactant-free.*

Equipment

- Medication, preservative-free.
  - *For push:* draw up in 5 mL syringe or larger.
  - *For continuous infusion:* compatible fluid with no other additives; administration set, preferably without y-sites.
- Sterile gloves.
- Povidone iodine.
- 3 mL syringe.

Procedure

For push administration:

1. Ensure that 0.22-micron filter is attached to catheter. Refer to procedure regarding epidural catheter preparation.
2. Raise head of bed to at least 30°.
   - Head of bed must remain elevated for at least 30 minutes after injection to prevent upward migration of medication.
3. Verify that medication is correct and has been drawn up appropriately.
   - A 5 mL syringe or larger must be used.
   - Syringe must be labeled **Preservative-Free.**
4. Wash hands; don sterile gloves.
   - It will not be possible to maintain strict asepsis but as sterile as possible a technique is desired.
5. Prep needleless connector above filter.
   - Medication must be filtered through a 0.22-micron filter.
   - Use povidone iodine; allow to dry completely (two minutes).
   - **Do not use alcohol to prep needleless connector.**

6. Attach 3 mL syringe to needleless connector and attempt to aspirate from catheter.
    - No fluid should be present if catheter has not been previously accessed.
    - Aspiration should yield a maximum of 1 mL fluid if a continuous infusion has been interrupted; do not re-instill aspirated fluid.
    - The presence of blood or more than 1 mL clear fluid indicates the catheter has migrated out of the epidural space**. Do not inject medication; notify physician.**
7. Inject medication into catheter using firm pressure.
    - Firm pressure on plunger is required because the epidural space contains negative pressure.
    - Medication may be injected rapidly, approximately 1 mL per 1-2 seconds.
8. Remove syringe and discard after administration.
    - Do not flush catheter with saline to clear line; dosing will account for overfill volume.
9. Remove gloves and perform hand hygiene.
10. Document on MAR.

For continuous infusion:

1. Assess need to change solution container.
    - Expiration date may vary depending on medication and vehicle used for dilution.
2. Remove fluid from refrigerator one (1) hour prior to use.
3. Verify that medication is correct.
    - Solution should not contain other additives.
    - Solution container must be labeled "**Preservative-Free**."
4. Ensure that 0.22-micron filter is attached to catheter. Refer to procedure regarding epidural catheter preparation.
5. Spike medication bag with the administration set and prime to remove all air; maintain sterility of the end of the administration set; prepare infusion pump according to orders.
    - Use of an infusion pump is mandated for the continuous administration of epidural medication.
    - Tape over any Y-tubing to prevent inadvertent use.
6. Prep needleless connector above filter.
    - Medication must be filtered through a 0.22-micron filter.
    - Use povidone iodine; allow to dry completely (two minutes).
    - **Do not use alcohol to prep needleless connector.**
7. Attach 3 mL syringe to needleless connector and attempt to aspirate from catheter.
    - No fluid should be present if catheter has not been previously accessed.
    - Aspiration should yield a maximum of 1 mL fluid if a continuous infusion has been interrupted; do not re-instill aspirated fluid.

- The presence of blood or more than 1 mL clear fluid indicates the catheter has migrated out of the epidural space. **Do not begin infusion; notify physician.**

8. Prep needleless connector above filter.
    - Medication must be filtered through a 0.22-micron filter.
    - Use povidone iodine; allow to dry completely (two minutes).
    - **Do not use alcohol to prep needleless connector.**
9 . Attach administration set to needleless connector.
10. Adjust flow as ordered.
11. Remove gloves and perform hand hygiene.
12. Document procedure on MAR and appropriate nursing notes.
13. To discontinue infusion:
    - Remove filter if no further medication is to be administered.
    - Place sterile needleless connector onto catheter.
    - **Do not flush catheter.**

NALOXONE (NARCAN®) ADMINISTRATION

Purpose

To provide for the safe administration of naloxone (Narcan®) in the event of narcotic toxicity.

Policy

Naloxone hydrochloride (Narcan®) should be available in the event of acute and unexpected over-sedation.

1. Resident specific orders for naloxone (Narcan®) must be obtained from physician.
3. Naloxone is appropriate for IV, SQ, and IM administration. **DO NOT INJECT INTO AN EPIDURAL LINE.**
4. Narcotic toxicity must be established before the administration of naloxone. (Deficits in respiratory status and level of consciousness due to imminent death related to terminal illness, are not related to narcotic toxicity and will not improve with naloxone administration.) Signs and symptoms of toxicity can include:
    - Sudden unexpected drowsiness, confusion, coma.
    - Severe respiratory depression - evaluate rate and quality of respirations.
    - Sudden skeletal muscle flaccidity.
    - Sudden hypotension.
    - Sudden bradycardia.
    - Sudden convulsions (in infants and children).
    - Cardiac arrest.
5. Narcotic must be discontinued prior to administration.
6. If not against resident's advance directive, initiate basic life support and activate emergency medical system.

Considerations

The exact dose of naloxone (Narcan®) cannot be determined in advance for an individual.

- The dose is usually titrated in 0.1mg increments, each administered over 2-4 minutes.
- Discontinue naloxone (Narcan®) administration when desired effect is achieved. Onset of action following IV injection occurs within 30 seconds to 3 minutes.
- Refer to appropriate drug reference text for complete administration guidelines.
- Verbal and physical stimulation of resident should occur simultaneously with administration of naloxone (Narcan®).
- A resident who has received Narcan® will most likely experience a recurrence of pain. An order must be obtained from the prescriber to treat the pain once the narcotic toxicity has been corrected.

NARCOTIC EFFECTS

Notify physician for any side effects of narcotic administration and obtain appropriate orders as necessary.

Constipation	Treat with dietary fiber or mild laxative.
Nausea and vomiting	Treat with anti-emetics.
Sedation	If it persists, reduce dose, may give mild CNS stimulants per orders.
Respiratory depression	Observe resident's respirations for the development of Cheyne-Stokes, apnea or cyanosis.
Sub-acute overdose	Slowly progressive somnolence, confusion and/or respiratory depression. Contact physician to request dose reduction. Severe overdose may require naloxone (Narcan®) administration per physician orders.
Tolerance to drug	Notify physician for possible dose changes.
Others	Dry mouth, urinary retention, pruritus, sleep disturbances, SIADH, altered cognitive function, hallucinations. Seizure activity has been reported with meperidine (Demerol®). Dose reduction may be required.

TRANSFUSION THERAPY

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ADMINISTRATION OF BLOOD PRODUCTS GENERAL POLICIES

Purpose

To ensure the safe delivery of blood and blood products in the Long-Term Care and Subacute Care settings.

Policy

A nurse with documented education and training in infusion therapy, including transfusion therapy, as designated by the facility and as allowed by state regulations, may administer blood and blood products.

1. It is the responsibility of the facility to ensure that any registered nurse administering blood components or caring for the resident receiving a transfusion have the knowledge, skills, and documented proof of competency prior to administering blood or blood products.
2. Nurses must be capable of recognizing early symptoms of transfusion reactions and providing appropriate interventions.
3. The entire blood transfusion procedure is under the direct supervision and responsibility of a registered nurse.
4. Obtain resident history of previous transfusions and document any previous transfusion related adverse events.
5. Immediate access to the physician by phone should be available during the transfusion.
6. Informed consent must be obtained prior to initiation of procedure.
7. Blood and blood products will be received by the facility in accordance with Blood Bank standards and State regulations. Blood will be transported in cooling containers verified for correct temperature.
8. Pre-transfusion testing (type and cross-match) will be done on all residents receiving blood or blood products to detect serologic incompatibility and to screen for unexpected antibodies. ABO and Rh grouping will also be performed as indicated. For Autologous donations, refer to American Association of Blood Banks established procedures.
9. Transfusions will be stopped for any resident who develops symptoms of a transfusion reaction.
10. Lab values for residents receiving blood and blood products will be ordered by the physician.

BLOOD COMPONENTS

COMPONENT	INDICATIONS	PRECAUTIONS	RATE OF INFUSION
Whole Blood Products			
Whole Blood	Large volume deficit.	Must be ABO identical.	Administer and complete each unit within 4 hours. For massive loss, as fast as resident can tolerate.
Red Blood Cells, packed or frozen	Symptomatic anemia.	Must be ABO compatible.	Administer and complete each unit within 4 hours.
Leukocyte reduced red blood cells	Symptomatic anemia, febrile reactions from leukocyte antibodies.	Must be ABO compatible.	Administer and complete each unit within 4 hours.
Washed cells	History of anaphylactic reaction to blood components. Recurrent severe urticarial reactions not prevented by pre-transfusion administration of antihistamines. Febrile reactions associated with red cell administration.	Must be ABO compatible.	Administer and complete each unit within 4 hours.
Irradiated blood products	Used for residents at high risk for transfusion-associated graft-versus-host disease.	Must be ABO compatible.	Administer and complete each unit within 4 hours.
Fresh frozen plasma	Deficit of coagulation factors, bleeding disorders.	Should be ABO compatible.	Administer as fast as the resident tolerates the infusion. Over 15-60 minutes.
Plasma Derivatives			
Cryoprecipitate	Hemophilia A, von Willebrand's disease, hypofibrinogenemia, factor XIII deficiency.	Frequent repeat doses may be necessary. No ABO or Rh matching required.	IV Push.
Platelets	Bleeding from thrombocytopenia or platelet function abnormality.	Do not use microaggregate filters. No ABO or Rh matching required.	Administer over 1-2 hours. agitate units every 30 min. to prevent agglutination.
Serum Albumin	Contains about 60% plasma protein. Indicated for residents who are hypovolemic and hypoproteinemic.	No ABO or Rh matching required.	Variable. Not greater than 10mL/min.
Factor Concentrates	Residents with clotting factor deficiencies causing abnormal bleeding, i.e., hemophilia.	No ABO or Rh matching required.	Variable. Refer to manufacturer's guidelines.
Immune Globulin Intravenous	Residents who are unable to produce their own IgG antibodies.	No matching ABO or Rh required. Label must state for IV use. Monitor for anaphylaxis.	Begin slowly: Increase rate if tolerated.

(from AABB)

HANDLING BLOOD

Purpose

To assure the safe handling of blood and blood products.

Policy

Blood will be handled according to the Association for Advancement of Blood and Biotherapies (AABB.org) established protocol.

1. Standard precautions must be adhered to when handling blood or blood products.
2. Gloves will be worn when handling any blood component.
3. To reduce the risk of bacterial growth, blood administration must begin within 30 minutes of arrival at the facility and completed within 4 hours.
4. Blood should never be placed in the resident care refrigerators.
5. Check expiration date before administering blood products. If expired, contact the blood bank.

INFUSION OF BLOOD AND BLOOD PRODUCTS

Purpose

To ensure the safe infusion of blood and blood products.

Policy

A nurse with documented education and training in infusion therapy, including transfusion therapy, as designated by the facility and as allowed by state regulations, may administer blood products.

1. The nurse administering the transfusion is responsible for:
    - Verifying the presence of a written physician's order for the transfusion.
    - Verifying that documented informed consent has been obtained from the resident.
    - Explaining the procedure to the resident.
    - Verifying ABO and Rh compatibility between donor and recipient if applicable.
2. Immediately prior to the administration of a blood product, ***the nurse administering the blood product and one additional nurse*** shall, at the resident bedside, positively identify the recipient and the blood product to be transfused. Identification procedures shall be documented in writing.
3. A registered nurse shall be immediately available at all times during a transfusion.
4. Only electronic devices specifically approved for blood infusions may be used for the infusion of blood and blood products.
5. The rate of infusion is governed by the condition of the resident. The infusion rate of red cell products should not exceed four (4) hours. If an infusion rate longer than four (4) hours is required, the unit should be split by the blood bank. Each aliquot may be given over four (4) hours.
6. The nurse administering blood must remain at the bedside for the first 15-30 minutes of a transfusion.
7. A filter designed to remove blood clots and harmful particles (170-260 micron) must be used for the administration of blood and blood components.
8. Blood and blood product filters and administration sets should be changed after the completion of each unit or every 4 hours. If more than one unit can be infused in 4 hours, the transfusion set can be used for 4 hours.
9. Only 0.9% sodium chloride may be used to initiate the infusion of blood products.
10. No medication or IV fluid other than 0.9% sodium chloride should be added to blood or administered simultaneously through the same set.
11. If administering blood through a peripheral vein:

- It is recommended that red blood cells be administered through a 20-gauge catheter.
- The IV site must be checked frequently during the infusion for the early detection of infiltration or other complications.
- If venospasm occurs due to cold blood being infused, apply a warm pack to the vein through which the blood is being infused.
- Do not use warming methods not expressly designed for blood warming including, but not limited to microwave ovens, hot water baths, or other devices as temperature and infection risks cannot be controlled.

12. If administering through a multi-lumen CVAD, use appropriate dedicated lumen for blood administration.
13. If resident has a small lumen PICC, consideration should be given to establishing peripheral access for the blood transfusion. Because the transfusion must begin within 30 minutes of arrival at the facility, the peripheral site should be established before ordering the blood from the blood bank.
14. Monitor for adverse transfusion events.
    - Check the resident's vital signs within 30 minutes prior to transfusion, within 5-15 minutes after initiating the transfusion, immediately after the transfusion, 1 hour after the transfusion is complete and as needed based on the resident's condition.
    - Initiate the transfusion slowly at approximately 2 mL per minute for the first 15 minutes and remain near the resident. Increase the rate if there are no signs or symptoms of a reaction and to ensure the completion of the unit within four hours.
    - Stop the transfusion immediately if signs and symptoms of a transfusion reaction are present. Notify the physician and the blood bank and administer emergency medications as prescribed.
    - Monitor residents for at least 4-6 hours to detect febrile or pulmonary reactions associated with the transfusion.

DISCONTINUING THE TRANSFUSION

1. All data relevant to the transfusion will be recorded in the resident's clinical and transfusion records.
2. Note the time the transfusion was complete, the volume of blood infused, the amount of normal saline infused, and the condition of the resident. Fill out a post-transfusion report and place it in the resident's chart.
3. When the transfusion is complete, disconnect the IV, place administration set and bag in biohazard waste receptacles.

4. Flush the IV catheter with normal saline using turbulent flush technique. Flush midlines and all central lines with 20 mL of saline post transfusion.
5. Monitor resident's condition including vital signs and for signs and symptoms of post-transfusion reactions for 4-6 hours post transfusion.
6. Obtain post-transfusion lab values according to physician order.
7. Document the procedure.
    A. *Whole Blood Products*: The following information should be included in the recipient's chart:
        - Unit number.
        - Donor's ABO and Rh groups.
        - Recipient's ABO and Rh groups.
        - Beginning and completion time of transfusion.
        - Description of the blood product.
        - Description of method of infusion – type and gauge or catheter and location of site.
        - Type of rate control used and rate of infusion.
        - Description of any adverse reaction, interventions, and the results of intervention related to this reaction.
        - Name(s) of the person(s) who performed the transfusion and who attended the recipient during the transfusion.
    B. *Plasma Derivatives*: Refer to "Blood Component" chart.
        - Beginning and completion time of the transfusion.
        - Description of the plasma derivative, including AABB donor numbers and expiration date; or manufacturer and the lot number; or other identification and the expiration date.
        - Description of method of infusion – type and gauge of catheter and location of site.
        - Type of rate control used and rate of infusion.
        - Description of any adverse reactions, interventions, and the results of interventions related to this reaction.
        - Name(s) of the person(s) who performed the transfusion and who attended the recipient during the transfusion.

TRANSFUSION REACTIONS

Purpose

To assure the appropriate response to a transfusion reaction.

Policy

1. The nurse will monitor for transfusion reactions and perform appropriate intervention.
2. All medications, equipment and supplies necessary for the management of adverse reactions must be **immediately** available.
3. When a transfusion reaction is suspected, stop the transfusion and remain with the resident. **HANG NEW IV TUBING AND NORMAL SALINE**. Infuse through the existing IV catheter at a keep vein open rate of 10-20 mL per hour. Take vital signs and notify the physician. *Maintain sterility of the transfusion set-up (blood tubing, bag, filter and normal saline); anticipate possible return to blood bank.*
4. Complete necessary transfusion reaction documentation.
5. Obtain lab work as ordered.

BLOOD TRANSFUSION REACTIONS

Reactions include but are not limited to those in the following tables. Refer to appropriate reference text for complete information.

Reactions Involving an Immediate Immune Response

Reaction	Timing of Reaction	Etiology	Signs & Symptoms	Intervention
Acute Hemolytic Reaction	May occur after the infusion of only 30 mL of incompatible blood OR may occur as much as two hours after the transfusion is complete.	Antigen-antibody reaction in the recipient leading to intravascular hemolysis. *Potentially fatal reaction.*	-Fever. -Chills. -Flushing of face. -Burning sensation along vein. -Frequent oozing of blood at the injection site. -Shock.	STOP THE TRANSFUSION. Severity of the reaction is directly related to the amount of blood infused. Return transfusion set-up (blood tubing/filter, blood bag and NS to blood bank). Attach a fresh bag of NS to the existing IV catheter using clean tubing. Notify physician and blood bank. Obtain lab specimens: -Urine sample. -Blood sample x 2 (one red top and one lavender top).

Reactions Involving an Immediate Immune Response *(continued)*

Reaction	Timing of Reaction	Etiology	Signs & Symptoms	Intervention
Anaphylactic Reaction	Onset of symptoms may be after only a few mLs of blood have been infused.	Results from extreme sensitivity of recipient to a specific allergen in donor blood. May occur to recipients who are IgA deficient and have developed anti-IgA antibodies.	Lack of fever distinguishes this reaction from hemolysis. - Bronchospasm. - Respiratory distress. - Abdominal cramps. - Vascular instability. - Shock. - Loss of consciousness.	STOP THE TRANSFUSION. Attach a fresh bag of NS to the existing IV catheter using clean tubing. Notify physician and blood bank. Anticipate order for epinephrine 1:1000. Request future transfusions to be plasma-free.
Allergic Reaction	May occur at any time during the transfusion.	Results from hypersensitivity of recipient to a specific allergen in donor blood.	Local erythema, hives, itching, occasional fever; mild bronchospasm. Symptoms are usually mild.	Interrupt the transfusion and notify physician; because symptoms are not dose related, the transfusion may be continued. Anticipate order for antihistamines. Residents experiencing a second allergic reaction should receive plasma-free blood in the future.
Nonhemolytic Febrile Transfusion Reaction	Onset of symptoms may be within five minutes of initiating blood, but these subside quickly. The reaction then manifests itself fully 1-6 hours after the initiation of the transfusion.	Anti-leukocyte antibodies in the recipient are directed against the donor's white blood cells.	Early symptoms: - Chills. - Cough. - Palpitation. - Tachycardia. Late symptoms: - Rise in fever by 1°F. - Headache. - Chills. - Nausea and vomiting. - Irritability.	STOP THE TRANSFUSION. Attach a fresh bag of NS to the existing IV catheter using clean tubing. Notify physician and blood bank. Anticipate orders for: - lab specimen to rule out intravascular hemolysis. - antipyretics for fever; meperidine for chills.
Noncardiogenic Pulmonary Edema	Related to non-hemolytic febrile transfusion reaction – onset of symptoms may be at any time during transfusion.	Reaction of donor high-titer anti-leukocyte antibodies and recipient leukocytes; the reaction is directed almost entirely toward granulocytes in the pulmonary vascular bed resulting in severe respiratory complications.	Sudden, severe respiratory distress which may advance to potentially fatal hypoxia; chest pain, cyanosis and hypotension; possible chills and fever.	STOP THE TRANSFUSION. Attach a fresh bag of NS to the existing IV catheter using clean tubing. Notify physician and blood bank; arrange for immediate transfer to acute care setting. Support respirations.

Reactions Involving a Non-Immune Response				
Reaction	**Timing of Reaction**	**Etiology**	**Signs & Symptoms**	**Intervention**
Circulatory Overload	Although the reaction will never occur immediately, the time of occurrence cannot be predicted.	Rapid administration of blood or blood products to a cardiac-compromised resident or one who has a high plasma volume.	Sudden severe headache, sudden severe dyspnea, a sudden increase in systolic blood pressure (> 50 mm Hg rise). Also seen are tachycardia, tachypnea, apprehension and restlessness.	STOP THE TRANSFUSION. Attach a fresh bag of NS to the existing IV catheter using clean tubing. Notify the physician. Facilitate respirations by raising the head of bed, providing oxygen at 2L nasal cannula. Anticipate orders for diuretics, possible digitalis.
Air Embolism	Symptoms are immediate with the introduction of 10-60 mL of air into the blood stream. The amount of air that constitutes a significant air embolism is resident dependent.	Entry of a large bolus of air into the blood stream through the IV catheter. The reaction is most often related to central line catheters but may occur with any catheter that is improperly primed.	Sudden apprehension, restlessness, chest pain, severe shortness of breath; cyanosis especially around mouth. May advance to shock and cardiac arrest.	ELIMINATE SOURCE OF AIR ENTRY. IMMEDIATELY TURN RESIDENT ON LEFT SIDE AND PLACE IN TRENDELENBURG; if Trendelenburg position is not possible, raise resident's hips (not feet) to lower head. Notify physician and arrange for transfer to acute care setting. Support respirations with oxygen at 2L nasal cannula.
Hypothermia	Although the reaction will never occur immediately, the time of occurrence cannot be predicted.	Rapid administration of cold blood, especially through a central venous catheter.	Chills, peripheral vasoconstriction, ventricular arrhythmias; may progress to cardiac arrest.	STOP THE TRANSFUSION. Attach a fresh bag of NS to the existing IV catheter using clean tubing. Notify the physician. Warm the resident with blankets, hot water bottle.
Bacterial Contamination	May occur after only 10 mLs of blood have infused.	Bacterial contamination of the blood at any time during donation or processing of the unit; results in inoculation of the resident with a high titer of bacteria.	Sudden high fever, marked hypotension, cardiovascular collapse. Initial response – "warm" shock: characterized by skin flushing and dryness. Advanced response – "cold" shock; characterized by cold, clammy skin.	STOP THE TRANSFUSION. Attach a fresh bag of NS to the existing IV catheter using clean tubing. Notify the physician and blood bank; arrange for immediate transfer to acute care setting. Treat symptoms of shock: - Trendelenburg. - Oxygen at 2L nasal cannula. - warmth. Anticipate order for STAT IV antibiotics.
Hepatitis **CMV** **AIDS**	Possible long-term reaction.			

Reactions Involving a Delayed Immune Response				
Reaction	**Timing of Reaction**	**Etiology**	**Signs & Symptoms**	**Intervention**
Delayed Hemolytic Reaction	May occur 2-10 days after transfusion.	An antigen-antibody reaction in the recipient leading to extravascular hemolysis.	Failure of hemoglobin level to rise after transfusion; a drop in hemoglobin may occur instead. Possible fever, mild jaundice.	Usually, no treatment will be necessary. Treat symptoms if any are present.
Graft-Versus-Host-Disease	Onset of disease is usually 4-30 days post-transfusion.	Transfer of immunocompetent T-lymphocyte into an immuno-incompetent recipient. The donor T-cells view the recipient as foreign and systematically destroy the "host."	High fever; generalized erythroderma anorexia nausea and vomiting; profuse diarrhea. Death is the result of bone marrow suppression and massive infection.	Notify physician of onset of suspicious symptoms. Arrange for transfer to acute care setting. Remember, this reaction will only occur in recipients who are immunocompromised. Such residents should only receive blood which has been irradiated.

GLOSSARY AND ABBREVIATIONS

Table of Contents

UNACCEPTABLE ABBREVIATIONS			
Abbreviation/ Do not use Expression	**Intended Meaning**	**Misinterpretation**	**Correction**
Apothecary symbols	dram minim	Misunderstood or misread (symbol for dram misread for "3" and minim misread as "mL").	Use the metric system.
AU	auris uterque (each ear)	Mistaken for OU (oculus uterque—each eye).	Don't use this abbreviation.
D/C	discharge discontinue	Premature discontinuation of medications when D/C (intended to mean "discharge") has been misinterpreted as "discontinued" when followed by a list of drugs.	Use "discharge" and "discontinue."
Drug names			**Use the complete spelling for drug names.**
ARAºA	vidarabine	cytarabineARAºC	
AZT	zidovudine (RETROVIR)	azathioprine	
CPZ	COMPAZINE (prochlorperazine)	chlorpromazine	
DPT	DEMEROL-PHENERGAN-THORAZINE	diphtheria-pertussis-tetanus (vaccine)	
HCl	hydrochloric acid	potassium chloride (The "H" is misinterpreted as "K.")	
HCT	hydrocortisone	hydrochlorothiazide	
HCTZ	hydrochlorothiazide	hydrocortisone (seen as HCT250 mg)	
MgSO4	magnesium sulfate	morphine sulfate	
MSO4	morphine sulfate	magnesium sulfate	
MTX	methotrexate	mitoxantrone	
TAC	triamcinolone	tetracaine, ADRENALIN, cocaine	
ZnSO4	zinc sulfate	morphine sulfate	

Stemmed names	**Intended Meaning**	**Misinterpretation**	**Correction**
"Nitro" drip	nitroglycerin infusion	sodium nitroprusside infusion	
"Norflox"	norfloxacin	NORFLEX	
m g	microgram	Mistaken for "mg" when handwritten.	Use "mcg."
o.d. or OD	once daily	Misinterpreted as "right eye" (OD—oculus dexter) and administration of oral medications in the eye.	Use "daily."
TIW or tiw	three times a week	Mistaken as "three times a day."	Don't use this abbreviation.
per os	orally	The "os" can be mistaken for "left eye."	Use "PO," "by mouth," or "orally."
q.d. or QD	every day	Mistaken as q.i.d., especially if the period after the "q" or the tail of the "q" is misunderstood as an "i."	Use "daily" or "every day."
qn	nightly or at bedtime	Misinterpreted as "qh" (every hour).	Use "nightly."
qhs	nightly at bedtime	Misread as every hour.	Use "nightly."
q6PM, etc.	every evening at 6 PM	Misread as every six hours.	Use 6 PM "nightly."
q.o.d. or QOD	every other day	Misinterpreted as "q.d." (daily) or "q.i.d." (four times daily) if the "o" is poorly written.	Use "every other day."
sub q	subcutaneous	The "q" has been mistaken for "every" (e.g., one heparin dose ordered "sub q 2 hours before surgery" misunderstood as every 2 hours before surgery).	Use "subcut." or write "subcutaneous."
SC	subcutaneous	Mistaken for SL (sublingual).	Use "subcut." or write subcutaneous.
U or u	unit	Read as a zero (0) or a four (4), causing a 10-fold overdose or greater (4U seen as "40" or 4u seen as 44").	"Unit" has no acceptable abbreviation. Use "unit."
IU	international unit	Misread as IV (intravenous).	Use "units."
cc	cubic centimeters	Misread as "U" (units).	Use "mL."
x3d	for three days	Mistaken for "three doses."	Use "for three days."
BT	bedtime	Mistaken as "BID" (twice daily).	Use "hs."

Stemmed names (continued)	**Intended Meaning**	**Misinterpretation**	**Correction**
ss	sliding scale (insulin) or ½ (apothecary)	Mistaken for "55."	Spell out "sliding scale." Use "one-half" or use "½."
> and <	greater than and less than	Mistakenly used opposite of intended.	Use "greater than" or "less than."
/ (slash mark)	separates two doses or indicates "per"	Misunderstood as the number 1 ("25 unit/10 units" read as "110" units).	Do not use a slash mark to separate doses. Use "per."
Name letters and dose numbers run together (e.g., Inderal40 mg)	Inderal 40 mg	Misread as Inderal 140 mg.	Always use space between drug name, dose and unit of measure.
Zero after decimal point (1.0)	1 mg	Misread as 10 mg if the decimal point is not seen.	Do not use terminal zeros for doses expressed in whole numbers.
No zero before decimal dose (.5 mg)	0.5 mg	Misread as 5 mg.	Always use zero before a decimal when the dose is less than a whole unit.

GLOSSARY

(From: *Intravenous Nursing Standards of Practice*, 2024)

Active Disinfection
Use of a disinfectant to physically scrub the injection site/port before each access; often referred to as "scrub the hub."

Adhesive Securement Device
An adhesive-backed device that adheres to the skin with a mechanism to hold the vascular access device in place.

Administration Set
A tubing set composed of plastic components that is used to deliver infusions and typically includes a spike, drip chamber, injection ports and a male luer end.

- Primary administration set – The tubing set connecting the infusate container directly to the vascular access device. May be continuous or intermittent.
- Secondary administration set – Also known as Piggyback. Additional shorter tubing set that is connected to an access point on the primary set. May be used to administer infusates concurrently or intermittently with the primary infusate.
- Intermittent administration set – A primary or secondary administration set that has been disconnected from the initial access point and left disconnected due to completion or a pause in an infusion. It must be disconnected aseptically with the distal tip protected by a new sterile end cap.
- Continuous administration set – A primary or secondary administration set that remains connected to the vascular access device for the duration of the infusion or until the scheduled administration set change occurs.
- Continuous infusion – A controlled method of intravenous administration given over at least several hours or longer without interruption.
- Intermittent infusion – A small volume given by short infusion (e.g., 30 – 60 minutes)

Admixture
To mix; to combine two or more medications.

Air Embolism
Presence of air in the vascular system that obstructs venous blood flow primarily to the lungs or brain; if air embolism is suspected, turn patient onto left side in Trendelenburg.

Ambulatory Infusion Pump
An electronic infusion pump specifically designed in size to be worn on the body to promote patient mobility and independence.

Amino Acids
Organic components of protein.

Anaphylaxis
A severe, potentially life-threatening allergic reaction with immunologic and nonimmunologic causes.

Anti-Free-Flow Protection
Administration set technology that prevents intravenous solutions from flowing into the patient when the administration set is removed from the flow-control device.

Antimicrobial
An agent that destroys or prevents development of microorganisms.

Antimicrobial Locking Solutions
Solutions using supra-therapeutic concentrations of antibiotic, or a variety of antiseptic agents to lock the central vascular access device lumen for a prescribed period of time for prevention of catheter related blood stream infections.

Antineoplastic Agent
A medication that prevents the development, growth or proliferation of malignant cells.

Aseptic non-touch technique (ANTT®)
A specific and comprehensively defined type of aseptic technique with a unique theory-practice framework based on an original concept of Key-Part and Key-Site Protection; achieved by integrating Standard Precautions such as hand hygiene and use of personal protective equipment with appropriate aseptic field management, non-touch technique and sterilized supplies. It is designed for all invasive clinical procedures and management of invasive medical devices. In the context of infusion therapy, this includes vascular access device placement and management and infusion administration. The 5 practice terms to using ANTT®:

- **Key-Site** – Any portal of entry into the patient (e.g., VAD site, injection site, open wound).
- **Key-Part** – The part of the procedure equipment that, if contaminated, is likely to contaminate the patient (e.g., Syringe tip, male luer end/spike of administration set, injection needle).
- **General Aseptic Field** – A decontaminated and disinfected procedure tray or single use procedure kit/barrier. Used to promote but not ensure asepsis.
- **Critical Aseptic Field** – A sterile drape/barrier. Used to ensure asepsis; all procedure equipment is placed on the drape and managed collectively.
- **Micro Critical Aseptic Field** – A small, protective sterile surface/housing (e.g., Sterile caps, covers, and the inside of recently opened sterile equipment packaging) that protects Key-Parts individually.

Back Check Valve
A feature incorporated within an intravenous administration set that functions to prevent retrograde solution flow.

Bacteria
A microorganism that may be non-pathogenic (normal flora) or pathogenic (disease causing).

Beyond Use Date (BUD)
The date added to a product label during the compounding process after which a product may not be used, based on the fact that the manufacturer's original container has been opened, exposed to ambient atmospheric conditions, and may not have the integrity of the original packaging.

Biofilm
A thin coating, usually a resistant layer, of microorganisms that form on and coat the surfaces of an implanted or indwelling device.

Biologic Therapy
Biologics are large, complex molecules made from living sources such as bacteria, yeast, and animal cells. Examples of biologics therapies include immunoglobulins, monoclonal antibodies, interferons, interleukins, and vaccines.

Blood Return
A component of vascular access device patency assessment; blood that is the color and consistency of whole blood flows readily into the syringe upon aspiration.

Body Surface Area
Surface area of the body determined through the use of a nomogram; this measure is important when calculating dosages.

Bolus
Concentrated medication/solution given rapidly over a short period of time; may be given by direct infusion injection or gravity drip.

Catheter
A hollow tube made of thermoplastic polyurethane, silicone elastomer, or metal inserted into the body and used for injecting or evacuating fluids.

Catheter-Associated Bloodstream Infection (CABSI)
Bloodstream infections originating from either peripheral or central vascular access devices.

Catheter-Associated Skin Injury (CASI)
An abnormality including, but not limited to, erythema, vesicle, bulla, erosion, or tear at a peripheral or central vascular access device site that is noted in the area of the device dressing and/or securement device and that is observable for 30 minutes or more after the dressing/securement removal.

Catheter Associated Thrombosis (CAT)
Initiated as an inflammatory response to vessel wall injury and partially or fully occludes the vessel lumen. May impact the function of the vascular access device, require anticoagulant therapy, cause VAD failure and premature removal.

- Deep Vein Thrombosis (DVT) – Thrombosis involving the deep veins of the arm (brachial, axillary) subclavian, or interal jugular veins.
- Upper Extremity DVT (UE-DVT) – Often associated with VADs inserted in smaller upper arm veins with lower blood flow velocity
- Superficial Vein Thrombosis (SVT) – Thrombosis involving the superficial veins of the upper or lower extremity
- Venous Thromboembolism (VTE) – A clinical episode of VTE includes deep vein thrombosis and pulmonary embolism.

Catheter Clearance (Declot)
The process to reestablish catheter lumen patency using medications or chemicals instilled into the lumen for a specific period of time.

Catheter Dislodgement
Catheter movement into or out of the insertion site indicating tip movement to a suboptimal level.

Catheter Related Blood Stream Infection (CR-BSI)
A clinical definition used when the catheter is identified through specific laboratory testing to be the source of the blood stream infection.

Central Line-Associated Blood Stream Infection (CLABSI)
A laboratory-confirmed, primary blood stream infection in a patient with a central line in place for more than 2 calendar days before the development of the bloodstream infection, and the blood stream infection is not related to an infection at another site.

Central Vascular Access Device (CVAD)
Catheter inserted into a peripheral or centrally located vein with the tip residing in the superior or inferior vena cava.

Central Venous Access Device (CVAD) Malposition
CVAD tip location in an aberrant position that differs from the original position on insertion within the vena cava or cavoatrial junction.

- Extravascular malposition – CVAD tip located outside the vein in subcutaneous tissue or nearby anatomical structures such as mediastinum, pleura, pericardium, or peritoneum
- Intravascular malposition – CVAD tip located in a suboptimal or aberrant position inside a vein
- Primary malposition – CVAD tip positioned in a suboptimal position during the insertion procedure
- Secondary malposition – CVAD tip found to be in a suboptimal position at any time during the catheter dwell time. Commonly referred to as tip migration.

Chemical Incompatibility
A change that may or may not be visually observed in the molecular structure or pharmacological properties of a substance.

Compatibility
Capable of being mixed and administered without undergoing undesirable chemical and/or physical changes or loss of therapeutic action.

Competency
A required level of effective performance in the work environment defined by adherence to professional standards, including knowledge, skills, abilities, and judgement based on established science.

Competency Assessment
A dynamic process used to verify an individual's performance; designed to empower the individual and support positive behavior in patient care activities.

Contamination
Introduction of pathogens or infectious material from one source to another.

Cross contamination
The indirect movement of pathogens or other harmful substances from one patient to another patient.

Delayed Reaction
Adverse effect occurring after 48 hours or longer post-transfusion.

Delivery System
A product that allows for the administration of medication.

Difficult Intravenous Access (DIVA)
Refers to multiple unsuccessful attempts to insert a catheter. This can be acute due to sudden illness or chronic due to complex medical intervention.

Disinfectant
An agent that eliminates all microorganisms except spores; this agent is generally used on inanimate objects.

Disinfection Cap
Disinfectant-impregnated protective cap containing an antiseptic solution placed on top of the connection surface of a needleless connector to disinfect the surface and provide protection between intermittent use.

Distal
Furthest from the heart; furthest from the point of attachment; below previous site.

Distention
Increase in size from pressure within.

Elastomeric Pump
A portable single-use device with an elastomeric reservoir (i.e., Balloon). Used to deliver a variety of infusion therapies.

Electronic Infusion Device
An electronic instrument, either a pump (i.e., positive pressure) or controller (i.e., gravity fed), that is used to regulate the flow rate of the prescribed therapy. This type of device is often referred to as an EID or electronic flow control device.

Embolus
A blood clot or other foreign substance that is carried in the bloodstream and has the potential to impede and/or obstruct circulation.

Epidural Space
Space surrounding the spinal cord and its meninges.

Erythema
Redness of skin along vein track that results from vascular irritation or capillary congestion in response to irritation; may be a precursor to phlebitis.

Evidence-Based Practice
Application of the best available synthesis of research results in conjunction with clinical expertise and with attention to and inclusion of patient preferences.

Extravasation
Inadvertent administration of vesicant solution/medication into surrounding tissue. Rated by a standard scale.

Extrinsic Contamination
Contamination that occurs after the manufacturing process of a product.

Fat Emulsion
Combination of liquid, lipid, and an emulsifying system formulated for intravenous use.

Flow Control Device
Device used to regulate infusion flow rate; includes categories of manual devices (slide clamp or roller clamp), non-electronic flow-control devices (dial-a-flow) and electronic infusion pumps.

Filter
A special porous device used to prevent the passage of air or other undesirable substances; product design determines size of substances retained.

Flushing
The act of moving fluids, medications, blood and blood products out of the vasculature access device into the bloodstream. Used to assess and maintain patency and prevent precipitation due to solution or medication incompatibility.

Free-Flow
Non-regulated, inadvertent administration of fluid.

Fungi
Saprophytic organisms that obtain food by absorbing dissolved organic matter.

Gram-Negative Bacteria
Microorganism that retains the color of the red counterstain in the Gram's method of staining. Klebsiella, Escherichia coli, Pseudomonas, and Serratia are Gram-negative bacteria that are often associated with infusate contamination and arterial catheters.

Gram-Positive Bacteria
Microorganism that retains the crystal violet stain in the Gram's method of staining. Staphylococcus epidermidis and Staphylococcus aureus are Gram-positive bacteria associated with venous catheter contamination.

Hazardous Drug
Drug exhibiting 1 or more of the following 6 characteristics in humans or animals:

- Carcinogenicity
- Teratogenicity or other developmental toxicity
- Reproductive toxicity
- Organ toxicity at low doses
- Genotoxicity
- Structure and toxicity profiles of new drugs that mimic existing drugs

Hazardous Drug Spill
Any fluid containing hazardous drugs escaping from its container in a quantity more than a few drops.

Hazardous Waste
Hazardous Waste is differentiated from medical waste and refers to that generated from administration of hazardous drugs (e.g., intravenous containers, equipment, and supplies used to administer hazardous drugs).

Hemolysis
Rupture of the red blood cell membrane with the release of hemoglobin.

Heparin Induced Thrombocytopenia (HIT)
An acute, transient prothrombotic disorder caused by heparin-dependent, platelet-activating antibodies; a hypercoagulable state with a strong association to venous and arterial thrombosis.

Hypertonic
Solution of a higher osmotic concentration than that of a reference solution or an isotonic solution; a fluid having a concentration greater than the normal tonicity of plasma.

Hypodermoclysis
The subcutaneous administration of isotonic hydration solutions; used to treat mild to moderate dehydration.

Hypotonic
Solution of a lower osmotic concentration than that of a reference solution or of an isotonic solution; a fluid having a concentration less than the normal tonicity of plasma.

Immediate Reaction
Adverse effect occurring immediately or up to 48 hours post-transfusion.

Immunocompromised
Decreased resistance to disease.

Implanted Pump
A catheter surgically placed into a vessel or body cavity and attached to a reservoir that contains a pumping mechanism for continuous medication administration. The reservoir is placed under the skin.

Implanted Vascular Access Port
A catheter surgically placed into a vessel or body cavity and attached to a reservoir. The reservoir is placed under the skin.

Incompatible
Incapable of being mixed or used simultaneously without undergoing chemical or physical changes or producing undesirable effects.

Infection
The presence and growth of a pathogenic microorganism having a local or systemic effect.

Infiltration
The inadvertent administration of a non-vesicant solution/medication into surrounding tissue. Rated by a standard scale.

Informed Consent
A person's voluntary agreement, based on adequate knowledge and understanding of relevant information. To participate in research or to undergo a diagnostic, therapeutic or preventive procedure.

Infusate
Parenteral solution administered into the vascular or nonvascular system; infusion.

Intermittent Intravenous Therapy
Administered at prescribed intervals with periods of infusion cessation.

Intrathecal
Space that lies within a sheath surrounded by the epidural space and separated from it by the dura matter.

Intrinsic Contamination
Contamination that occurs during the manufacturing process of a product.

Irritant
An agent capable of producing venous pain at the site or along the wall of the vein, with or without inflammatory reaction.

Isotonic
Solution having the same concentration as that with which it is compared (i.e., plasma).

Laminar Flow Hood
A contained work area in which the airflow within a confined area moves with uniform velocity along parallel flow lines with a minimum of eddies (may be referred to as a clean air center).

Lipid Emulsion
Natural product consisting of a mixture of neutral triglycerides of predominantly unsaturated fatty acids.

Locking
The instillation of a solution into a vascular access device used to maintain patency in between use and/or reduce risk of catheter-associated blood stream infection.

Lumen
The interior space of a tubular structure, such as a blood vessel or cannula.

Lymphedema
Swelling of an extremity caused by obstruction of the lymphatic vessel(s).

Medical Act
Procedure performed by a licensed physician.

Microabrasion
A superficial break in skin integrity that may predispose the patient to infection.

Microaggregate
Microscopic collection of particles such as platelets, leukocytes, and fibrin, that occurs in stored blood.

Microaggregate Blood Filter
Filter that removes potentially harmful microaggregates and reduces non-hemolytic febrile reactions.

Micron (μ)
A unit of length equal to one millionth of a meter or one thousandth of a millimeter.

Microorganisms
Living matter that can only be seen with the aid of a microscope.

Milliosmoles (mOsm)
One thousandth of an osmole. The osmotic pressure equal to one thousandth of the molecular weight of a substance divided by the number of ions that the substance forms in a liter of solution.

Needleless Connector
A device that allows the connection of the male luer tip of a syringe or administration set directly to the hub of a vascular access device or other injection sites on the infusion system without the use of needles.

Needleless System
A substitute for a needle or a sharp access cannula that includes various designs: blunt, cannula, valve.

Nonpermeable
Ability to maintain integrity. Does not allow fluid to pass through.

Non-Tunneled Central Venous Access Device
A type of CVAD for short-term use that is inserted percutaneously usually via the axillary, subclavian, internal jugular or femoral vein.

Nurse Practice Act
Defines the practice of registered nurses and licensed practical/vocational nurses within each state.

Occlusion
Obstruction of a vascular access device lumen, preventing or limiting the ability to flush and/or administer solutions through a lumen or withdraw blood.

- Complete occlusion – The inability to infuse or inject solution into a catheter; the inability to aspirate blood from a catheter or both.
- Partial occlusion – Decreased ability to administer solutions and/or withdraw blood from the CVAD lumen.
- Withdrawal occlusion – Ability to infuse solutions with decreased ability or inability to obtain blood return.

Osmolarity
Number of solutes contained in solution measured in milliosmoles per liter.

Outcome
The interpretation of documented results.

Palliative
Treatment that provides for comfort and/or temporary relief of symptoms; treatment that does not cure.

Palpable Cord
A vein that is rigid and hard to the touch.

Palpation
Examination by touch.

Parenteral
Denoting any route other than the alimentary canal, such as intravenous.

Parenteral Nutrition
Nutrients that are administered intravenously and are comprised of carbohydrates, proteins, and/or fats, as well as additives such as electrolytes, vitamins, and trace elements.

Particulate Matter
Relating to or composed of fine particles.

Pathogens
Disease-producing microorganisms.

Patient-controlled analgesia (PCA)
A drug delivery system that dispenses a preset dose of a narcotic analgesic upon activation by the patient.

Peripheral Intravenous Catheter (PIVC)
A catheter that is inserted into a resides in the veins of the periphery that includes all extremities, the external jugular vein, and scalp veins in neonates.

Peripherally Inserted Central Catheter (PICC)
A catheter inserted through veins of the upper or lower extremity. The catheter tip is advanced to the superior vena cava or inferior vena cava (lower limb insertion).

pH
Hydrogen ion (H+) concentration.

Phlebitis
Inflammation of a vein; may be accompanied by pain erythema, edema, streak formation, and/or palpable cord. Rated by a standard scale. A possible precursor to sepsis.

Phlebotomy
Withdrawal of blood from a vein.

Physical Incompatibility
An undesirable change that is visually observed.

Policy
Written statement of a course of action chosen to guide decision making.

Positive Pressure
Maintaining a constant, even force within a lumen to prevent reflux of blood; achieved by clamping while injecting or by withdrawing the needle from the cannula while injecting.

Post-infusion Phlebitis
Inflammation of a vein occurring after cannula removal.

Pounds Per Square Inch (PSI)
A measurement of pressure: 1PSI equals 50 mm Hg or 68 cm H_2O.

Precipitation
The act or process of a substance or drug in solution to settle in solid particles: most commonly caused by a change in pH.

Preservative Free
Contains no added substance capable of inhibiting bacterial contamination.

Procedure
Written statements of steps to complete an action.

Process
Actual performance and observation of performance based on compliance with policies, procedures, and professional standards.

Product Integrity
Intact, uncompromised product; condition suitable for intended use.

Proximal
Nearest to the heart; closest point of attachment; above previous site of cannulation.

Psychomotor
Behaviors that place primary emphasis on the various degrees of physical skills and dexterity as they relate to the thought process.

Pulsatile Flushing Technique
Repetitive injection of short (e.g., 1 mL) pushes followed by a brief pause for the purpose of creating turbulence within the vascular access device lumen.

Purulent
Containing or producing pus.

Push
Manual administration of medication under pressure.

Quality Improvement
An ongoing, systematic process for monitoring, evaluating, and problem solving.

Radiopaque
Ability to be detected by radiographic examination.

Risk Management
Process that centers on identification, analysis, treatment and evaluation of real and potential hazards.

Sclerotic
Fibrous thickening of the wall of the vein resulting in decreased lumen size. On palpation, vein usually feels hard to the touch.

Scope of Practice
The roles, responsibilities, and functions that a qualified health professional deemed competent to perform and allowed to undertake, in keeping with the terms of their professional license.

Semi-quantitative Culture Technique
A laboratory protocol for isolating and identifying microorganisms.

Sepsis
The systemic response caused by the presence of infectious microorganisms or their toxins in the bloodstream.

Single-Use Vial
Medication bottle that is hermetically sealed with a rubber stopper and is intended for one-time use.

Skin-Cannula Junction
Point at which the cannula enters the skin.

Standard
Authoritative statement enunciated and promulgated by the profession by which the quality of practice, service, or education can be judged.

Stylet
A rigid, metal object within a catheter designed to facilitate insertion.

Subcutaneous infusion
Administration of medication or fluids into the tissues beneath the skin.

Thrombolytic Agent
A pharmacological agent capable of dissolving blood clots.

Thrombophlebitis
Inflammation of the vein with clot formation.

Thrombosis
Formation of a blood clot within a blood vessel.

Trace Elements
Minute amounts of essential elements present in the body.

Transparent Semipermeable Membrane (TSM)
A sterile dressing that allows visualization of the surface underneath it. TSM is water-resistant and air-permeable.

Trendelenburg Position
A position in which the head is lower than the feet; this position is utilized to increase venous distention in the upper torso.

Tunneled Cuffed Catheter
A central venous access device designed to have a portion lie within a subcutaneous tunnel with the presence of a cuff into which the subcutaneous tissue grows to offer security for the catheter before exiting the body.

Tunneled Non-Cuffed Venous Catheter
A non-cuffed catheter that is inserted into a large vein of the neck or groin. The catheter is traditionally tunneled through the subcutaneous tissue to an exit point on the anterior chest wall or mid-thigh. This catheter is reliant on external securement for anchorage.

Universal Precautions
Standard approach to infection control. All human blood and certain body fluids are treated as if infectious for bloodborne pathogens.

Valsalva Maneuver
The process of making a forceful attempt at expiration with the mouth, nostrils, and glottis closed.

Vesicant
An intravenous medication that causes blisters and tissue injury when it escapes into surrounding tissue.

Volumetric
Relating to measurement of or by volume.

IV PUMPS

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ZYNO MEDICAL Intelligent Infusion Solutions

PharMerica® Training Manual

Z-800F Large Volume Pump

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PharMerica® Forward Together

ZYNO MEDICAL Intelligent Infusion Solutions

Z-800F Large Volume Pump

PharMerica® Training Manual

Content:

- **Zyno Medical**
  - Introduction
- **Basic Setup Infusion Training Module**
  - IV Set and General Setup Instructions
    - Key Pump Features
    - Priming and Loading IV Set
    - Unloading IV Set
    - Locking Key Pad
    - Clearing Volume Infused
    - Alarms, Warnings and Errors
- **Standard Modes Training Module**
  - Z-800F: Continuous Time/ Volume Infusion Mode
  - Z-800F: Continuous Rate/ Volume Infusion Mode (and Secondary programming)
- **Specialty Modes Training Module**
  - Z-800F: TPN Infusion Mode
- **PharMerica® Training Record: Z-800F Large Volume Pump**

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ZYNO MEDICAL Intelligent Infusion Solutions

Z-800F: IV Set and General Setup Instructions

Key Pump Features:

- Rugged/durable design: Durable aluminum casing and door
- 45 Degree Angle Pole Clamp for easier viewing
- Very simple, intuitive programming
- Set-based free-flow protection (Available in Z-800F and Z-800WF models)
- Configurable menus
- Upgradeable software
- Light weight: 7 lbs
- Detachable Power Cord
- Optional Alarm Light Indicator
- Optional Drip Sensor

Priming and Loading IV Set

- Turn Pump ON (door should be closed) -----POST----- will display for 2 seconds as the self-test is completed.
- Prime IV Set by gravity, invert Y-site and tap air out of back check valve and any Y-sites, then engage roller clamp, white set based anti-free-flow clamp (pinch clamp available on B2 Series IV sets) and slide clamp if available.
- Lift Pump Door Handle and open to the right.
- **Z-800F and Z-800WF models only: Loading the pinch clamp**
    - **Press in the GREEN Loading Button, hold the clamp with the top handle and side wings facing front, and slide the side wings straight down into the clamp holder slots, then release the green loading button.**
- Load Tubing into the tubing guides down through the Black Air-In-Line Sensor near the bottom, and push the tubing into the Black Air-In-Line Sensor cavity.
- Align Tubing OVER the pump based anti-free-flow clamp (located below the black Air-In-Line Sensor), do NOT push tubing into this clamp, closing the pump door will automatically engage this mechanism.
- Close the Pump Door and push down on the pump door handle to secure the door.
- Open IV Set roller clamp and slide clamp and VERIFY there is NO FLOW in the IV Set Drip Chamber. If flow is observed, remove pump for maintenance servicing.

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Unloading IV Set

- Once infusion is stopped, engage IV set clamps.
- Open pump door by lifting up on the door handle.
- SLOWLY Unload IV set from BOTTOM to Top.
- **Z-800F and Z-800WF models only: Unloading IV Set (pinch clamp)**
  - **Press in the GREEN Loading Button, grasp the tubing immediately below the pump, and in one smooth motion, lift up to release from the pump anti-free-flow clamp and continue lifting upwards to unload the pinch clamp from the clamp holder. Do not unload by grasping the pinch clamp itself.**
- Close pump door.

Locking Key Pad

- While holding down CLR Button press the 10's down button, an audio prompt and PANEL LOCKED will display for 3 seconds.
- Repeat the process to unlock the key pad.

Clearing Volume Infused

- The pump must be stopped to clear volume infused.
- From Primary or Secondary set up screen, hold CLR Button for 5 seconds.
- An audio prompt will sound and a confirmation prompt will display.
- Press YES Button (...) to Confirm.

Factory Settings

- To adjust Alarm Volume, Screen Brightness and Screen Contrast go to the Configuration Menu
  - While in programming screen, select CONFIG on lower left of screen
  - Highlight and select 2. FACTORY SET
  - Highlight and select BRIGHTNESS, CONTRAST or ALARM VOLUME
  - Use 1"s digit key to adjust setting
  - Press SAVE
  - Press QUIT to return to programming screen

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Z-800F: Continuous Rate/Volume Infusion Mode

Setting up a Primary Infusion in Continuous Rate/Volume Mode

Press and hold On/Off for 2 seconds to turn pump on

The Pump Will Display:

- RESUME INFUSION
- NEW INFUSION
- SELECT Button (...)

Use the Down Navigation Key (arrow Button) and Choose NEW INFUSION. Confirm with the SELECT Button (...).

The Pump Will Display:

- PROGRAM
- SELECT Button (...)

Confirm with the SELECT Button (...).

Use the Up and Down Navigation Keys to Select the desired Mode:

- Use Down navigation key to Highlight
- **1. Continuous Mode Rate/Volume**
- Use the SELECT Button (...) to select this mode.
- Enter Primary Rate by using the Up/Down 100, 10, 1 Numeric Buttons (125).
- Use Down Navigation Key to highlight - Primary VTBI.
- Enter the correct value using the UP/Down 100, 10, 1 Numeric Buttons (250).
- Press RUN to start (Yellow Button).
- Check for drip in drip chamber to ensure infusion is running.

Explain Run Screen (Top to Bottom)

- Top Left are 2 Green lights that flash while infusing. They will flash red when there is an alarm.
- The top right red LED lights display the current Rate.
- The first line of the Run Screen displays:
  - PRI (primary infusion)
  - RUN (pump state)
  - TL 00:00 (time left)
  - Battery icon (charge status)
- The Second Line displays: RATE
- The Third Line displays: VTBI (volume to be infused)

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ZYNO MEDICAL Intelligent Infusion Solutions

Z-800F: Continuous Time/Volume Infusion Mode

Setting up a Primary Infusion in Continuous Time/Volume Mode

Press and hold On/Off for 2 seconds to turn pump on

The Pump Will Display:

- RESUME INFUSION
- NEW INFUSION
- SELECT Button (...)

Use the Down Navigation Key (arrow button) and Choose NEW INFUSION. Confirm with the SELECT Button (...).

The Pump Will Display:

- PROGRAM
- SELECT Button (...)

Confirm with the SELECT Button (...).

Use the Up and Down Navigation Keys to Select the desired Mode.

- Use Down navigation key to Highlight:
- **2. Continuous Mode Time/Volume**
- Use the SELECT button (...) to select this mode.
- Enter Primary Time by using the 100, 10, and 1 Numeric Buttons (100).
- Use down navigation key to highlight : Primary VTBI
- Enter the correct value using the UP/Down 100, 10, 1 Numeric Buttons (230).
- Press RUN to start. (Yellow Button)
- Check for drip in drip chamber to ensure infusion is running

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Setting up Secondary Infusion

- Press Run/Stop to stop Primary Infusion
- Press PROG Button (-)
- Press Select Button (...)
- Press SEC Button (-)
- Enter Time
- Enter Volume
- Press RUN to start
- Pump will alarm when secondary volume is completed and automatically switch over to Primary infusion.

NOTE: Height differential instructions for primary and secondary fluid containers, as described in the *PharMerica® Operating Manual*, must be followed for safe operation of a primary/secondary infusion.

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Z-800F: TPN Infusion Mode

Setting up TPN Infusion

Press and hold On/Off for 2 seconds to turn pump on

The Pump Will Display:

- RESUME INFUSION
- NEW INFUSION
- SELECT Button (...)

Use the Down Navigation Key (arrow button) and Choose NEW INFUSION. Confirm with the SELECT Soft Button (...).

The Pump Will Display:

- PROGRAM
- SELECT Button (...)

Confirm with the SELECT Soft Button (...).

Use the Up and Down Navigation Keys to Select the desired Mode:

- Use Down Navigation Key Button to Highlight:
- **3. TPN Mode**
- Use the SELECT Button (...) to select this mode.
- Enter Time by using the 100, 10, and 1 Numeric Buttons (300).
- Use down Navigation Key to highlight : VTBI
- Enter the correct value using the UP/Down 100, 10, 1 Numeric Buttons (500).
- Press RUN to start (Yellow Button) **or** use:

RAMP Feature

- Press RAMP Soft Button (-)
- Enter Ramp UP Time by using the 100, 10, and 1 Numeric Buttons (1:00).
- Press Down Navigation Key to enter Ramp Down Time by using the 100, 10, and 1 Numeric Buttons (1:00).
- Press RUN to start. (Yellow Button)

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PharMerica® Training Record: Z-800F Large Volume Pump

Facility Name: _____

Educator Name: _____

Educator Signature: _____ Date: _____

Learning Objectives and Skills:

1. Prime Administration Set Using Gravity
2. Load Primary Administration Set
3. Program Infusion in Continuous Infusion Rate/ Volume Mode
4. Program Secondary Infusion (if applicable)
5. Stop Infusion/ Clear Programming
6. Demonstrate Infusion Complete/ KVO Feature
7. Program TPN Mode
8. Program TPN Mode Using Ramp
9. Demonstrate Downstream Occlusion
10. Clear Volume Infused
11. Demonstrate Keypad Lockout Feature
12. Unload Primary Administration Set
13. Understand Alarms: Air-in-Line, Door Open, Battery Empty, No Drip (Sensor)
14. Understand Warnings: Low Battery, Pump Unattended, Near End

By signing below, I am indicating that I have attended training and have successfully mastered the skills noted above.

	Name	Signature	Date
1.			
2.			
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	Name	Signature	Date
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Notes:

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CADD SOLIS PUMP

smiths medical
bringing technology to life

Clinician Guide

CADD®-Solis VIP
Ambulatory Infusion Pump
Model 2120

CADD

Contents

For detailed instructions, specifications, warnings and additional information on the CADD®-Solis VIP ambulatory infusion pump, please refer to the User Manual for this product.

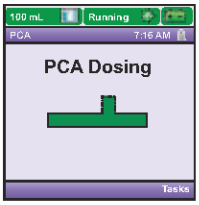
Description of the CADD®-Solis VIP Pump

The CADD®-Solis VIP ambulatory infusion pump provides measured drug therapy to patients in hospital or outpatient settings. Therapy should always be overseen by a physician or a certified, licensed healthcare professional. As appropriate, the caregiver and patient should be instructed in using the pump.

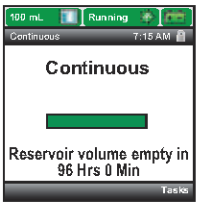
Indications

The CADD®-Solis VIP ambulatory infusion pump is indicated for intravenous, intra-arterial, subcutaneous, intraperitoneal, perineural, surgical site, epidural space, or subarachnoid space infusion.

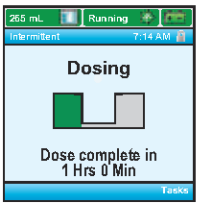
- **PCA** (patient controlled analgesia) delivery is used for therapies that require a continuous rate of infusion, patient-controlled demand doses, or both, such as patient-controlled analgesia



- **Continuous delivery** allows the infusion of drug/fluid at a constant, programmed rate

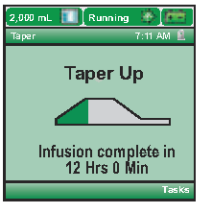


- **Intermittent delivery** allows the infusion of a specific volume of drug/fluid at a regular, programmed interval

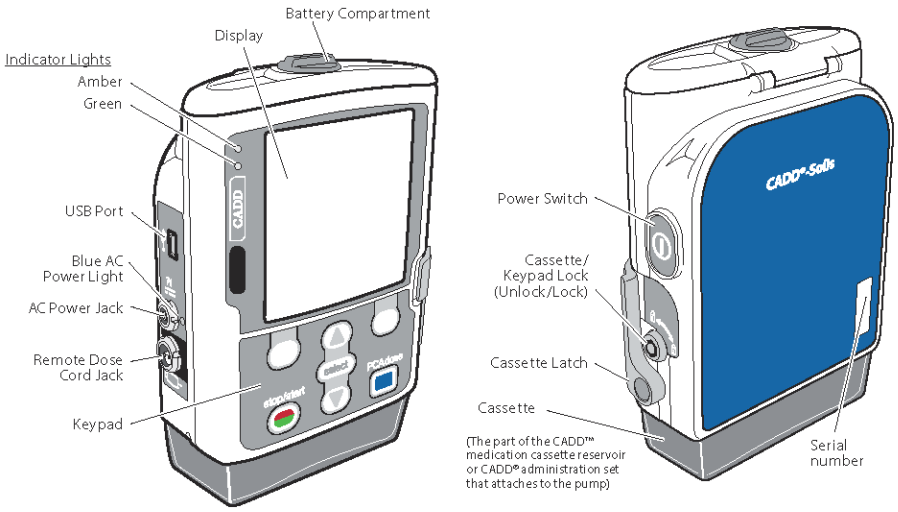


- **Step delivery** allows an incremental increase in infusion rate to a specified maximum infusion rate for a specified total infusion volume

- **Taper delivery** allows a plateau rate of infusion with the option of tapering at the beginning and/or end and has a programmable KVO rate at the end of the infusion



Pump Diagram



Pump Descriptions

Indicator Lights

- **Green** – Flashes when the pump is running and delivering fluid as programmed
- **Amber** – Flashes when the pump is stopped, an alarm condition exists, or the battery or the reservoir volume is low. It stays on continuously when the pump is inoperable.

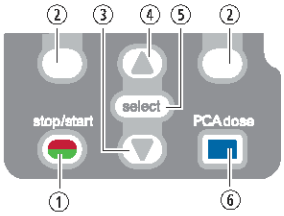
Note: If both lights flash the pump is running but there is a condition that needs attention.

Display with Backlighting - The display shows programming information and messages. If no keys are pressed after a period of time, the backlight turns off and the display goes blank to save battery power (except during an alarm or when the AC adapter is in use). Press any key to turn the display back on except the PCA dose key when in PCA mode.

Power Switch - Turns the pump on or off. Press and hold the switch.

Power Jack - The AC adapter can be plugged into the power jack. When the AC adapter is plugged in, the blue power light turns on. The light is on regardless of the pump's on or off status.

Keypad



1. stop/start — Start and stops pump delivery
2. soft keys — Answer questions on the pump's display or navigate through pump screens
3. ▼ — Navigates through the pump menus, scrolls down or decreases values
4. ▲ — Navigates through the pump menus, scrolls up or increases values
5. select — Selects a menu item
6. PCA dose — Requests a PCA dose if the remote dose cord is not connected and the PCA dose option is available

USB Port - A mini-B USB cord can be attached to the USB port for communication with the CADD®-Solis medication safety software

Remote Dose Cord Jack - Used for attaching the remote dose cord to the pump

Battery Compartment - Four AA batteries or the rechargeable battery pack fit into this compartment. The batteries are the primary source of power or serve as a back-up when the AC adapter is in use.

Cassette Latch - Used to attach the cassette to the pump

Cassette / Keypad Lock - Secures the cassette to the pump using the pump key. The cassette latch must be closed before it can be locked.

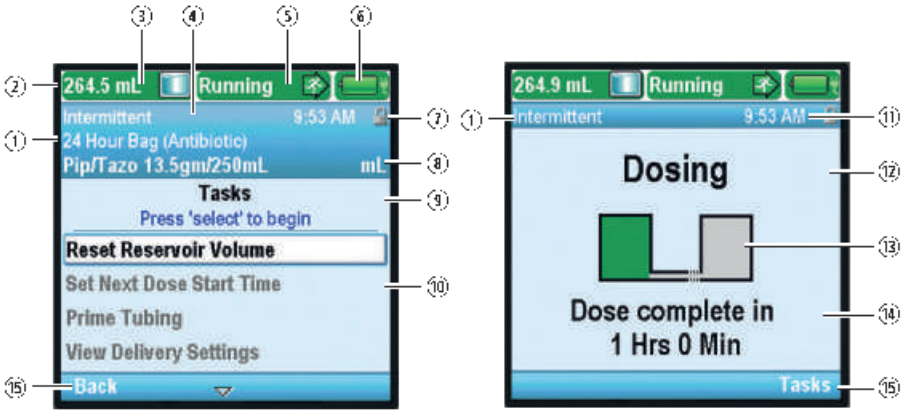
Air Detector - The air detector can be turned on or off, depending on facility or therapy requirements. If it is turned on and air is detected in the part of the tubing that passes the air detector sensor, an alarm sounds and delivery stops.

Downstream Occlusion Sensor - When a downstream occlusion (between the pump and the patient) is detected, an alarm sounds, delivery stops and the display shows a message

Upstream Occlusion Sensor - When an upstream occlusion (between the pump and the reservoir) is detected, an alarm sounds, delivery stops and the display shows a message

Pump Screens

The sample screens shown below are only examples of what might be displayed. The protocols and all associated pump settings will be established by your facility.



Menu Screen Home Screen

1. The therapy, qualifier and drug in the current protocol. On a home screen, only the therapy is listed.
2. The status bar shows the status of the pump. It may also display messages and alerts.
3. Current reservoir volume
4. The screen color is unique for each therapy
5. Delivery status of the pump – stopped or running
6. The type of battery in use, the approximate amount of life remaining and if an AC adapter is in use

AA batteries *AA batteries with AC adapter* *Rechargeable battery pack* *Rechargeable battery with AC adapter*

7. Keypad lock status – locked or unlocked
8. Units of measurement and concentration (if applicable) for the drug or solution used in the current protocol
9. Screen name and blue help text, if any

10. The work area/contents for the displayed screen
11. The current time
12. The current status of the programmed infusion
13. Graphic that identifies which therapy is programmed and the status of the infusion
14. Information indicating important upcoming events
15. Options for navigating the pump that change depending on the screen and the functions being performed

Security Settings

Security settings are used to limit patient and unauthorized access to certain programming and operating functions of the pump. Pump functions are protected by three different security codes that can be customized.

Keypad Code - The keypad code is for clinicians who need to modify and review patient-specific parameters and manage air and occlusion parameter settings.

Clinician Code - The clinician code allows access to all the functions the keypad code allows. In addition, it allows users to modify most advanced task settings, format the time and date, change delayed start and priming security options, and select new protocols.

Administrator Code - The administrator code allows access to all pump functions and allows users to change protocol ranges for delivery settings, reset the pump to factory defaults, and select manual mode protocols.

Security Levels

Pump Operations and Tasks	Available without a security code		Available with keypad code		Available with clinician code	
	Running	Stopped	Running	Stopped	Running	Stopped
Stop/Start	✓	✓	✓	✓	✓	✓
PCA Dose (PCA only)	*		*		*	
Reset Reservoir Volume		✓		✓		✓
Taper Down Now (Taper only)	✓		✓		✓	
Taper Down Period of Taper Down Now (Taper only)			✓		✓	
Set Delayed Start (not available in Intermittent)		*		✓		✓
Next Dose Start Time (Intermittent only)		*		✓		✓
Prime Tubing		*		✓		✓
View Delivery Settings	✓	✓	✓	✓	✓	✓
Edit Delivery Settings (Therapy type determines which submenus appear)				✓		✓
Display and Sound Settings menu	✓	✓	✓	✓	✓	✓
Backlight Intensity	✓	✓	✓	✓	✓	✓
Alarm Volume	✓	✓	✓	✓	✓	✓
Sound Theme	✓	✓	✓	✓	✓	✓
Key Beep On/Off	✓	✓	✓	✓	✓	✓
Numeric Format						✓
Change Time and Date menu		✓		✓		✓
Current Time		✓		✓		✓
Current Date		✓		✓		✓
Time Format						✓
Date Format						✓
View Reports	✓	✓	✓	✓	✓	✓
View Advanced Tasks (see *Security Levels, Advanced Tasks* on page 20)	✓	✓	✓	✓	✓	✓

Table Key: ✓ Yes No * Availability based on facility protocol

The Administrator code allows access to all of the above operations and tasks, while stopped.

Advanced Tasks	Available without a security code		Available with keypad code		Available with clinician code	
	Running	Stopped	Running	Stopped	Running	Stopped
Step Down (Step only)	✓	✓	✓	✓	✓	✓
Step Up (Step only)			✓	✓	✓	✓
Give Clinician Bolus (PCA only)					✓	
Patient Permissions						✓
Air and Occlusion Settings				✓		✓
Alarm Settings						✓
Security Settings menu						✓
Keypad Security						✓
Keypad Code						✓
Clinician Code						✓
Admin Code						
Manual Programming Security						
Start New Patient						✓
Select a manual mode protocol						*
Start New Protocol Same Patient						✓
Select a manual mode protocol						*
Delivery Hard and Soft Limits menu (Therapy type determines which submenus appear)						
Reset to Factory Settings						

Table Key: ✓ Yes No * Availability based on facility protocol

The Administrator code allows access to all of the above operations and tasks, while stopped.

Autolock

The autolock feature reduces the chance of unauthorized pump programming. When the keypad is unlocked with a security code and left unlocked, the software automatically locks the keypad. When the pump is on the home screen, the autolock feature takes effect 30 seconds after the last key press. Autolock takes longer on programming or task screens when you typically need more time to perform an action. Depending on which screen was on the pump last, and if the pump is not alarming, it can take up to four minutes after the last key press before the pump reverts to the home screen and autolocks immediately. When the pump is alarming, autolock does not take effect.

Note: *The keypad can be re-locked by pushing the right soft key twice from the home screen or once from the Tasks or Advanced Tasks menu. As a recommended safety precaution, always manually lock the pump using this feature.*

Entering Security Codes

Press ▲ or ▼ to scroll to the correct digit. Press **Select** or **Accept Value** to advance to the next digit. Once the complete code has been entered, press **Select** or **Accept Value**.

If an incorrect code is entered, a wrong code error appears. Select Retry to enter the code again.

Note: *If you enter a code that you believe is correct and receive a wrong code message, check the screen to see if the code has been customized.*

Depending on the level of security required and how the security settings have been programmed, you may be able to use the pump key to unlock the keypad. To unlock the keypad with the pump key, turn the key counterclockwise.

Programming the Pump

Start New Patient - Single Protocol

To start a new patient using the single protocol that was downloaded to the pump:

1. Power on the pump. The pump will display the home screen.
2. Attach a cassette. (see page 25 for instructions)
3. You will be prompted to prime the tubing. (see page 26 for instructions)
4. Depending on your facility's policies and procedures, one of two messages will appear on the screen:

a. "Review pump settings" may appear on the screen.
   - > Press the right soft key **Review**
   - > Unlock the keypad, if required, the delivery settings will appear
   - > Review and accept each delivery setting by pressing the right soft key **Accept Value**
   - > If any of the delivery setting values need to be edited, press the **Select** key
   - > Once all the values have been accepted, press the right soft key **Next**
   - > "Start Pump?" appears, choose **Yes**

b. "Start Pump?" may appear on the screen

   Choose **No**. The home screen will appear. To review the delivery settings before starting the infusion:
   - > Press the right soft key **Tasks**
   - > Scroll to highlight **View Delivery Settings**, press **Select**
   - > Review each setting by scrolling through each parameter
   - > Press **Select** to edit any specific parameter. Unlock keypad if required.
   - > When all parameters have been reviewed, press the left soft key **Back** until you return to the home screen
   - > Now press the **Stop/Start** key, "Start Pump?" appears. Choose **Yes**.

Start New Patient – Protocol Library

To Start a New Patient Using a Protocol From a Library on the Pump:

1. Make sure the pump is stopped
2. In the **Advanced Tasks** menu, press ▲ or ▼ to highlight **Start New Patient** or **Start New Protocol Same Patient** and press **Select**
3. The next screen informs you completing this task will overwrite all delivery settings. Press continue to unlock the keypad and continue programming the pump.

   Note: To edit individual settings rather than starting a new patient or protocol, see page 11 for more information on editing delivery settings.
4. Unlock the keypad
5. Press ▲ or ▼ to highlight a therapy and press **Select**
6. Press ▲ or ▼ to highlight a qualifier and press **Select**
7. Press ▲ or ▼ to highlight a drug and press **Select**
8. A screen appears with a summary of your selections. Review them to confirm they are correct. Select **Yes**.
9. The "Review pump settings" screen appears. Select **Review**.

10. Press ▲ or ▼ to scroll through and review all the settings. Press **Accept Value** if the highlighted setting is correct or press **Select** to edit the value. Then press **Save**.
11. When the review is complete, select **Next**
12. If a cassette is attached, latched and locked (if using the PCA therapy), the "Prime tubing?" screen may appear. The "Start pump?" screen appears. Select **Yes** to start the pump immediately or **No** to start the pump at a later time.

Manual Mode Programming

You can manually program the CADD®-Solis VIP pump if the physician's orders do not match the single protocol or any of the protocols in the library or if the patient's therapy requires wider programming ranges than available in a standard protocol.

Unlike protocols that are created and downloaded into the pump by the CADD®-Solis medication safety software, manual programming does not contain any programming limits. For more information, see the Operator's Manual or your CADD®-Solis system administrator.

Delayed Start/Next Dose Start Time

Delayed Start

Note: *This task is available for all therapies except intermittent.*

The Set Delayed Start task allows you to delay the start of an infusion by up to 96 hours by selecting the date and time the infusion should begin. If the Set Delayed Start task is programmed, the start time is displayed as the last delivery setting. This is the time the next infusion will begin. The pump must be running on the selected date and time in order for delivery to begin.

If the Set Delayed Start is programmed, the KVO rate is active until the infusion begins.

Note: *In step and taper therapies, you may not set a delayed start after an infusion has been started.*

To Set a Delayed Start:

1. From the Tasks menu, press ▲ or ▼ until Set Delayed Start is highlighted, then press **Select**
2. Unlock the keypad, if required
3. Press ▲ or ▼ until the desired start time appears on the screen and select **Confirm**
4. Confirm the new start time by selecting **Yes**

Next Dose Start Time

Note: This task is available for intermittent therapies only.

A Next Dose Start Time may be programmed to delay the start of the next dose of an infusion. However if a dose is in progress, this cancels the remainder of the current dose. To avoid interrupting the dose in progress, adjust the next dose start time when the pump is in KVO.

Note: During dosing, the home screen shows "Dosing". If a dose is stopped in progress, the home screen shows "Interrupted." If the infusion is in KVO, "Between Doses" appears on the home screen.

The Next Dose Start Time may also be set to delay delivery of the first dose of the infusion by up to 96 hours. The pump must be running on the selected date and time in order for delivery to begin.

To Set the Next Dose Start Time:

1. Stop the pump if it is running. If a dose was delivering when the pump was stopped, the "Interrupted" screen appears.

   Note: If a dose is in progress, this cancels the remainder of the dose.
2. From the Tasks menu, press ▲ or ▼ until Set Next Dose Start Time is highlighted, then press **Select**
3. Unlock the keypad, if required
4. Press ▲ or ▼ until you reach the time that you want the next dose to begin. The length of the delay is listed below the time. Select **Confirm**.
5. Confirm the new start time and length of the delay. Select **Yes**.

Edit/View Delivery Settings

The delivery settings are patient-specific parameters of a therapy that are directly related to the drug being infused and can be edited within limits established in the protocol. The CADD®-Solis system administrator establishes the initial values of the parameters, any applicable programming units and drug concentration, other parameter limits, and which parameters can be viewed and/or edited. A security code (or the pump key, if enabled) are required to edit the parameters.

Note: Editing individual delivery settings in Step or Taper mode will reset the infusion back to the beginning.

Editing Delivery Settings

To view and edit delivery settings:

1. Stop the pump if it is running
2. In the Tasks menu, press ▲ or ▼ until View Delivery Settings is highlighted, then press **Select**

3. Press ▲ or ▼ until the desired setting is highlighted, then press Select
4. If requested, unlock the keypad
5. Press ▲ or ▼ until the desired value appears on the screen, then select Save

   Note: *If the new value is above the maximum soft limit or below the minimum soft limit, the value appears in amber on the screen. To select a value above the maximum soft limit or below the minimum soft limit, select Confirm and then select Yes.*

   Change any additional settings by scrolling through the remaining delivery settings and press Select to edit each setting as necessary.

Review Pump Settings

When starting a new patient or a new protocol for the same patient, or after adjusting any delivery settings, the pump settings must be reviewed and accepted as accurate.

To Review Pump Settings:

1. When the "Review pump settings" screen appears, select Review
2. Press ▲ or ▼ to scroll through and review all the settings. If the highlighted setting is correct, press Accept Value. If the highlighted setting is incorrect, press Select to edit the setting. Press ▲ or ▼ to modify the setting and then press Save or Confirm.
3. When the review is complete, select Next

PCA Delivery Mode

PCA (patient-controlled analgesia) delivery is used for therapies that require a continuous rate of infusion, patient-controlled demand doses, and/or a clinician-activated bolus. The delivery methods available are:

- Continuous rate
- PCA dose, a demand dose activated by the patient
- Clinician bolus, a dose activated by the clinician

Home Screen

The delivery mode and status of the infusion are indicated on the home screen with messages appearing in text, a graphic in a shape unique to the therapy, and with the colors green, red, and grey.

Examples specific to the PCA delivery mode are:

- The pump is stopped with a programmed delayed start

- The pump is running and delivering at a continuous rate
- The pump is running and delivering a PCA bolus

Programming Screens

- **Continuous Rate**
  The desired continuous rate of medication delivery
- **PCA Dose**
  The amount of drug delivered when the patient requests a PCA dose by either pressing the PCA dose key or using the remote dose cord button. The PCA dose key on the pump is inactive when the remote dose cord is connected to the pump.
- **PCA Lockout**
  The minimum time that must elapse between the time one PCA dose starts and the time that the next PCA dose is available
- **Delivery Limit**
  Restricts the amount of drug delivered to the patient within a specified time frame. The programmable range is 1 hour to 12 hours. The limit includes the continuous rate and PCA doses, but does not include clinician boluses.
- **Max Doses/Hr**
  The maximum number of PCA doses allowed in a one-hour period. The frequency of available doses is limited by the programmed PCA lockout time. If the PCA Lockout is one hour or greater, this setting will not appear in the menu.
- **KVO Rate**
  The KVO or "keep vein open" rate is calculated by the pump. It allows the delivery of a minimal amount of drug to help maintain catheter patency. If a continuous rate is programmed, it will display as 0.1 mL/hr (or the mg or mcg equivalent). If no continuous rate is programmed, the KVO rate will display 0 mL/hr (or the mg or mcg equivalent). If a delayed start is programmed, the KVO rate is active until the infusion begins. If a delivery limit is programmed, the KVO rate is active when the delivery limit is reached.
- **Reservoir Volume**
  The volume of fluid contained in the reservoir. The reservoir volume value decreases as the pump is primed or delivers fluid.
- **Start Time**
  The time the next infusion will begin. It is displayed only if the delayed start is programmed. The pump must be running on the selected date and time in order for the infusion to begin.

Giving a Clinician Bolus

A clinician bolus may be delivered only when the pump is running. It allows delivery of a specific amount of drug, such as a loading dose. A clinician bolus cannot be started while a PCA dose is in progress. The clinician

bolus increases the given amount, but does not add to the dose counters or to the delivery limit. A clinician bolus may be stopped in progress.

Note: *The maximum clinician bolus may be limited by the settings in the protocol, which is determined by the CADD®-Solis system administrator.*

To start a clinician bolus:

1. Make sure the pump is running
2. From the View Advanced Tasks menu, press ▲ or ▼ to highlight Give Clinician Bolus and press **Select**
3. Unlock the keypad
4. Press ▲ or ▼ to change the value of the clinician bolus. Select **Deliver**.
5. If you enter a value outside the soft limit, a screen appears asking you to confirm the soft limit override. Select **Confirm** to deliver the bolus.
6. The screen shows the decreasing amount as the bolus is delivered. You may stop the bolus at any time by selecting **Stop Bolus**.
7. When the bolus has been delivered, the screen says, "Clinician bolus complete." Select **OK**.

Start a PCA Dose

If a PCA dose is programmed, the patient may start a PCA dose while the pump is running. The amount delivered is added to the amount provided by the continuous rate. Each time the patient requests a PCA dose, the pump automatically adds it to the Given and PCA Dose Counters report.

The remote dose cord can be attached to the pump and provided to the patient as an alternative to pushing the PCA dose key when requesting a PCA dose. The LED on the remote dose cord indicates PCA dose status:

- **Off:** A PCA dose is not available
- **Flashing:** A PCA dose is available
- **On:** A PCA dose has been requested and delivery has started

Notes:

- *A PCA dose cannot be started while another PCA dose or a clinician bolus is in progress*
- *The PCA dose key on the pump is inactive when the remote dose cord is connected to the pump*
- *If the display has automatically blanked, pressing the PCA dose key turns the display back on and delivers a PCA dose, if available*

To Start a PCA Dose:

Press the **PCA dose** key on the pump or the remote dose cord. If a dose is available, it will start infusing.

Stopping a Clinician Bolus or PCA Dose

To Stop a Clinician Bolus:

While the clinician bolus is delivering, the Clinician Bolus screen appears on the pump and shows the decreasing amount of the bolus remaining to be delivered. You may stop the clinician bolus from the screen by selecting Stop Bolus.

To stop a PCA dose:

From the "PCA dose started" screen you may stop the PCA dose while it is delivering by selecting Stop Dose.

Or

If the pump is on the home screen, press the Stop/Start button.

You will first be asked if you want to stop the dose, select Yes. Then you will be asked if you want to stop the pump, select No.

Continuous Delivery Mode

Continuous delivery allows the infusion of drug fluid at a constant, programmed rate.

Home Screen

The delivery mode and status of the infusion are indicated on the home screen with messages appearing in text, a graphic in a shape unique to the therapy, and with the colors green, red, and grey.

Examples specific to the continuous delivery mode are:

- The pump is running with a programmed delayed start 
- The pump is stopped. It will deliver at a continuous rate once it is started 

Programming Screens

- Continuous Rate
  The desired continuous rate of medication delivery. Rates above 250 mL/hr require a CADD® high volume administration set.
- KVO Rate
  The KVO or "keep vein open" rate is optional. It allows the delivery of a minimal amount of drug to help maintain catheter patency. If a KVO rate is programmed, it will only be active if a delayed start is programmed. The pump will infuse at the KVO rate until the programmed infusion begins.
- Reservoir Volume
  The volume of fluid contained in the reservoir. The reservoir volume value decreases as the pump is primed or delivers fluid.

- Start Time
  The time the next infusion will begin. It is displayed only if the delayed start is programmed. The pump must be running on the selected date and time in order for the infusion to begin.

Intermittent Delivery Mode

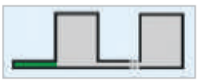
Intermittent delivery allows the infusion of a specific volume of drug at a regular, programmed interval and over a specified duration. A dose may be repeated in a cycle up to 96 hours.

Home Screen

The delivery mode and status of the infusion are indicated on the home screen with messages appearing in text, a graphic in a shape unique to the therapy, and with the colors green, red, and grey.

Examples specific to the intermittent delivery mode are:

- The pump is running with a manually programmed next dose start time



- The pump is running and delivering a dose

- The pump is stopped between doses while at the KVO rate

Programming Screens

- Dose Volume
  The volume of the dose cannot be programmed to a value that would cause the rate of delivery for the programmed dose duration to exceed the dose rate maximum of 500 mL/hr. Therefore, programming the dose volume may result in the automatic lengthening of the dose duration to accommodate the maximum dose rate.
- Dose Duration
  The length of time required to deliver the dose. The dose duration cannot be programmed to a value that would cause the rate of delivery for the programmed dose volume to exceed the maximum dose rate of 500 mL/hr.
- Dose Cycle
  The time from the start of one dose to the start of the next dose. The programmable values for the dose cycle are dependent on the dose duration. There must be at least five minutes between the end of one dose and the start of the next dose. Therefore, the minimum programmable cycle is the dose duration plus five minutes.

- **Dose Rate**
  This setting is for review only and shows the rate at which the dose is delivered based on the programmed dose volume and dose duration. The maximum allowable rate is 500 mL/hr. Rates above 250 mL/hr require a CADD® high volume administration set.
- **Next Dose**
  The time the next dose is scheduled to begin. The pump must be running on the selected date and time in order for the dose to begin. The next dose time can be programmed at any time to delay the start of the next dose, but if a dose is in progress, this cancels the remainder of the dose.
- **KVO Rate**
  The KVO or "keep vein open" rate is optional. It allows the delivery of a minimal amount of drug to help maintain catheter patency. The KVO rate is active between doses or until a dose begins if the next dose start time has been set to a value other than "immediate."
- **Reservoir Volume**
  The volume of fluid contained in the reservoir. The reservoir volume value decreases as the pump is primed or delivers fluid.
- **Stopping the Pump During an Infusion**
  Stopping the pump between doses does not affect the start time of subsequent doses. Stopping the pump while a dose is in progress shifts all subsequent doses by the amount of time the pump is stopped.
- **Resuming the Dose**
  To resume delivery of a dose stopped in progress, simply restart the pump by pressing stop/start
- **Resetting the Cycle**
  To reset the cycle, stop the pump between doses, and reprogram the next dose start time. When a dose is stopped in progress, the "Interrupted" screen appears. To cancel the current dose and reset the cycle, reprogram the next dose start time through the Tasks menu. The next cycle will start at the time you select.

Step Delivery Mode

Step delivery allows the infusion of a specified volume of drug at an initial rate with linear step increases up to a plateau rate. Multiple steps down may also be applied, reducing the continuous rate as low as the initial rate. An optional KVO rate may be delivered at the end of the infusion, depending on protocol settings.

Home Screen

The delivery mode and status of the infusion are indicated on the home screen with messages appearing in text, a graphic in a shape unique to the therapy, and with the colors green, red, and grey.

Examples specific to the step delivery mode are:

- The pump is running with a programmed delayed start
- The pump is stopped and has not yet reached the plateau
- The pump is running at the plateau rate
- The pump is running at continuous hold after a manual step down
- The infusion is complete

Programming Screens

- Infusion Volume

  The total volume of fluid to be delivered. The reservoir volume must be large enough to support the entire infusion volume. Therefore, programming the infusion volume may result in an automatic increase in the reservoir volume. Entering a new infusion volume resets the infusion so that delivery starts at the beginning.

- Initial Rate

  The initial rate of medication delivery. Entering a new initial rate resets the infusion so that delivery starts at the beginning.

- Rate Increment

  The amount that you want medication delivery to increase by for each step. Entering a new rate increment resets the infusion so that delivery starts at the beginning.

- Plateau Rate

  The maximum rate at which you want the medication to be delivered. The pump begins at the initial rate, and increases by the rate increment until the plateau rate is reached. The pump runs at the plateau rate until the infusion volume is fully delivered. Entering a new plateau rate resets the infusion so that delivery starts at the beginning.

- Step Duration

  The length of time programmed for each step during medication delivery. After infusion occurs for the step duration, the rate increases by the rate increment unless the current rate is equal to

the plateau rate. Entering a new step duration resets the infusion so that delivery starts at the beginning.

- **Infusion Duration**

  The time required to deliver the infusion volume. It is calculated by the pump based on the initial values programmed for infusion volume, initial rate, rate increment, step duration, and plateau rate. It appears on the screen for review only.

- **KVO Rate**

  The KVO or "keep vein open" rate is optional. It allows the delivery of a minimal amount of drug to help maintain catheter patency. If a delayed start is programmed, the KVO rate is active until the infusion begins. It is also active after the infusion volume is delivered if the reservoir volume is programmed greater than the infusion volume.

- **Reservoir Volume**

  The volume of fluid contained in the reservoir. The reservoir volume value decreases as the pump is primed or delivers fluid. The reservoir volume should not be programmed or edited to be less than the programmed infusion volume. Entering a new reservoir volume resets the infusion so that delivery starts at the beginning.

- **Start Time**

  The time the next infusion will begin. It is displayed only if the delayed start is programmed. The pump must be running on the selected date and time in order for the infusion to begin.

  Note: In the Step therapy, you may not set a delayed start after an infusion has started.

Starting Each Infusion

When a new cassette is attached to the pump at the beginning of the infusion, the reservoir volume should be reset. This also resets the infusion. When the pump is started, delivery will start at the beginning of the infusion.

Stopping and Restarting the Pump During an Infusion

If you stop the pump before a step infusion was fully delivered and then restart the pump, you may choose to either restart the infusion from where delivery left off, or you may reset the infusion.

When you press stop/start to restart the pump, a screen appears with the message, "Infusion was interrupted before completion. Finish interrupted infusion or start from beginning with new bag." Select New Bag to reset the reservoir volume and reset the infusion. Or, select Finish to resume the infusion from the point it was at when it was last running.

Step Up

This option allows you to increase the rate of infusion at a time other than what is programmed. You cannot step up to a higher rate than the plateau rate

To step up from the current rate:

1. In the Advanced Tasks menu, press ▲ or ▼ to highlight Step Up and press Select
2. Unlock the keypad
3. The pump displays a screen that tells you the current rate, and asks you if you want to step up to the next step rate. Select Yes.

Step Down

This option allows you to reduce the rate of infusion at any time. You cannot step down lower than the initial rate. Once the step down task has been performed successfully, the automatic step increases after each step duration are cancelled. Delivery continues at the step down (hold) rate. The step up task can be used to restart the automatic step increases.

To step down from the current rate:

1. In the Advanced Tasks menu, press ▲ or ▼ to highlight Step Down and press Select
2. The pump displays a screen that tells you the current rate, and asks you if you want to step down to the previous step rate and hold at that rate. Select Yes.

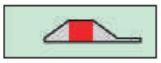
Taper Delivery Mode

Taper delivery allows the infusion of nutritional solutions (TPN, total parenteral nutrition) or other fluids, with optional tapering. Delivery can be gradually increased, or tapered up, at the beginning of the infusion, and it can be gradually decreased, or tapered down, at the end of the infusion. An optional KVO rate may be delivered at the end of the infusion, depending on protocol settings.

Home Screen

The delivery mode and status of the infusion are indicated on the home screen with messages appearing in text, a graphic in a shape unique to the therapy, and with the colors green, red, and grey.

Examples specific to the taper delivery mode are:

- The pump is running with a programmed delayed start 
- The pump is stopped at the plateau rate 

- The pump is running at the plateau rate. No taper up was programmed.

- The pump is running at taper up

- The pump is running at taper down

- The infusion is complete and running at KVO

Programming Screens

Entering a new infusion volume, taper up, taper down, infusion duration or reservoir volume resets the infusion so that delivery starts at the beginning of the infusion duration.

- Infusion Volume - The total volume of fluid to be delivered. The reservoir volume must be large enough to support the entire infusion volume. Therefore, programming the infusion volume may result in an automatic increase in the reservoir volume. Entering a new infusion volume resets the infusion so that delivery starts at the beginning.
- Taper Up - The duration for the taper up period. The maximum programmable taper up is limited by a combination of the plateau rate, infusion duration, infusion volume, and taper down. You cannot select a taper up duration that would cause the plateau rate to exceed the maximum allowable rate. Entering a new taper up duration resets the infusion so that delivery starts at the beginning.
- Taper Down - The duration for the taper down period. The maximum programmable taper down is limited by a combination of the plateau rate, infusion duration, infusion volume, and taper up. You cannot select a taper down duration that would cause the plateau rate to exceed the maximum allowable rate. Entering a new taper down duration resets the infusion so that delivery starts at the beginning.
- Infusion Duration - The time required to deliver the infusion volume. The minimum programmable infusion duration is limited by a combination of the plateau rate, infusion volume, taper up, and taper down. You cannot select an infusion duration that would cause the plateau rate to exceed the maximum allowable rate. Entering a new infusion duration resets the infusion so that delivery starts at the beginning.
- Plateau Rate - The maximum rate at which medication is delivered during the plateau portion of the infusion. It appears on the screen for review only and is calculated by the pump based on the infusion volume, infusion duration, and any programmed tapering. Rates above 250 mL/hr require a CADD® high volume administration set.
- KVO Rate - The KVO or "keep vein open" rate is optional. It allows the delivery of a minimal amount of drug to help maintain catheter patency. If a delayed start is programmed, the KVO rate is active

until the infusion begins. It is also active after the infusion volume is delivered if the reservoir volume is programmed greater than the infusion volume.

- **Reservoir Volume** - The volume of fluid contained in the reservoir. The reservoir volume value decreases as the pump is primed or delivers fluid. The reservoir volume should not be programmed or edited to be less than the programmed infusion volume. Entering a new reservoir volume resets the infusion so the delivery starts at the beginning.
- **Start Time** - The time the next infusion will begin. It is displayed only if the delayed start is programmed. The pump must be running on the selected date and time in order for the infusion to begin.
  Note: *In the Taper therapy, you may not set a delayed start after an infusion has started.*

Starting Daily Infusion

When a new cassette is attached to the pump at the beginning of the infusion, the reservoir volume should be reset. This also resets the infusion.

Stopping and Restarting the Pump During an Infusion

If you stop the pump and then restart it before a taper infusion was fully delivered, you may choose to either restart the infusion from where delivery left off, or you may reset the infusion.

When you press stop/start to restart the pump, a screen appears with the message, "Infusion was interrupted before completion. Finish interrupted infusion or start from beginning with new bag." Select New Bag to reset the reservoir volume and reset the infusion. Or, select Finish to resume the infusion from the point it was at when it was last running.

Taper Down Now

This task allows you to stop an infusion early by immediately tapering down. The following conditions are necessary for Taper Down Now:

- The pump must be running
- The pump must be delivering at the plateau rate or already be in taper down

Access the Taper Down Now option:

1. From the Tasks menu, press ▲ or ▼ until Taper Down Now is highlighted, then press **Select**
   Note: *If a taper down was not programmed, you can edit the setting by pressing Select. Enter the security code, and then press* ▲ or ▼ *to set the taper down duration. Press Confirm to accept the change.*
2. Select **Yes** to continue with taper down now or press **Select** to edit the taper down period. Editing the taper down now period only affects the period for this immediate taper. It has no effect on the taper period of the protocol that is seen in the delivery settings.

Note: Once you select Yes, you can not restart delivery at the plateau rate without resetting the infusion period.

3. When "Beginning Taper Down...." appears, select **OK**

Operating the Pump

Power Sources

AA Batteries

To power the CADD®-Solis VIP pump, it is recommended that four AA, 1.5 volt non-rechargeable alkaline batteries are used or the CADD®-Solis pump rechargeable battery pack.

Note: Mixing new and used batteries is not recommended because it may affect low battery alarm times. Always use four new batteries when replacing depleted batteries.

The pump retains all programmed values when the batteries are removed, but the batteries must be in place during delivery. If the batteries are removed while the pump is delivering, and an AC adapter is connected, delivery stops. If an AC adapter is not connected and the batteries are removed, delivery stops and the pump loses power.

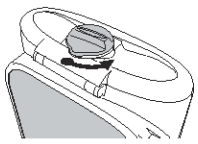
AC Adapter

The AC adapter can be used as an alternate source of power for the pump and/or to recharge the rechargeable battery pack. The pump requires AA batteries or the rechargeable battery pack to be installed as a backup while using the AC adapter.

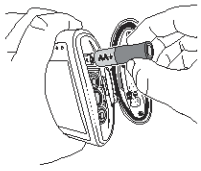
Rechargeable Battery Pack

The rechargeable battery pack is an alternative to using four AA batteries. The rechargeable battery pack can be recharged with the AC adapter, either inside or outside of the pump.

Installing Batteries or a Battery Pack

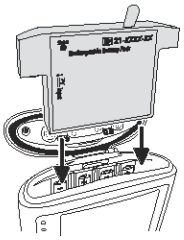


1. Make sure the pump is stopped and powered off. Using your fingers, the pump key, or a coin, turn the knob on the battery door counterclockwise to open the battery door.



2. Hold the pump at an angle and place four AA batteries in the pump, from the bottom up. Match the + and – markings on the new batteries with the markings on the pump.

OR



Or

If using a rechargeable battery pack, insert it into the pump as shown.

3. Close the battery door and using your fingers, the pump key, or a coin, turn the knob on the battery door clockwise to lock it.

Note: *If you put the batteries in backwards, the pump will not power up. Check the batteries, making sure to match the + and – markings.*

AA batteries | *AA batteries with AC adapter* | *Rechargeable battery pack* | *Rechargeable battery with AC adapter*

Replacing the Battery Door

If the battery door is removed or needs replacing, simply snap the door onto the bar that is located on the pump.

Power Up

Press and hold the power switch to turn the pump on. The pump starts the power up sequence during which it performs various self-tests and tests for alarm conditions.

- If any issues are found while the pump is performing the self tests, alarms will sound
- If you believe there is a problem, remove the pump from service and contact Smiths Medical Customer Service

CAUTION: *If the power up results in an error message indicating that the protocol library was lost, do not proceed with using the pump. Follow your facility's procedures for downloading protocol libraries.*

Power Down

Press the power switch to turn the pump off. You must acknowledge the "Power down?" prompt by selecting Yes. The pump then powers down.

Cassettes

The cassette is part of the CADD™ medication cassette reservoir or CADD® administration set that attaches to the bottom of the pump.

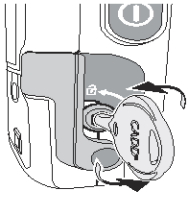
Notes:

- *A CADD® administation or extension set with free-flow protection must be used*
- *A CADD® high volume administration set is required for rates above 250 mL/hr*

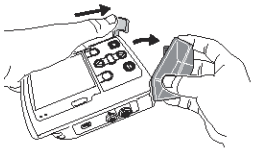
Removing a Cassette

1. Make sure the pump is stopped before removing the cassette
2. Close the tubing clamp
3. If locked, insert the pump key and turn the cassette/keypad lock counter-clockwise into the unlocked position. "Cassette Unlocked" briefly appears in the status bar.

   Note: *Only PCA infusions require the cassette to be locked in order to run the pump.*



4. Push down on the cassette latch until cassette detaches

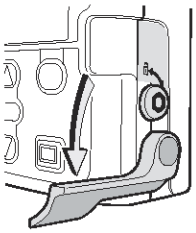


Attaching a Cassette

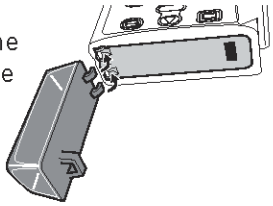
Obtain a new, filled CADD™ medication cassette reservoir or CADD® administration set attached to a flexible IV bag.

Before attaching a new cassette, make sure the pump is powered on. Once the cassette is attached, the pump automatically displays screens that allow you to verify the cassette type, prime the fluid path, reset the reservoir volume, review pump settings, and/or start the pump.

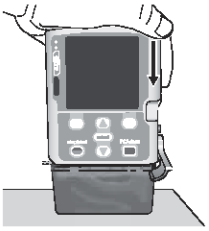
1. Clamp the tubing
2. Make sure the cassette latch is unlocked then open the latch



3. Insert the cassette hooks into the hinge pins on the bottom of the pump, then swing the cassette to the latch position



4. Place the pump upright on a firm, flat surface, and then press down on the latch side of the pump so the cassette fits tightly against the pump

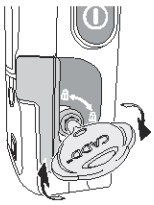


5. Lift the cassette latch handle into the closed position. If you experience resistance when lifting the cassette latch handle, do not force the latch. If the pump doesn't latch easily, unlatch the cassette and repeat the process. A message briefly appears in the status bar so you can verify the type of cassette you have attached.

6. Verify the cassette is attached correctly. Looking from left to right, the top of the cassette should line up evenly with the bottom of the pump and be securely attached. If an uneven gap exists, unlatch the cassette and repeat the process.

7. If you wish to lock the cassette, insert the pump key into the cassette/keypad lock and turn clockwise into the locked position. "Cassette Locked" appears briefly in the status bar.

   Note: *For PCA infusions, the cassette must be locked in order to start the pump.*



Prime Tubing

When priming the fluid path, the tubing downstream of the pump is filled with fluid, removing any air bubbles. Prime the tubing before connecting it to the patient's infusion set or indwelling catheter.

Fluid delivered by priming is subtracted from the reservoir volume, but is not added to the amount given because this fluid is not delivered to the patient. Priming is not allowed with the reservoir volume is 0 mL.

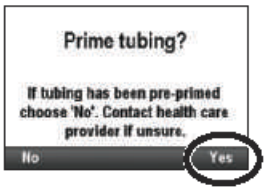
Notes:

- *The air detector is disabled while the pump is priming*
- *If the fluid path contains an air eliminating filter, it is acceptable for air bubbles to be present on the vent side of the filter.*

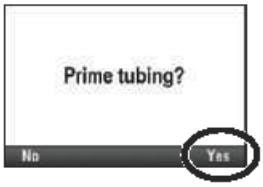
Prime Tubing After Changing a Cassette

Note: If you are not changing the cassette but wish to prime the fluid path, use the Prime Tubing, No Cassette Change task.

1. When a cassette is attached after the pump is powered on, a "Prime Tubing?" screen always appears

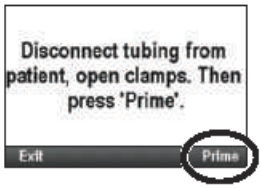


2. Select Yes



3. Unlock the keypad, if required

4. If you have not already done so, disconnect the tubing from the patient, open the clamps and select Prime



5. Stop priming at any time by selecting Stop Priming. Priming automatically stops after 10 mL (or 20 mL if a high volume set is attached) are primed. Continue priming as needed.

Prime Tubing, No Cassette Change

1. Stop the pump if it is running
2. In the Tasks menu press ▲ or ▼ until Prime Tubing is highlighted, and then press Select
3. Unlock the keypad, if required
4. If you have not already done so, disconnect the tubing from the patient, open the clamps, and select Prime
5. Stop priming at any time by selecting Stop Priming. Priming automatically stops after 10 mL (or 20 mL if a high volume set is attached) are primed. Continue priming as needed.

Start the Pump

Infusion begins when the pump starts. When the pump is running, "Running" appears on the status bar, the graphic on the home screen is green, and the green indicator light flashes. If the pump will not start, a message appears on the display.

Note: *Before starting the pump, be sure the tubing is primed and the pump is connected to the patient according to your facility's standards of practice.*

1. Press Stop/Start.

   Note: *If the delivery settings have not been reviewed and the values have not been accepted, you must do so before the pump will run. (See instructions to review pump settings on page 12.) If a step or taper infusion was previously stopped and delivery was not completed (the infusion was not fully delivered), a screen appears with the message, "Infusion was interrupted before completion. Finish interrupted infusion or start from beginning with new bag." Select New Bag to reset the reservoir volume and reset the infusion. Or, select Finish to resume the infusion from the point it was at when it was last running.*

2. When "Start Pump?" appears, select **Yes**
3. The pump begins running. The red "Stopped" message in the status bar changes to a green "Running" message, and "Infusion is starting now..." appears briefly on the screen.

   If a delayed start was programmed, the display turns green and a message that the infusion is delayed appears briefly on the screen. Then the "Delayed Start" screen appears along with the time remaining until the infusion starts. The pump infuses at the programmed KVO rate.

Stop the Pump

Stopping the pump stops delivery. After the pump is stopped, "Stopped" appears in red on the status bar, the graphic on the home screen is red, the amber indicator light flashes, and the green indicator light is off.

1. Press **Stop/Start**. In a PCA protocol, if a PCA dose is in progress, "Stop PCA dose?"appears. Select **Yes** to stop the dose. In a PCA protocol, if a clinician bolus is in progress, "Stop clinician bolus?" appears. Select **Yes** to stop the bolus. A confirmation screen appears stating, "Clinician bolus stopped." Select **OK** to continue. In a taper protocol, "Taper down instead?" appears. Select **No** to stop the infusion.
2. When "Stop Pump?" appears, select **Yes**
3. The pump stops running. The green "Running" message in the status bar changes to a red "Stopped" message, and "Pump is stopping..." appears briefly on the screen.

Reset Reservoir Volume

The reservoir volume setting indicates the amount of fluid contained in the reservoir. Once this number is set, the pump keeps track of how much fluid has been delivered and adjusts the reservoir volume setting accordingly.

Note: *If you are running a step or taper therapy, resetting the reservoir volume also resets the infusion. When you restart the pump, delivery starts at the beginning of the infusion duration.*

To reset the reservoir volume after attaching a new cassette:

1. The pump displays a question asking if you wish to reset the volume to the default amount. If this screen does not appear, the reservoir volume may already be reset.
2. If you are running a step or taper therapy, you also see, "Infusion will be reset". Select **Yes** to reset the volume and infusion. Select **No** to keep the reservoir volume at the current setting.

To reset the reservoir volume without changing the cassette:

1. Stop the pump if it is running
2. In the Tasks menu, press ▲ or ▼ until Reset Reservoir Volume is highlighted, and then press **Select**
3. The pump displays a screen asking you to confirm that you want to reset the reservoir volume. Select **Yes**.

Tasks and Advanced Tasks

Tasks Menu Overview

The Tasks menu leads to most of the pump's operating functions. Some items in the Tasks menu will require a security code to view/edit the item.

Task Menu Function	Description on Page
Reset Reservoir Volume	28
Taper Down Now (Taper therapy)	22
Set Delayed Start (all therapies except Intermittent)	10
Set Next Dose Start Time (intermittent therapy)	10
Prime Tubing	26
View Delivery Settings	11
Display and Sound Settings	29
View Reports	32
View Advanced Tasks	33

Display and Sound Settings

The Display and Sound Settings menu allows you to adjust various factors such as the intensity of the backlight on the screen, alarm volumes, sound themes, key beeps, and numeric formats. This change is for the current protocol only and remains in effect until the Start New Patient or Same Patient New Protocol task is selected.

To view or change any of these settings:

- In the Tasks menu, press ▲ or ▼ to highlight Display and Sound Settings and press **Select**
- Press ▲ or ▼ to highlight the setting you wish to view or change and press **Select**
- Unlock the keypad, if required
- Edit the setting, if appropriate, and press **Save** or press **Don't Save** to exit the task

The items in the Display and Sound Settings menu are:

Backlight Intensity

The backlight intensity feature allows you to adjust the screen backlight intensity within the range of 1 to 10, with 1 being low and 10 being high.

Note: *Increasing the backlight intensity shortens the battery life.*

Alarm Volume

The alarm volume feature allows you to set the volume of the alarms in the therapy. You may choose between three volumes: low, medium, and high.

Sound Theme

The Sound Theme setting allows you to choose between three different sound themes for the alarms and beeps that the pump makes. The three themes are standard, intense, and distinctive. You may preview the sound themes in the menu. The alarms and beeps that use the sound theme are:

- High Priority Alarm
- Medium Priority Alarm
- Low Priority Alarm
- Informational Alarm

To preview/choose a sound theme:

1. In the Display and Sounds Settings menu, press ▲ or ▼ to highlight Sound Theme and press **Select**

2. Press ▲ or ▼ to highlight Standard, Intense, or Distinctive, and press **Select** to preview the theme, or select **Save** to save the theme without a preview
3. To preview the theme, press ▲ or ▼ to scroll through the alarms and beeps. Press **Select** to listen to each alarm or beep. Continue until you have decided which one to apply. To exit, select **Back**.
4. Highlight the desired theme and select **Save**

Key Beep On/Off

The key beep on/off feature allows you to turn on or off the audible beep that accompanies each key press. This feature does not turn off any audible alarms associated with alarm or alert conditions of the pump.

Note: *If the key beep feature is turned on, the key beeps will not sound while any alarm screens are being displayed or when entering a security code.*

Numeric Format

The numeric format setting allows you to select the character or space used to indicate the decimal point and thousands units separators. This will be determined by your CADD®-Solis system adminstrator when the protocol library is created. Contact your CADD®-Solis system administrator or see the Operator's Manual for more information.

Time and Date

The Change Time and Date setting allows you to edit the time and date, and to choose a time and date format. The time and date options should reflect the current time and date. The clock is powered by a separate, internal battery, which retains the time and date even when the 4 AA batteries or the battery pack is removed. The pump uses this feature to record the time and date of events in the delivery and event logs, and in other reports. It is also used to determine when delayed starts and next dose start times begin, and when preventative maintenance alarms occur.

Note: *The internal battery is rechargeable and automatically recharges when the pump is powered on. If the pump is off for a long period of time, it may not show the correct time and date when it is powered on. Check the time and date, and edit these settings if necessary.*

In the Tasks menu, press ▲ or ▼ to highlight Change Time and Date and press **Select**.

Current Time

To set the current time:

1. In the Change Time and Date menu, press ▲ or ▼ to highlight Current Time and press **Select**
2. Press ▲ or ▼ to scroll to the correct hour and press **Select** to navigate to the minutes
3. Press ▲ or ▼ to scroll to the correct minutes and press **Select** to navigate to the am or pm field
4. Press ▲ or ▼ to scroll between am and pm and press **Select** when the correct setting appears. If you are using a 24-hour clock, the am/pm field does not appear. Select **Save**.

Current Date

To set the current date:

1. In the Change Time and Date menu, press ▲ or ▼ to highlight Current Date and press **Select**
2. Press ▲ or ▼ to scroll to the correct month and press **Select** to navigate to the day
3. Press ▲ or ▼ to scroll to the correct day and press **Select** to navigate to the year
4. Press ▲ or ▼ to scroll to the correct year and select **Save**

Time Format

The time format setting allows you to select either a 12-hour or 24-hour clock format, and to set the character used for indicating the hours, minutes and seconds separators. This will be determined by your CADD®-Solis system adminstrator when the protocol library is created. Contact your CADD®-Solis system administrator or see the Operator's Manual for more information.

Date Format

The date format option allows you to select 1 of 3 formats for indicating the day, month, and year. This will be determined by your CADD®-Solis system administrator when the protocol library is created. Contact your CADD®-Solis system administrator or see the Operator's Manual for more information.

Daylight Savings Time

The pump time and date do not automatically update for daylight savings time. If you live in a geographical area that follows daylight savings time, you must manually update the time and date. You may choose to change the time while the pump is currently being used by a patient, or

wait until the patient is finished with the infusion. However, because delivery of some therapies is affected by a time and/or date change, it is recommended that you wait until the infusion is complete.

Note: *If you update the time while the pump is in use, the timestamps in the event and delivery logs are not updated to reflect daylight savings time prior to the change. All events record the reported time from when the event actually occurred. For your reference, the event log records the time when it was changed.*

Reports

The reports screen is used to view a variety of reporting and record-keeping functions. The reports available are:

- Total Given (not available for PCA therapies)
- Given and PCA Dose Counters (PCA therapies only)
- PCA Dose Graph (PCA therapies only)
- Delivery History and Pie Chart
- Delivery Log
- Event Log
- Protocol Library Summary
- Device Information

The reports can be viewed at any time, with the pump running or stopped. In the Tasks menu, press ▲ or ▼ to highlight View Reports and press **Select**. For details on what each report contains, see the Operator's Manual.

Advanced Tasks Menu Overview

Most pump configurations are set up by a CADD®-Solis system administrator. Protocol libraries consisting of therapies, qualifiers, and drugs are created using the CADD®-Solis medication safety software. The Advanced Tasks menu allows you to select a standard therapy protocol created by the CADD®-Solis system administrator, or make changes to an individual protocol for single use, or to manually program a protocol.

Notes:

- *When creating or editing a protocol under Advanced Tasks, it is important to note that the edits made affect only the protocol currently in use.*
- *The Advanced Tasks screens revert to the home screen if there is a four minute delay between button presses. Make certain you are still in the Advanced Tasks menu after any delays.*
- *Most of the advanced tasks require a security code to unlock the keypad. This step is necessary only if the keypad is not already unlocked.*

The following functions are in the Advanced Tasks menu:

Advanced Task Menu Function	Description on Page
Give Clinician Bolus (PCA Therapy)	13
Step Up (Step therapy)	19
Step Down (Step therapy)	20
Patient Permissions	34
Air and Occlusion Settings	See Operator's Manual
Alarm Settings	See Operator's Manual
Security Settings	5
Start New Patient	8
Start New Protocol Same Patient	9
Delivery Hard and Soft Limits	See Operator's Manual
Reset to Factory Defaults	See Operator's Manual

To access any item in the Advanced Tasks menu:

1. From the home screen, select Tasks
2. Press ▲ or ▼ to highlight View Advanced Tasks and press **Select**
3. Press ▲ or ▼ to highlight the Advanced Tasks you wish to view/edit and press **Select**
4. Unlock the keypad, if required
5. View/edit the setting and press either **Save** to confirm the edit or **Don't Save** to exit the task

Patient Permissions

Security levels are used to limit unauthorized access to certain programming and operating functions. In some cases, the default security settings may be changed to allow patients additional access to pump functions. Do not reduce security settings without providing proper training to patients.

The Patient Permissions task allows you to control a patient's access to two specific tasks: priming and setting a delayed start. Setting the permission to "Off" allows the patient to access one or both tasks without having to enter a security code. Setting the permission to "On" restricts the patient's access to one or both tasks because a security code is required.

There are two items under patient permissions:

Priming Security On/Off - Setting this value to "Off" allows the patient/caregiver to prime the tubing on the pump without having to enter a security code. If this value is set to "On", the pump will ask for a security code before allowing the user to use the priming function on the pump.

Delayed Start Security On/Off- Setting this value to "Off" allows the patient/caregiver to set Delayed Starts or Next Dose Start Times without having to enter a security code. If this value is set to "On", the pump will ask for a security code before allowing the user to enter and complete this task.

References and Troubleshooting

Alarms and Messages

The pump can sound multiple alarms. For many of the alarms, you have the option to "acknowledge" or "silence."

- Acknowledge—the alarm clears from the screen
- Silence—the alarm stays on the screen, but is silenced for 2 minutes before it sounds again

The alarm continues until it is acknowledged or resolved. The alarms may have different sounds depending on the sound theme selected. There are three different sound themes for the alarms and beeps that the pump makes: standard, intense, and distinctive.

Types of Alarms

- System Fault Alarm

  If this screen appears, an unrecoverable error may have occurred, such as a hardware or software fault. The amber indicator light is continuously illuminated during these conditions and is accompanied by an audible two-tone alarm. If a system fault occurs, the fault should be reported to Smiths Medical Customer Service at 1-800-258-5361.

  To clear this alarm, remove power from the pump by opening the battery door, and if necessary, removing the AC power. Close the battery door and turn the pump back on. If the error code does not repeat, Customer Service may suggest continued use of the pump. If the error is persistent, the pump must be returned for service.

  Note: *Document the error numbers displayed on the system fault screen to help Customer Service identify the problem.*

- High Priority Alarm

  A high priority alarm always pauses or stops the pump if it is running. The alarm is accompanied by a red screen, and it persists until acknowledged by the press of a key on the pump or until the condition that triggered the alarm goes away (for example, high pressure going down). The alarm can be silenced with a key press and will sound again after two minutes if the alarm condition still exists.

- **Medium Priority Alarm**
  A medium priority alarm does not stop the pump if it is running. The alarm is accompanied by an amber screen, and it persists until acknowledged by the press of a key on the pump or until the condition that triggered the alarm goes away. The alarm can be silenced with a key press and will sound again after two minutes if the alarm condition still exists.
- **Low Priority Alarm**
  A low priority alarm does not stop the pump if it is running. The alarm is accompanied by a blue screen, and it persists for five seconds unless it is acknowledged by the press of a key or the condition that triggered the alarm goes away before the five seconds have passed. (Some low priority alarms persist for longer than five seconds.)
- **Informational Message**
  An informational priority message does not stop the pump if it is running. This message appears in the status bar, and does not display a new alarm screen. It persists for five seconds and may be silent, requiring no acknowledgement. Some informational examples are "Cassette Locked," and "Cassette Unlocked".

Alarm Help Screens

Additional information may be displayed when certain alarms occur. The help screens describe what you can do to try to solve the current problem that is causing the alarm.

1. When an alarm occurs, select **Silence** to quiet the alarm
2. If help screens are available for the alarm, "Help" appears above the right soft key. To view the help screens, select **Help**.
3. Follow the applicable instructions provided on the help screen. To page through all available help screens, press **Next** repeatedly. Press **Acknowledge** at any time to exit Help.
4. "Retry Help" appears when no additional help steps are available. To page through the help screens again, press **Retry Help**. The Alarm screen reappears as in Step 2 above. Repeat Steps 2 and 3. When the alarm clears, the help screens will no longer be displayed.

Troubleshooting

Issue	Possible Solution
A continuous two-tone alarm is sounding, and the amber light is lit or flashing.	Delivery has stopped. Read the message on the display and refer to the list of messages in the table below. If the display is blank or contains random characters, the 4 AA batteries or the rechargeable battery pack may be depleted. Install 4 new AA batteries or a rechargeable battery pack.
The pump is sounding 2 beeps every 2 seconds, and the amber light is flashing.	Look at the message on the display and refer to the list of messages in the table below.
Three beeps sound every 5 minutes.	This is a reminder that the pump is stopped.
After installing 4 new AA batteries and powering up the pump, no screen appears and no beep sounds.	The batteries may be installed incorrectly. Review the procedure for installing batteries. Be sure to match the polarity (+ and –) markings inside the battery door with the markings on the batteries. If there is still no power, the batteries may be completely depleted.

Alarms and Messages, Alphabetical List

A more detailed list of alarms and messages is included in the Operator's Manual.

Alarm / Message	Alarm Priority	Description / Corrective Action
(Screen is blank and alarm is sounding)	High	The pump was delivering and the batteries were removed or the battery door was opened. The pump lost power and is no longer delivering. Clear the alarm by turning the pump back on, or the alarm will stop after the power has been off for a minimum of 2 minutes.
A setting was edited, but not saved, and the edit was lost.	Medium	A parameter was being manually edited, but it was not saved and the pump reverted to the home screen. Select **Acknowledge** to clear the alarm and if appropriate, edit the parameter and save.
Air in-line detected. Press **Acknowledge** then prime tubing.	High	The air detector has detected air in the fluid path. The fluid path may contain air bubbles. The pump was delivering and is now stopped and will not run. Select **Acknowledge** to clear the alarm. If the fluid path contains air bubbles, close the clamps and disconnect the fluid path from the patient. Follow the instructions in the Operator's Manual for removing air by priming. Restart the pump.
Battery depleted. Pump stopped.	High	The pump was delivering but is now stopped and the battery power is too low to operate the pump. If the AC adapter is attached, select **Acknowledge** to clear the alarm. Remove the batteries. Install 4 new AA batteries or a rechargeable battery pack. To start delivery, good batteries must always be installed even when an external source of power is connected. If appropriate, restart the pump.
Battery low. Replace battery.	Low	The rechargeable battery pack or the 4 AA batteries are low but the pump is still operable. Select **Acknowledge** to clear the alarm, or the alarm will automatically clear after 5 seconds. Recharge or change the rechargeable battery pack or replace the 4 AA batteries soon.

Alarm / Message	Alarm Priority	Description / Corrective Action
Battery removed. Pump will not run.	Medium	The pump is stopped and the rechargeable battery pack or the 4 AA batteries were removed, but the pump is still powered by the AC adapter. Select **Acknowledge** to clear the alarm. Install a fully charged rechargeable battery pack or 4 new AA batteries. To start delivery, good batteries must always be installed, even when an external source of power is connected.
Cannot start pump with a depleted battery.	Medium	The battery power is too low to operate the pump. To start delivery, good batteries must always be installed even when an external source of power is connected. Select **Acknowledge** to clear the alarm. Install 4 new AA batteries or a fully charged rechargeable battery pack. If appropriate, start the pump.
Cannot start pump with a reservoir volume of zero.	Medium	The reservoir volume in the pump is set to zero. Select **Acknowledge** to clear the alarm. Edit or reset the reservoir volume to the correct value. If appropriate, start the pump. See page <?> for more information about resetting the reservoir volume.
Cannot start pump without a latched cassette.	Medium	The pump will not start without a cassette attached. Select **Acknowledge** to clear the alarm. Make sure a cassette is properly attached, then start the pump. **NOTE:** This alarm has associated help screens.
Cassette not attached properly. Reattach cassette.	High	The cassette is not properly attached. Close the tubing, remove the cassette, then reattach. If the alarm persists, replace the cassette. **NOTE:** You must remove the cassette to continue.
Cassette was partially unlatched. Fully remove and reattach the cassette.	Medium	The cassette was not completely removed from the pump before it was reattached and the pump's sensors are not able to detect the cassette type. Remove the cassette and reattach it, then verify the cassette type in the pump display. If the alarm persists, replace the cassette. **NOTE:** You must remove the cassette to continue.
Check for empty tubing or reservoir. Pump stopped.	High	The tubing beneath the pump may not contain fluid, or the fluid container may be empty. The pump is stopped and will not run. Select **Acknowledge** to clear the alarm. Check to see if the fluid container is empty. If fluid is present in the reservoir, clamp the tubing, remove the cassette, and check for air in the tubing. If the alarm persists, remove the pump from service and contact Customer Service to return the pump for service.
Dose is now overdue. Pump is stopped.	Medium	The pump is stopped and a dose is overdue for its scheduled delivery. Select **Acknowledge** to clear the alarm, and then start the pump.

Alarm / Message	Alarm Priority	Description / Corrective Action
Downstream occlusion. Clear occlusion between pump and patient.	High	The pump has detected high pressure, which may be resulting from a downstream blockage, a kink in the fluid path, or a closed tubing clamp. Delivery is paused and will resume if the occlusion is removed. Remove the obstruction to resume operation. Or select **Stop Pump** to stop the pump and silence the alarm for 2 minutes, then remove the obstruction and restart the pump. **NOTE:** To reduce the potential for a bolus delivery after an occlusion, perform the following: 1. Select **Stop Pump** to stop the pump. 2. Close the distal clamp. If the distal clamp is the cause of obstruction, keep it closed and continue with step 4. 3. Remove the obstruction. 4. Detach the CADD™ medication cassette reservoir or CADD® administration set from the pump. 5. Open the Flow Stop feature, if present. 6. Wait 10 seconds. 7. Close the Flow Stop feature, if present. 8. Reattach the CADD™ medication cassette reservoir or CADD® administration set to the pump. 9. Open the distal clamp. 10. Review the pump program. 11. Restart the pump. **NOTE:** This alarm has associated help screens.
High flow admin set required. Remove cassette.	High	The delivery-specific parameters are programmed to values that cause the maximum rate of delivery to exceed 250 mL/hr. NOTE: You must remove the standard volume cassette to continue.
High volume admin set not allowed. Remove cassette.	High	The CADD® high volume administration set cannot be used. The pump is stopped and will not run. **NOTE:** Remove the administration set to continue.
Infusion is now overdue. Pump is stopped.	Medium	The pump is stopped and the infusion is overdue for its scheduled delivery. Select **Acknowledge** to clear the alarm, and then start the pump.
Lock cassette to start pump.	Medium	PCA mode only. The cassette must be locked onto the pump before beginning delivery. Lock the cassette to clear the alarm and the pump will automatically start. **NOTE:** This alarm has associated help screens.
Pump does not have a protocol library.	Medium	The pump had a protocol library the last time it was powered on, but now it does not. This may happen if the pump was manually reverted to the factory default, recently had a software update, or if an attempt to install a protocol library failed. Select **Acknowledge** to clear the alarm and contact the CADD®-Solis system administrator to download a new protocol library.
Pump settings and patient data lost.	Medium	The pump reverted to the factory default. The pump was either manually reverted to this default, recently had a software update, or has not been in use for some time. Select **Acknowledge** to clear the alarm and contact the CADD®-Solis system administrator to reprogram the pump.

Alarm / Message	Alarm Priority	Description / Corrective Action
Pump stopped by an alarm that has since cleared.	High	The pump was stopped by another high priority alarm. That alarm was not acknowledged, but the problem has since cleared. Select **Acknowledge** to clear the alarm and if appropriate, restart the pump. The event log recorded the alarm that stopped the pump. For information on accessing the event log, see page 32.
Reservoir volume is zero. Pump stopped.	High	The reservoir volume is 0.0 mL. The pump was delivering, but is now stopped and will not run. Select **Acknowledge** to clear the alarm. Attach a new reservoir, and reset or edit the value of the reservoir volume, if appropriate.
Reservoir volume low.	Medium Low	Medium: The programmed reservoir volume trip point has been reached, indicating the level of fluid in the reservoir is low. Select **Acknowledge** to clear the alarm. Low: The programmed reservoir volume trip point has been reached, indicating the level of fluid in the reservoir is low. Select **Acknowledge** to clear the alarm, or the alarm will automatically clear after 5 seconds. Prepare to install a new reservoir, and reset or edit the value of the reservoir volume, if appropriate.
Upstream occlusion. Clear occlusion between pump and reservoir.	High	Fluid is not flowing from the fluid container to the pump, which may be due to a kink, closed clamp, or air bubble in the tubing between the fluid container and pump. Delivery is paused and will resume if the occlusion is removed. Remove the obstruction to resume operation. The alarm will clear when the occlusion is removed. You must acknowledge this alarm after it clears if it has occurred and cleared more than 3 times within 15 minutes. **NOTE:** This alarm has associated help screens.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CADD®-Solis VIP Ambulatory Infusion System

Alarm Help Screens

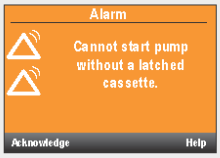
When certain alarms occur, additional information may be displayed on the screen. The help screens describe what you can do to try to solve the problem that is causing the alarm.

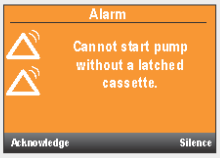
STEPS:

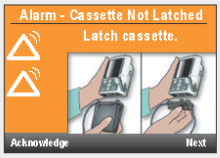
1. When an alarm occurs, press **SILENCE** to quiet the alarm.
2. If help screens are available for the alarm, "Help" appears above the right soft key. To view the help screens, select **HELP**.
3. Follow the applicable instructions provided on the help screen. To page through all of the available help screens, press **NEXT** repeatedly. Press **ACKNOWLEDGE** at any time to exit Help.
4. "Retry Help" appears when no additional help steps are available. To page through the help screens again, press **RETRY HELP**. The alarm screen reappears as in Step 2 above. Repeat steps 2 and 3. When the alarm clears, the help screen will no longer be displayed.

The Following Alarms Have Associated Help Screens. Refer to Steps Above to Navigate the Help Screens.

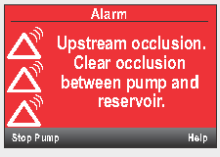
CANNOT START PUMP WITHOUT A LATCHED CASSETTE.

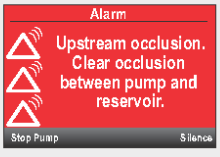


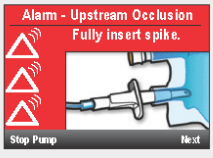


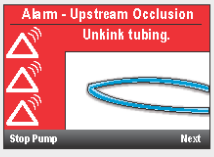


UPSTREAM OCCLUSION. CLEAR OCCLUSION BETWEEN PUMP AND RESERVOIR.







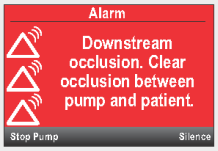


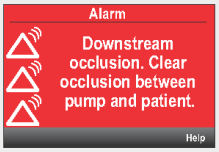
CADD®-Solis VIP Ambulatory Infusion System

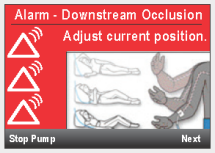
Alarm Help Screens

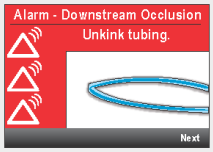
The Following Alarms Have Associated Help Screens. Refer to Steps Above to Navigate the Help Screens.

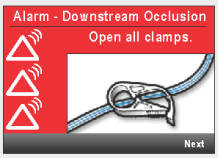
DOWNSTREAM OCCLUSION. CLEAR OCCLUSION BETWEEN PUMP AND PATIENT.

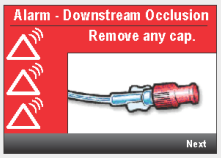






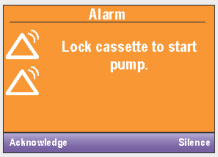


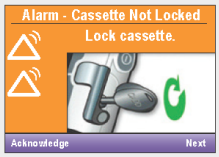




CANNOT START PUMP WITHOUT A LATCHED AND LOCKED CASSETTE. (PCA ONLY)

LOCK CASSETTE TO START PUMP. (PCA ONLY)





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CADD®-Solis VIP

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F. AC Power Jack
G. Remote Dose Cord Jack
H. Keypad
I. Cassette Latch
J. Cassette/Keypad Lock
K. Power Switch

Screensaver

The screensaver allows the pump to conserve battery power when not in an edit mode or if no keypad buttons have been pressed for 30 seconds. The pump displays a blank screen. Press any button on the keypad to turn on the display, except the PCA dose key when in PCA mode.

Blue Text

Blue text that appears on the screen provides further instructions for that particular screen.

Insert Batteries

1. Open the battery compartment and insert four AA batteries matching the + and – markings inside the battery compartment, or insert a rechargeable battery pack
2. Close the compartment cover tightly when the batteries are in place
3. Turn the gray knob to close the battery compartment

Remove Batteries

1. Stop the pump
2. Press and hold the power switch to turn off the pump
3. Turn the gray knob to open the battery compartment
4. Remove the batteries

Power On

1. Press and hold the power switch
2. The pump carries out self-tests and sounds six beeps when the tests are complete
3. Home screen is displayed

Unlocking the Pump

With the code

1. Press ▲ or ▼ until the first digit of the code is shown
2. Press Select to advance to the next digit
3. Repeat with the second and third digits then press Select or Accept Value

With the key

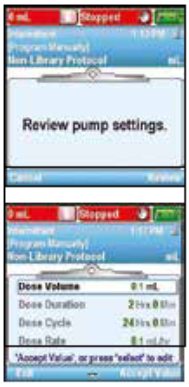
1. Insert into the lock and turn counterclockwise

Setting up the Pump for a New Patient

1. Insert a fresh set of four AA batteries or a rechargeable battery pack
2. Press and hold the power switch to turn the pump on
3. Pump displays the home screen
4. Select Tasks, then View Advanced Tasks, then Start New Patient
5. The next screen informs you that completing this task will overwrite all delivery settings

Note: To edit individual settings rather than starting a new patient or protocol, see Editing Individual Delivery Settings.

6. Press continue to unlock the keypad using the security code or the pump key
7. Select the therapy - press ▲ or ▼ to highlight the desired therapy and press Select
8. To review the pump setting, press Review
9. Press Select to edit the patient specific parameters. Press ▲ or ▼ until the desired setting is highlighted, then press Save
10. Carefully check the patient specific parameters. Press Accept Value on each parameter
11. When you have finished the review, press Next to continue



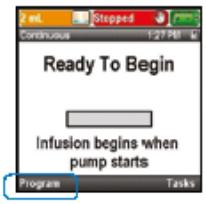
Editing Individual Delivery Settings

The delivery settings are patient-specific parameters of a therapy that are directly related to the drug being infused.

To view and edit delivery settings:

1. Press the Program button
2. Press ▲ or ▼ until the desired setting is highlighted, then press
3. Select

   If requested, unlock the keypad
4. Press ▲ or ▼ until the desired value appears on the screen, then select Save



Change any additional settings by scrolling through the remaining delivery settings and press Select to edit each setting as necessary.

Note: Editing individual delivery settings in Step or Taper mode will reset the infusion back to the beginning.

Attaching a Cassette

1. Clamp the tubing and open the cassette latch
2. Insert the cassette hooks into the hinge pins on the bottom of the pump. Swing the cassette to the latch position

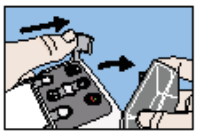
3. Place the pump upright on a firm, flat surface, and press down on the latch side of the pump so the cassette fits tightly against the pump

4. Lift the cassette latch into the closed position. If you experience resistance when lifting the cassette latch handle, do not force the latch. If the pump doesn't latch easily, unlatch the cassette and repeat the process

5. Verify the cassette is attached properly. Looking from left to right, the top of the cassette should line up evenly with the bottom of the pump and be securely attached. If an uneven gap exists, unlatch the cassette and repeat the process
6. To lock the cassette, insert the pump key into the lock and turn it clockwise into the locked position

Removing a Cassette

1. Make sure the pump is stopped and clamp the tubing
2. If the cassette is locked, insert the pump key and the turn the lock counterclockwise into the unlocked position
3. Push down on the cassette latch until the cassette detaches



Resetting the Reservoir Volume

After attaching a new cassette

1. The screen displays Reset reservoir volume to XX mL? Select Yes to reset the volume or No to keep the volume at the current setting

Without changing the cassette

1. Stop the pump if it is running
2. In the Tasks menu, press ▲ or ▼ to highlight Reset Reservoir Volume and press Select
3. The screen displays Reset reservoir volume to XX mL? Select Yes to reset the volume

Priming the Tubing

Ensure that the pump is stopped, the tubing is disconnected from the patient, and the tubing clamps are open.

After changing a cassette

1. If a cassette is attached after the pump is powered on, a Prime Tubing? screen will appear. Select Yes (unlock the keypad if required)
2. Select Prime
3. Select Stop Priming when the air is removed or the delivery will stop at 10 mL (or 20 mL if a high volume set is attached)

No cassette is changed

1. In the Tasks menu, press or to highlight Prime Tubing and press Select (unlock the keypad if required)
2. Select Prime
3. Select Stop Priming when the air is removed or the delivery will stop at 10 mL (or 20 mL if a high volume set is attached)

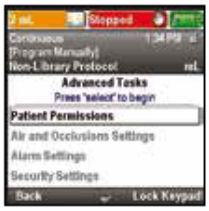
Reports

Reports can be viewed at any time, with the pump running or stopped.

1. In the Tasks menu, press ▲ or ▼ to highlight View Reports and press Select
2. Press ▲ or ▼ to highlight the desired report and press Select
3. Press Back to return to the Select Report menu and then Back again to return to the Tasks Menu

Patient Permissions

Stop the pump if it is running. In the Advanced Tasks menu, press ▲ or ▼ to highlight Patient Permissions and press Select.



Priming security on/off

Setting this value to off allows patients to prime the tubing without having to enter a security code.

1. In the Patient Permissions menu, press ▲ or ▼ to highlight Priming Security On/Off and press
2. Select Unlock the keypad
3. Press ▲ or ▼ to set the security to on (security code required) or off (no security code required) and select Save

Delayed start security on/off

Setting this value to off allows patients to set delayed starts without having to enter a security code.

4. In the Patient Permissions menu, press ▲ or ▼ to highlight Delayed Start Security On/Off and press Select
5. Unlock the keypad
6. Press ▲ or ▼ to highlight on (security code required) or off (no security code required) and select Save

Alarms

System Fault Alarm

An unrecoverable error may have occurred, such as a hardware or software fault. The amber indicator light is on along with a two-tone alarm and a red screen. To clear the alarm, remove power from the pump.

High Priority Alarm

The pump pauses or stops if it is running. The pump screen is red and the alarm continues until a key is pressed or the condition that triggered it goes away.

Medium Priority Alarm

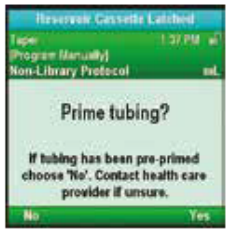
The pump does not stop if it is running. The pump screen is amber and the alarm continues until a key is pressed or the condition that triggered it goes away.

Low Priority Alarm

The pump does not stop if it is running. The pump screen is blue and the alarm continues for five seconds or until a key is pressed or the condition that triggered it goes away.

Informational Message

The pump does not stop if it is running. The message appears in the status bar. The alarm continues for five seconds and may be silent, requiring no acknowledgement.



Troubleshooting

Screen is blank and alarm is sounding

Alarm Priority High. The pump was delivering and the batteries were removed or the battery door was opened. The pump has lost power and is no longer delivering. Clear the alarm by turning the pump back on, or the alarm will stop after the power has been off for a minimum of two minutes.

Air-in-line detected. Press "acknowledge" then prime tubing

Alarm Priority High. The air detector has detected air in the fluid path. The pump was delivering and is now stopped and will not run. Select Acknowledge to clear the alarm. If the fluid path contains air bubbles, close the clamps, disconnect the fluid path from the patient, then prime the tubing to remove the air and restart the pump.

Battery depleted. Pump stopped.

Alarm Priority High. If the AC adapter is attached, select Acknowledge to clear the alarm. Remove the batteries and install four new AA batteries or a rechargeable battery pack. To start delivery, good batteries must always be installed even when an external source of power is connected. If appropriate, restart the pump.

Battery low. Replace battery.

Alarm Priority Low. Select Acknowledge to clear the alarm, or it will automatically clear after five seconds. Recharge or change the rechargeable battery pack or replace the four AA batteries soon.

Downstream occlusion. Clear occlusion between pump and patient.

Alarm Priority High. The pump has detected high pressure, which may be resulting from a downstream blockage, kink in the fluid path, or a closed tubing clamp. Delivery pauses and resumes if the occlusion is removed. Remove the obstruction or select Stop Pump to silence the alarm for two minutes, then remove the obstruction and restart the pump.

Reservoir volume low

Alarm Priority Medium or Low. The priority depends on how the alarm is programmed in Admin Settings. The level of fluid in the reservoir is low. Select Acknowledge to clear the alarm and prepare to install a new reservoir, if appropriate.

Use PharmGuard® medication safety software to view and download reports. It may not be used to create a Protocol Library for the Standard Settings pump.

Troubleshooting continued

Reservoir volume is zero. Pump stopped.

Alarm Priority High. The reservoir volume has reached 0.0 mL. The pump will stop and not run. Select Acknowledge to clear the alarm. Attach a new reservoir and reset or edit the value of the reservoir volume,
if appropriate.

Upstream occlusion. Clear occlusion between pump and reservoir.

Alarm Priority High. Fluid is not flowing from the fluid container to the pump, which may be due to a kink, closed clamp, or air bubble in the tubing between
the fluid container and pump. Delivery is paused and will resume if the occlusion is removed. Remove the obstruction to resume operation. The alarm will clear when the occlusion is removed. You must acknowledge this alarm after it clears if it has occurred and cleared more than three times with 15 minutes.

CADD PRIZM PUMP

A. Green indicator light. Blinks when pump is running.
B. Amber indicator light. Blinks when pump is stopped or alarming.
C. Power jack. For power pack or AC adapter.
D. Data in/out jack. For remote dose cord, modem cable, or printer cable.
E. Battery compartment.
F. Medication cassette. Attaches to bottom of pump.

KEYPAD

STOP/START	Stops and starts the pump.
LOCK	Displays or changes lock level.
?	Help key. Displays more information about a screen.
ENTER	Sets new value; selects choice from menu; clears screen.
NEXT	Advances to next programming screen; backs out of an option or menu.
DOSE	Delivers a demand (bolus) dose.
OPTIONS	Displays the Options Menu, pages through options.
▲	Answers YES; *increases* values on programming screen; pages through menus; pages through history screens.
▼	Answers NO; *decreases* values on programming screen; pages through menus; pages through history screens.

THESE ARE BASIC PUMP FUNCTIONS. YOU MUST CONSULT THE PUMP MANUAL FOR COMPLETE DIRECTIONS

PROGRAMMING SCREENS

RESERVOIR VOLUME	Volume of fluid in the reservoir (cassette).
UNITS	Programming units (mL, mg, mcg).
CONCENTRATION	Concentration of drug. Appears if units are *mg* or *mcg.*
CONTINUOUS RATE	Continuous rate of drug delivery.
DEMAND DOSE	Amount delivered when *dose* key is pressed.
DEMAND DOSE LOCKOUT	Amount of time that must elapse between demand doses. Only appears if *demand dose* is programmed.
MAX DOSES PER HOUR	Maximum number of demand doses allowed in any one hour period. Only appears if demand dose is programmed and demand dose lockout is less than one hour.
DOSE COUNTERS	*Displays number of demand doses given and attempted since date and time shown (appears if demand dose is programmed).*
UNITS GIVEN	*Displays total amount delivered since date and time shown.*
AIR DETECTOR STATUS	Shows whether Air Detector is required, turned on or off (appears if Air Detector is attached).
NEW PATIENT MARKER	Allows you to add a New Patient Marker to the Event Log and clear Extended History (appears if Extended History is turned on).

PUMP OPERATIONS

TO CHANGE LOCK LEVELS

1. Stop the pump.
2. Press LOCK.
3. Press  or  until desired lock level appears.
4. Press LOCK.
5. Press  or  until lock level code appears.
6. Press LOCK.

TO START OR STOP PUMP

1. Press STOP/START.
2. Press 

TO SET TIME OF DAY (Pump must be stopped and in LL0)

1. Press OPTIONS.
2. Press  until TIME option appears.
3. Press ENTER.
4. Press  or  to select time.
5. Select ENTER.
6. Press 

TO SET DATE (Pump must be stopped and in LL0.)

1. Press OPTIONS.
2. Press ▲ until DATE option appears.
3. Press ENTER to display DATE screen.
4. Press ▲ or ▼ to select date.
5. Press ENTER.
6. Press ▲

TO SET AUTO-LOCK (Auto-Lock automatically changes lock level to LLI or LL2 when pump is started in LL0. To change Auto-Lock setting, pump must be stopped and in LL0.)

1. Press OPTIONS.
2. Press ▲ until AUTO-LOCK option appears.
3. Press ENTER to display AUTO-LOCK screen.
4. Press ▲ or ▼ to select LL1 or LL2 or "Not in Use".
5. Press ENTER.
6. Press ▲

PROGRAMMING THE PUMP (Battery must be installed, pump must be stopped and in Lock Level 0.)

On Main Screen. Press **NEXT.**

Enter RESERVOIR VOLUME	Press ▲ or ▼ to select desired Reservoir Volume. Press ENTER. Press NEXT.
Enter UNITS	Press ▲ or ▼ to select desired Units. Press ENTER. Press NEXT.
Enter CONCENTRATION	Press ▲ or ▼ to select desired Concentration. Press ENTER. Press NEXT.
Enter CONTINUOUS RATE	Press ▲ or ▼ to select desired Continuous Rate. (Select the upper limit if the program will be adjusted in LL1.) Press ENTER. Press NEXT.
Enter DEMAND (BOLUS) DOSE	Press ▲ or ▼ to select amount of DemandDose. (Select the upper limit if the program will be adjusted in LL1.) Press ENTER. Press NEXT.

Enter DEMAND DOSE LOCKOUT TIME (If Demand Dose is 0, this screen will not appear.)	Press ▲ or ▼ to select desired time between Demand Doses. Press ENTER. Press NEXT.
Enter MAX DOSES per HOUR (If Demand Dose is 0, this screen will not appear.)	Press ▲ or ▼ to select desired number of Demand Doses per hour. Press ENTER. Press NEXT.
Clear DOSE COUNTERS (If Demand Dose is 0, this screen will not appear.)	Press ENTER to clear the Dose Counters. This updates the date and time markers. Press NEXT.
Clear UNITS GIVEN	Press ENTER to clear the Given amount. This updates the date and time markers. Press NEXT.
REVIEW PROGRAM	Press NEXT repeatedly to review program.

ATTACHING A NEW CASSETTE

1. Close tubing clamp.
2. Insert new cassette hooks into pump's hinge pins.
3. Place pump with cassette on firm surface and push down on top of pump.
4. Use coin or side of key to latch cassette.
5. Use key to lock cassette.
    - **WARNING: The marks on the latching button and lock must line up with the solid dots on the side of the pump. If the cassette is not attached properly, unregulated gravity infusion of fluid from reservoir or reflux of blood may result, which could result in death or serious injury to the patient.**
6. Gently twist and pull on cassette to make sure it is attached properly.
7. When CASSETTE LOCKED appears, press NEXT.
8. If RE-SET RESERVOIR to____mL? appears, press ▲ if appropriate.
9. When PRIME TUBING? appears, open tubing clamp and press ▲ if appropriate. Follow priming instructions on screen. When primed, close tubing clamp.

ALARMS AND TROUBLESHOOTING

Reservoir Volume Low	Level of fluid in the reservoir is low. Prepare to install a new cassette.
Reservoir Volume Zero	Reservoir volume is 0.0 mL. Press NEXT to stop alarm. Install a new cassette if appropriate.
9 Volt Battery Low	9 volt battery is low, but pump is operable. Change battery soon.
9 Volt Battery Depleted	9 volt battery is depleted and cannot operate pump. Install fresh battery immediately.
High Pressure	Possible blockage downstream, (between pump and patient), clamp or kink in fluid path. Find cause and remove blockage to continue. Or, press STOP/START to stop pump and silence alarm. Remove blockage and re-start pump.
Upstream Occlusion (Model 6101 only)	Fluid is not flowing from the reservoir to the pump. Check for a kink, a closed clamp or an air bubble in the tubing between reservoir and pump. Press STOP/START to silence alarm for 2 minutes. Remove obstruction and re-start pump.
Error Detected	Pump fault occurred. Close tubing clamp. Remove pump from service.
Air-In-Line Detected	Air in fluid path. Press NEXT to silence alarm. Make sure tubing is threaded in Air Detector properly. If fluid path contains air, close clamps, disconnect from patient and prime fluid path.

CADD LEGACY PCA PUMP

A. Display
B. Power jack
C. Air detector
D. Keypad
E. Medication cassette

KEYPAD

STOP/START	Stops and starts the infusion.
ENTER/CLEAR	Enters or clears displayed value.
PRIME	Fills tubing with fluid.
LOCK	Displays or changes Lock Level (security level).
NEXT	Advances to next programming screen.
	Increases or decreases displayed values or scrolls through menu items.
ON/OFF	Turns the pump on or off (low power).
DOSE	Delivers demand dose.

THESE ARE BASIC PUMP FUNCTIONS. YOU MUST CONSULT THE PUMP MANUAL FOR COMPLETE DIRECTIONS

ALARMS & TROUBLESHOOTING

The CADD-Legacy® PCA pump signals with audible alarms and messages that appear on the display when a condition requires your attention.

Res Vol Low – Three beeps.
Level of fluid in the reservoir is low. Prepare to install new reservoir.

Reservoir Volume Empty – Two-tone alarm.
Reservoir volume has reached 0.0 mL. Press NEXT or STOP/START to silence alarm. Install a new reservoir, if appropriate.

Low Bat – 3 two-tone beep every 5 minutes.
Batteries are low, but pump is operable. Change batteries soon.

Battery Depleted – Two-tone alarm.
Batteries are depleted and cannot operate pump; install new batteries immediately.

Battery Removed Pump Won't Run – Two-tone alarm.
With AC adapter attached, batteries have been removed while pump was running, or you have tried to start pump with depleted batteries. Install new batteries.

High Pressure – Two-tone alarm.
High pressure is being caused by an obstruction in the fluid path between the pump and the patient. Remove the obstruction to resume operation. Or press STOP/START or NEXT to stop the pump and silence the alarm for two minutes, then remove obstruction and restart pump.

Upstream Occlusion – Two-tone alarm.
Fluid is not flowing from the reservoir to the pump. Check for a kink or air bubble in the tubing between the reservoir and pump. Remove the obstruction to resume operation. Press STOP/START or NEXT to stop the pump and silence alarm for two minutes, then remove the obstruction and restart the pump.

Screen displays current pump status – Two-beep (long/short) alarm.
The cassette is not aligned with the pump, or is damaged, or a malfunction of the pump sensor(s) is occurring. Reposition the pump to silence the alarm. If repositioning the pump does not silence the alarm within two minutes, the pump will display "No Disposable, Clamp Tubing."

Air In Line Detected – Two-tone alarm.
Air in fluid path. Press NEXT or STOP/START to silence alarm. Make sure tubing is threaded in air detector properly. If the fluid path contains air, close clamps, disconnect from patient and prime fluid path.

Remote Dose Cord Removed – Two beeps when pump stopped, 2-tone alarm when pump is running.
Remote dose cord removed while pump was running.

Stopped – Three beeps every five minutes.
Pump is stopped. Start pump, if appropriate.

Programming Incomplete – Two-tone alarm when starting pump.
Verify all programming screens by pressing ENTER/CLEAR before moving to next screen or starting pump.

Value Not Saved – Two-tone alarm.
A value was not saved by pressing ENTER/CLEAR. Press NEXT to resume programming.

Error – Two-tone alarm.
An error has occurred. Remove pump from service.

No Message Displayed – Two-tone alarm.
The pump was running when batteries were removed or the batteries were removed within 15 seconds after stopping the pump. Batteries must be reinstalled.
IMPORTANT: Always stop pump before removing batteries.

No Disposable, Clamp Tubing – Two beep (long-short) alarm.
The disposable was removed, or the cassette is not aligned with the pump or is damaged, or a malfunction of the pump sensor(s) is occurring. Clamp the tubing immediately. Press STOP/START or NEXT to silence the alarm.

Service Due – Two-tone alarm.
The pump is due for service.

PROGRAMMING / SET-UP SEQUENCE
Batteries must be installed; pump must be stopped and in LL0.

NOTE: Value Not Saved is displayed if a value is scrolled and ENTER/CLEAR is not pressed. Press NEXT to continue programming.

Main Screen Press NEXT.

Enter Reservoir Volume
1. Press ▲or▼ to select desired Reservoir Volume.
2. Press ENTER/CLEAR.
3. Press NEXT.

Enter Units
4. Press ▲or▼ to select desired units.
5. Press ENTER/CLEAR.
6. Press NEXT

Enter Concentration – NOTE: This screen does not appear if programming in milliliters.
7. Press ▲or▼ to select desired Concentration.
8. Press ENTER/CLEAR.
9. Press NEXT.

Enter Continuous Rate
10. Press ▲or▼ to select desired Continuous Rate (select the upper limit if the program will be adjusted in LL1).
11. Press ENTER/CLEAR.
12. Press NEXT.

Enter Demand Dose
13. Press ▲or▼ to select desired Demand Dose (select the upper limit if program will be adjusted in LL1).
14. Press ENTER/CLEAR.
15. Press NEXT.

***Enter Dose Lockout – WARNING: When you enter a new value, any lockout time in effect will be cleared. A demand dose could be requested immediately upon starting the pump, resulting in over-delivery.**
16. Press ▲or▼ to select desired Demand Dose Lockout.
17. Press ENTER/CLEAR.
18. Press NEXT.

Enter Doses Per Hour – NOTE: This screen will only appear if you have programmed a demand dose and dose lockout is less than 1 hour.
19. Press ▲or▼ to select desired Doses Per Hour.
20. Press ENTER/CLEAR.
21. Press NEXT.

***Clear Doses Given**
22. Press ENTER/CLEAR to clear the value for the number of Doses Given. The display will show 0.
23. Press NEXT.

***Clear Doses Attempted**

24. Press ENTER/CLEAR to clear the value for the number of Doses Attempted by the patient. The display will show 0.
25. Press NEXT.

***These screens will appear only if you have programmed a demand dose.**

Clear Given (mL, mg, mcg)

26. Press ENTER/CLEAR to clear the Given value. The display will show 0.00.
27. Press NEXT.

Verify Air Detector Status

28. Verify the setting is correct. (To change setting, see Biomed Functions section.)
29. Press NEXT.

Verify Upstream Sensor Status

30. Verify the setting is correct. (To change setting, see Biomed Functions section.)
31. Press NEXT.

Verify Programming

32. Press NEXT repeatedly to review program.

To Operate in LL1 with Upper Limits, Decrease Continuous Rate and/or Demand Dose. If pump will be operated in LL1 to allow adjustment of Continuous Rate and/or Demand Dose (up to the maximum entered in LL0):

33. Change lock level to LL1.
34. Press NEXT to go to Continuous Rate or Demand Dose screen.
35. Press Î to select desired starting value.
36. Press ENTER/CLEAR.

PUMP OPERATIONS

Change the Lock Level

1. Stop the pump.
2. Press LOCK.
3. Press ▲or▼ until desired lock level appears.
4. Press LOCK or ENTER/CLEAR.
5. Press ▲or▼ until the lock level code appears.
6. Press LOCK or ENTER/CLEAR.

Stop the Pump

1. Press and hold STOP/START until (– – – – – – – – – – –) appears on the display.
2. Release STOP/START key. STOPPED will appear on the display when the pump is stopped.

Start the Pump

1. Press and hold STOP/START until (– – – – – – – – – – –) disappears from the display.
2. Release STOP/START key. RUN will appear on the display when the pump is running.

Prime the Fluid Path

Pump must be stopped and in LL0 or LL1.

WARNING: Do not prime the fluid path with the tubing connected to a patient as this could result in over delivery of medication or air embolism.

1. Press and hold PRIME until the word PRIME appears on the display, along with (– – – – – – – – – – – –).
2. Release the PRIME key.
3. Press and hold PRIME until priming appears on the screen. Continue priming until the fluid path is free of air.
4. Press NEXT to return to the main screen.

Reset the Reservoir Volume

1. Stop the pump.
2. Press NEXT to display the Reservoir Volume screen.
3. Press ENTER/CLEAR to reset the value to previously programmed amount.

Turn the Pump On

1. Press and hold ON/OFF until pump beeps and powers up.

Turn the Pump Off

1. Press and hold ON/OFF until (•••• •••• ••••) appears on the display.
2. Release ON/OFF key.
3. The screen will go blank as the pump goes into a lower power state.

Change the Batteries

1. Stop the pump.
2. Push down and hold the arrow button on the battery door while sliding the door off. Remove and discard old batteries.

IMPORTANT: Always stop pump before removing batteries.

3. Install new batteries, matching polarities shown on the pump. Replace battery door and close.
4. Start the pump.

WARNING: If a gap is present anywhere between the battery door and the pump housing, the door is not properly latched. If the battery door becomes detached or loose, the batteries will not be properly secured which could result in loss of power or non-delivery of drug.

WARNING: Do not use rechargeable NiCad or nickel metal hydride (NiMH) batteries. Do not use carbon zinc ("heavy duty") batteries.

PROGRAMMING SCREENS

Main Screen	Displays status of pump (STOPPED or RUN).
Reservoir Volume	Volume of fluid in reservoir.
Units	Programming units (mL, mg, mcg).
Concentration	Concentration of drug in mg/mL or mcg/mL.
Continuous Rate	Continuous rate of infusion (mL/hr, mg/hr, mcg/hr).
Demand Dose	Amount delivered when patient presses the DOSE key or Remote Dose Button.
Dose Lockout	Amount of time that must elapse between demand doses (appears if demand dose is programmed).
Doses Per Hour	Maximum number of demand doses allowed in any one hour period (appears if demand dose is programmed and demand dose lockout is less than one hour).
Doses Given	Displays number of demand doses given since screen was last cleared (appears if demand dose is programmed).
Doses Attempted	Displays number of demand doses attempted since screen was last cleared (appears if demand dose is programmed).
Given	Total amount of drug delivered since display was last cleared (mL, mg, mcg).
Air Detector (status only)	Indicates if air detector is turned On or Off and High or Low sensitivity level.
Upstream Sensor (status only)	Indicates if turned On or Off.

CHANGING THE CASSETTE

To Remove Used Cassette

1. Stop the pump.
2. Close all tubing clamps.
3. Disconnect tubing from patient.
4. Use key to unlock used cassette.
5. Remove and discard used cassette.

To Attach New Cassette

1. Close all tubing clamps.
2. Insert new cassette hooks into pump's hinge pins.
3. Place pump with cassette on firm surface and push down on top of pump so cassette fits tightly against the pump.
4. Insert a key into the lock, push in and turn until the line on the lock lines up with the arrow on the side of the pump.
5. Gently twist and pull on cassette to make sure it is attached properly.
6. Press SET/CLEAR to reset reservoir volume, if appropriate.
7. If the Air Detector is in use, make a small loop of tubing underneath the air detector and hold it with your thumb. Place the tubing over the groove in the air detector and tuck it under the catch. Seat the tubing into the groove by gently pulling the tube upward until it is under the retention nubs and flat in the groove.

WARNING:
Attach the cassette properly. An improperly attached cassette could result in unregulated gravity infusion of medication from the reservoir or a reflux of blood, which could result in death or serious injury to the patient. You must use a CADD® Extension Set with anti-siphon valve or a CADD® Administration Set with either an integral or an add-on anti-siphon valve to protect against unregulated gravity infusion that can result from an improperly attached reservoir.

DOSING

To Start Demand Dose

Pump must be running.

1. Press DOSE or remote dose cord button.

Note: If you wish to stop delivery of the demand dose, press and hold STOP/START to stop the pump.

To Start Clinician Bolus

Pump must be running.

1. Press LOCK.
2. Press ▲ until Clinician Bolus Code appears.
3. Press LOCK or ENTER/CLEAR.
4. Press ▲or▼ to select desired amount.
5. Press DOSE or ENTER/CLEAR to start bolus.

Note: If you wish to stop delivery of a clinician bolus, press and hold STOP/START to stop the pump.

To Use the Remote Dose Cord/Button

Use remote dose button on cord in same manner as DOSE key on pump keyboard.

1. Attach the remote dose cord by inserting the connector into the Accessory Jack and pushing firmly until it snaps into place.
2. Detach the remote dose cord by grasping the connector and pulling it out of the jack.

Do not use excessive force or instruments, such as pliers, to remove the remote dose cord from pump.

Vista™ basic

Instructions for Use

Excellence in Safety™

Rx Only

B|BRAUN

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WARRANTY

WARRRANTY
B. Braun provides 24 months warranty as of the date of delivery for every Vista™ basic Infusion Pump. This includes the repair or replacement of damaged parts as a result of design/manufacturing errors or material defects. Modifications or repairs to the unit by the owner or third parties invalidate the warranty.

The warranty does not cover the elimination of faults attributable to incorrect/inexpert handling, normal wear and tear, or rechargeable batteries.

The CE mark confirms compliance with the "Council Directive on Medical Products 93/42/EEC" dated the 14th of June, 1993.

B. Braun Melsungen AG

RESPONSIBILITY OF MANUFACTURER
Manufacturer, assembly, and installation personnel or instructors can only be held responsible for any effects on device safety, reliability, and performance if

- Installation, expansion work, readjustments, modifications, or repairs are carried out by personnel authorized by the above,
- The electrical wiring for AC power satisfies the requirements of VDE 0100, 0107, and/or the IEC publications, or regional and/or national variations,
- The device is operated in line with the Instructions for Use, and
- Regular technical inspections (Preventative Maintenance) are carried out every 2 years as outlined in the Service Manual.

INSPECTION ON DELIVERY
Despite careful packaging, the risk of transport damage cannot be entirely excluded. Upon delivery, please check that nothing is missing. Do not use a damaged device! If the device is damaged, contact the Service Department. See "Maintenance, Storage, & Service."

Packaging: The pump packaging is reusable.

Package Contents: Vista basic Infusion Pump, drop sensor, power cable, pole clamp, Instructions for Use.

Vista™ basic Contents

CONTENTS

The Vista basic is a volumetric infusion pump intended to provide accurate and continuous flow of parenteral and enteral fluids.

Qualified medical staff should decide how the device should be used based on its features and specifications.

For more details, please read the Instructions for Use.

Rx only.

WARNINGS & CAUTIONS

The following should be observed to avoid patient/user injury. This Instructions for Use manual contains detailed instructions and warnings on the use of the Vista™ basic Infusion Pump. Please read it completely prior to using this device. This manual is intended to reinforce the teaching given to the user by a trained health care professional or an authorized B. Braun representative.

WARNINGS

- B. Braun will assume no responsibility for incidents which may occur if the product is not used in accordance with product labeling.
- Make sure the pump is stable, either fastened securely to the IV pole or resting on a flat surface.
- Prior to use, always check the audible and visual alarms (and staff call, where applicable).
- Connection of pump tubing to the patient should only be made after the tubing is loaded and the unit is turned on. Disconnect tubing from patient when changing solution containers to avoid the danger of incorrect dosage.
- Ensure there are no kinks in the tubing.
- Always read and follow the instructions that accompany the source container and IV administration sets you are using. Carefully follow the instructions for loading, removing, and reloading the set, as well as the recommended set change intervals.
- Change pumping section on tubing every 24 hours. Do not use tubing for more than 72 hours or per current facility protocol.
- Always check pump data prior to starting infusion.
- Do not operate this device in environments where there is an explosion hazard! A possible explosion hazard exists if the pump is used in the presence of flammable anesthetics.
- The EMC-limits (Electro-magnetic compatibility) according to IEC/EN 60601-1-2 and IEC/EN 60601-2-24 are maintained. If the equipment is operated near other equipment which may cause high levels of interference (e.g. HF surgical equipment, nuclear spin tomography units, mobile telephones, etc.) maintain the recommended protective distances for these devices. Under certain conditions, malfunctions may occur which lead to a device alarm with permanent alarm tone. Interference may occur e.g. at electro-magnetic fields > 10 [V/m] resp. electro-magnetic discharges > [8 kV].
- Monitoring of the patient and infusion status is necessary to ensure the infusion is being delivered as anticipated. The Vista basic has been designed to stop fluid flow to the patient under certain alarm conditions. Also, prior to starting an infusion, verify that no drops are falling in the drip chamber and the programmed information is correct.

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WARNINGS & CAUTIONS

- After starting an infusion, make sure drops are falling in the drip chamber. If no drops are falling, make sure the roller clamp is open. If the roller clamp is open and still no drops are falling, replace and dispose of the set.
- The air detector cannot recognize the introduction of air at 3-way stopcocks, infusion ports, and other lines/tubes below the pump.
- See section entitled "Drop Sensor" for additional information on using the device without a drop sensor.
- To avoid mechanical or electronic damage, do not steam autoclave or immerse the pump in any fluids or cleaning solutions. Always disconnect electrical power cord from outlet before cleaning to prevent electrical shock.

CAUTIONS

- Rx only.
- Do not attempt to infuse two fluids simultaneously using the Vista™ basic.
- Variations in pressure, e.g. caused by change in level of fluid container, may affect the accuracy of the device.
- If several pieces of infusion equipment are connected together, it is possible there may be mutual influence. Possible incompatibilities can be found in the instructions for use for the drug or for the other appliances.
- Use only equipment, accessories, parts, and disposables that are intended for use with the Vista basic.
- Do not clean, disinfect, or sterilize any part of the device by autoclaving or with ethylene oxide gas. Doing so may damage the device and void the warranty. Only external parts of the pump should be disinfected. See "Maintenance, Storage, & Service" for suggested cleaning solutions.
- Technical specifications are not guaranteed with any other tubing than that approved for use with the Vista basic.
- Any analog and digital components connected must demonstrate that they meet EN specifications (i.e. EN 60950 for data processing equipment and EN 60601 for electrical medical equipment).
- Only an authorized system configuration technician responsible for meeting the specifications of standard EN 60601-1-1 may connect additional devices to the signal inputs or outputs.

SAFETY STANDARD

The Vista basic meets all safety standards for medical electrical devices, corresponding to IEC 60601-1 and IEC 60601-2-4.

NOTE: IEC 60601-1 corresponds to European Standard EN 60601.

INTRODUCTION

Handle for carrying

Display
All essential information is displayed in plain language. Green background lighting illuminates only when connected to AC power, or, in battery operation, only when a key is pressed.

Keyboard
Allows data entry

Clear Key
Resets a value to zero

Alarm Light
Lights up during an alarm. Display will also show flashing AAAA.

Infusing Light
Indicates pump is infusing

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INTRODUCTION

Door Open Button

Aluminum Case
Easy upkeep, drip proof, and resistant to disinfectants

Function Keys
Allow choices of YES, NO, OK, INFO, OPTS, etc.

ON/OFF (Power) Key

Alarm Silence Key
Silences alarm tone for 2 minutes

START/STOP Key

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PREPARING THE INFUSION

Prepare the Pump

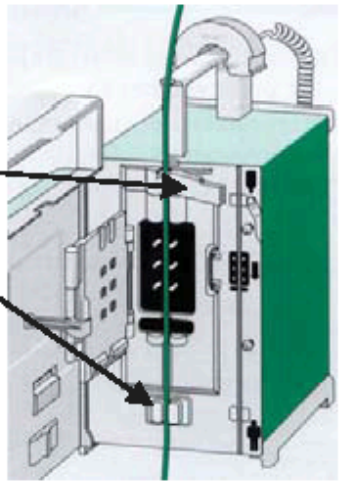
1. Check for cleanliness, completeness, and damage. If unit appears damaged, do not use it.
2. Attach the pump to an IV pole by turning the knob on the pole clamp clockwise, or place the pump on a flat, stable surface.
3. Plug the pump's power cord into an electrical outlet.

Turn on the Pump

1. Press (ON/OFF).
2. Listen for 3 loud beeps.
3. Check screen for completeness of all pixels on the display. The Alarm (🔔) and Infusing (💧) lights will blink once.

Load the Set

1. Prepare the solution container and prime the administration set according to the instructions provided on the set package. Close the roller clamp.
2. Check that the drip chamber is about 1/3 full and there is no air in the set.
3. Open the pump door by pressing the Door Open Button on the top right corner of the pump.
4. Push and hold open the clamp at the top of the fluid path.
5. Insert tubing in clamp and release clamp.
6. Thread the tubing down the fluid path, making sure the tubing is pressed into the Air-in-Line detector at the bottom of the fluid path. The roller clamp should be below the pump.
7. Close the door and open the roller clamp. Check that no drops are falling in the drip chamber.
8. Place drop sensor on drip chamber (optional).
9. Connect set to patient site.



Turning off the Pump

1. Press to stop the infusion.
2. Close the roller clamp.
3. Press and hold for 2 seconds.

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Continuous Mode

When the pump is turned on, it may display: **Tubing Type VISTA Pump Set**
Confirm you are using a Vista™ Pump Set, then press **YES**.

The pump may then display: **Is This a New Therapy?**

YES	NO
Begins in Continuous Mode with all data cleared.	Returns to the beginning of the last program with all data retained.

The pump may then display: **Prime Set?**

YES	YES
Press YES to begin priming set. • Press STOP to end priming. • Press EXIT to begin Continuous Mode.	Press YES to begin priming set. • Press STOP to end priming. • Press EXIT to return to the beginning of the last program with all data retained.
NO	**NO**
Begins in Continuous Mode with all data cleared. Press the green key below your answer.	Returns to the beginning of the last program with all data retained.

CONTINUOUS MODE

This section explains how to program a Continuous Mode infusion. For directions on how to program other Modes and Options, refer to those sections later in this manual.

There are three ways to enter infusion data in Continuous Mode:

RATE and VTBD (Volume To Be Delivered)

1. Enter rate in ml/hr.
2. Press VTBD (Volume To Be Delivered).
3. Enter bag volume in ml.
4. Press OK. (To leave screen without saving changes, press EXIT.)
5. Press START STOP to begin the infusion. Check for drops in the drip chamber.

Continuous Mode

VTBD and TIME

1. Press VTBD.
2. Enter bag volume in ml.
3. Press OK. (To leave screen without saving changes, press EXIT.)
4. Press TIME.
5. Enter infusion time in hours and minutes.
   NOTE: For a 2 hour infusion, enter 2, 0, 0. The pump will show: Time: 02h00m
6. Press OK. (To leave screen without saving changes, press EXIT.) The pump calculates the rate and asks: **Accept Rate?**
7. Press OK.
8. Press START STOP to begin the infusion. Check for drops in the drip chamber.

RATE and TIME

1. Enter rate in ml/hr.
2. Press TIME.
3. Enter infusion time in hours and minutes.
4. Press OK. (To leave screen without saving changes, press EXIT.)
5. Press START STOP to begin the infusion. Check for drops in the drip chamber.

To Change the Rate

1. Press START STOP to stop the infusion.
2. Press C. The display will reset to 000.0 ml/h.
3. Enter a new rate.
4. Press START STOP to begin the infusion. Check for drops in the drip chamber.

To Change the Rate While Infusing

1. Enter a new rate.
2. Press OK.
   NOTE: If the OK key is not pressed within 10 seconds of the change, the infusion will continue at the old rate.

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Continuous Mode

KEEP VEIN OPEN RATE
After an infusion is complete, the pump will alarm and begin pumping at 1.0 ml/hr or the current infusion rate, whichever is less.

1. Stop the infusion.
2. Turn off the pump or reset the program.

INFORMATION KEY
This key is only available while the pump is infusing.

1. Press INFO.
2. The Total Infused value and the Total Time of the infusion completed are displayed.
3. Press INFO again and the Battery Left and Total Operation time of the pump is displayed.
4. The pump will return to the main infusion screen after 10 seconds.

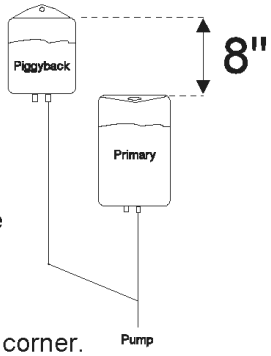
OPTIONS — Piggyback

The Vista™ basic contains many options to allow custom programming. To access the various options, press OPTS while the pump is stopped. Pressing OPTS each time will move you to the next option. Eventually, the OPTS key will bring you back to the mode from which you began.

Depending on the model, some modes/options may have been disabled and will not appear on the display when the OPTS key is pressed.

PIGGYBACK

The Piggyback feature allows programming of a secondary (Piggyback) infusion. The pump automatically switches from the Piggyback to the Continuous Mode infusion when the Piggyback program is complete. The option is only available if there is data in the Continuous Mode.



1. Connect the Piggyback set to the injection site on the tubing above the pump on the primary set. Open the roller clamp on the Piggyback set.
2. Hang the Piggyback solution container at least 8 inches above the primary solution container.
3. Program the continuous infusion in the Continuous Mode (see "Continuous Mode").
4. Press OPTS.
5. Press ON to turn the Piggyback feature on.
6. Press END. PIGY will now be displayed in the lower left corner.
7. Press PIGY.
8. Enter the Piggyback infusion data as you would Continuous Mode data.
9. Press START STOP to start the Piggyback infusion.
10. Check that drops are falling in the Piggyback drip chamber.

CAUTION: Do not attempt to infuse both Continuous and Piggyback fluids at the same time. Use primary sets with check valves.

NOTE: To prevent incorrect delivery, the programmed Piggyback volume to be delivered must equal the amount of fluid in the Piggyback container. Automatic Piggyback is not intended for the infusion of fluids requiring flushing before and after administration.

NOTE: If the Piggyback container is not empty, the remaining Piggyback fluid will be delivered at the Continuous Mode rate once the pump transitions back to the Continuous Mode.

OPTIONS Piggyback, Ramp/Taper Mode

To Exit Piggyback

1. Press START STOP to stop the infusion.
2. Press END.
3. Press OPTS.
4. Press OFF to turn Piggyback off
5. Press END to return to Continuous Mode.

RAMP/TAPER MODE

The Ramp/Taper Mode is designed to deliver infusions, such as Total Parenteral Nutrition (TPN), which require gradual ramp up and taper down rates. The pump automatically calculates the rate changes required to match the volume, total time, and ramp/taper time parameters.

1. Press OPTS until display shows RAMP TAPER MODE.
2. Press ON.
3. Enter the total bag VOLUME to be delivered.
4. Press OK.
5. Enter the RAMP UP time, in hours and minutes.
   NOTE: The pump defaults to 01h00m. To change, press C, and enter the time.
6. Press OK.
7. Enter the TAPER DOWN time, in hours and minutes.
   NOTE: The pump defaults to 01h00m. To change, press C, and enter the time.
8. Press OK.
9. Enter the TOTAL Time for the infusion.
10. Press OK
    Note: The pump calculates the maximum rate and asks: **Accept Rate?**
11. Press OK.
12. Press START STOP to start the infusion. Check for drops in the drip chamber.

To Review or Change Ramp/Taper Mode Data

1. Press OPTS until display shows RAMP TAPER MODE.
2. Press ON.
3. Review the data on each screen and press OK if data is correct or press C to clear the current data and re-enter new data. Press OK to accept new data.

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OPTIONS Ramp/Taper Mode

To Clear Ramp/Taper Mode

1. Press OPTS until display shows RAMP TAPER MODE.
2. Press CLR.
3. Press YES to clear all the data in Ramp/Taper Mode.
4. Press ON and continue to program a new Ramp/Taper program.

To Exit Ramp/Taper Mode

1. When infusion is complete, press START STOP to stop the KVO.
2. Press EXIT.
3. Press END to return to Continuous Mode.

Fast Taper

The infusion can be interrupted to begin an early taper down process during the Ramp/Taper Mode Infusion.

1. Stop the infusion.
2. Press FAST.
3. Enter the FAST Taper Time in hours and minutes.
4. Press OK.
5. Press START STOP to start the infusion. Check for drops in the drip chamber.

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OPTIONS Program Mode

PROGRAM MODE
Program Mode is for infusions requiring up to 9 separate rates and volumes to be delivered one after another. This is designed to deliver infusions for stepped oncology drugs, circadian medication delivery, and other custom programs.

1. Press OPTS until display shows PROGRAM MODE.
2. Press ON.
3. Enter the rate of the first Step.
4. Press OK.
5. Enter the volume of the first Step.
6. Press OK.
7. Continue to enter the rates and volumes for Steps 2-9.
8. If less than 9 Steps are needed, press OK with a rate of zero.
9. Press OK to accept the total Program Volume.
   NOTE: Pressing CHNG on this screen returns to Step 1 for review and changes.
10. Press START STOP to start the infusion. Check for drops in the drip chamber.

To Review or Change Program Mode data
1. Press OPTS until display shows PROGRAM MODE.
   Note: If Program Mode is infusing, stop the infusion and press EXIT.
2. Press ON.
3. Review the data on each screen and press OK if data is correct or press C to clear the current data and re-enter new data. Press OK to accept new data.
4. OR, press CHNG on Accept Program Volume screen (see #9 **NOTE** above).

To Clear Program Mode
1. Press OPTS until display shows PROGRAM MODE.
   Note: If Program Mode is infusing, stop the infusion and press EXIT.
2. Press CLR.
3. Press YES to clear all the data in Program Mode.
4. Press ON and continue to program a new Program.

To Exit Program Mode
1. When infusion is complete, press START STOP to stop the KVO.
2. Press EXIT.
3. Press END to return to Continuous Mode.

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OPTIONS — Delay A Mode

DELAY A MODE

The start of Continuous, Piggyback, Ramp/Taper, and Program Modes may all be delayed. The Vista™ basic also provides an option to extend the Infusion Complete alarm at the end of the infusion.

1. Program the infusion.
2. Press OPTS until display shows DELAY A MODE.
3. Press ON.
4. Enter in how many hours and minutes the infusion should begin.
   NOTE: This is NOT a clock time like 12:30 pm.
5. Press OK.
6. Enter how long, in hours and minutes, after the end of the infusion the pump should wait before alarming.
7. Press OK.
8. Press YES if the pump should run at KVO during the delay times. Press NO if the pump should not infuse during the delay times.
9. Review the data and press OK. To change the data, press EXIT and begin with #3 above.
10. Press START STOP to begin the delayed infusion.

To Exit Delay A Mode

1. Stop the infusion.
2. Press OPTS until display shows DELAY A MODE.
3. Press OFF.
4. Press END to return to the previously active mode.

OPTIONS Dosage Calculation

DOSAGE CALCULATION

This feature allows a rate to be calculated given the concentration and dose.

1. Press OPTS until display shows DOSAGE CALC.
2. Press ON.
3. If concentration unit desired is other than the one displayed, press button under the mcg? until units desired appear in the CONCENTRAT. (0*/ml) line.
4. Enter the concentration of the solution. If the concentration of the solution is not known, go to #6 below. Press C to clear current data and re-enter new data.
5. Press OK.
6. To calculate the concentration of the solution, use ← to move the * to the mg field. Enter the amount of drug in the solution. Then press → to move the * to the ml field. Enter the amount of solution.
7. Press OK.
8. Enter the body weight if part of the dosing parameters, then press OK. If body weight is not part of the dosing parameters, press OK with 0 in the body weight field.
9. If time unit desired is other than the one displayed, press button under the /h? until time unit desired appears in the first line. Enter the dose or use → to move the * to the rate field and enter the rate.
10. Press OK.
11. Press START STOP to begin the infusion.

To Review Data During Infusion

1. Press INFO twice.

To Exit Dosage Calculation

1. Stop the infusion.
2. Press OPTS until display shows DOSAGE CALC.
3. Press OFF.
4. Press END.

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OPTIONS Bolus Mode, Interval Bolus (Intermittent Mode)

BOLUS MODE

This feature allows a bolus to be given during a Continuous Mode infusion.

1. Press OPTS until display shows BOLUS MODE.
2. Press ON.
3. Press RATE.
4. Enter the rate at which the bolus should infuse, then press OK.
5. Press END.
6. To give a bolus during the infusion, press BOL.
7. Enter the amount of bolus to be given in ml.
8. Press OK.

Bolus Without Entering a Volume

1. During the infusion, press BOL and hold down until a second BOL is displayed to the right.
2. Continue to hold down the first BOL while also pressing the second BOL.

   A bolus will be given as long as both BOL keys are held down. The pump will display the amount of bolus being administered and will beep once after each milliliter delivered.

INTERVAL BOLUS (INTERMITTENT MODE)

The basal/KVO rate and entire bag volume must be entered in CONTINUOUS MODE first.

1. Press OPTS until display shows BOLUS MODE.
2. Press ON.
3. Press TIME.
4. Enter the time between the start of each dose, then press OK.
5. Press RATE.
6. Enter the rate at which the dose is to be given, then press OK.
7. Press VTBD.
8. Enter the volume of each dose, then press OK.
9. Press END.
10. Press START STOP. The pump will deliver at the basal/KVO rate for the interval time, then begin delivery of the first dose.

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OPTIONS Total Infused, Standby Function

TOTAL INFUSED
The Total Infused information screen displays the total amount of fluid in ml that has been pumped since the last time the Total Infused was cleared.

To Clear the Total Infused
1. Press OPTS until display shows Tot Infused=.
2. Press C.
3. Press END.

STANDBY
This function allows the pump to be put on standby while retaining all set infusion data. This function is only available in Continuous Mode.

1. Press OPTS until display shows STANDBY
2. Press ON.
3. Enter time in hours and minutes the pump is to stand by.
4. Press C to clear the current data and re-enter new data. Press OK to accept new data.
4. Press OK.
   The pump will count down to zero and then alarm **Pump Stopped!**

To Exit Standby Function
1. Press EXIT to return to Continuous Mode.
   Note: If countdown has already started, press END to return to Continuous Mode.

OPTIONS Occlusion Pressure, Drop Sensor, Battery

OCCLUSION PRESSURE

The pressure at which a downstream occlusion alarm will be triggered may be varied. The higher the pressure limit, the less sensitive the pump is to changes in fluid resistance.

1. Press OPTS until display shows OCCLUSION PRESSURE.
2. Press (--) to change pressure to Low. Press (+) to change pressure to High.
3. Press END to return to Continuous Mode.

NOTE: Low corresponds to approximately 8 PSI and high to approximately 17 PSI. High pressure limits may increase the severity of an infiltration without alarming.

DROP SENSOR

Using a drop sensor eliminates the need for pre-setting a VTBD in Continuous Mode and senses upstream occlusions and empty solution containers.

NOTE: Turning the Drop Sensor feature off forces volumes to be entered and prevents sensing of upstream occlusions.

To Turn On the Drop Sensor

1. Press OPTS until display shows DROP SENSOR.
2. Press ON.
3. Press END to return to Continuous Mode.

To Turn Off the Drop Sensor

1. Press OPTS until display shows DROP SENSOR.
2. Press OFF.
3. Press END to return to Continuous Mode.

BATTERY CAPACITY

This is an indicator of the remaining battery time in hours and minutes. This screen also indicates the amount of time the pump has been in operation.

1. Press OPTS until display shows Battery Left =.
2. Press END to return to Continuous Mode

OPTIONS Data Lock, Contrast Selection

DATA LOCK

This features prevents unauthorized use by locking out all keys except START/STOP,  , and  .

1. Press OPTS until display shows DATA LOCK.
2. Press ON.
3. Press END to return to Continuous Mode.

To Turn Off Data Lock

1. Press OPTS until display shows DATA LOCK.
2. Press the decimal key.
3. Press OFF.
4. Press END to return to Continuous Mode.

CONTRAST SELECTION

This feature allows the contrast of the screen to be changed for best possible viewing.

1. Press OPTS until display shows CONTRAST SELECTION.
2. Press (+) to increase the contrast (make the text darker). Press (--) to decrease the contrast (make the text lighter).
3. Press END to return to Continuous Mode.

OPTIONS Adjust Clock, Loudness

ADJUST CLOCK

This feature allows the time and date to be changed.

1. Press OPTS until display shows ADJUST CLOCK.
2. Press DAT to enter the date. (Press C to clear the current data and re-enter new data.)
3. Enter the date using two digits for month, day and year.
   Example: November 5, 2001 is entered as 11 05 01
4. Press OK
5. Press TIME to enter the time of day.
   Note: The time is set using 24 hour Military Time.
   Example: 6:30pm is entered as 18:30
6. Press OK
7. Press END to return to Continuous Mode.

LOUDNESS

This feature allows the volume of the alarm tone to be changed.

1. Press OPTS until display shows LOUDNESS.
2. Press (+) to increase the alarm volume. Press (--) to decrease the volume.
3. Press END to return to Continuous Mode.

OPTIONS Alarms

In alarm situations, press to silence the alarm. Correct the problem. Resume the infusion by pressing START STOP.

Alarm	Possible Cause	Action
Air-In-Line!	Air bubble in air-in-line sensor	Remove air from system
Check Drop Sensor! Free Flow! Not Enough Drops! Too Many Drops!	Solution container empty Roller clamp closed Set loaded incorrectly Kinks, closed clamps, or blockage Droplets on wall of drip chamber Drop sensor out of position	Replace solution container Open roller clamp Re-load set Check for blockage Shake drip chamber Reposition drop sensor
Door Open!	Door opened during infusion	Close door
Dwnstream Occlusion!	Downstream tubing kinked Filter blocked Closed clamp IV positional or infiltrated Catheter or vein too small Occlusion limit too low	Correct kinks Correct blocked filter Open clamps Check IV site Increase occlusion limit
Invalid data!	Entered data is out of range	Press C; re-enter data
Keep Vein Open Rate: Infusion Complete	Programmed infusion is complete	Stop infusion
Low Battery!	30 minutes until battery is fully discharged	Silence alarm and connect pump to AC power
Plug In Now!	Battery is discharged	Connect pump to AC power
Pump Stopped!	No key panel activity for 2 minutes or Standby time expired	Silence alarm; begin infusion
Unit Malfunction!	Internal error	Press until display reads: "Do not press any key until display is off;" wait until pump turns off, turn device on. If alarm repeats, return for service.

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AC, 12 V, BATTERY, & CC INTERFACE

AC and 12 V

- Check AC voltage as per rating label.
- Insert/screw on power lead (12 V lead in ambulance car) on back.

Battery Operation

- Switching to internal battery is automatic in the event of power failure or if 12 V or AC is not connected.
- Charge battery on initial use, following a battery alarm, or after 2 months of non-use.
- Charging time: approx. 16 hours. Longer charging has no detrimental effect.
- Full battery provides operation for 3.0 hours at highest delivery rate.
- Battery capacity is approx. 50% after 2 years.
- The service life of the battery can be extended by completely discharging it from time to time and then fully recharging it on AC power.

CC Interface

Interface descriptions available from B. Braun. Connection to interface input uses MFC plug.

Documentation

- All operating data of the Vista™ basic can be called up and logged via external computer

Vista™ basic Instructions for Use
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MAINTENANCE, STORAGE, & SERVICE

Maintenance
Clean the pump with a soft, lint-free cloth or swab dampened with soap and water, a general non staining chemical disinfectant, isopropyl alcohol (15%), derivatives of phenylphenol (5%) or ammonium chloride (10%).

As a general recommendation for cleaning and disinfecting this device, use a lint-free cloth dampened (not soaked) with a 0.5% bleach (Sodium Hypochlorite) solution (10% solution with water). The solution is most effective when prepared weekly and allowed to remain on the device for approximately 10 minutes prior to wiping off.

- Do not use acetone solutions containing glutaraldehyde or abrasive cleansers on the pump. If necessary, Betadine or Iodine solutions may be used, but they will stain the pump.
- Do not use abrasive cleaning tools or pressurized spraying devices as these may damage the device.
- Do not sterilize the pump using ethylene oxide (EtO) gas.
- Do not steam autoclave or immerse the pump in any fluids or cleaning solutions.
- Always turn off the pump and disconnect it from the electrical outlet prior to cleaning.

Storage
Store the pump away from excessive heat, cold, or humidity. Keep devices plugged into electrical power during storage.

Service
If the pump fails to respond to the operating or troubleshooting procedures listed in this manual and the cause cannot be determined, discontinue use and forward it to an authorized B. Braun Service Center.

Should it be necessary to return a pump for repair, contact Technical Support at B. Braun Customer Service at 800-627-PUMP. A Returned Materials Authorization number will be provided. Carefully pack the pump (preferably in the original packing) and ship it prepaid to:

B. Braun Medical Inc.
Attn: Service Manager
1601 Wallace Drive
Suite 150
Carrollton, TX 75006 USA

B. Braun cannot assume responsibility for loss or damage to returned pumps while they are in transit.

Product complaints may be sent to the Quality Manager at the above address. With each complaint, please include pump serial number and full description of difficulty, including all settings, types of fluids, times, and alarm messages. Return set used if possible. Contact Technical Support for an RMA number prior to return.

SPECIFICATIONS

Mechanism	Linear peristaltic volumetric infusion pump
Dimensions WxHxD	5.5 in (14cm) x 9.4 in (24cm) x 7.8 in (20cm)
Weight	6.8 lbs. (3.1 kg)
Power Requirements	100-120 VAC, 50-60 Hz, 13 Watts
Leakage Current	Max 30µA
Battery	7.2V, 1.2 Ah NiCd (rechargeable)
Battery Operating Time	≈3.5 hours at 125 mL/hr
Rate Range	0.1 to 800.0 mL/hr in 0.1 mL increments with Vista™ tubing
Volume to be Infused Range	0.1 to 9999.9 mL
Occlusion Pressure	Variable Settings Low: 8 PSI High: 17 PSI
KVO Rate	1 mL/hr or selected rate, whichever is lower
Flow Rate Accuracy	± 5% measurement time 8hr, temp. 71.6° F
Alarms	Air-in-Line, Low Battery, Plug In Now, Bag Empty, Downstream Occlusion, Door Open, Pump Stopped, KVO, Unit Malfunction
Air-in-Line Alarm	Air bubble size 0.3mL* or 1.5mL/hr** *Can be set from 0.01 to 0.3 mL in service program **Can be set from 0.5 to 3.5 mL/hr in service program
Memory	User option to retain last Continuous and Piggyback Mode data upon power up. Permanent data retention in Program and Ramp/Taper Modes after pump is turned off
Tubing	B. Braun Vista™ administration sets
Modes/Features	Continuous and Piggyback Modes, Program Mode for variable infusions, Ramp/Taper Mode for TPN infusions and Delay A Mode for postponing infusion start and finish
Operating Temperatures	Operating: 64.4° F to 95° F, 10.15 PSI to 15.37PSI Non-Operating: -13° F to 131° F, 10.15 PSI to 15.37 PSI

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B. Braun Medical Inc.
824 Twelfth Ave.
Bethlehem, PA 18018

Tel 800-227-2862
www.bbraunusa.com

Vista™ basic Instructions for Use
950787 Rev 6/02

PROPACARE PHARMACY

VISTA BRAUN IV PUMP TROUBLESHOOTING

IMPROPER PRIMING

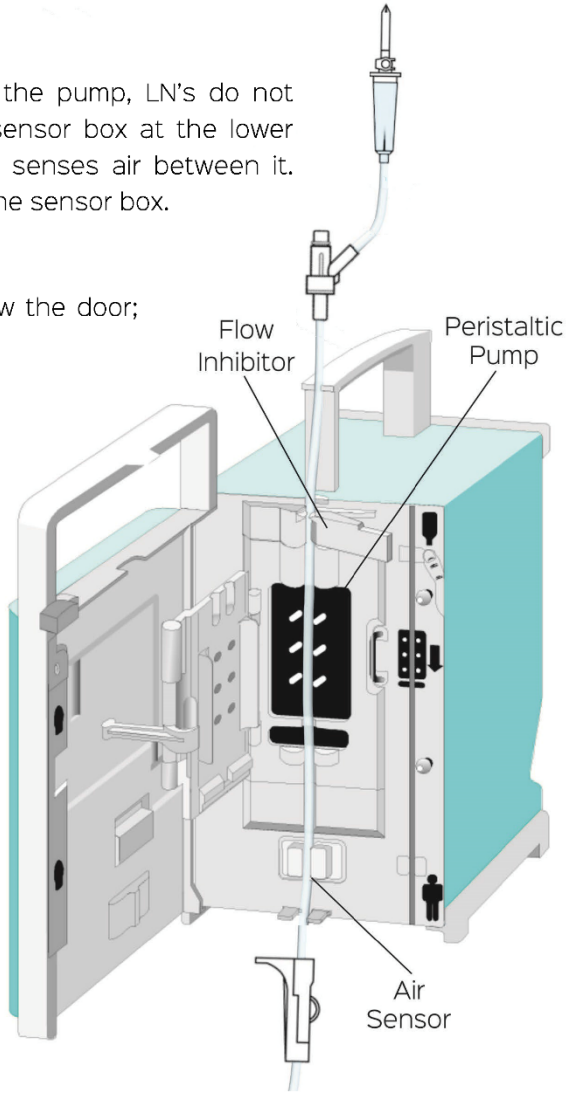
Issue: LN partially primes the tubing then places into pump for the pump to prime the rest; LN is to spike the bag, squeeze the drip chamber until 1/3 full then place tubing into the pump for the remainder of the setup. ***The pump will alarm if it is not allowed to perform the function it was designed for.***

IMPROPER SECUREMENT OF TUBING

Issue: When lining the tubing into the track of the pump, LN's do not ensure tubing is placed securely into the air sensor box at the lower portion of the IV line track therefore the pump senses air between it. The LN needs to push the tubing snuggly into the sensor box.

IMPROPER TUBING SET UP

Issue: Tubing is pulled taut with upper port below the door; The upper port is to be above the pump as the back check valve to reduce air in line will need to be above the pump door. Plus the port for piggyback needs to be above the pump door if a secondary bag will be used.



IV LINE FATIGUE

Anytime a tubing is used multiple times within 24 hours it can develop "line fatigue" which appears as numerous "dents" into the line. If the nurse has reviewed and does not see any other issues, it can be line fatigue of the 6 inch section within the pump. The nurse can open the pump door and remove line and place a new section of the tubing (6" above or below) within the track and reattempt.

WRONG TUBING

If an LN attempts to run TPN using primary tubing (0.2 micron) vs. 1.2 micron; it will not function.

If you are unable to resolve the issue after troubleshooting
Please call the Pharmacy IV Department at (800) 330-3665

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MISCELLANEOUS DEVICES-INSTRUCTIONS FOR USE

Table of Contents

CARESITE Micro™ Extension Set

with CARESITE Micro Luer Access Device and Spin-Lock® Connector

Instructions for Use: Use Aseptic Technique.

- **To access CARESITE Micro Luer Access Device:** Swab top of luer access device vigorously for 15 seconds with 70% Isopropyl Alcohol and allow to air dry prior to use. Use a luer connector without a needle. After medication administration, flush per institutional protocol.
- **For use with Power Injectors (maximum pressure of 325 psi and maximum flow rate of 10 mL/sec):** Secure luer access device with a luer lock connector. Refer to labeling of associate devices (e.g. catheters) for maximum pressure and flow rate to ensure compatibility.
- Compatible with male luer connectors of internal diameter (ID) between 0.067 in. (1.7 mm) and 0.114 in. (2.9 mm).
- Replace set per CDC guidelines.

1. Prime extension set to ensure air is expelled.
2. Firmly attach connectors to desired connections.

B. Braun CARESITE Micro™ Luer Access Device

Smooth, flat surface to disinfect

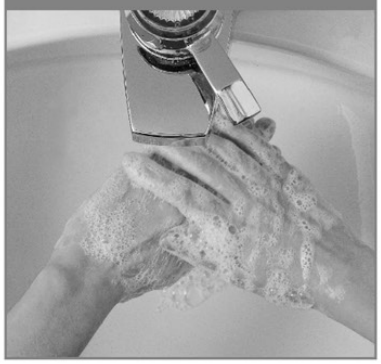
Straight fluid path for small flush volumes and minimal deadspace

Clear window to visually confirm flushing

Disinfection Instructions For CARESITE® Luer Access Device

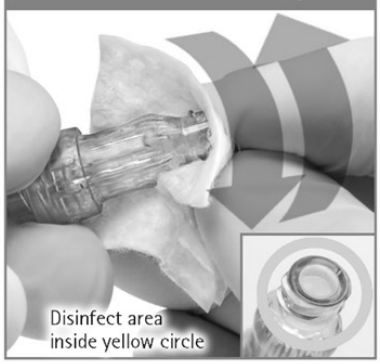
Three simple steps to flush or administer medication:

1. Wash Hands



- Use antibacterial soap.
- Wear gloves for IV procedure.

2. Disinfect Valve Top



- Vigorously swab with alcohol pad; best practice recommends 15 seconds.
- Allow alcohol to dry.

3. Attach and Disconnect

- **IMPORTANT: Do not clamp line until syringe is disconnected.**
- Remove any residual fluid upon disconnect with alcohol pad.

Always Remember:

- Swab valve top vigorously with an alcohol pad for 15 seconds before each infusion access.
- Flush before and after meds.
- Flush before and after blood draws.
- Disinfect valve top after each blood drawing process is complete.
- Upon completion of IV infusion follow institutional protocol for IV care and valve change.
- Always refer to package instructions for complete directions for use.

For questions or information, contact B. Braun Clinical/Technical Support at **1-800-854-6851**

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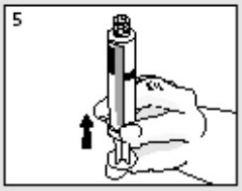
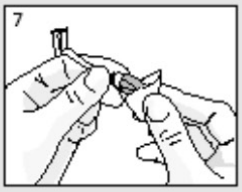
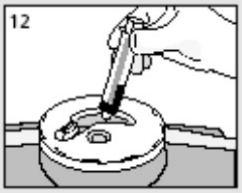
BD Indispensable to human health

BD PosiFlush™ Saline Syringe Home Care Patient Guide

Saline Flush Guidelines







To prepare the flushing procedure:

1. Establish a clean workspace.
2. Remove the syringe from the package.
3. Prior to flushing, the vacuum that exists inside the syringe must be broken. To break the vacuum: with syringe cap ON and holding syringe upright, depress plunger rod slightly forward until you feel or hear a "pop" or until you see the solution move.
4. Remove syringe cap by twisting it off (note: place the cap on clean workspace). If using a needleless system that requires a plastic cannula, attach it by twisting firmly onto the syringe.
5. Holding syringe upright and pointing away from you, expel air from the syringe until you see a drop of fluid at the tip of the syringe.
6. After expelling air, recap the syringe in order to keep the syringe tip sterile. If using a plastic cannula, recap the cannula with the shield. If using a valve, twist the syringe cap back on.
7. Clean the injection site or valve using an alcohol pad (or the antiseptic suggested by your nurse).
8. Remove the syringe cap by twisting it off or, if applicable, remove the plastic cannula shield.
9. Attach the syringe to injection site or valve (if applicable, open the slide clamp on the IV extension tubing). If using a plastic cannula, push the cannula tip through the center of injection site. If using a valve, push and twist the syringe clockwise onto the valve.
10. Infuse the saline solution as instructed by your nurse. If applicable, after completing the flush, close the slide clamp on the IV extension tubing.
11. Disconnect syringe from injection or valve site.
12. Discard syringe, including any unused solution, into a sharps collector.

DO NOT REUSE ANY SYRINGE

Copies are available online at **www.bd.com/injection/products/posiflush**

Introcan Safety® IV Catheter

1 Prepare Site
- Confirm all items are accessible for IV catheter insertion/ securement
- Prepare site according to facility protocol
- **DO NOT ROTATE CATHETER PRIOR TO INSERTION**
- Confirm Locking Bevel Indicator is seated in "slot" of catheter hub

2 Perform Venipuncture
- Hold skin taut
- Adjust angle of insertion and insert needle tip
- Puncture vein and observe flashback to confirm entry

3 Thread Catheter
- Upon flashback visualization, **LOWER** catheter parallel to skin
- Advance needle and catheter together 1/8 inch
- Thread catheter into vein while keeping needle stabilized
- Release tourniquet

4 Stabilize Catheter
- Place middle finger over vein distal to catheter tip and apply pressure to occlude vein (interrupts flow of blood)
- Stabilize catheter hub with index finger ("V" technique)

5 Remove Needle from Catheter
- Withdraw needle with a swift, continuous motion parallel to the skin
- Passive safety clip automatically covers needle bevel
- Dispose of needle immediately into sharps container

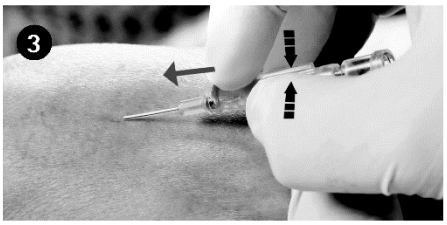
6 Secure Catheter
- Connect and secure infusion line to catheter hub
- Stabilize and cover site according to facility protocol

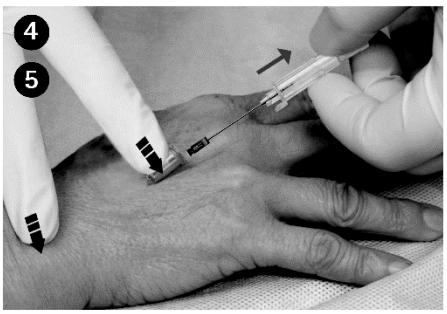
CAUTION –

Never reinsert needle into catheter; catheter shearing may occur, causing an embolism.

In the case of an unsuccessful IV start, remove the stylet first to activate safety mechanism, then remove catheter from patient.

Practice Suggestions





PRIOR TO USE AND FOR COMPLETE PRODUCT INFORMATION, INCLUDING WARNINGS AND PRECAUTIONS, REFER TO "DIRECTIONS FOR USE".

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SHARING EXPERTISE

PRACTICE SUGGESTIONS

Introcan Safety® IV Catheter

CONCERNS	POSSIBLE CAUSES	TIPS FOR SUCCESS
Difficult to thread catheter off needle	Only tip of needle is in vein (catheter not in vein)	Observe flashback, then lower catheter until parallel with skin, advance catheter and needle together 1/8-inch prior to threading catheter
	Catheter is hitting valve	Remove Flashplug; attach syringe and float catheter into vein
During needle removal, catheter came out of vein	Catheter hub may not have been stabilized	Stabilize catheter hub prior to needle removal by using the "V" technique or applying transparent dressing over catheter hub
Needle feels dull	Catheter tip advanced over needle bevel, preventing full cutting surface of bevel	• DO NOT ROTATE CATHETER (There is no catheter seal to release) • Confirm Locking Bevel Indicator is properly seated in "slot" of catheter hub prior to venipuncture
	Catheter or needle bevel design may be different from your previous IV catheter	Hold skin taut, insert catheter at optimal insertion angle • Former BD user: increase insertion angle • Former J&J/Medex user: decrease insertion angle
"Blowing" veins during venipuncture	Insertion angle too high	Lower angle of insertion
	Catheter not in vein	Observe flashback; lower catheter until parallel with skin, advance catheter and needle together 1/8-inch
	Catheter Material: FEP may feel "POP" PUR may not feel "POP"	• "Pop" sensation is the traumatic "ripping" of vein • Observe flashback to determine if in vein • Reduce speed of insertion
Blood exposure during needle removal	Vein may not have been occluded	• Release tourniquet upon flashback • Occlude vein distal to catheter tip using "V" technique
Catheter kinks during advancement	Catheter may need to be threaded over needle	Advance catheter while needle is held in place, use needle as a guidewire
	Catheter material	FEP material is typically stiffer than PUR
Flashback of blood is too slow	Patient may have low blood pressure	• Loosen or remove vented Flashplug • Prime Flashback Chamber with saline prior to venipuncture

For Clinical and Technical Support,
Call 800-854-6851

B|BRAUN
SHARING EXPERTISE

www.bbraunusa.com

Introcan Safety® 2 IV Catheter with Multi-Access Blood Control

INSERTION GUIDE:

1 | Preparation
- Select and prepare site according to institutional protocol.
- Completely remove the paper from the packaging.
- Remove protective cover by holding at each end, then pull straight apart.
- DO NOT ROTATE CATHETER PRIOR TO INSERTION
- Verify push-off plate and needle bevel are in the "up" position.
- Confirm catheter hub is seated tightly against flashback chamber.

2 | Perform insertion
- Hold skin taut, insert catheter at optimal insertion angle.
- Visualize first flashback in flashback chamber to confirm needle entry in the vessel.
- Upon first flashback visualization, LOWER and advance the needle and catheter together approx 3mm or 1/8in.

3 | Thread catheter
- Holding needle still, advance the catheter off needle and visualize second flash within the catheter to confirm catheter entry in the vessel.
- After confirmation, continue advancing catheter off the needle into the vessel.
- Release tourniquet.

4 | Stabilize catheter hub and remove needle
- With catheter hub stabilized, withdraw the needle straight out with a controlled and continuous motion (minimize rotation or bending of the needle).
- The metal passive safety shield will automatically attach to and cover needle tip as needle tip exits catheter hub.
- Properly discard needle into sharps container.

5 | Connect and secure catheter
- Immediately CONNECT and TIGHTEN the accessory device to the catheter hub.
- Stabilize and dress the site per institutional protocol.

PRIOR TO USE AND FOR COMPLETE PRODUCT INFORMATION, INCLUDING WARNINGS AND PRECAUTIONS, REFER TO "INSTRUCTIONS FOR USE" AT www.bbraunusa.com.

Scan for eIFU and more information

ALWAYS REMEMBER

Never reinsert needle into catheter; catheter shearing may occur and may cause embolism.

In the case of an unsuccessful IV start, remove the needle first to activate safety mechanism, then remove catheter from patient and discard both.

If clinical support is needed, please contact Medical Affairs at 800-854-6851 or visit www.introcansafety.bbraunusa.com for more information.

B|BRAUN SHARING EXPERTISE

PRACTICE SUGGESTIONS:

1 | Needle feels dull
a. Catheter tip advanced over needle bevel, preventing exposure of full cutting surface of bevel.
- Completely remove the paper from the package and then remove catheter.
- Grasp product by flashback chamber in a manner to be able to visualize blood flash.
- Confirm catheter hub is seated tightly against flashback chamber.

DO DON'T

b. Catheter or needle bevel design may be different from your previous IV catheter.
- Hold skin taut, insert catheter at optimal insertion angle.

2 | Blowing vessels
a. Not seeing initial flash.
- Upon insertion hold the clear flashback chamber so that you can easily visualize first flash in clear flashback chamber.

b. Insertion angle too high.
- Lower angle of insertion.

c. Catheter not in vessel.
- Visualize first flash; lower catheter and advance catheter and needle together approximately 3mm or 1/8 in. prior to threading catheter.

d. Insertion speed too fast; needle and catheter exited vessel.
- Reduce speed of insertion to allow flash visualization.

3 | Flashback of blood too slow
a. May be due to patient condition (eg, hypovolemia; hypotension).
- Ensure tourniquet is properly applied.
- Observe first flash in clear flashback chamber.
- Loosen vented flash plug.

4 | Difficult to thread catheter
a. Catheter not in vessel (only needle bevel has entered vessel).
- Visualize first flash; lower catheter and advance catheter and needle together approximately 3mm or 1/8 in.; thread catheter and visualize second flash in catheter.

b. Pulling back on needle before catheter is fully threaded.
- Hold needle still and thread catheter off the needle into the vessel. Do not simultaneously withdraw needle when threading catheter.

DO DON'T

5 | Flow restriction
a. Improper opening of blood control septum.
- Ensure all luer connections are fully engaged and completely tightened to catheter hub.

b. Catheter kinking at insertion site.
- Dress and secure the catheter to maintain proper hub angle.

c. Ensure site patency.

6 | Catheter dislodged during needle removal
a. Catheter hub not properly stabilized.
- Stabilize catheter hub while pulling the needle straight out.

DO DON'T

Dressing and securement tip

Dress and secure catheter to maintain proper angle to avoid kinking.

Introcan Safety®2 IV Catheter with Multi-Access Blood Control

B|BRAUN SHARING EXPERTISE

INSERTION GUIDE:

1 Preparation

- Select and prepare site according to institutional protocol.
- Completely remove the paper from the packaging.

- Remove protective cover by holding at each end, then pull straight apart.

- DO NOT ROTATE CATHETER PRIOR TO INSERTION.
- Verify push-off plate and needle bevel are in the "up" position.
- Confirm catheter hub is seated tightly against flashback chamber.

2 Perform insertion

- Hold skin taut, insert catheter at optimal insertion angle.
- Visualize first flashback in flashback chamber to confirm needle entry in the vessel.

- Upon first flashback visualization, LOWER and advance the needle and catheter together approx 3mm or 1/8in.

3 Thread catheter

- Holding needle still, advance the catheter off needle and visualize second flash within the catheter.

- After visualization, continue advancing catheter off the needle into the vessel.
- Release tourniquet.

4 Stabilize catheter hub and remove needle

- With catheter hub stabilized, withdraw the needle straight out with a controlled and continuous motion (minimize rotation or bending of the needle).

- The metal passive safety shield will automatically attach to and cover needle tip as needle tip exits catheter hub.

- Properly discard needle into sharps container.

5 Connect and secure catheter

- Immediately CONNECT and TIGHTEN the accessory device to the catheter hub.

- Stabilize and dress the site per institutional protocol.

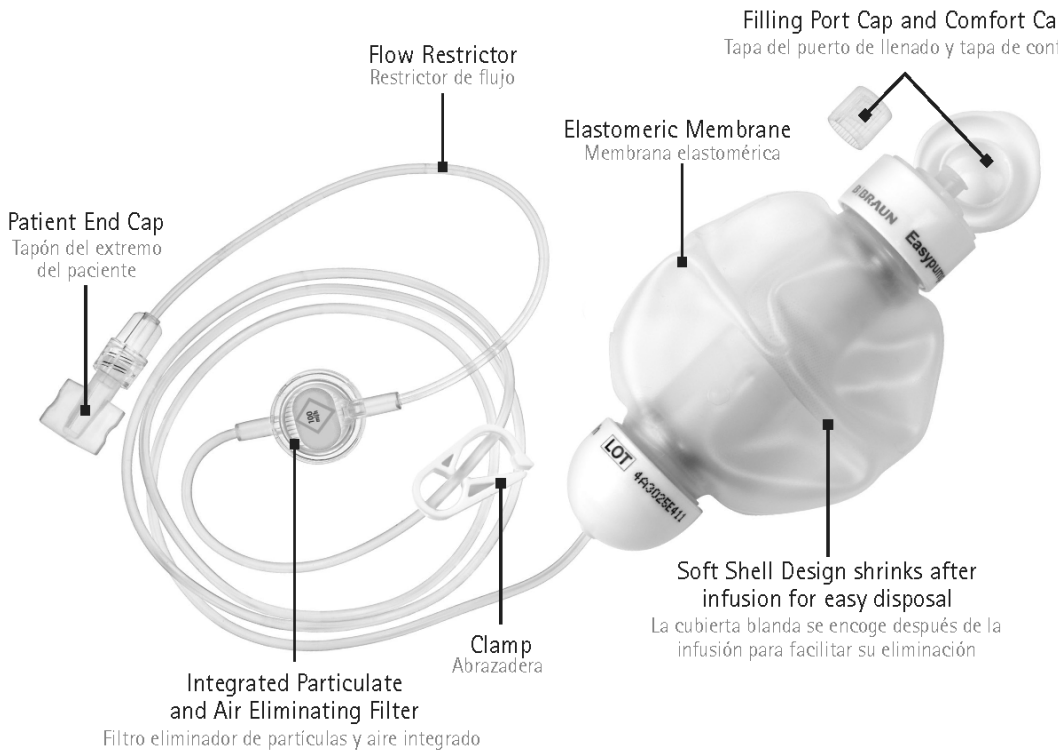
PRIOR TO USE AND FOR COMPLETE PRODUCT INFORMATION, INCLUDING WARNINGS AND PRECAUTIONS, REFER TO "INSTRUCTIONS FOR USE" AT WWW.BBRAUNUSA.COM.

Scan for eIFU and more information

B|BRAUN
SHARING EXPERTISE

Easypump® ST/LT
Patient Guide | Guía para Pacientes

Elastomeric Infusion Pump System


Filling Port Cap and Comfort Cap
Tapa del puerto de llenado y tapa de confort
Flow Restrictor
Restrictor de flujo
Elastomeric Membrane
Membrana elastomérica
Patient End Cap
Tapón del extremo del paciente
Soft Shell Design shrinks after infusion for easy disposal
La cubierta blanda se encoge después de la infusión para facilitar su eliminación
Clamp
Abrazadera
Integrated Particulate and Air Eliminating Filter
Filtro eliminador de partículas y aire integrado

The Easypump® ST/LT disposable infusion system is designed to provide safe and convenient delivery of intravenous medications. Easypump ST is designed for short-term infusions (30 minutes up to 4 hours). Easypump LT is designed for long-term infusions (1 day up to 11 days). This guide is provided to help you use the Easypump ST/LT infusion system safely and correctly. Please be sure to read and understand all the instructions below, prior to beginning your infusion.

Your medication is called _____

You will be receiving _____ dose(s) daily

at the following time(s): _____

Your healthcare provider is responsible for instructing you in the use of this infusion system. If you have any questions about your Vascular Access Device, your therapy or the Easypump ST/LT device, call your home healthcare provider at:

( ) _____ - _____

STORAGE:

Your Easypump ST/LT devices should be stored: _____ In the refrigerator
_____ In the freezer
_____ Other _____

CAUTION: The Easypump ST/LT device must be allowed to reach room temperature prior to use. If the solution is colder than room temperature, the infusion time will likely be longer than anticipated. Failure to allow solution to reach room temperature can lead to longer infusion time. It should be near room temperature when you use it. Simply remove each dose from the refrigerator 6-12 hours before you plan to infuse. (If frozen, remove from the freezer 12-18 hours before use.) It is a good idea to remove the next dose from the refrigerator or freezer during the time of the current infusion. If the time between infusions is less than 6 or 8 hours, then removing two doses from the refrigerator or freezer at one time is suggested.

WARNING: DO NOT HEAT the Easypump ST/LT device in a microwave oven, direct sunlight, hot water or any other heat source. Heating may cause problems with the device and flow rate.

PREPARING FOR THE INFUSION

- Wash your hands thoroughly, as instructed by your healthcare provider.
- Check the drug label on your Easypump ST/LT device. Be sure that your name, the medication name and the dosage are correct. Be sure that the expiration date has not passed.
- Be sure that the clamp on the tubing is in the closed position.

► In a clean work area described by your healthcare provider, gather the supplies you will need:

- Easypump ST/LT device
- Alcohol (or other antiseptic) prep pad(s)
- Flush syringes (Your healthcare provider will provide information about how to flush your Vascular Access Device before and after your infusion.)

1 CONNECTING YOUR Easypump ST/LT DEVICE

► Always swab the septum on the end of your vascular access device with an alcohol (or other antiseptic) prep pad.

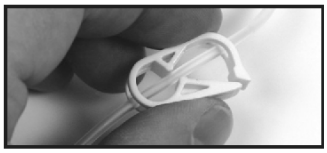
► Remove the Patient End Cap from the luer tip end (the end with the screw-like edges) of the Easypump ST/LT tubing. Avoid touching the open end.

► Insert the luer tip end of the tubing into the valve septum of your vascular access device. Turn the luer-lock clockwise to secure the connection.

► Do not over tighten.

► Tape flow restrictor to the skin for best results.

2 STARTING YOUR INFUSION



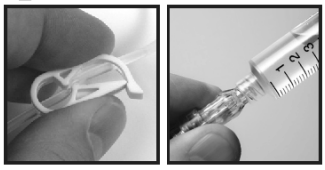
- Open the clamp to begin the flow of fluid.
- The Easypump ST/LT device does not need to be positioned above your vascular access device.
- Do not squeeze the pump. The fluid will flow by itself.

3 DURING YOUR INFUSION

- Place the Easypump ST/LT device in a carrying pouch, in your pocket or on a nearby surface while receiving your medication.
- If you are sleeping during the infusion, keep the pump above the covers and do not place the pump on the floor or hang the pump on the bedpost.

Do not use while bathing, showering, or swimming.

4 ENDING YOUR INFUSION



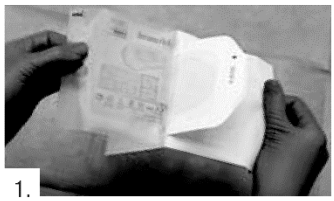
- All your medication has been delivered when the pump is empty.
- Close the clamp. Disconnect the luer tip from the valve septum of your vascular access device and disconnect the pump from your catheter.
- Flush your catheter as instructed by your healthcare provider.
- Dispose of pump and supplies as instructed by your healthcare provider.

5 TROUBLESHOOTING

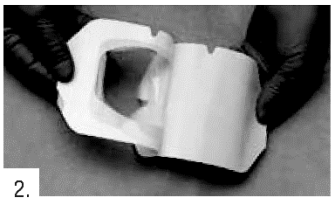
- If pump does not seem to be working, make sure:
  - The pump is at room temperature
  - The white clamp on the tubing is open (moves freely on the tubing)
  - All clamps on your catheter are open
  - There are no kinks in the pump tubing
  - Follow your healthcare provider's instructions to make sure that your catheter is working properly

3M™ Tegaderm™ I.V. Advanced Securement Dressing with Comfort Adhesive Technology

1688 APPLICATION TECHNIQUE



1. Prepare the site according to your facility's protocol. Allow all preps and skin protectants to dry completely. Open package and remove sterile dressing.



2. Peel liner from dressing, exposing adhesive surface. Flip dressing over so adhesive faces skin.

3. Positioning notched edge of dressing over catheter hub, place stabilization border over catheter "wings." Smooth down all dressing surfaces. Device should be stabilized according to facility protocol.

4. Slowly remove paper frame while continuing to smooth down outer edges of transparent dressing.

5. Smooth dressing from center toward edges using firm presure to enhance adhesion.

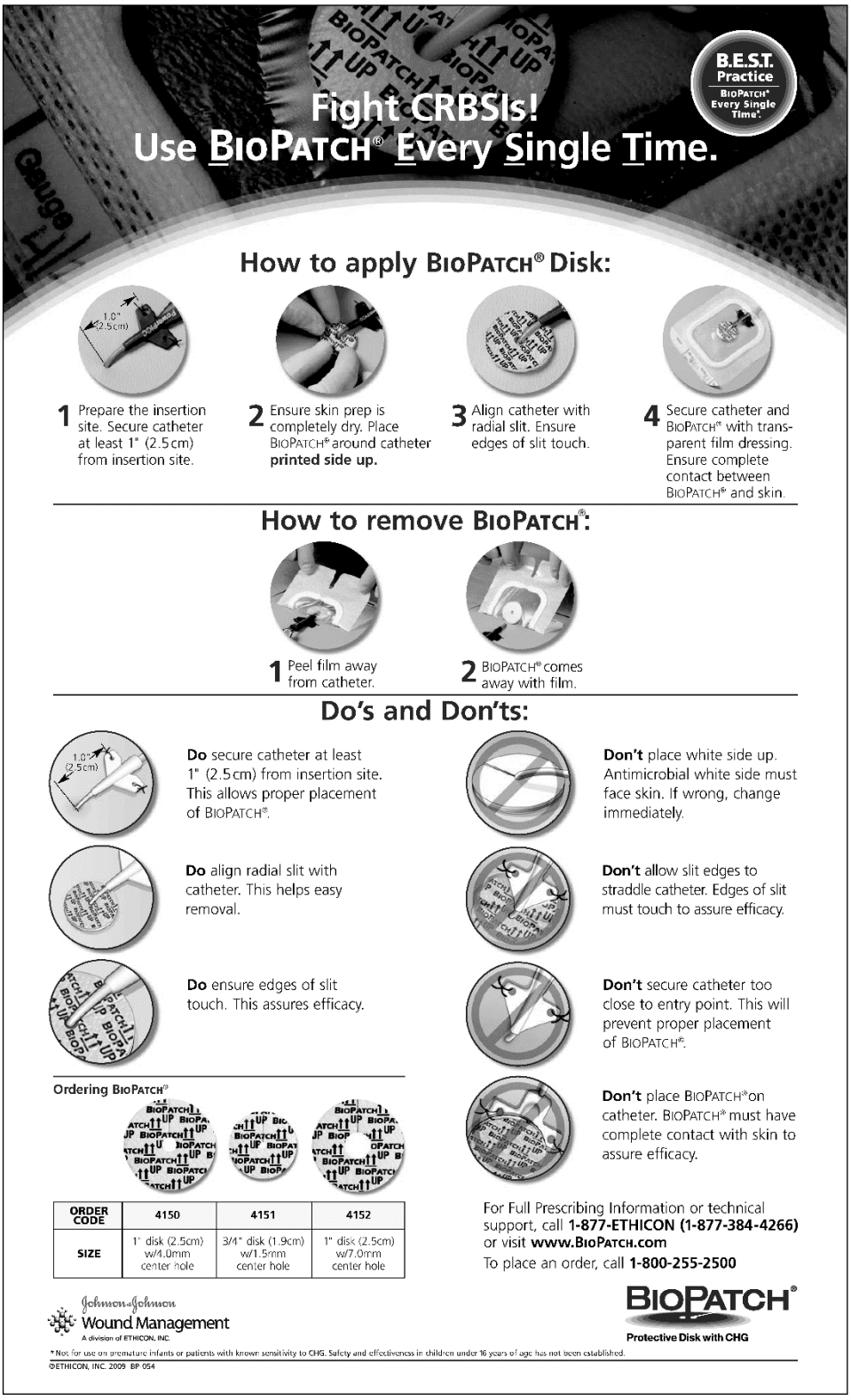
6. Remove the large precut notched sterile tape. Apply tape strip across the stabilization border of the dressing over the catheter hub. The notch opening should face away from the catheter insertion site, or be parallel with the dressing notch. Press all surfaces firmly but gently to enhance adhesion. Label dressing according to our facility's protocol. Secure catheter lumens or extensions.

1688 REMOVAL TECHNIQUE

1. Remove tape strip over dressing.

2. Gently grasp the edge of the dressing and slowly peel dressing back over itself toward insertion site or in direction of hair growth. Keep removal "low and slow." Support catheter hub and surrounding skin with other hand.

Note: 3M™ Tegaderm™ I.V. Advanced Securement Dressing is not indicated to replace sutures for short-term C.V.C. catheters (e.g. jugular, subclavian, femoral).


Fight CRBSIs!
Use BIOPATCH® Every Single Time.
B.E.S.T. Practice
BIOPATCH® Every Single Time.
How to apply BIOPATCH® Disk:
1 Prepare the insertion site. Secure catheter at least 1" (2.5 cm) from insertion site.
2 Ensure skin prep is completely dry. Place BIOPATCH® around catheter printed side up.
3 Align catheter with radial slit. Ensure edges of slit touch.
4 Secure catheter and BIOPATCH® with transparent film dressing. Ensure complete contact between BIOPATCH® and skin.
How to remove BIOPATCH®:
1 Peel film away from catheter.
2 BIOPATCH® comes away with film.
Do's and Don'ts:
Do secure catheter at least 1" (2.5 cm) from insertion site. This allows proper placement of BIOPATCH®.
Do align radial slit with catheter. This helps easy removal.
Do ensure edges of slit touch. This assures efficacy.
Don't place white side up. Antimicrobial white side must face skin. If wrong, change immediately.
Don't allow slit edges to straddle catheter. Edges of slit must touch to assure efficacy.
Don't secure catheter too close to entry point. This will prevent proper placement of BIOPATCH®.
Don't place BIOPATCH® on catheter. BIOPATCH® must have complete contact with skin to assure efficacy.
Ordering BIOPATCH®
ORDER CODE | 4150 | 4151 | 4152
SIZE | 1" disk (2.5cm) w/4.0mm center hole | 3/4" disk (1.9cm) w/1.5mm center hole | 1" disk (2.5cm) w/7.0mm center hole
For Full Prescribing Information or technical support, call 1-877-ETHICON (1-877-384-4266) or visit www.BIOPATCH.com
To place an order, call 1-800-255-2500
Johnson & Johnson Wound Management
A division of ETHICON, INC.
BIOPATCH®
Protective Disk with CHG
* Not for use on premature infants or patients with known sensitivity to CHG. Safety and effectiveness in children under 16 years of age has not been established.
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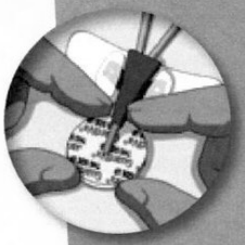
GUARDIVA®

Antimicrobial Hemostatic IV Dressing

Application and Removal Guide

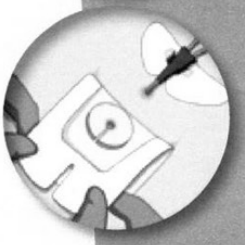
How to apply the GuardIVa® Dressing



PREPARATION
1. Prepare the skin surrounding the percutaneous device according to hospital protocol.
2. Remove the GuardIVa® dressing from the sterile package using aseptic technique.

PLACEMENT
3. Place the GuardIVa® dressing around the catheter with the printed side facing up.
4. Position the GuardIVa® dressing around the catheter/pin site, so the catheter rests on the slit portion of the GuardIVa® dressing. The slit edges should come in contact with one another to assure best efficacy.

SECUREMENT
5. Secure the catheter and GuardIVa® dressing to the skin with a transparent dressing. Assure complete contact between the skin and GuardIVa® dressing.



DRESSING CHANGE
6. Change the dressing as necessary, according to facility protocol; dressing can be left in place for up to seven days. More frequent changes may be needed with highly exuding wounds.

How to remove the GuardIVa® Dressing

REMOVAL
7. To remove GuardIVa®, hold the catheter and pick up the corner of the transparent dressing. In a slow and low motion pull the dressing away from the catheter. The GuardIVa® dressing will lift off with the transparent dressing.

The IV Site Care Solution.
Don't Let Your Guard Down.

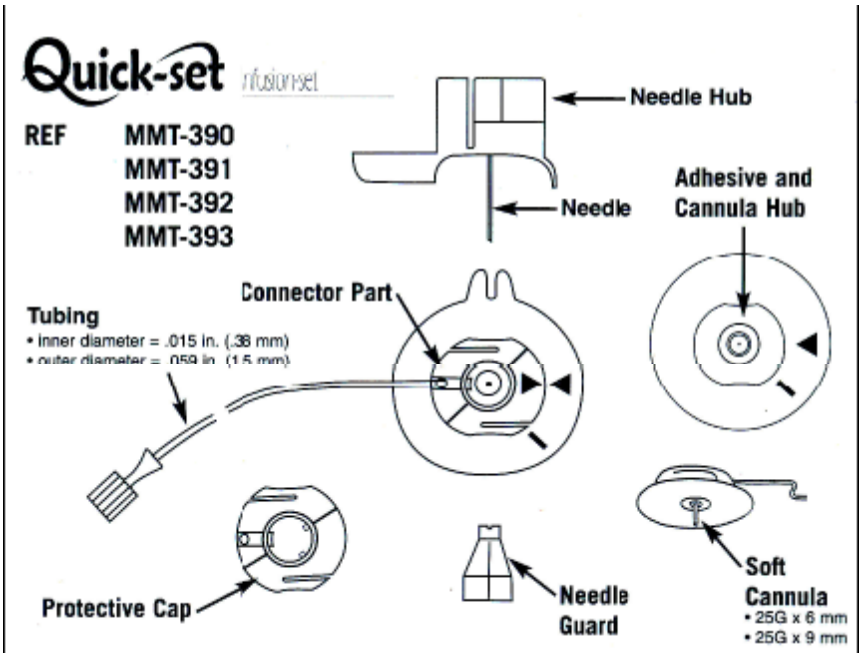
BARD
ACCESS SYSTEMS

Please consult Instructions for Use (IFU) for important safety information. This Application Guideline is not intended as a replacement for the detailed information contained in the IFU.

Warning: Do not use the *GuardIVa®* dressing on patients with a known sensitivity to chlorhexidine gluconate. The use of chlorhexidine gluconate containing products has been reported to cause irritation, sensitization, and generalized allergic reactions. If any such reactions occur, discontinue use of the dressing immediately, and if severe, contact a physician.

QUICK SET SUBCUTANEOUS INFUSION SET

The Quick Set is an over the needle polyurethane SC catheter that may be used for subcutaneous infusion. This set has a safety shield that can be folded over the needle after it is removed from the cannula.



1. Attach Quick-set to the IV administration set and prime.
2. Select appropriate subcutaneous infusion site and prep per your facility protocol.
3. Remove paper backing from adhesive disk.
4. Twist to remove needle guard.
5. Pinch skin and insert the Quick-set at a 90 degree angle. Smooth down adhesive.
6. Gently pull blue needle hub out of the subcutaneous cannula.
7. Fold needle hub cover until it snaps into place enclosing the metal needle. Keep your fingers away from the needle during this procedure.
8. Dispose into sharps container.
9. Cover subcutaneous set with a transparent dressing and tape tubing to prevent tension on the cannula.

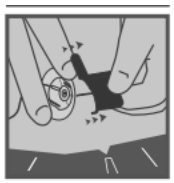
Inserting your infusion set **without an inserter:**

11-A Remove paper backing from infusion set. Remove one side half-way first. Remove other side entirely and then remove rest of the first half.

11-B Twist blue needle guard to remove from infusion set needle.

11-C Insert the Quick-set infusion set using a 90 degree angle. Smooth down adhesive. Remove introducer needle by following Steps 10-I and 10-J.

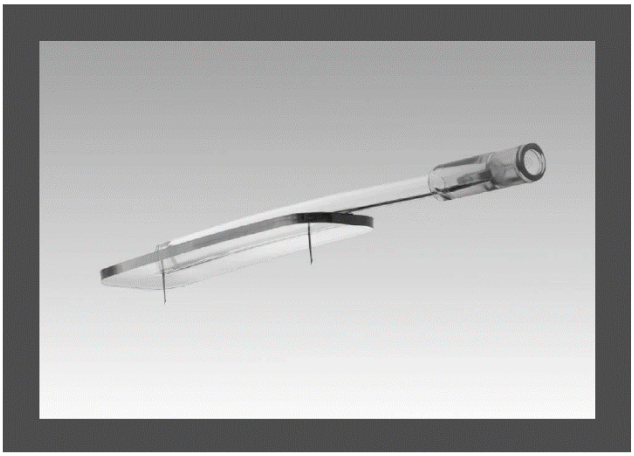
10-I PHold sides of infusion set down, then gently pull introducer needle out. Check needle for any blood (and change set if required)



10-J Fold needle hub over until it snaps into place, dispose into sharps container.

the AQUA-C hydration system *for* HypoDermoClysis ...in the 21st Century

"The simple and effective alternative to IV hydration therapy."



Safe, Simple, Easy to Administer

With the Aqua-C Hydration System, hypodermoclysis is now simple, easy to administer, and relatively painless for the patient.

Hypodermoclysis, the infusion of fluid into the subcutaneous space, is an easy and convenient way of providing hydration for long-term care patients where venous access can be difficult or is unacceptable.

The Aqua-C is easier and less distressing to administer than IV hydration, more suitable for home use, and often eliminates the need for hospitalization to find a vein. The Aqua-C's smaller 27 gauge x 6mm long needles enhance patient comfort while multiple needles promote even fluid dispersion.

Hypodermoclysis does not cause thrombophlebitis and it is less likely than IV administration to cause pulmonary edema or fluid overload.

The Aqua-C is the perfect solution where IV access is not an option. Call Norfolk Medical for your free sample.

PATENT PENDING

tel: 847-674-7075 • fax: 847-674-7066
info@norfolkmedical.com • www.norfolkmedical.com

Norfolk Medical

the AQUA-C hydration system *from* Norfolk Medical

PRODUCT INFORMATON

For your convenience, all of the supplies you need for the safe and simple delivery of fluids to the dehydrated, long-term care patient, are supplied in a sterile pouch.

Aqua-C Hydration System Product Specification Information

HDC-2500 ***High Flow Aqua-C Hydration System*** 125cc/hr., Gravity flow, 36"Height
- 2 x (25 gauge x 6mm) needles offset 1 1/2" on a flexible base with adhesive backing, with a female luer, and 1" tubing
- 82" 20 drop IV administration set with universal spike and flow regulator
- prep swabstick, alcohol swabs, latex free gloves and transparent dressing

HDC-2700 ***Low Flow Aqua-C Hydration System*** 80 cc/hr., Gravity flow, 36"Height
- 2 x (27 gauge x 6mm) needles offset 1 1/2" on a flexible base with adhesive backing, with a female luer, and 1" tubing
- 82" 20 drop IV administration set with universal spike and flow regulator
- prep swabstick, alcohol swabs, latex free gloves and transparent dressing

Aqua-C Hydration Needle Set Product Specification Information

HDC-2521 ***High Flow Aqua-C Hydration Needle Set*** 125cc/hr., Gravity flow, 36"Height
- 2 x (25 gauge x 6mm) needles offset 1 1/2" on a flexible base with adhesive backing, with a female luer, and 1" tubing

HDC-2721 ***Low Flow Aqua-C Hydration Needle Set*** 80 cc/hr., Gravity flow, 36"Height
- 2 x (27 gauge x 6mm) needles offset 1 1/2" on a flexible base with adhesive backing, with a female luer, and 1" tubing

"HypoDermoClysis.....in the 21st Century"

7350 N. Ridgeway, Skokie, IL 60076 • tel: 847-674-7075 • fax: 847-674-7066
info@norfolkmedical.com • www.norfolkmedical.com

PATENT PENDING
32504

B|BRAUN
SHARING EXPERTISE

Surecan™ Safety II Port Access Needle Handling Guide and Practice Suggestions

Pressure resistant*, non-coring*, safety-engineered needle for access ports

1 Use universal precautions and aseptic technique per institutional protocol. Begin by removing product from the package and straighten the loop in the tubing.

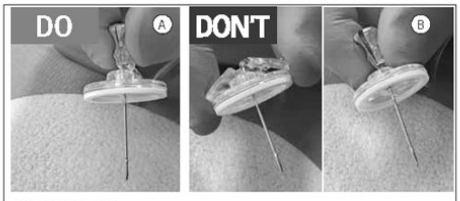
Before insertion, prime the device per institutional protocol.

Prep the insertion site per institutional protocol.

2 The base plate is secured by a small retention clip under the wings.

Grasp the wings and fold vertically to prevent unclipping of the base plate prior to insertion.

When grasping the wings, be sure to keep fingers off of the baseplate.



CAUTION: (A) Be careful not to detach the base plate from the retention clip during this step. (B) Do not pinch the wings down or hold the wings too close to the base plate.

3 Remove the needle guard with the other hand.

Important: If unintended dislodgement of the baseplate occurs, align and reattach the baseplate to the retention clip.

IMPORTANT:
Discard product if the needle tip becomes covered by the base plate.

Scan QR Code to launch instructional video

4 Locate and hold the access port firmly between two fingers.

While holding the wings in their vertical position, insert the needle perpendicular to the skin until the back of the port chamber is felt.

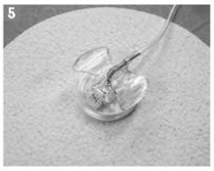
Do not use excessive force when inserting the needle into the septum.

5 The foam padded base plate should be flush to the skin.

Next, unfold the wings to a horizontal position.

The wings are secured to the base plate to reduce movement of the needle inside the port.

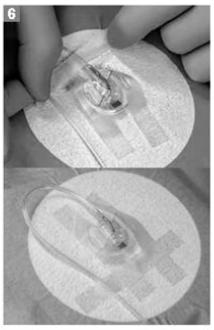
Always check for blood return to determine patency of the port and correct positioning of the needle, per institutional protocol.



6 Dress the device per institutional protocol.

B. Braun suggests placing two sterile adhesive strips over the wings and one over the extension set.

When applying a clear dressing, place the dressing over the entire Port Access needle and adhere to prevent tenting.



7 To remove the port access needle, stabilize the port by securely **holding the baseplate against the skin** with two fingers.

Now, with the other hand, fold the wings to a vertical position, grasp them firmly, and pull straight up until the green dot appears on the baseplate. You may also feel a click.

8 The needle is now locked in the safety position within the baseplate.

Keep the tip of the needle away from the body and fingers at all times and immediately dispose into an approved sharps container.

Discard the needle per institutional protocol.

Refer to product labeling for complete instructions for use.

* Data on file

B. Braun Medical Inc. | Bethlehem PA | USA
1-800-227-2862 | BBraunUSA.com

StatLock™ PICC Plus

StatLock™ devices are manufactured in different configurations for a wide variety of uses -IVs, Foley catheters, NG tubes, etc. StatLock™ devices are provided by some IV catheter manufacturers in the insertion prep tray for midlines and PICCs. While Steri-strips can also be used to secure midlines and PICCs, a StatLock™ may be preferable for securing non-sutured catheters on some patients.

- **StatLock™ securement devices MUST be changed when the CVAD dressing is changed per manufacturer's recommendations.**
- **Alcohol MUST be used to assist in removing StatLock™ products from the skin to reduce the risk of shearing or tearing the skin.**
- **The pharmacy carries one StatLock™ device that is compatible with most midlines and PICC catheters.**

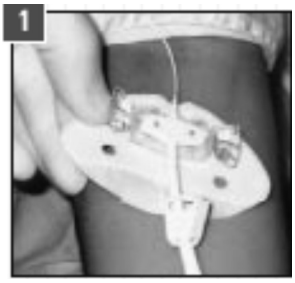
Other StatLock™ products can be obtained as a special order for a specific patient/device through PharMerica, your medical supply distributor, or directly through the manufacturer.

Venetec
12555 High Bluff Drive
Suite 170
San Diego, CA 92130
(858) 350-4444
800-833-3895
Fax 858-350-7899
Email: cservice@venetec.com
www.statlock.com

Application Technique

PREP:

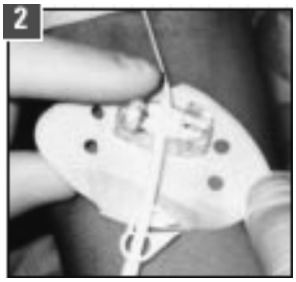
1. Prepare the targeted securement site with alcohol to degrease the skin and to remove betadine, if present.
2. Apply SKIN PREP solution for enhanced adherence and skin protection.
   ALLOW TO DRY "PAPER DRY" (at least 10-15 seconds).



<u>NOTE</u>: ALWAYS SECURE CATHETER TO STATLOCK™ BEFORE PLACING PAD ON SKIN.

PRESS:

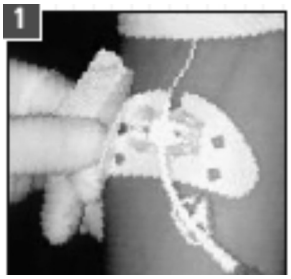
1. Fixed Post - Place suture holes in the catheter wing over posts, or
   Sliding Post - First, place suture hole of one side of catheter wing over post, then slide post and wing toward opposite side until second suture hole fits over second post.



2. Close doors of plastic cradle to secure catheter.

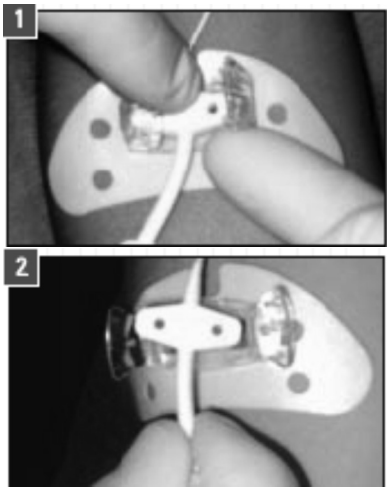
PEEL AND PLACE:

1. Peel away StatLock™ paper backing and place on skin.



Removal Technique

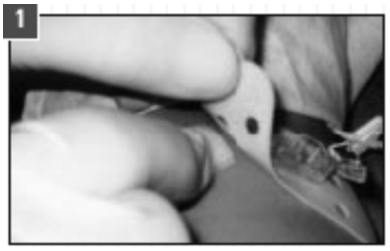
DISENGAGE:



1. Gently lift plastic doors one side at a time.

2. Carefully remove catheter from retainer.

DISSOLVE:



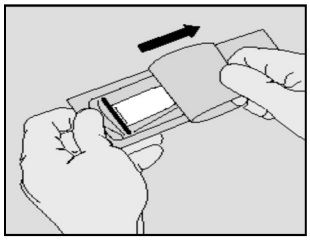
1. **Apply a generous amount of alcohol** to loosen edge of pad.

Gently stroke undersurface of pad with alcohol to DISSOLVE the adhesive as pad slowly lifts away from the skin.

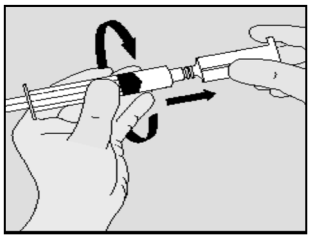
Do not pull or force pad for removal.

BD VACUTAINER® BLOOD TRANSFER DEVICE

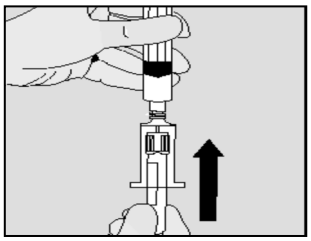
- Perform pre-flush as needed.
- Draw adequate discard volume.
- Draw blood for lab sample using a syringe.
- Flush IV catheter immediately after lab draw to ensure continued patency.
- Transfer blood to lab tube as follows:



Open package of Blood Transfer Device.



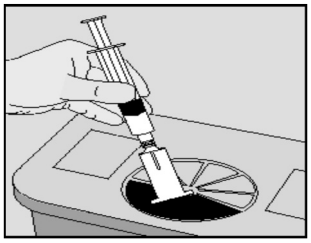
Screw syringe containing lab sample onto the Blood Transfer Device.



Push lab tube firmly into the Blood Transfer Device until the needle in the device punctures the stopper on the top of the lab tube.

Hold the syringe/Blood Transfer Device assembly as shown to allow blood to be drawn into the tube.

Place patient ID label on tube and send to lab.



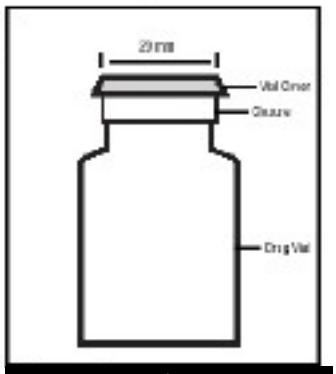
Dispose of syringe and Blood Transfer Device in sharps container per facility policy.

BAXTER MINI-BAG PLUS CONTAINER DIRECTIONS

ONLY FOR SINGLE DOSE POWDERED DRUG VIALS WITH 20 MM CLOSURES.
USE ASEPTIC TECHNIQUE.

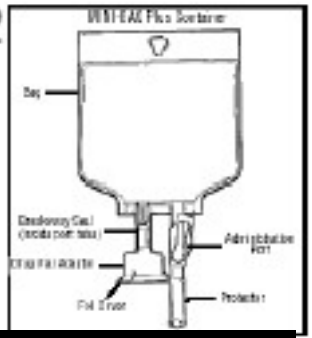
Assembly

1



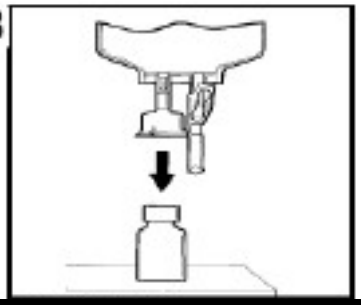
Remove vial cover
Disinfect stopper

2



Peel off foil cover
Inspect adapter for moisture.

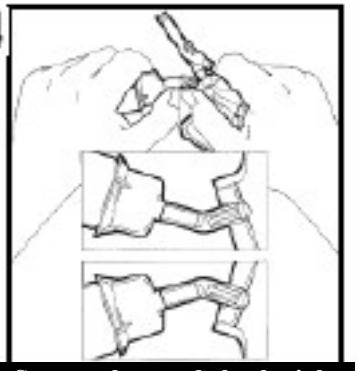
3



Place vial upright. Hold firmly. Push the adapter down until vial snaps in place. Do not twist. Pull vial to ensure it is fully seated.

Reconstitution

4



Squeeze bag and check vial. Use only if sealed and dry. Bend up then down to break seal.

5

Hold bag with vial down. Squeeze solution into vial until half full. Shake to suspend the medication into solution.

6

Hold bag with vial upside down. Squeeze bag to force air into vial. Release to drain suspended drug from vial. Repeat until vial is empty of drug and drug is dissolved .

addEASE® Binary Connector

Assembly, Activation and Administration Instructions

B. Efficient.

B BRAUN
SHARING EXPERTISE

addEASE® Connector Assembly Instructions

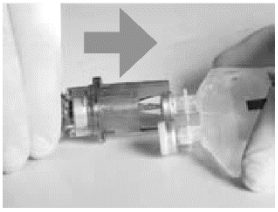
VIAL

- **Remove cap** from medication vial and **swab** vial access site.
- **Twist/snap open addEASE cap** to expose vial spike.
- **Center spike** on top of vial and **PUSH STRAIGHT DOWN** until addEASE latches firmly onto vial.

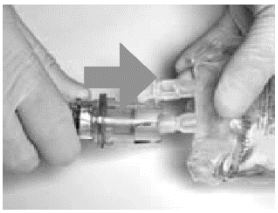
TIP: Coring can occur if addEASE spike tip is turned or twisted during insertion.
Spiking off-center can cause spike to bend or cause leakage with certain drug vial stoppers.

NO REFRIGERATED DRUGS: Do not use addEASE with drugs requiring refrigeration.

- **Remove top cap** from addEASE to expose bag spike.



Spiking the PAB bag



Spiking the EXCEL bag (250mL bag shown)

BAG (B. Braun PAB® and 250 mL EXCEL® containers shown)

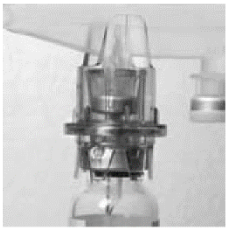
- Lay container on flat surface. **Hold edges of bag** with thumb and index finger as shown. **DO NOT SQUEEZE BAG.**
- **Remove PAB blue cap** and **swab** medication port.
- **Center spike** and orient so that protective flanges slide over container.
- **Push spike straight into medication port** until addEASE latches firmly into place.
- Check to ensure tight connection to medication port.
- Label and send to patient care areas.

TIPS: To ease insertion of addEASE into 250mL Excel IV Fluid bags:

- Avoid rocking motion and levering spike into the port.
- Relax and reapply in-line insertion pressure (increases ease of accessing the port).

STERILE and nonpyrogenic under protective coverings. Dispose of according to facility protocol. For single use only. USE ASEPTICALLY.
Refer to drug package insert for manufacturer's statement regarding use with binary connectors.
NOTE: These instructions are intended to supplement device product labeling.

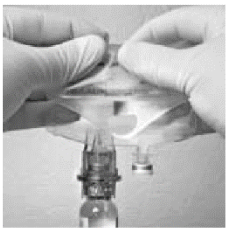
addEASE® Connector Activation and Administration Instructions



INSPECT

- **Connection:** Check to assure tight connection. If not firmly latched, discard assembly.
- **Contents** of drug vial. Discard if liquid has leaked into vial from bag.
- **Confirm** correct patient, drug and dose delivery information on label.

TIP: Some dry powders can clump. Firmly tap the drug vial on a solid surface to dislodge clumped powder prior to attempting activation.



ACTIVATE

- **Fold PAB** at fluid line and **squeeze** to deploy plug into vial.
- **Locate plug:** Make certain white plug is visible in drug vial during transfer.
- **Transfer diluent:** Squeeze bag repeatedly until vial is at least one-half full.

CAUTION: Do not overfill vial (beyond half) as it's more difficult to pump drug into bag when full.

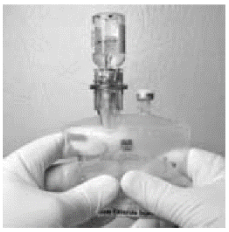
TIPS: Position vial below bag to ease activation.
When folding, try to trap all air at hanger end of bag.

For 13mm vials and liquid drugs, position vial above bag.

MIX

- **Unfold bag** and thoroughly **mix drug** per manufacturer's instructions.

TIP: With liquid drugs, monitor diluent to avoid overfill. Reserving airspace simplifies process of drawing solution back into vial.



TRANSFER

- **Transfer to container:** With vial above container, squeeze and release bag (unfolded or refolded) to pump air into vial to displace drug into bag. If necessary, repeat flushing of solution in vial (see STEPS 2 and 3). Inspect solution for cloudiness, haze or particulate matter.

TIPS: Vial must be above bag for drug to transfer into bag. TAP VIAL against palm prior to transferring drug to bag. Plug should stick to inner surface of vial to reduce possibility of drug displacement. It is normal to have a minimal amount of residual volume.

HANG

- **Hang bag:** Attach administration set to set port. Refer to IV set Directions for Use. Hold by vial to hang container.
- addEASE connector and medication vial are to remain connected to container during administration.

TIP: To prevent fluid from re-entering vial, avoid squeezing fluid container.

addEASE® Binary Connector

Easy and convenient for staff

- Easy to use drug admixture and delivery
- Needle-free design helps ensure safety
- May be pre-assembled for activation just prior to dosing

Helps improve pharmacy efficiency

- Cost-effective – Instrumental in reducing drug waste
- No double stocking of vials
- Long shelf life* – 10 weeks once connected to PAB® IV container; 8 weeks once connected to 250 mL EXCEL® IV container
- Connects to most unit-dose 13 mm or 20 mm drug vials

shown actual size

Sharing Expertise.®

It's more than a philosophy.
It's a promise.

Sharing expertise includes listening to the wisdom of colleagues, customers and clinicians. It's more than a philosophy. It's our promise to the healthcare community and ourselves to continuously seek knowledge. To expand it. To apply it. To share it. All to help improve and save lives.

This is Sharing Expertise.
This is B. Braun.

For more information on our drug delivery portfolio including addEASE, DUPLEX® Drug Delivery System or premixed drugs Call 1-800-227-2862 to speak to a B. Braun Representative.

B. Efficient.

Ordering Information

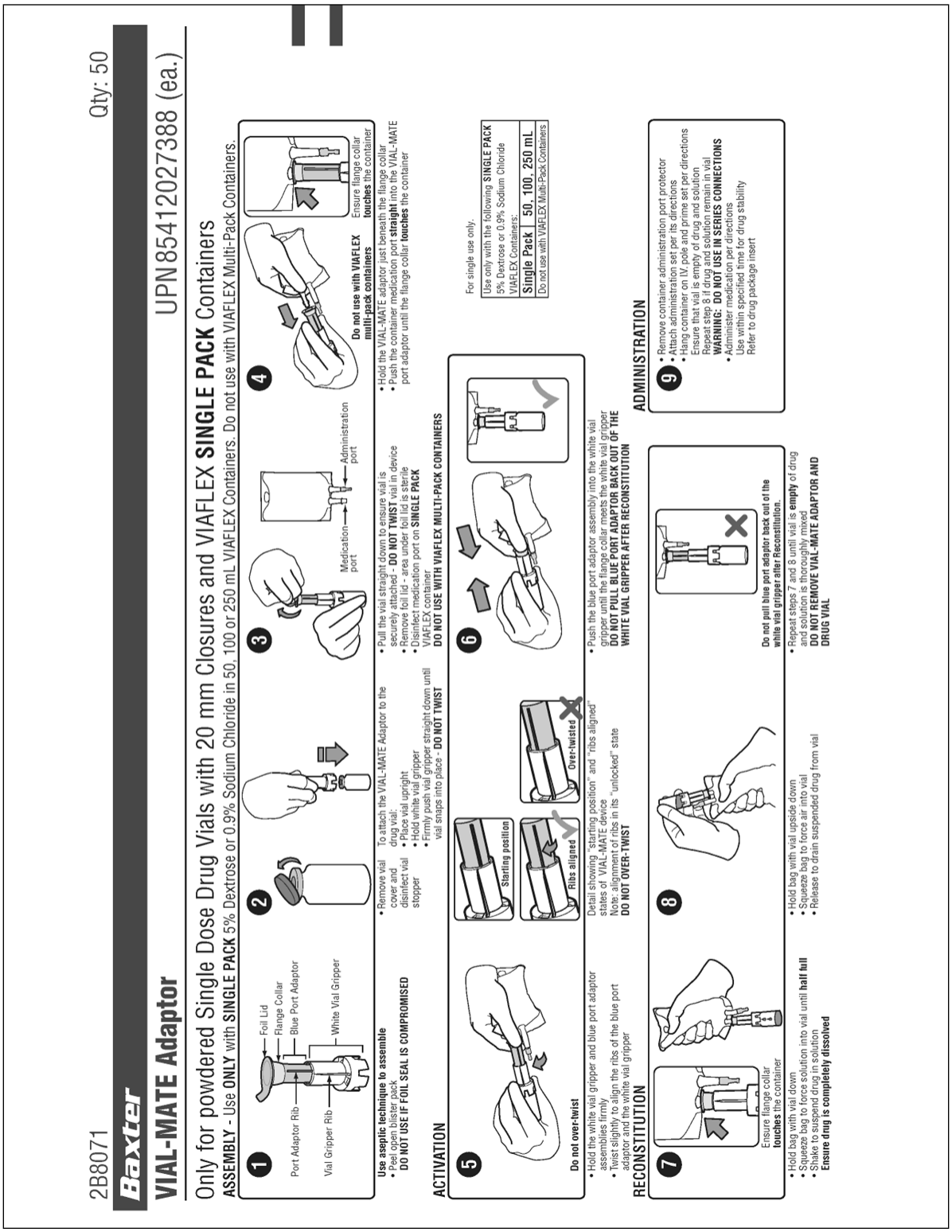
Catalog Number	Description	Units/Case
N7990	addEASE Binary Connector 20mm	200
N7993	addEASE Binary Connector 13mm	200

* When aseptically assembled in ISO class 5 environment.
Store at room temperature. Do not refrigerate.

B|BRAUN
SHARING EXPERTISE

www.bbraunusa.com

IVX31–8/07–5M–BB

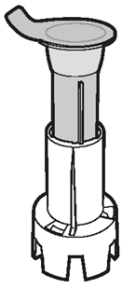

2B8071
Qty: 50
Baxter
VIAL-MATE Adaptor
UPN 8541202738 8 (ea.)
Only for powdered Single Dose Drug Vials with 20 mm Closures and VIAFLEX SINGLE PACK Containers
ASSEMBLY - Use ONLY with SINGLE PACK 5% Dextrose or 0.9% Sodium Chloride in 50, 100 or 250 mL VIAFLEX Containers. Do not use with VIAFLEX Multi-Pack Containers.
1
Foil Lid
Flange Collar
Blue Port Adaptor
Port Adaptor Rib
Vial Gripper Rib
White Vial Gripper
Use aseptic technique to assemble
• Peel open blister pack
DO NOT USE IF FOIL SEAL IS COMPROMISED
2
• Remove vial cover and disinfect vial stopper
To attach the VIAL-MATE Adaptor to the drug vial:
• Place vial upright
• Hold white vial gripper
• Firmly push vial gripper straight down until vial snaps into place - DO NOT TWIST
3
Medication port
Administration port
• Pull the vial straight down to ensure vial is securely attached - DO NOT TWIST vial in device
• Remove foil lid - area under foil lid is sterile
• Disinfect medication port on SINGLE PACK VIAFLEX container
DO NOT USE WITH VIAFLEX MULTI-PACK CONTAINERS
4
Do not use with VIAFLEX multi-pack containers
Ensure flange collar touches the container
• Hold the VIAL-MATE adaptor just beneath the flange collar
• Push the container medication port straight into the VIAL-MATE port adaptor until the flange collar touches the container
For single use only.
Use only with the following SINGLE PACK 5% Dextrose or 0.9% Sodium Chloride VIAFLEX Containers:
Single Pack | 50, 100, 250 mL
Do not use with VIAFLEX Multi-Pack Containers
ACTIVATION
5
Do not over-twist
• Hold the white vial gripper and blue port adaptor assemblies firmly
• Twist slightly to align the ribs of the blue port adaptor and the white vial gripper
6
Starting position
Ribs aligned
Over-twisted
Detail showing "starting position" and "ribs aligned" states of VIAL-MATE device
Note: alignment of ribs in its "unlocked" state
DO NOT OVER-TWIST
• Push the blue port adaptor assembly into the white vial gripper until the flange collar meets the white vial gripper
DO NOT PULL BLUE PORT ADAPTOR BACK OUT OF THE WHITE VIAL GRIPPER AFTER RECONSTITUTION
RECONSTITUTION
7
Ensure flange collar touches the container
• Hold bag with vial down
• Squeeze bag to force solution into vial until half full
• Shake to suspend drug in solution
Ensure drug is completely dissolved
8
• Hold bag with vial upside down
• Squeeze bag to force air into vial
• Release to drain suspended drug from vial
Do not pull blue port adaptor back out of the white vial gripper after Reconstitution.
• Repeat steps 7 and 8 until vial is empty of drug and solution is thoroughly mixed
DO NOT REMOVE VIAL-MATE ADAPTOR AND DRUG VIAL
ADMINISTRATION
9
• Remove container administration port protector
• Attach administration set per its directions
• Hang container on IV pole and prime set per directions
Ensure that vial is empty of drug and solution
Repeat step 8 if drug and solution remain in vial
WARNING: DO NOT USE IN SERIES CONNECTIONS
• Administer medication per directions
Use within specified time for drug stability
Refer to drug package insert

2B8071 Qty: 50

Baxter

VIAL-MATE Adaptor

Only for powdered Single Dose Drug Vials with 20 mm Closures and VIAFLEX **SINGLE PACK** Containers



See either side panel for directions for use.
For single use only.

Use only with the following **SINGLE PACK** 5% Dextrose or 0.9% Sodium Chloride VIAFLEX Containers:	
Single Pack	**50, 100, 250 mL**
Not for use with VIAFLEX Multi-Pack Containers.	

Indications for Use:
To provide the pharmacist or health practitioner a means of connecting a standard 20 mm single dose drug vial to an I.V. solution container without mixing the vial contents with the diluent until immediately before administration of the reconstituted drug to the patient.

Rx Only

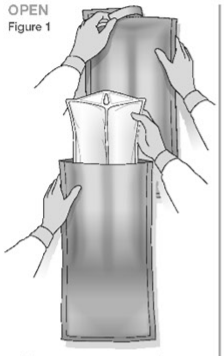
How to Use

CLINIMIX sulfite-free (Amino Acid in Dextrose) Injections

CLINIMIX E sulfite-free (Amino Acid with Electrolytes in Dextrose with Calcium) Injections

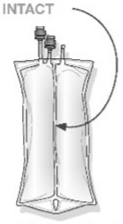
#1 Bag Activation

OPEN
Figure 1



- Tear overwrap across top slit (Figure 1) and remove the container from the overwrap.

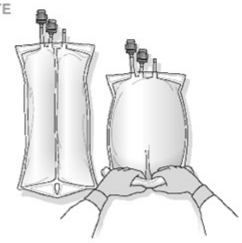
VERIFY INTACT
Figure 2



- Verify that the two chambers are intact; discard if the seal has been activated inadvertently or if there are any leaks (Figure 2).

NOTE: Some opacity of the plastic may be observed; this is due to moisture absorption during the sterilization process. This is normal and does not affect the solution quality or safety.

ACTIVATE
Figure 3



- Place the bag flat on a table with the label facing you. The top (hanger end) should be nearest you with the ports pointing away from you. Grasp the bag firmly on each side of the hanger end. Using some pressure, firmly roll the bag to open the seal between the chambers (Figure 3). If only half of the seal separates, flip the bag over and roll it again. The entire seal from top to bottom must be separated. Do not pull or rip the seal apart; roll to open.

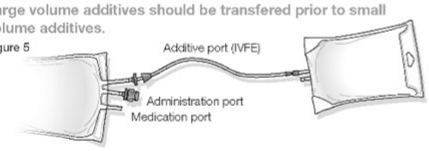
MIX
Figure 4

- Mix solutions thoroughly; discard if there are any leaks (Figure 4).

#2 Additives (After Bag Activation)

Large volume additives should be transfered prior to small volume additives.

Figure 5



IV Fat Emulsion (IVFE): Using aseptic technique, attach transfer set to the IVFE container. Remove twist-off protector on the additive port (Figure 5). Twist and push the transfer set spike through the diaphragm of the port, but do not insert beyond the diaphragm. Once transfer is complete, use appropriate clamp to seal off port tube and remove transfer set. Mix thoroughly; check for leaks.

To add medications: Prepare medication port; puncture using a 19-22 gauge needle and syringe. Inject additives; mix thoroughly and check for leaks.

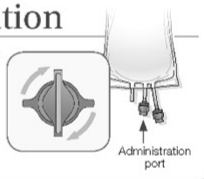
Other Additives as required may include vitamins, additional electrolytes, trace elements.

WARNING: Additives may be incompatible.

#3 Administration

- Hang bag.
- Remove twist-off protector from Administration Port (Figure 6).
- Attach administration set.

Figure 6



#4 Stability

- While in foil overwrap, the product is good until the last day of the month stated on the top of the overwrap.
- Once removed from overwrap, the product can be stored for 9 days, under refrigeration, in its activated or inactivated form — WITHOUT additives.
- Admixtures containing additives should be used promptly. Any storage should be under refrigeration and limited to less than 24 hours.

Visit clinimix.com for a video demonstration!

Please see enclosed full Prescribing Information.
For more information, please contact Medical Information at 1-800-422-2751.

MIX Paper from responsible sources FSC® C008084

Medication Delivery

Baxter Healthcare Corporation, Route 120 and Wilson Road, Round Lake, IL 60073 www.baxter.com 801526 5K 7/12

Baxter

Indications and Usage

CLINIMIX sulfite-free (Amino Acid in Dextrose) Injections and CLINIMIX E sulfite-free (Amino Acid with Electrolytes in Dextrose with Calcium) Injections are indicated as a caloric component in a parenteral nutrition regimen and as the protein (nitrogen) source for offsetting nitrogen loss or for the treatment of negative nitrogen balance in patients where (1) the alimentary tract cannot or should not be used, (2) gastrointestinal absorption of protein is impaired, or (3) metabolic requirements for protein are substantially increased, as with extensive burns.

Important Risk Information

- **It is essential that a carefully prepared protocol based on current medical practices be followed, preferably by an experienced team. Frequent clinical evaluation and laboratory determinations are necessary for proper monitoring during administration.**
- CLINIMIX and CLINIMIX E Injections are contraindicated in patients having intracranial or intraspinal hemorrhage, in patients who are severely dehydrated, in patients hypersensitive to one or more amino acids and in patients with severe liver disease or hepatic coma. Solutions containing corn-derived dextrose may be contraindicated in patients with known allergy to corn or corn products.
- Because of the potential for life-threatening events, caution should be taken to ensure that precipitates have not formed in any parenteral nutrient admixture.
- Use with caution when administering to patients with anuria or renal insufficiency, pulmonary insufficiency, or heart disease. The intravenous administration of these solutions can cause fluid and/or solute overloading resulting in dilution of serum electrolyte concentrations, overhydration, congested states, or pulmonary edema.
- Metabolic complications have been reported, such as acid-base, electrolyte, and blood glucose imbalances, elevated liver enzymes, and osmotic diuresis and dehydration.
- Other adverse reactions that may occur include febrile response, infection at the site of injection, extravasation, and hypervolemia. The infusion of hypertonic nutrient injections into a peripheral vein may result in vein irritation, vein damage, and thrombosis.
- This product contains aluminum that may be toxic with prolonged parenteral administration if kidney function is impaired.
- CLINIMIX and CLINIMIX E Injections **must be** admixed prior to infusion.

Please refer to the accompanying full Prescribing Information.

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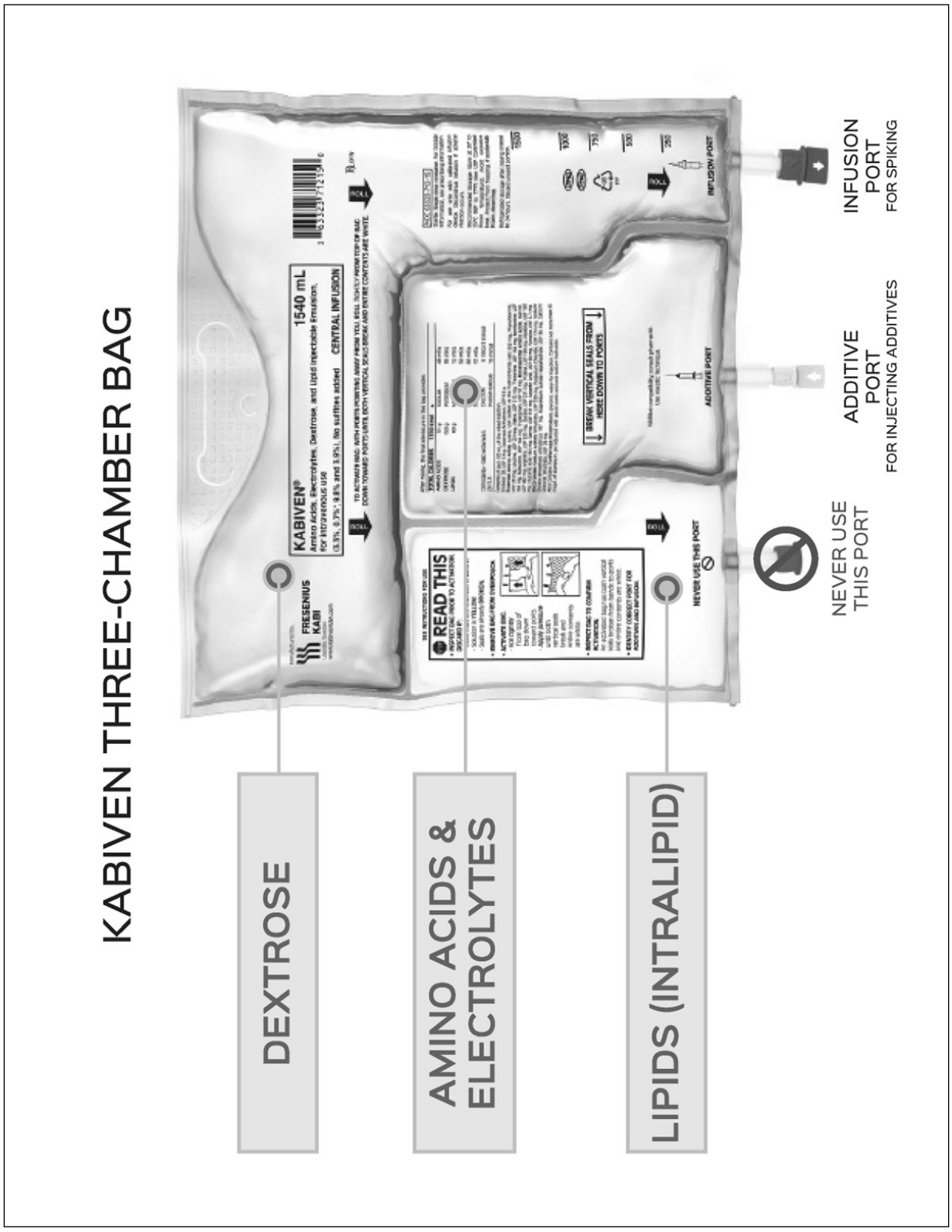
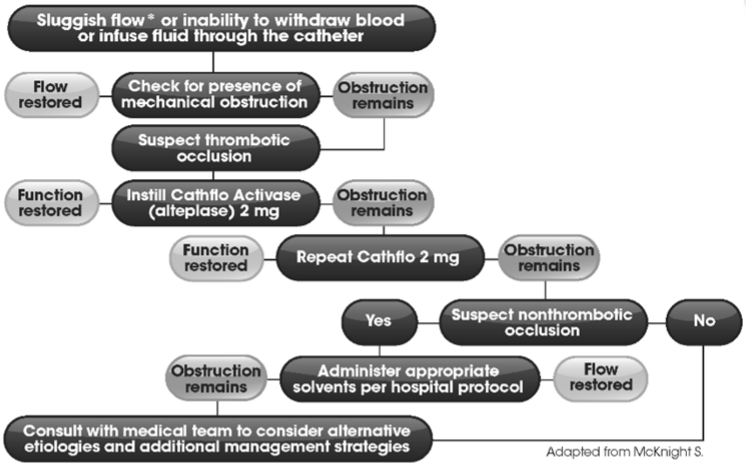

KABIVEN THREE-CHAMBER BAG
DEXTROSE
AMINO ACIDS & ELECTROLYTES
LIPIDS (INTRALIPID)
INFUSION PORT FOR SPIKING
ADDITIVE PORT FOR INJECTING ADDITIVES
NEVER USE THIS PORT
KABIVEN®
1540 mL
CENTRAL INFUSION
FRESENIUS KABI
READ THIS
BREAK VERTICAL SEALS FROM HERE DOWN TO PORTS
ADDITIVE PORT
INFUSION PORT
NEVER USE THIS PORT

Recommended algorithm for assessing and treating occluded catheters[1]



Adapted from McKnight S.

*Sluggish flow is defined as lack of brisk, free-flowing blood return (<3 mL in 3 seconds).[2]

Indication

Cathflo Activase (Alteplase) is indicated for the restoration of function to central venous access devices as assessed by the ability to withdraw blood.

Important Safety Information

Cathflo Activase should not be administered to patients with known hypersensitivity to Alteplase or any component of the formulation.

In clinical trials, the most serious adverse events reported after treatment were sepsis, gastrointestinal bleeding, and venous thrombosis.

Certain causes of catheter dysfunction should be considered before treatment with Cathflo Activase (ie, catheter malposition, mechanical failure, constriction by a suture and lipid deposits or drug precipitates within the catheter lumen).

The most frequent adverse reaction associated with all thrombolytics in all approved indications is bleeding. Caution should be exercised with patients who have any condition for which bleeding constitutes a significant hazard.

Cathflo Activase should be used with caution in the presence of known or suspected infection in the catheter.

Please see accompanying full Prescribing Information for additional Important Safety Information.

References: 1. McKnight S. Nurse's guide to understanding and treating thrombotic occlusion of central venous access devices. *Medsurg Nurs.* 2004;13(6):377-382. **2.** Cummings-Winfield C. Mushani-Kanji T. Restoring patency to central venous access devices. *Clin J Oncol Nurs.* 2008;12(6):925-934.

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cathflo® ACTIVASE® (ALTEPLASE)

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Please see other side for administration instructions.

Cathflo Activase (alteplase) 2 mg is the only lytic FDA approved for the restoration of function to central venous access devices (CVADs)

Preparation of solution[1]

After WASHING hands, using aseptic technique, reconstitute Cathflo to a final concentration of 2 mg/2 mL:

1

Aseptically **WITHDRAW** 2.2 mL of Sterile Water for Injection, USP **(diluent is not provided)**. Do not use Bacteriostatic Water for Injection, USP.

2

INJECT the 2.2 mL of Sterile Water for Injection, USP, into the Cathflo vial, directing the diluent stream into the powder. Slight foaming is not unusual; let the vial stand undisturbed to allow large bubbles to dissipate.

3

Mix by gently **SWIRLING** until the contents are completely dissolved. Complete dissolution should occur within 3 minutes. **DO NOT SHAKE.** The reconstituted preparation results in a colorless to pale yellow transparent solution at a pH of approximately 7.3.

Note: Store lyophilized Cathflo at refrigerated temperature (2°C–8°C/36°F–46°F). Cathflo contains no antibacterial preservatives and should be reconstituted immediately before use. The solution may be used for intracatheter instillation within 8 hours following reconstitution when stored at 2°C to 30°C (36°F–86°F).

Indication

Cathflo Activase (Alteplase) is indicated for the restoration of function to central venous access devices as assessed by the ability to withdraw blood.

Important Safety Information

Cathflo Activase should not be administered to patients with known hypersensitivity to Alteplase or any component of the formulation.

In clinical trials, the most serious adverse events reported after treatment were sepsis, gastrointestinal bleeding, and venous thrombosis. Cathflo Activase should be used with caution in the presence of known or suspected infections in the catheter.

Please see accompanying full Prescribing Information for additional Important Safety Information.

References: 1. Cathflo Prescribing Information. Genentech USA, Inc. **2.** Kaler W, Chinn R. Successful disinfection of needleless access ports: a matter of time and friction. *JAVA*. 2007;12(3):140-142.

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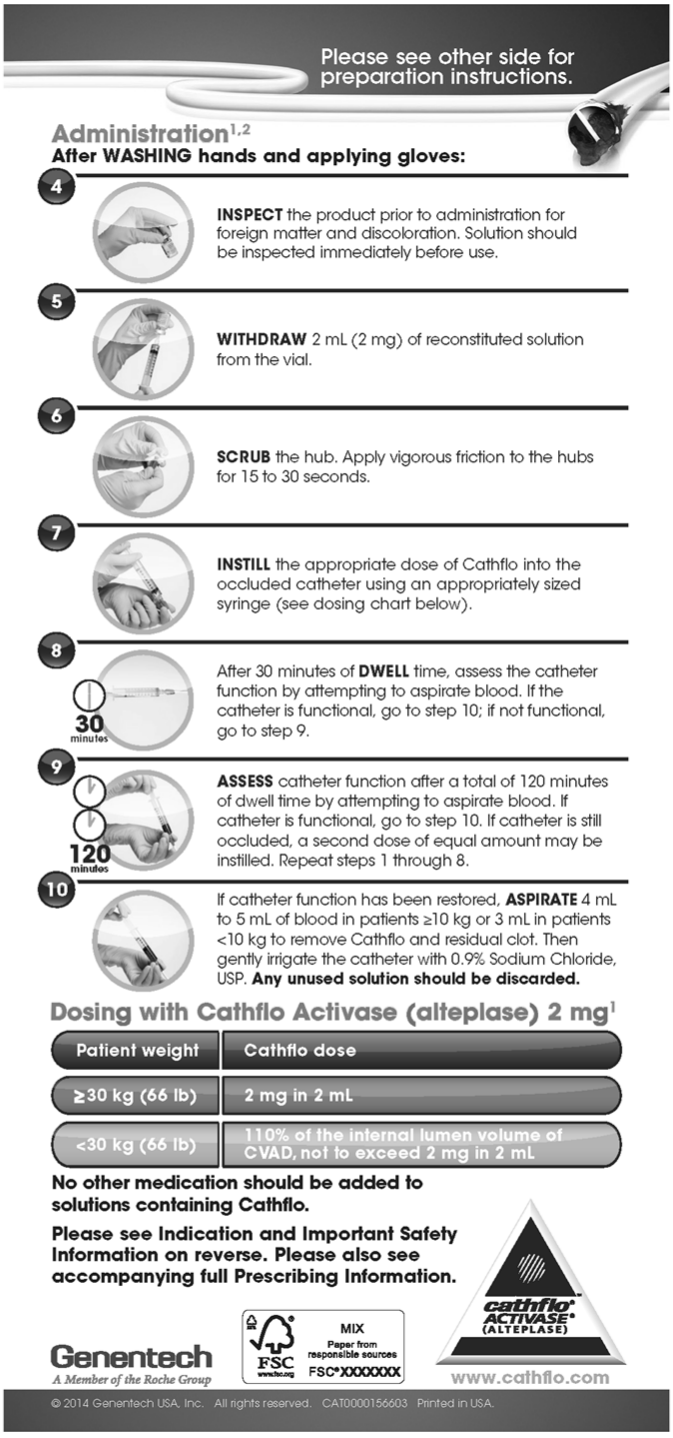
Please see other side for preparation instructions.
Administration[1,2]
After WASHING hands and applying gloves:
4
INSPECT the product prior to administration for foreign matter and discoloration. Solution should be inspected immediately before use.
5
WITHDRAW 2 mL (2 mg) of reconstituted solution from the vial.
6
SCRUB the hub. Apply vigorous friction to the hubs for 15 to 30 seconds.
7
INSTILL the appropriate dose of Cathflo into the occluded catheter using an appropriately sized syringe (see dosing chart below).
8
30 minutes
After 30 minutes of DWELL time, assess the catheter function by attempting to aspirate blood. If the catheter is functional, go to step 10; if not functional, go to step 9.
9
120 minutes
ASSESS catheter function after a total of 120 minutes of dwell time by attempting to aspirate blood. If catheter is functional, go to step 10. If catheter is still occluded, a second dose of equal amount may be instilled. Repeat steps 1 through 8.
10
If catheter function has been restored, ASPIRATE 4 mL to 5 mL of blood in patients ≥10 kg or 3 mL in patients <10 kg to remove Cathflo and residual clot. Then gently irrigate the catheter with 0.9% Sodium Chloride, USP. Any unused solution should be discarded.
Dosing with Cathflo Activase (alteplase) 2 mg[1]
Patient weight
Cathflo dose
≥30 kg (66 lb)
2 mg in 2 mL
<30 kg (66 lb)
110% of the internal lumen volume of CVAD, not to exceed 2 mg in 2 mL
No other medication should be added to solutions containing Cathflo.
Please see Indication and Important Safety Information on reverse. Please also see accompanying full Prescribing Information.
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FSC
MIX
Paper from responsible sources
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cathflo ACTIVASE (ALTEPLASE)
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IV SKILLS VALIDATION CHECKLISTS

Table of Contents

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Skills Checklist - General Competencies

Name _____Date_____

Please check one: ☐ **Clinical Setting** ☐ **Classroom Setting**

Follow Standard Aseptic Technique (ANTT) for all procedures – See Policy 3.1

Procedure	Satisfactory	Needs Improvement/ Comments
1. Inserting a peripheral IV catheter.		
2. Flushing peripheral and central venous access devices.		
3. Central venous access device/midline dressing change.		
4. Needleless connector change.		
5. Extension set change.		
6. Peripheral catheter removal.		
7. Midline catheter removal.		
8. PICC catheter removal.		
9. Non-Tunneled Central venous access device removal.		
10. Implanted port access/de-access.		
11. Blood draw from a central venous access device.		
12. Loading the tubing and programming the pump for a primary infusion.		
13. Initiating a primary infusion.		
14. Discontinuing a primary infusion.		
15. Connecting the administration set and programming the pump for a secondary infusion.		
16. Initiating a secondary infusion.		
17. Discontinuing a secondary infusion.		

Procedure	Satisfactory	Needs Improvement/ Comments
18. Administering an IV push medication.		
19. Inserting a subcutaneous infusion device.		
20. Hypodermoclysis infusion.		
21. Gravity administration with flow regulator set.		
22. Reconstituting and adding medications to an IV bag.		
23. Administration of TPN and lipids.		
24. Declotting a central venous access device.		

Nurse Signature:_____

Evaluator Signature:_____

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Skills Checklist – Reconstituting and Adding Medications to an IV Bag

Name _____Date_____

Please check one: ☐ **Clinical Setting** ☐ **Classroom Setting**

Follow Standard Aseptic Technique (ANTT) for all procedures – See Policy 3.1

Procedure	Satisfactory	Needs Improvement/ Comments
1. Verify prescriber order.		
2. Identify resident using appropriate identifiers.		
3. Explain procedure to resident/significant other.		
4. Perform hand hygiene.		
5. Assemble equipment and supplies on clean work surface.		
6. Don gloves.		
7. Check drug vial label and/or package insert for:		
• Correct drug.		
• Formulated for IV use.		
• Expiration date.		
• Appropriate diluent (e.g., sterile water for injection or sterile sodium chloride 0.9%).		
Reconstitution Procedure:		
Reconstituting powdered IV drug:		
1. Clean medication port on IV bag with alcohol and allow to dry. Take precautions to prevent contamination of the port after cleaning.		

Procedure	Satisfactory	Needs Improvement/ Comments
2. Remove covers from the medication and diluent vials and scrub vial stoppers with alcohol (use a new alcohol wipe for each vial). Allow to air dry.		
3. Using an empty syringe inject air into diluent vial and withdraw required amount of solution.		
4. Remove syringe from diluent vial. Insert needle into medication vial and inject diluent.		
5. Keeping syringe in vial, gently mix until medication is dissolved.		
6. When completely dissolved, withdraw desired amount of medication.		
7. With needle attached to syringe insert needle into medication port and inject medication.		
8. Remove needle and activate safety feature of the needle and dispose of syringe and needle in sharps container.		
9. Gently agitate bag to mix. Be sure solution is thoroughly mixed prior to infusion.		
10. Begin infusion within one hour.		
11. Label IV bag with resident's name, medication added, dose, rate of infusion, date, time, and initials.		
12. Document Procedure.		
Reconstituting using a Reconstitution Device (i.e., B Braun Add-Ease, Baxter Minibag Plus or Baxter Vial-Mate®)		
1. Activate the specific device according to manufacturer's instructions.		
2. Gently agitate medication bag to mix. Be sure solution is thoroughly mixed prior to infusion.		

Procedure	Satisfactory	Needs Improvement/ Comments
3. Begin infusion within one hour.		
4. Label IV bag with resident's name, medication added, dose, rate of infusion, date, time, and initials.		
5. Document procedure.		
IV medication in solution:		
1. Swab medication port on IV bag with alcohol swab and allow to air dry. Take precautions to prevent contamination of the port after cleaning.		
2. Attach a safety needle to an empty syringe. If medication is in an ampule that requires breaking attached a filter needle.		
3. If using an ampule - clean the outside of the ampule with an alcohol swab at the neck of the ampule where it will break.		
4. Using a 2x2 gauze around the neck of the ampule break the ampule and discard the gauze and top of the ampule into a sharps container.		
5. Draw up required amount of medication into syringe.		
6. Remove the filter needle/straw and attach a standard safety needle before adding medication to bag.		
7. If drawing from a vial – clean the top of the vial with an alcohol swab and allow to dry.		
8. Insert needle into vial and draw up correct amount of medication into the syringe.		
9. Insert needle into medication port on IV bag and inject medication.		

Procedure	Satisfactory	Needs Improvement/ Comments
10. Remove needle and activate the safety feature of the needle and discard in a sharps container.		
11. Gently agitate bag to mix. Be sure solution is thoroughly mixed prior to infusion.		
12. Begin infusion within one hour.		
13. Label IV bag with resident's name, medication added, dose, rate of infusion, date, time, and initials.		
14. Document procedure.		

Nurse Signature:_____

Evaluator Signature:_____

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Skills Checklist – Setting up a Primary Infusion

Name _____**Date**_____

Please check one: ☐ **Clinical Setting** ☐ **Classroom Setting**

Follow Standard Aseptic Technique (ANTT) for all procedures – See Policy 3.1

Procedure	Satisfactory	Needs Improvement/ Comments
1. Verify prescriber order.		
2. Identify resident using appropriate identifiers.		
3. Explain procedure to resident/significant other.		
4. Perform hand hygiene.		
5. Assemble equipment and supplies on clean work surface.		
6. Verify label on IV bag is consistent with prescriber's order.		
7. Attach label (with date, time, and nurse's initials) to IV bag and administration set.		
8. Don gloves.		
9. Close the clamp on the administration set.		
10. Spike IV bag. Hang IV bag on hook on IV pole.		
11. Squeeze drip chamber until ¼ - ½ full.		
12. Open clamp on the administration set.		
13. Prime the administration set via gravity or if using IV pump to prime, insert administration set into the pump and follow manufacturer's instructions to prime.		
14. Close clamp.		

Procedure	Satisfactory	Needs Improvement/ Comments
15. Scrub needleless connector on resident's catheter with antiseptic wipe and allow to dry.		
16. Attach flush syringe, aspirate for a blood return to determine patency and then flush resident's IV catheter with appropriate flush solution as ordered.		
17. If using pump, insert the administration set into pump according to manufacturer's directions.		
18. Program pump.		
19. If using a flow control regulator, set the dial to the ordered rate.		
20. Scrub needleless connector on resident's catheter with antiseptic wipe.		
21. Attach primed administration set to the needleless connector.		
22. Begin infusion.		
23. If using a flow control regulator, count drops for accuracy of rate and adjust dial accordingly.		
24. Remove gloves and perform hand hygiene.		
25. Document procedure according to facility policy.		

Nurse Signature:_____

Evaluator Signature:_____

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Skills Checklist – Setting up a Secondary Infusion

Name _____**Date**_____

Please check one: ☐ **Clinical Setting** ☐ **Classroom Setting**

Follow Standard Aseptic Technique (ANTT) for all procedures – See Policy 3.1

Procedure	Satisfactory	Needs Improvement/ Comments
1. Verify prescriber order.		
2. Identify resident using appropriate identifiers.		
3. Explain procedure to resident/significant other.		
4. Perform hand hygiene.		
5. Assemble equipment and supplies on clean work surface.		
6. Verify label on IV bag with prescriber's order. Attach label (with date, time, and nurse's initials) to administration set and IV bag.		
7. Verify compatibility between the primary infusion and the secondary medication prior to infusion.		
8. Don gloves.		
9. Clamp secondary administration set and spike secondary IV bag.		
10. Hang secondary medication bag on the IV pole and open clamp to prime the secondary administration set.		
11. Lower the primary solution bag by hanging it on hook provided with secondary administration set. *Secondary bag must be higher than primary bag.*		

	Satisfactory	Needs Improvement/ Comments
12. Swab upper port on primary administration set with antiseptic wipe and let dry.		
13. Attach secondary set to upper port on primary tubing.		
14. Open clamps.		
15. Program pump for secondary infusion according to directions and begin infusion.		
16. When secondary infusion is complete, ensure that the primary infusion has resumed at its programmed rate.		
17. Close the clamp on the secondary set.		
18. Document medication administration according to facility protocol.		

Nurse Signature:_____

Evaluator Signature:_____

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Skills Checklist – Inserting a Peripheral IV Catheter

Name _____**Date**_____

Please check one: ☐ **Clinical Setting** ☐ **Classroom Setting**

Follow Standard Aseptic Technique (ANTT) for all procedures – See Policy 3.1

Procedure	Satisfactory	Needs Improvement/ Comments
1. Verify prescriber order.		
2. Identify resident using appropriate identifiers.		
3. Explain procedure to resident/significant other.		
4. Perform hand hygiene.		
5. Assemble equipment and supplies on clean work surface.		
6. Cleanse the needleless connector on the extension set with antiseptic swab and allow to dry.		
7. Attach pre-filled saline flush syringe to the extension set and prime. Leave flush syringe attached to the extension set		
8. Apply tourniquet and assess resident's venous access. Consider drug or solution to be administered, condition of resident's veins, and duration of therapy. Select appropriate vein for insertion.		
9. Remove tourniquet.		
10. Don gloves.		
11. Cleanse insertion site with antiseptic solution per manufacturer's guidelines using a back and forth scrubbing motion. Allow prep to dry completely prior to venipuncture.		

Procedure	Satisfactory	Needs Improvement/ Comments
12. Re-apply tourniquet 4-6" above the intended venipuncture site.		
13. If vein palpation is necessary after application of antiseptic solution, don sterile gloves.		
14. Stabilize the vein below the insertion site by holding skin taut.		
15. Insert catheter per manufacturer's directions.		
16. Remove tourniquet.		
17. Remove needle from the catheter. Ensure safety feature is activated.		
18. Connect extension set, with pre-filled syringe attached, aspirate for brisk blood return and flush catheter then clamp and remove syringe.		
19. Secure catheter with sterile tape and apply transparent dressing correctly. Label with date time and initials.		
20. Secure extension set to prevent tension on catheter.		
21. Dispose of sharps per OSHA and facility guidelines.		
22. Remove gloves and perform hand hygiene.		
23. Document the procedure and patient education in medical record according to policy.		

Nurse Signature:_____

Evaluator Signature:_____

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Skills Checklist - Flushing a Vascular Access Device

Name _____Date_____

Please check one: ☐ **Clinical Setting** ☐ **Classroom Setting**

Follow Standard Aseptic Technique (ANTT) for all procedures – See Policy 3.1

Procedure	Satisfactory	Needs Improvement/ Comments
1. Verify prescriber order.		
2. Identify resident using appropriate identifiers.		
3. Explain procedure to resident/significant other.		
4. Perform hand hygiene.		
5. Assemble equipment and supplies on clean work surface.		
6. Don gloves.		
7. Scrub needleless connector on catheter lumen with antiseptic wipe and allow to dry.		
8. Attach normal saline flush syringe to needleless connector.		
9. Open clamp on catheter lumen.		
10. Aspirate for blood return then flush using "turbulent flushing" technique (push-stop, push-stop) per flushing procedure.		
11. Clamp catheter then disconnect syringe.		
12. If flushing with heparin, repeat steps 4-8.		
13. Repeat for each individual lumen if appropriate.		

Procedure	Satisfactory	Needs Improvement/ Comments
14. Remove gloves and perform hand hygiene.		
15. Document the procedure in patient's chart according to policy.		

Nurse Signature:_____

Evaluator Signature:_____

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Skills Checklist – Midline/Central Venous Access Device Dressing Change

Name _____Date_____

Please check one: ☐ **Clinical Setting** ☐ **Classroom Setting**

Follow Standard Aseptic Technique (ANTT) for all procedures – See Policy 3.1

Procedure	Satisfactory	Needs Improvement/ Comments
1. Verify prescriber order.		
2. Identify resident using appropriate identifiers.		
3. Explain procedure to resident/significant other.		
4. Perform hand hygiene.		
5. Assemble equipment and supplies on clean work surface.		
6. Don sterile gloves and mask.		
7. Remove dressing and securement device if present.		
• Use care to prevent skin tear, shearing, or bruising.		
• Press skin away from dressing vs. pulling up on dressing.		
• Stretch TSM dressings to side.		
• Work from the edge of the dressing toward the insertion site while stabilizing the catheter to minimize catheter movement.		
• Use alcohol to help loosen adhesive.		
8. Assess site for erythema, induration, swelling and drainage.		
9. Measure external length of catheter.		

Procedure	Satisfactory	Needs Improvement/ Comments
10. Measure upper arm circumference 10 cm above the insertion site and compare to the baseline documented measurement if signs of complications are noted.		
11. Remove gloves.		
12. Perform hand hygiene and don second pair of sterile gloves.		
13. Prep site with alcohol to remove skin oils, followed by the primary antiseptic (Chloraprep™).		
14. Allow prep solutions to dry completely prior to applying dressing.		
15. Apply sterile tape or securement device if applicable.		
16. Apply transparent dressing.		
17. Reinforce edge of dressing where catheter exits the dressing using tape provided in kit.		
18. Secure catheter and IV tubing using tension loop taping to prevent tension on device.		
19. Remove gloves and perform hand hygiene.		
20. Apply label on dressing with date and nurse's initials. Do not write directly on TSM dressing with pen or marker.		
21. Dispose of waste following OSHA, CDC, and facility guidelines.		
22. Document procedure.		

Nurse Signature:_____

Evaluator Signature:_____

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Skills Checklist - Extension Set with Attached Needleless Connector Change

Name _____Date_____

Please check one: ☐ **Clinical Setting** ☐ **Classroom Setting**

Follow Standard Aseptic Technique (ANTT) for all procedures – See Policy 3.1

Procedure	Satisfactory	Needs Improvement/ Comments
1. Verify prescriber order.		
2. Identify resident using appropriate identifiers.		
3. Explain procedure to resident/significant other.		
4. Perform hand hygiene.		
5. Assemble equipment and supplies on clean work surface.		
6. Don mask and clean gloves.		
7. If extension set is on any type of catheter other than a PIV, confirm that the catheter is clamped.		
8. Attach needleless connector to an extension set if they are provided as two separate pieces.		
9. Scrub the replacement needleless connector with an alcohol swab and allow to dry.		
10. Attach saline flush syringe to needleless connector and prime needleless connector and extension set.		
11. Remove extension set on catheter.		
12. Swab the catheter hub with an antiseptic wipe and allow to dry.		
13. Attach new extension set to catheter hub.		

Procedure	Satisfactory	Needs Improvement/ Comments
14. Open clamp and flush catheter using appropriate flushing technique.		
15. Repeat with other lumens if appropriate.		
16. Resume infusion or clamp extension set.		
17. Remove gloves and perform hand hygiene.		
18. Document the procedure in patient's chart according to policy.		

Nurse Signature:_____

Evaluator Signature:_____

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Skills Checklist – Needleless Connector Change

Name _____**Date**_____

Please check one: ☐ **Clinical Setting** ☐ **Classroom Setting**

Follow Standard Aseptic Technique (ANTT) for all procedures – See Policy 3.1

Procedure	Satisfactory	Needs Improvement/ Comments
1. Verify prescriber order.		
2. Identify resident using appropriate identifiers.		
3. Explain procedure to resident/significant other.		
4. Perform hand hygiene.		
5. Assemble equipment and supplies on clean work surface.		
6. Don gloves and mask.		
7. Clamp IV catheter.		
8. Scrub the replacement needleless connector with an alcohol swab and allow to dry.		
9. Attach saline flush syringe and prime needleless connector with saline. Leave saline syringe attached.		
10. Remove the needleless connector on the IV catheter.		
11. Using an alcohol swab, vigorously scrub the IV catheter hub and allow to dry.		
12. Securely attach the replacement needleless connector onto catheter.		
13. Open clamp on catheter. Flush with saline.		
14. Resume infusion or clamp catheter.		
15. Remove gloves and perform hand hygiene.		

Procedure	Satisfactory	Needs Improvement/ Comments
16. Dispose of waste following OSHA and facility guidelines.		
17. Document procedure according to facility policy.		

Nurse Signature:_____

Evaluator Signature:_____

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Skills Checklist – Peripheral Catheter Removal

Name _____**Date**_____

Please check one: ☐ **Clinical Setting** ☐ **Classroom Setting**

Follow Standard Aseptic Technique (ANTT) for all procedures – See Policy 3.1

Procedure	Satisfactory	Needs Improvement/ Comments
1. Verify prescriber order.		
2. Identify resident using appropriate identifiers.		
3. Explain procedure to resident/significant other.		
4. Perform hand hygiene.		
5. Assemble equipment and supplies on clean work surface.		
6. Don gloves.		
7. Remove dressing.		
8. Grasp catheter wings or hub; gently pull until catheter is out.		
9. Apply gentle pressure to site with 2x2 until bleeding stops.		
10. Apply Band-Aid® or sterile 2x2 and tape.		
11. Inspect catheter for damage.		
12. Discard waste according to OSHA, CDC, and facility guidelines.		
13. Remove gloves.		
14. Perform hand hygiene.		
15. Document procedure including catheter length and integrity and patient's tolerance to procedure.		

Nurse Signature:_____

Evaluator Signature:_____

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Skills Checklist – Midline Catheter Removal

Name _____**Date**_____

Please check one: ☐ **Clinical Setting** ☐ **Classroom Setting**

Follow Standard Aseptic Technique (ANTT) for all procedures – See Policy 3.1

Procedure	Satisfactory	Needs Improvement/ Comments
1. Verify prescriber order.		
2. Identify resident using appropriate identifiers.		
3. Explain procedure to resident/significant other.		
4. Perform hand hygiene.		
5. Assemble equipment and supplies on clean work surface.		
6. Place resident in supine flat or Trendelenburg position unless contraindicated.		
7. Don non-sterile gloves.		
8. Remove dressing. Discard appropriately.		
9. Remove gloves and perform hand hygiene.		
10. Open central line dressing change tray; put on mask and place plastic backed drape from the dressing change tray under the resident's arm. Open suture removal kit if needed.		
11. Open petroleum gauze onto dressing tray or squeeze sterile ointment onto gauze.		
12. Don sterile gloves. Clean site with appropriate antiseptic solution.		
13. Remove sutures if applicable.		

Procedure	Satisfactory	Needs Improvement/ Comments
14. Grasp catheter wings or hub and remove with a gentle pulling motion. Pull out approximately 2", release grip, reposition grip near insertion site, pull another 2", reposition grip. Repeat until catheter has been removed. If resistance is felt, reposition resident's arm and make another attempt. If still unable to remove, clamp catheter, apply a dressing and notify physician.		
15. Once catheter is out, apply gentle pressure at the insertion site with sterile, dry gauze until bleeding stops. Apply sterile ointment or petroleum gauze to the insertion site.		
16. Apply an air occlusive dressing. Leave the air occlusive dressing in place for a minimum of 48 hours or per prescriber's order.		
17. Assess length and integrity of catheter and inspect catheter tip. Catheter tip should be straight or beveled. An uneven or ragged tip could indicate catheter breakage and must be addressed immediately.		
18. Dispose of waste per OSHA, CDC, and facility guidelines.		
19. Remove gloves.		
20. Perform hand hygiene.		
21. Document procedure including catheter length and integrity and patient's tolerance to the procedure.		

Nurse Signature:_____

Evaluator Signature:_____

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Skills Checklist – PICC Catheter Removal

Name _____**Date**_____

Please check one: ☐ **Clinical Setting** ☐ **Classroom Setting**

Follow Standard Aseptic Technique (ANTT) for all procedures – See Policy 3.1

Procedure	Satisfactory	Needs Improvement/ Comments
1. Verify prescriber order.		
2. Identify resident using appropriate identifiers.		
3. Explain procedure to resident/significant other.		
4. Perform hand hygiene.		
5. Assemble equipment and supplies on clean work surface.		
6. Place resident in supine flat or Trendelenburg position unless contraindicated.		
7. Don non-sterile gloves.		
8. Remove dressing. Discard appropriately.		
9. Remove gloves and perform hand hygiene.		
10. Open central line dressing change tray; put on mask and place plastic backed drape from the dressing change tray under the resident's arm. Open suture removal kit if needed.		
11. Open petroleum gauze onto dressing tray or squeeze sterile ointment onto gauze.		
12. Don sterile gloves. Clean site with appropriate antiseptic solution.		
13. Remove sutures if applicable.		

Procedure	Satisfactory	Needs Improvement/ Comments
14. Grasp catheter wings or hub and remove with a gentle pulling motion. Pull out approximately 2", release grip, reposition grip near insertion site, pull another 2", reposition grip. Repeat until catheter has been removed. If resistance is felt, reposition resident's arm and make another attempt. If still unable to remove, clamp catheter, apply a dressing and notify physician.		
15. Once catheter is out, apply gentle pressure at the insertion site with sterile, dry gauze until bleeding stops. Apply sterile ointment or petroleum gauze to the insertion site.		
16. Apply an air occlusive dressing. Leave the air occlusive dressing in place for a minimum of 48 hours or per prescriber's order.		
17. Assess length and integrity of catheter and inspect catheter tip. Catheter tip should be straight or beveled. An uneven or ragged tip could indicate catheter breakage and must be addressed immediately.		
18. Dispose of waste per OSHA, CDC, and facility guidelines.		
19. Remove gloves.		
20. Perform hand hygiene.		
21. Document procedure including catheter length and integrity and patient's tolerance to the procedure.		

Nurse Signature:_____

Evaluator Signature:_____

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Skills Checklist – Non-Tunneled Central Venous Access Device Removal Subclavian or Femoral

Name _____**Date**_____

Please check one: ☐ **Clinical Setting** ☐ **Classroom Setting**

Follow Standard Aseptic Technique (ANTT) for all procedures – See Policy 3.1

Procedure	Satisfactory	Needs Improvement/ Comments
1. Verify prescriber order.		
2. Identify resident using appropriate identifiers.		
3. Explain procedure to resident/significant other.		
4. Perform hand hygiene.		
5. Assemble equipment and supplies on clean work surface.		
6. Place resident in supine flat or Trendelenburg position with head turned away from the insertion site.		
7. Don mask, protective eyewear and clean gloves.		
8. Remove dressing and discard appropriately.		
9. Remove gloves. Perform hand hygiene.		
10. Open central line dressing change tray; put on mask. Open petroleum gauze onto dressing tray or squeeze sterile ointment onto gauze. Open suture removal kit if needed.		
11. Don sterile gloves.		

Procedure	Satisfactory	Needs Improvement/ Comments
12. Cleanse around insertion site with antiseptic swabstick and allow to air dry.		
13. Remove sutures if present.		
14. Grasp catheter and gently remove using air embolism precautions. When removing a non-tunneled subclavian catheter the patient must hold their breath and perform Valsalva maneuver or if unable to do so then remove catheter while patient is exhaling.		
15. Once catheter is out, apply gentle pressure at insertion site with sterile, dry gauze until bleeding stops. Hold for at least two minutes if resident is on anticoagulants.		
16. Apply sterile ointment or Vaseline® gauze and occlusive dressing. Label with date, time and initials. Leave occlusive dressing in place for at least 48 hours.		
17. Resident remains in supine position for 30 minutes post removal.		
18. Assess length of catheter removed and inspect catheter tip.		
19. Dispose of catheter per OSHA and facility guidelines.		
20. Remove gloves. Perform hand hygiene.		
21. Document the procedure in patient's chart according to policy.		

Nurse Signature:_____

Evaluator Signature:_____

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Skills Checklist - Drawing Blood Through a Central Venous Access Device

Name _____Date_____

Please check one: ☐ **Clinical Setting** ☐ **Classroom Setting**

Follow Standard Aseptic Technique (ANTT) for all procedures – See Policy 3.1

Procedure	Satisfactory	Needs Improvement/ Comments
1. Verify prescriber order.		
2. Identify resident using appropriate identifiers.		
3. Explain procedure to resident/significant other.		
4. Perform hand hygiene.		
5. Assemble equipment and supplies on clean work surface.		
6. Don mask and clean gloves.		
7. Stop infusions one minute before drawing blood.		
8. Select appropriate lumen on catheter for drawing blood.		
9. Label the first flush syringe with a piece of tape marked “discard.”		
10. Clean needleless connector on lumen of catheter to be used for blood draw with antiseptic wipe and allow to dry.		
11. Attach flush syringe labeled as the discard syringe and aspirate catheter for presence of blood return then flush catheter with 10mL normal saline.		

12. Wait 30 seconds then draw back 6 – 10 mL of blood. Into flush syringe. Disconnect and discard in sharps container.		
Procedure	**Satisfactory**	**Needs Improvement/ Comments**
13. Scrub needleless connector with an alcohol swab and allow to dry.		
14. Using a new empty sterile syringe, draw the volume needed for the lab tubes and withdraw blood until all specimens are obtained. Transfer to correct vacutainer tubes using safety equipment.		
15. Follow lab polices for order of filling blood tubes and for processing and storage requirements.		
16. Scrub needleless connector with an alcohol swab and allow to dry.		
17. Flush catheter with 10mL saline using turbulent technique.		
18. Change needleless connector per policy.		
19. Scrub needleless connector with an alcohol swab and allow to dry.		
20. Flush catheter with 10mL saline per policy, followed by appropriate heparin flush if applicable or resume infusion.		
21. Remove gloves and perform hand hygiene.		
22. Correctly label blood tubes and store according to lab policies and procedures.		
23. Document the procedure in patient's chart according to policy.		

Nurse Signature:_____

Evaluator Signature:_____

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Skills Checklist - Accessing/De-Accessing an Implanted Port

Name _____Date_____

Please check one: ☐ **Clinical Setting** ☐ **Classroom Setting**

Follow Standard Aseptic Technique (ANTT) for all procedures – See Policy 3.1

Procedure	Satisfactory	Needs Improvement/ Comments
1. Verify prescriber order.		
2. Identify resident using appropriate identifiers.		
3. Explain procedure to resident/significant other.		
4. Perform hand hygiene.		
5. Assemble equipment and supplies on clean work surface.		
If de-accessing:		
1. Don clean gloves.		
2. Swab needleless connector with alcohol swab and allow to dry.		
3. Attached flush syringe and verify catheter patency by aspirating for blood return and flushing with 20 mL normal saline and follow with appropriate heparin flush solution.		
4. Remove dressing.		
5. Stabilize port and remove needle. Activate safety mechanism per manufacturer's instructions.		
6. Dispose of needle in appropriate sharps container.		

Procedure	Satisfactory	Needs Improvement/Comments
7. Apply Band-Aid or sterile 2x2 over site for 24 hours.		
8. Remove gloves and perform hand hygiene.		
9. Document procedure.		
If accessing:		
1. Choose correct non-coring needle length and gauge.		
2. Set up sterile field correctly.		
a. Open CVAD dressing change tray and drop non-coring needle and needleless connector onto sterile field.		
b. Don sterile gloves and attach the needleless connector to the non-coring needle.		
3. Maintain awareness of equipment that is not sterile and cannot be placed into tray (e.g., If using pre-filled flush syringes: flush solution is sterile, but outside of syringe is clean not sterile).		
a. Attach flush syringe to the needleless connector.		
b. Prime tubing and non-coring needle.		
c. Place non-coring needle on edge of sterile field with syringe on non-sterile area.***You have a non-sterile syringe attached to a sterile needle . The needle that will be under the dressing must remain sterile. Do not touch it with the hand that has touched the syringe.***		
4. Remove gloves, perform hand hygiene, and don new pair of sterile gloves.		
5. Perform skin antisepsis and allow to air dry completely.		

Procedure	Satisfactory	Needs Improvement/Comments
6. Stabilize port by placing a finger on either side of port. With your dominant hand, pick up the non-coring needle with the flush syringe attached, taking care not to touch the syringe. Hold needle perpendicular to septum. Insert needle through the skin and into the port septum until it touches back of port.		
7. Check for proper placement by opening clamp and aspirating for blood return in tubing.		
8. Flush catheter per facility policy using turbulent flushing technique.		
9. Clamp extension set.		
10. If flushing for maintenance, remove needle, apply pressure if needed, wipe with alcohol, and apply Band-Aid® or sterile 2x2 dressing.		
11. If port is to remain accessed, apply transparent dressing and tape securely. Do not cover insertion site with gauze.		
12. Label dressing with date, gauge and length of needle, initials.		
13. Remove gloves and perform hand hygiene.		
14. Secure IV administration set to prevent tension on IV catheter.		
15. Document procedure/observations per facility policy.		

Nurse Signature:_____

Evaluator Signature:_____

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Skills Checklist - Administering IV Push Medications

Name _____**Date**_____

Please check one: ☐ **Clinical Setting** ☐ **Classroom Setting**

Follow Standard Aseptic Technique (ANTT) for all procedures – See Policy 3.1

Procedure	Satisfactory	Needs Improvement/ Comments
1. Verify prescriber order.		
2. Identify resident using appropriate identifiers.		
3. Explain procedure to resident/significant other.		
4. Perform hand hygiene.		
5. Assemble equipment and supplies on clean work surface.		
Review medication in appropriate drug reference for recommended rate of infusion and potential side effects.		
Medication:		
1. Compare the prescriber's order to the medication label for correct medication name, dosage, route, rate of administration, and expiration date.		
2. Draw up correct volume of medication into the appropriate syringe.		
Administration directly into IV catheter:		
1. Swab the needleless connector with alcohol and allow to dry.		
2. Connect a flush syringe to the needleless connector.		

Procedure	Satisfactory	Needs Improvement/ Comments
3. Aspirate for presence of blood return then flush IV line with appropriate type and volume of flush.		
4. Swab needleless connector with alcohol and allow to dry.		
5. Attach medication syringe and administer at the prescribed rate.		
6. Swab needleless connector with alcohol and allow to dry.		
7. Flush IV line at the same rate as the medication was given to clear medication from the catheter with appropriate type and volume of flush.		
8. Remove gloves and perform hand hygiene.		
Administration into IV tubing:		
1. Confirm compatibility of IV fluid and medication.		
2. Open clamp on the administration set to ensure that IV fluid is flowing freely.		
3. Swab Y-site of the set closest to the resident with alcohol and allow to dry.		
4. Attach the medication syringe to y-site of IV administration set and administer the medication at the prescribed rate stopping intermittently to allow IV fluid to flow.		
5. Return infusion to the prescribed IV fluid infusion rate.		
6. Remove gloves and perform hand hygiene.		
Documentation:		
1. IV push medication correctly recorded on the MAR.		

Nurse Signature:_____

Evaluator Signature:_____

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Skills Checklist – TPN Administration

Name _____**Date**_____

Please check one: ☐ **Clinical Setting** ☐ **Classroom Setting**

Follow Standard Aseptic Technique (ANTT) for all procedures – See Policy 3.1

Procedure	Satisfactory	Needs Improvement/ Comments
1. Verify prescriber order.		
2. Identify resident using appropriate identifiers.		
3. Explain procedure to resident/significant other.		
4. Perform hand hygiene.		
5. Assemble equipment and supplies on clean work surface.		
6. Remove parenteral nutrition from the refrigerator one hour per liter prior to administration. DO NOT use any artificial means of warming the solution.		
7. Check label on bag for correct formula against physician orders. Double-checking/ verification with two nurses may be required depending on state and facility requirements.		
8. Before hanging the bag, label the bag with the date, time and nurse's initials.		
9. Don gloves.		
10. Add medications to bag as ordered. Infusion of the parenteral nutrition must be started within one hour after adding medications to the bag.		

Procedure	Satisfactory	Needs Improvement/ Comments
11. Assemble administration set. Remove protective cap on bag and administration set spike. Spike bag. Prime the set to gravity or per pump manufacturer's guidelines if priming via the IV pump.		
12. Load tubing into pump and program according to instructions.		
13. SCRUB the needleless connector of the lumen on central venous access device to be used for parenteral nutrition with alcohol and allow to dry.		
14. Connect a normal saline flush syringe and aspirate for a blood return.		
15. Flush with 10 mL normal saline and remove the flush syringe.		
16. SCRUB the needleless connector again with alcohol and allow to dry.		
17. Attach the primed administration set.		
18. Open all clamps. Begin infusion.		
19. Document administration on medication administration record.		

Nurse Signature:_____

Evaluator Signature:_____

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Skills Checklist – Adding Medications to TPN Solution

Name _____Date_____

Please check one: ☐ **Clinical Setting** ☐ **Classroom Setting**

Follow Standard Aseptic Technique (ANTT) for all procedures – See Policy 3.1

Procedure	Satisfactory	Needs Improvement/ Comments
1. Verify prescriber order.		
2. Identify resident using appropriate identifiers.		
3. Explain procedure to resident/significant other.		
4. Perform hand hygiene.		
5. Assemble equipment and supplies on clean work surface.		
6. Don gloves.		
7. Draw additives up in individual labeled syringes using strict aseptic non-touch technique. (ANTT®).		
8. If using a multi-dose vial (i.e., regular insulin) date, time and initial vial and store appropriately.		
9. Cleanse injection port on parenteral nutrition bag with alcohol swab for 60 seconds and allow to dry. Take care that injection port does not touch counter after cleaning.		
10. Carefully insert needle of first additive into port and instill medication into the bag.		
11. Gently rotate bag to mix.		

Procedure	Satisfactory	Needs Improvement/ Comments
12. Repeat steps 4 and 5 until all medications have been added to the bag.		
13. Remove gloves and perform hand hygiene.		
14. Place medication added label onto TPN bag with list of medications added, date, time and initials.		

Nurse Signature:_____

Evaluator Signature:_____

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Skills Checklist – Lipids Administration

Name _____Date_____

Please check one: ☐ **Clinical Setting** ☐ **Classroom Setting**

Follow Standard Aseptic Technique (ANTT) for all procedures – See Policy 3.1

Procedure	Satisfactory	Needs Improvement/ Comments
1. Verify prescriber order.		
2. Identify resident using appropriate identifiers.		
3. Explain procedure to resident/significant other.		
4. Perform hand hygiene.		
5. Assemble equipment and supplies on clean work surface.		
6. Strict aseptic non-touch technique (ANTT®) must be used when manipulating all parenteral nutrition solutions and all venous access devices.		
7. Check label on bag and verify against physician orders. Double-checking/ verification with two nurses may be required depending on state and facility requirements. Before hanging the bag, label the bag and administration set with the date, time and nurse's initials.		
8. Don gloves.		
9. Assemble administration set. Remove protective caps on bag and tubing spike. Spike bag. Prime tubing to gravity or per pump manufacturer's guidelines if priming via the IV pump. .		

Procedure	Satisfactory	Needs Improvement/ Comments
10. Load tubing into pump and program according to instructions.		
11. SCRUB the side port of the parenteral nutrition administration set below the filter with alcohol and allow to dry.		
12. Connect the lipid emulsion administration set to the side port of the parenteral nutrition administration set below the filter.		
13. Open all clamps. Begin infusion.		
14. Document administration on medication administration record.		

Nurse Signature:_____

Evaluator Signature:_____

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Skills Checklist - Hypodermoclysis

Name _____Date_____

Please check one: ☐ **Clinical Setting** ☐ **Classroom Setting**

Follow Standard Aseptic Technique (ANTT) for all procedures – See Policy 3.1

Procedure	Satisfactory	Needs Improvement/ Comments
1. Verify prescriber order.		
2. Identify resident using appropriate identifiers.		
3. Explain procedure to resident/significant other.		
4. Perform hand hygiene.		
5. Assemble equipment and supplies on clean work surface.		
6. Position patient and examine and assess for potential insertion sites.		
7. Don clean gloves.		
8. Refer to policy and procedure 4.25 Insertion of subcutaneous infusion sets and follow the procedure for the type of subcutaneous infusion set being used.		
9. Prepare solution to be administered. Prime the subcutaneous needle and tubing.		
10. Disinfect insertion site with antimicrobial solution and allow to dry.		
11. Insert the primed needle per manufacturer's guidelines.		
12. Confirm that device is not in a vein. No blood return should be detected.		
13. Stabilize device and dress site with a transparent dressing.		

Procedure	Satisfactory	Needs Improvement/ Comments
14. Open clamp(s) and adjust flow rate with flow control regulator.		
15. Initiate therapy at prescribed rate. Calculate drops per minute to determine correct rate and count drops to determine accurate flow rate.		
16. Label dressing with date, time and initials.		
17. Dispose of used supplies appropriately.		
18. Remove gloves and perform hand hygiene.		
19. Document procedure in medical record and MAR.		

Nurse Signature:_____

Evaluator Signature:_____

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Skills Checklist – Inserting a Subcutaneous Infusion Device – Aqua C Administration Set

Name _____**Date**_____

Please check one: ☐ **Clinical Setting** ☐ **Classroom Setting**

Follow Standard Aseptic Technique (ANTT) for all procedures – See Policy 3.1

Procedure	Satisfactory	Needs Improvement/ Comments
1. Verify prescriber order.		
2. Identify resident using appropriate identifiers.		
3. Explain procedure to resident/significant other.		
4. Perform hand hygiene.		
5. Assemble equipment and supplies on clean work surface.		
6. Don gloves.		
7. Select a site for insertion on the abdomen, thigh, or deltoid. (Take positioning and activities of daily living into consideration when selecting the site.)		
8. Peel open the Aqua C sterile package and remove the contents.		
9. Cleanse the selected subcutaneous site with alcohol swab and chlorhexidine prep from the kit. Clean an area larger than the dressing to be applied. Allow to dry completely.		
10. Close the clamps on the tubing. Remove end cap on the tubing spike and insert it into the solution container.		
11. Carefully remove the Aqua-C needle set from the plastic tube.		

Procedure	Satisfactory	Needs Improvement/ Comments
12. Connect the Aqua-C needle to the 82" (20 drop) IV set.		
13. Prime the tubing and Aqua-C needle set, until you can see drops from both needles of the Aqua-C.		
14. Close the dial-a-flow controller.		
15. Remove the needle guard and insert the Aqua-C into the patient at the chosen site.		
16. Apply the transparent dressing provided.		
17. Secure the tubing to prevent pulling on the needles.		
18. Calculate the drops per minute and count adjusting the dial to confirm the correct rate of infusion.		
19. Remove gloves and perform hand hygiene.		
20. Document procedure. Include date and time of insertion, location of site, type and size of subcutaneous needle, type of dressing applied, education and response to the procedure.		

Nurse Signature:_____

Evaluator Signature:_____

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Skills Checklist – Inserting a Subcutaneous Infusion Device – Quick Set Administration Set

Name _____**Date**_____

Please check one: ☐ **Clinical Setting** ☐ **Classroom Setting**

Follow Standard Aseptic Technique (ANTT) for all procedures – See Policy 3.1

Procedure	Satisfactory	Needs Improvement/ Comments
1. Verify prescriber order.		
2. Identify resident using appropriate identifiers.		
3. Explain procedure to resident/significant other.		
4. Perform hand hygiene.		
5. Assemble equipment and supplies on clean work surface.		
6. Select a site for insertion on the abdomen, thigh or deltoid. (Take positioning and activities of daily living into consideration when selecting the site.)		
7. Open the Quick Set infusion device. Attach needleless connector to the end of the subcutaneous administration set, clean the needleless connector with an alcohol swab and then attach a saline flush syringe to the needleless connector and flush device. Do not remove flush syringe.		
8. Cleanse the selected site with an alcohol swabstick and chlorhexidine prep from the central line dressing change kit. Clean an area larger than the dressing to be applied. Allow to dry completely.		

Procedure	Satisfactory	Needs Improvement/ Comments
9. Remove paper backing from infusion set. Remove one side half-way first. Remove other side entirely and then remove rest of the first half.		
10. Twist blue needle guard to remove from infusion set needle.		
11. Insert the Quick-set infusion set using a 90-degree angle. Smooth down adhesive.		
12. Remove introducer needle. Hold sides of infusion set down, then gently pull introducer needle out.		
13. Fold needle hub over until it snaps into place, dispose into sharps container.		
14. Aspirate with the attached syringe to make sure no blood return is present in the tubing. If blood is present on aspiration, remove the catheter and choose an alternate site. Do not flush saline into the subcutaneous tissue with the attached syringe.		
15. Apply transparent dressing from the central line dressing change kit. Tape extension tubing to prevent dislodgement of the device.		
16. Label dressing with date, time and initials.		
17. Dispose of waste per OSHA, CDC, and facility guidelines.		
Using Quick set for Hypodermoclysis		
1. Open flow control regulator tubing and close the clamps.		
2. Spike the bag of IV fluid with the tubing, open clamps and prime the set then close the clamps.		
3. Cleanse the needleless connector with alcohol and allow to dry.		
4. Connect the tubing to the needleless connector.		

Procedure	Satisfactory	Needs Improvement/ Comments
5. Set the flow regulator dial to the desired rate.		
6. Calculate the drops per minute and count adjusting the dial to confirm the correct rate of infusion.		
7. Remove gloves and perform hand hygiene.		
8. Document procedure. Include date and time of insertion, location of site, type and size of subcutaneous needle, type of dressing applied, education provided and response to the procedure.		

Nurse Signature:_____

Evaluator Signature:_____

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Skills Checklist - Administering Inotropic Medications

Name _____Date_____

Please check one: ☐ **Clinical Setting** ☐ **Classroom Setting**

Follow Standard Aseptic Technique (ANTT) for all procedures – See Policy 3.1

Procedure	Satisfactory	Needs Improvement/ Comments
1. Verify prescriber order.		
2. Identify resident using appropriate identifiers.		
3. Explain procedure to resident/significant other.		
4. Perform hand hygiene.		
5. Assemble equipment and supplies on clean work surface.		
Review medication in appropriate drug reference for recommended rate of infusion and potential side effects.		
1. Check label for the correct medication name, route of administration, and expiration date.		
2. Verify resident's height and weight.		
3. Verify the correct dose and dose calculations for patient's weight and the correct rate of administration with a second nurse or pharmacist.		
4. Verify the infusion pump settings with a second nurse.		
5. Don gloves.		

Procedure	Satisfactory	Needs Improvement/ Comments
Initiation of a New Inotropic Medication infusion:		
1. Cleanse needleless connector with an alcohol swab and allow to dry.		
2. Attach a flush syringe and aspirate the catheter to obtain a positive blood return.		
3. Flush with 10 mL normal saline.		
Initiation of an ongoing Inotropic Medication Infusion:		
1. Time the weekly dressing change and needleless connector change to coincide with medication bag and tubing change.		
2. Stop the current infusion and disconnect from the patient's catheter.		
3. Cleanse needleless connector with an alcohol swab and allow to dry.		
4. Attach an empty 10 mL syringe to the needleless connector and aspirate 5 mL from the catheter and remove syringe and discard in appropriate biohazardous waste container.		
5. Cleanse needleless connector with an alcohol swab and allow to dry.		
6. Attach a flush syringe, aspirate to obtain a positive blood return and flush the catheter with 10 mL of normal saline.		
7. Clamp the catheter, cleanse the junction of the catheter hub and the needleless connector and allow to dry.		
8. Remove the needleless connector and cleanse the catheter hub with an alcohol swab and allow to dry.		
9. Attach a new needleless connector to the catheter hub.		

Procedure	Satisfactory	Needs Improvement/ Comments
Initiate infusion		
1. Open new administration set and clamp the tubing.		
2. Spike the medication bag, open clamps, prime the set and re-clamp.		
3. Insert the administration set into the IV pump.		
4. Verify pump settings a second time.		
5. Cleanse the needleless connector with an alcohol swab and allow to dry.		
6. Connect the administration set to the needleless connector.		
7. Start the infusion.		
8. Remove gloves and perform hand hygiene.		
Documentation:		
1. Date and time.		
2. Verification of drug, dosage and pump settings with second nurse.		
3. IV Site assessment.		
4. Needleless connector change and dressing change (if performed).		
5. Flush solutions administered.		
6. Resident assessment, response to therapy and patient teaching.		
7. Note any complications identified with necessary interventions.		

Nurse Signature:_____

Evaluator Signature:_____

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Skills Checklist – Unlicensed Support Personnel

Name _____Date_____

Please check one: ☐ **Clinical Setting** ☐ **Classroom Setting**

Follow Standard Aseptic Technique (ANTT) for all procedures – See Policy 3.1

Procedure	Satisfactory	Needs Improvement/ Comments
1. Perform hand hygiene appropriately.		
2. Correctly reads amount of solution in container and notifies charge nurse if amount of solution is low.		
3. Notifies charge nurse if an alarm on mechanical infusion device is activated.		
4. Notifies charge nurse if any signs or symptoms of complications are noted at the insertion site.		
5. Performs ADLs correctly for a resident with an IV catheter.		
6. Changes the resident's gown appropriately.		
7. Transfers the resident from bed to chair appropriately.		
8. Ambulates the resident appropriately.		
9. Protects IV catheter dressing while bathing to maintain clean, dry and intact status.		

Nurse Signature:_____

Evaluator Signature:_____

FORMS

Table of Contents

Parenteral Nutrition Prescription

PharMerica®

Pharmacy		Pharmacy Fax		Date	
Patient		Facility		IV Access	Unit/Bed #
DOB	Height	Weight	Diagnosis for TPN/PPN		
Prescriber		Prescriber Phone		Allergies	

1. Select Formula

Clinimix with Standard Electrolytes

- ☐ 4.25% amino acids, 5% dextrose (42.5g protein, 50g dextrose, 340 cal/liter)
- ☐ 4.25% amino acids, 10% dextrose (42.5g protein, 100g dextrose, 510 cal/liter)
- ☐ 5% amino acids, 15% dextrose (50g protein, 150g dextrose, 710 cal/liter)
- ☐ 5% amino acids, 20% dextrose (50g protein, 200g dextrose, 880 cal/liter)
- ☐ Other: _____

Clinimix E contains:
Sodium (Na) 35 mEq per liter
Potassium (K) 30 mEq per liter
Phosphate (PO4) 15 mmol per liter
Calcium (Ca) 4.5 mEq per liter
Magnesium (Mg) 5 mEq per liter
Acetate (Ac)
- 4.25% Protein 70 mEq per liter
- 5% Protein 80 mEq per liter

Chloride (Cl) 39 mEq per liter

24 hr volume: _____ mL (Excluding Lipids Volume)

Clinimix with Custom Electrolytes

- ☐ 4.25% amino acids, 5% dextrose (42.5g protein, 50g dextrose, 340 cal/liter)
- ☐ 4.25% amino acids, 10% dextrose (42.5g protein, 100g dextrose, 510 cal/liter)
- ☐ 5% amino acids, 15% dextrose (50g protein, 150g dextrose, 710 cal/liter)
- ☐ 5% amino acids, 20% dextrose (50g protein, 200g dextrose, 880 cal/liter)
- ☐ Other: _____

Select Electrolytes per Day Below:

☐ Sodium Chloride (NaCl)	_____ mEq
☐ Sodium Acetate (NaAc)	_____ mEq
☐ Sodium Phosphate (NaPO4)	_____ mmol
☐ Potassium Chloride (KCl)	_____ mEq
☐ Potassium Acetate (KAc)	_____ mEq
☐ Potassium Phosphate (KPO4)	_____ mmol
☐ Calcium Gluconate	_____ mEq
☐ Magnesium Sulfate (MgSO4)	_____ mEq

24 hr volume: _____ mL (Excluding Lipids Volume)

Custom Formula

- ☐ **Amino Acids** _____ gm
- ☐ **Dextrose** _____ gm

Sterile Water added to achieve total volume desired.

Select Electrolytes per Day Below:

☐ Sodium Chloride (NaCl)	_____ mEq
☐ Sodium Acetate (NaAc)	_____ mEq
☐ Sodium Phosphate (NaPO4)	_____ mmol
☐ Potassium Chloride (KCl)	_____ mEq
☐ Potassium Acetate (KAc)	_____ mEq
☐ Potassium Phosphate (KPO4)	_____ mmol
☐ Calcium Gluconate	_____ mEq
☐ Magnesium Sulfate (MgSO4)	_____ mEq

24 hr volume: _____ mL (Excluding Lipids Volume)

2. Select Trace Elements

- ☐ M.T.E. C4 1 mL or equivalent
- ☐ M.T.E. C5 1 mL or equivalent
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

3. Select Lipids

- ☐ Lipids 20% 250mL 50gm
- ☐ Lipids 20% _____ mL or _____ gm
- ☐ Add to TPN/PPN (3:1 solution)
- ☐ Administer separately over _____ hrs at _____ mL/hr (12 hr maximum hang time)
- ☐ Daily
- ☐ 2x a week
- ☐ 3x a week

4. Select Additional Additives

Added by FACILITY NURSE TO EACH BAG JUST PRIOR TO HANGING

☐ MVI	_____ mL	☐ Other:	
☐ Reg Insulin	_____ units	☐ Other:	
☐ Folic Acid	_____ mg	☐ Other:	
☐ Ascorbic Acid	_____ mg	☐ Other:	
☐ Famotidine	_____ mg	☐ Other:	
☐ Vitamin K	_____ mg/week or _____ mg/day		

5. Select Additional Orders

- ☐ **Continuous Infusion** Rate: _____ mL/hr
- ☐ **Cyclic Infusion** Total Infusion Time: _____ hrs
- ☐ **Auto Ramp/Taper**
- ☐ **Custom Taper:** _____
- ☐ Weight: Daily
- ☐ Weight: Weekly
- ☐ **Dextrose 10%** to infuse at _____ mL/hr if TPN is interrupted
- ☐ Clinimix _____ % AA/ _____ % Dextrose to infuse at _____ mL/hr if TPN/PPN is interrupted

Labs/Frequency:
- ☐ Basic Metabolic Panel (BMP) _____
- ☐ Complete Metabolic Panel (CMP) _____
- ☐ Magnesium _____
- ☐ CBC with Differential _____
- ☐ Cholesterol _____
- ☐ Triglycerides _____
- ☐ Fingerstick Glucose _____
- ☐ Phosphorus _____
- ☐ Other _____

6. Signatures

Prescriber	Pharmacist	Nurse Verification
Date _____ Time _____	Date _____ Time _____	Date _____ Time _____
☐ Order Signed in E.H.R		