Regional Parenteral Manual

Usage Guidelines

Revised May, 2013

If you have any questions about the information in these guidelines or the regional parenteral monographs, please submit a comment using the **"Contact Us"** tab in the Regional Parenteral Manual database (http://www.intranet2.capitalhealth.ca/pharmacy/pm/contact_us.asp).

You may also contact Drug Information North:
DrugInfoNorth@albertahealthservices.ca or call (780) 407-7404.

Revisions are highlighted with a new image.

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1. Background and Objectives

The Regional Parenteral Manual arose out of the necessity to provide consistent policies, drug therapy guidelines, and parenteral drug information between each of the hospitals within the former Capital Health region. The objective of this manual is to provide a convenient, accessible, and reliable reference for health professionals involved with parenteral drug administration.

Prior to regionalization, various committees at the Caritas Health Group, Royal Alexandra Hospital and University Hospital individually researched the drug monographs. This manual is a compilation of their efforts in these site-specific monographs; current literature; and consultation with stakeholders, programs, and sites as needed. The Regional Parenteral Manual is maintained by Pharmacy Services through the Regional Drug Information Centre (RDIC), and is reviewed by the Medication Administration Policy Advisory Subcommittee (MAPAS) of the Drugs and Therapeutics Committee (DTC).

Existing site specific monographs are to be used until a regional monograph is available.

Please note that this manual is NOT a comprehensive drug reference. The manual is to be consulted first for information on medication administration. If the information is not adequate, alternative sources should be consulted.

Objectives

- Familiarize staff with the regional parenteral drug policies.
- Familiarize staff with the Regional Parenteral Manual and the drug monographs.
- Provide accurate information related to parenteral drug admixtures in order to maintain trouble-free infusions.

2. Policies

2.1 Policy Sections of the Monographs

The regional parenteral medication policies endorsed by Edmonton Area MAPAS/DTC are contained in the following sections of the parenteral monograph:

a) Route of administration
b) Who may administer
c) Special training, equipment and monitoring.

Any exceptions to the parenteral manual monographs are to be documented in accordance with the *Exceptional Circumstances of Parenteral Drug Administration Process* (see below), and will be used to monitor aspects of parenteral medication administration that are not covered in, or are inconsistent with, the parenteral manual monographs.

2.2 Physician-Only Drug Administration

Taken from Edmonton Area Corporate Administration Directive 2.3.3 Parenteral Medication Delivery Definitions:
http://www.intranet.cha.ab.ca/policies/s2/2.3.3ParenteralMedicationDeliveryDefinitions.pdf

a. A medication that only a physician or resident may administer. Furthermore, the physician or resident is responsible for:
   i) Preparing the IV medication (as necessary).
   ii) Signing/co-signing the Medication Administration Record form.

b. **Exception:**
   i) An RN may, under the direct supervision of a physician, prepare and/or administer a prescribed medication that is to be administered only by a physician, where a physician is not able to prepare and/or administer same due to the provision of other treatment services for a patient. Direct supervision for the purpose of this Directive is defined as the physician being present at all times during the preparation and/or administration of the prescribed medication including the co-checking of the medication and dosage drawn by the RN and the co-signing of the administration of the medication (refer to *Medication Administration Co-checking/Co-signing Corporate Administrative Procedure*).
   ii) Those drug routes which are listed as “physician-only” in the policy section of the monographs may be administered by Nurse Practitioners, as permitted by legislation and their scope of practice.

2.3 Nurse Practitioner Drug Administration in the Parenteral Monographs

The Regional Parenteral Manual may not refer to nurse practitioners (NP’s) in the policy sections of the parenteral monograph (i.e. who may give). However, NP’s may administer drugs by all routes, as permitted by legislation and their scope of practice. This includes those drugs which are listed as “physician-only” in the policy section of the monographs.

2.4 Licensed Practical Nurse Drug Administration in the Parenteral Monographs

It is the intent of Alberta Health Services (Edmonton Area) to maintain all terms within the Regional Parenteral Manual in compliance with the provisions of the Health Professions Act and the College of Licensed Practical Nurses of Alberta Competence Profile. While the individual regional parenteral monographs may prohibit Licensed Practical Nurses (LPNs) from administering medication by the following routes: (1) direct intravenous (IV) injections and intermittent and continuous IV infusions; (2) subcutaneous injections; (3) subcutaneous infusions; and (4) intramuscular injections, the Act and the Profile permit the administration of drugs by such routes. Accordingly, the regional parenteral monographs will be revised as required, as soon as reasonably possible, in order to reflect the terms contained within the Act and the Profile.

A decision path to determine whether LPNs should administer any of these routes (if they are not included in the parenteral monograph) is found in ***Appendix F*** of these guidelines.

2.5 Emergency Medical Technician – Paramedic (EMT-P) Drug Administration in the Parenteral Monographs

It is the intent of Alberta Health Services (Edmonton Area) to maintain all terms within the Regional Parenteral Manual in compliance with the provisions of the Health Disciplines Act, the Emergency Medical Technicians Regulation (or other legislation) and the Alberta College of Paramedics Occupational Competency Profile. While individual regional parenteral monographs may currently prohibit an EMT-P from administering medications by the following routes: (1) intermittent and continuous intravenous infusions; (2) direct intravenous injections; (3) subcutaneous injections; (4) intradermal injections; (5) intramuscular injections; and (6) intraosseus infusions, the Act, the Regulation and the Profile all currently permit the administration of certain medications by such routes. Accordingly, until the regional parenteral monographs are revised as required in order to reflect the terms contained within the Act, the Regulation and the Profile, an EMT-P may rely upon such terms when administering medications by the above noted routes.

2.6 Emergency Medical Technician – Ambulance (EMT-A) Drug Administration in the Parenteral Monographs

It is the intent of Alberta Health Services (Edmonton Area) to maintain all terms within the Regional Parenteral Manual in compliance with the provisions of the Health Disciplines Act, the Emergency Medical Technicians Regulation (or other legislation) and the Alberta College of Paramedics Occupational Competency Profile, section A4. While individual regional parenteral monographs may currently prohibit an EMT-A from administering medications by the following routes: (1) direct intravenous injections; (2) subcutaneous injections; and (3) intramuscular injections, the Act, the Regulation and the Profile all currently permit the administration of certain medications by such routes. Accordingly, until the regional parenteral monographs are revised as required in order to reflect the terms contained within the Act, the Regulation and the Profile, an EMT-A may rely upon such terms when administering medications by the above noted routes.

2.7 Off-Label Use of Drugs

Some of the monographs in the Regional Parenteral Manual may have indications, administration routes, or use in age groups that are not endorsed by the manufacturer, i.e. off-label use. Examples include the approved IV use of haloperidol and ketorolac in the parenteral manual, even though the manufacturers indicate that these drugs are for IM use only.

The information in the regional parenteral monographs is obtained from several sources, including the manufacturer, the literature, and from current practice within Alberta Health Services (Edmonton Area) and/or across Canada. With off-label use, the information in the parenteral manual takes precedence over data from the manufacturer, as the parenteral manual monographs are a compilation of several references, and therefore are evidence-based or accepted practice.

If you have any questions about the information in the parenteral monographs or these usage guidelines, please submit a comment using the **"Contact Us"** tab in the Regional Parenteral Manual database:
http://www.intranet2.capitalhealth.ca/pharmacy/pm/contact_us.asp.
You may also contact Drug Information North (DrugInfoNorth@albertahealthservices.ca or call (780) 407-7404).

2.8 Exceptional Circumstances of Parenteral Drug Administration

Taken from Edmonton Area Corporate Administration Directive 2.3.6: Parenteral Fluid and Medication Administration:
http://www.intranet.cha.ab.ca/policies/s2/2.3.6%20Parental%20Fluid%20&%20Med%20Administration.pdf.

The Exceptional Circumstances of Parenteral Drug Administration Process and Form shall be used for:

a. Orders inconsistent with policy:
   - Route of administration
   - Who may administer
   - Special training, equipment and monitoring.

b. Orders inconsistent with guidelines:
   - Dosage
   - Concentration
   - Rate of administration.

c. Immediate exceptional circumstances where it is in the interest of patient care to administer the drug as per the request, even though it is inconsistent with the parenteral manual monograph.

d. General (non-patient specific) requests for changes to existing parenteral manual monographs.

e. Orders for administration of a drug for which a parenteral manual monograph does not exist.

A sample of the *Exceptional Circumstances of Parenteral Drug Administration Form* (CH 0165) is provided in ***Appendix E*****.**

3. Definitions

3.1 Definitions of Staff

Refer to Corporate Administration Directive 2.3.2: Medications – Definitions of Staff:
http://www.intranet.cha.ab.ca/policies/s2/2.3.2Medications-DefinitionsofStaff.pdf

3.2 Definitions of Parenteral Routes

Refer to Corporate Administration Directive 2.3.3: Parenteral Medication Delivery Definitions:
http://www.intranet2.capitalhealth.ca/policies/s2/2.3.3%20Med-Parenteral%20MedDeliveryDefinitions.pdf.

3.3 Y-Site Compatibility

Y-site compatibility means that two separate drug infusions are compatible when infused through the same line. For example, if the parenteral monograph indicates that ampicillin is compatible for 3 hours with furosemide in NS, it means that both infusions must be mixed in NS separately. The separate lines can then be connected, and both infusions run through the same line without risk of precipitation.

3.4 Definitions of Monitoring Requirements

3.4.1 Blood pressure monitoring

- Invasive blood pressure monitoring refers to intra-arterial monitoring.
- Non-invasive continuous blood pressure monitoring refers to intermittent monitoring by an external cuff, etc.

3.4.2 ECG monitoring

Personnel must be qualified to read and interpret the ECG results, and determine the impact on patient care.

3.4.3 Equipment and Personnel for Intubation and Ventilation

- Must have equipment and personnel with necessary experience and education required for intubation and mechanical ventilation of the patient.
- Generally, the patient should be in a critical care area, emergency, operating theatre, or other areas with ventilators.

3.4.4 Equipment and Personnel for Airway Management (or Resuscitation) and Ventilation

- Must have equipment and personnel with necessary experience and education required for ventilation of the patient.
- This would include having emergency/resuscitation airway equipment on the unit, or the availability of an emergency or rapid response team (e.g. MET team, Code Blue team) within the institution.

3.4.5 Emergency Cardiac Management

- Emergency Cardiac Management refers to the Specialized Clinical Competency (SCC) for Critical Care/Emergency Registered Nurses in the management of cardiac arrest or potential life threatening cardiac rhythms.
- Rhythms include pulseless ventricular tachycardia, ventricular fibrillation, pulseless electrical activity, asystole, unstable bradycardia and unstable tachycardia.
- The Registered Nurse must demonstrate knowledge in the management of the patient, as well as demonstrate proficiency in the skills of defibrillation, transcutaneous pacing and electrical cardioversion with their unit-based Clinical Nurse Educator.

3.5 Definitions of Neonates, Infants, and Children

For the purposes of the Regional Parenteral Manual, the ages for neonates, infants and children will be defined as follows:

- Neonates: 0 – 28 days
- Infants: 1 – 12 months
- Children: 1 year – less than 18 years

4. Abbreviations for Regional Parenteral Monographs ONLY

AST	Aspartate aminotransferase
ALT	Alanine aminotransferase
BUN	Blood urea nitrogen
CBC	Complete blood count
CrCl	Creatinine clearance
ClCr	Creatinine clearance
CNS	Central nervous system
D5S	Dextrose 5% and 0.9% sodium chloride
D5-1/2S	Dextrose 5% and 0.45% sodium chloride
D5-1/2NS	Dextrose 5% and 0.45% sodium chloride
D5LR	Dextrose 5% and lactated Ringer's
D5W	Dextrose 5% in water
D10W	Dextrose 10% in water
DSS	Dextrose-saline solutions
g	Gram
GFR	Glomerular filtration rate
IM	Intramuscular
INR	International normalization ratio
IV	Intravenous
kg	Kilogram
L	Liter or litre
LR	Lactated Ringer's or Ringer's lactate or Ringer's injection, lactated
m^2	Square meter
mcg	Microgram (=0.001 milligrams)
mEq	Milliequivalent(s)
mg	Milligram (= 0.001 grams)
mL	Milliliter(s)
mmol (mMol)	Millimole(s)
mOsm (mosm)	Milliosmole(s)
ng	Nanograms (= 0.000001 milligrams)
NS	Normal Saline
½NS	Half-strength normal saline (0.45% sodium chloride)
R	Ringer's solution
RL	Ringers lactate
SCC	Specialized Clinical Competency
SWI	Sterile water for injection
2/3-1/3	Dextrose 3.3% and sodium chloride 0.3%
q__h	Every __ hours.

Staff Abbreviations

DR	Physician/ resident
RN	Registered nurse
RN-SCC	RN with a Specialized Clinical Competency
RPN	Registered psychiatric nurse
LPN	Licensed practical nurse
ENS	Employed nursing student. Note: ENS designation will not be included within the monographs. Each unit/patient care area will inform the ENS of their responsibilities regarding medication administration by any route.

5. Parenteral Monograph Template Description

NAMES/ CLASSIFICATION

Alberta Health Services Penicillin antibiotic	**OTHER NAMES:** AMPICIN®, PENBRITIN®	**Ampicillin**

- The generic name will be at the top right hand corner of each monograph.
- Common trade names, alternative generic names, and drug salts will be listed under "*Other Names*".
  - Note: This is not a comprehensive listing and should not be considered as an endorsement of any product.
- The therapeutic class will be noted under the logo.

POLICY SECTION

Route of Administration	**Intravenous**			**Subcutaneous**		**IM**
	Direct IV	Intermittent	Continuous	Injection	Infusion	
	YES	YES	YES	NO	NO	YES
Who may give	RN/RPN [1]	RN, RPN, LPN [2]	RN, RPN, LPN [2]			RN, RPN, LPN [3]

Special Training, Equipment or Monitoring

1. RN or RPN with specialized training in administration of direct IV injections.
2. LPN with additional training in administration of IV infusions and IV medications, as per site and/or program standards.
3. LPN with site and/or program requirements for administration of IM injections.

- This is policy for the AHS/ Covenant Health – Edmonton zone, describing the routes of administration, who may administer the medication, special training, equipment or monitoring required.
- The numbers found under the "Route of Administration" and "Who May Give" correspond with policy number in the "Special training, Equipment and Monitoring" section.
- The "Special Training, Equipment or Monitoring" section implies that the available staff is knowledgeable in operating equipment and/or performing the monitoring.

INDICATIONS/ CONTRAINDICATIONS

INDICATIONS

- Treatment of infections caused by susceptible bacteria.

CONTRAINDICATIONS

- Hypersensitivity/allergy to ampicillin, penicillins or other beta lactam antibiotics.
- Cross allergenicity with cephalosporins.

- General information included from the product monograph/ e-CPS.
- Indications: AHS formulary restrictions may be included here.
- Contraindications: Refers to those conditions for which the drug cannot be used.

DOSAGE

DOSAGE

ADULTS

Usual dose:
- 1 - 2 g every 6 hours.

Meningitis/septicemia:
- 2 g every 4 - 6 hours.

Maximum dose:
- 12 g/day.

NEONATES

Post-Natal Age

7 days or less:
- 2000 g or less:
  - 50 mg/kg/day, divided q12h, OR
  - 50 mg/kg/dose q12h.
- More than 2000 g:
  - 75 mg/kg/day, divided q8h, OR
  - 50 mg/kg/dose q12h.

8 - 28 days:
- 2000 g or less:
  - 75 mg/kg/day, divided q8h, OR
  - 50 mg/kg/dose q8h.
- More than 2000 g:
  - 100 mg/kg/day, divided q6h, OR
  - 50 mg/kg/dose q6h.

More than 28 days
- 50 mg/kg/dose q6h.

Meningitis:
- Double the doses above, OR
- For GBS meningitis, larger doses of 50 to 100 mg/kg/dose q6h may be given, at a dosing range of 200 to 300 mg/kg/day

INFANTS / CHILDREN

Usual dose:
- 100 - 200 mg/kg/day, divided every 4 to 6 hours.

Meningitis:
- 200 - 400 mg/kg/day, divided every 4 to 6 hours.

Maximum dose for meningitis:
- The lesser of 400 mg/kg/day or 12 g/day.

RENAL FAILURE

Neonates:
- Adjust dosing interval with renal impairment.

Infants/ Children:
- For a CrCl of 10 - 29 mL/min/1.73m^2, administer 35 - 50 mg/kg/dose q8 - 12h.
- For a CrCl of less than 10 mL/min/1.73m^2, administer 35 - 50 mg/kg/dose q12h.

Adults:
- For a creatinine clearance (CrCl) of 10 - 50 mL/minute, increase dosage interval to q6 - 12h.
- For a CrCl less than 10 - 50 mL/minute, increase dosage interval to q12 - 24h.

Text box
- Highlights important prescribing information or precautions.

Adult:
- Reflects clinical practice in the Edmonton zone, and dosing information from the product monograph/ e--CPS.
- Antimicrobial/anti-infective doses are taken from the most current *Bugs and Drugs* antimicrobial reference.

Neonates
- Reflects clinical practice in the Edmonton zone. Dosages are taken from the current edition of *Neofax*, *Pediatric Dosage Handbook/ Pediatric Lexi-Drugs Online*, or other sources.

Infants/ Children:
- Reflects clinical practice in the Edmonton zone. Dosages are taken from *Pediatric Dosage Handbook/ Pediatric Lexi-Drugs Online*, the product monograph/ e-CPS, or other sources.

Geriatrics:
- Dosages are taken from the *Geriatric Dosage Handbook/ Lexi-Drugs Online*, the product monograph/ e-CPS, or other sources.

Renal or Hepatic Failure:
- This information will be included if dosage adjustments are required, or if there is information that adjustments are not needed for renal and hepatic failure.
- The information is from a variety of renal drug references, including the product monograph/e-CPS and/or the most current editions of:
  - *Bugs and Drugs* antimicrobial reference
  - *Drug Prescribing in Renal Failure*
  - *American Hospital Formulary Service*

ADMINISTRATION/ DILUTION

ADMINISTRATION/ DILUTION

Administering too rapidly may cause seizures, i.e. at rates more than 10 mg/kg/minute in neonates, infants and children and 100 mg/minute in adults.

DIRECT IV

- Neonates: Administer at a concentration of 50 mg/mL via a peripheral line and give over 5 minutes.
- Infants/ Children: Dilute to a maximum concentration of 100 mg/mL and give over 5 minutes.
- Adults: Dilute from 50 - 100 mg/mL, and administer over 3 – 15 minutes, up to a maximum rate of 100 mg/minute.

INTERMITTENT IV INFUSION

- Neonates:
  - Administer at a concentration of 50 mg/mL via a peripheral line or 100 mg/mL via a central line and infuse over 15 to 30 minutes, OR
  - Dilute to a maximum concentration of 40 mg/mL, and infuse over 15 - 60 minutes, at a rate not exceeding 100 mg/minute.
- Infants/ Children:
  - Dilute to a maximum concentration of 40 mg/mL, and infuse over 15 - 60 minutes, at a rate not exceeding 100 mg/minute, OR
  - Administer concentrations up to 30 mg/mL over 15 - 30 minutes.
- Adults: Dilute to a maximum concentration of 40 mg/mL (usually in 50 – 100 mL), and infuse over 15 - 60 minutes.

CONTINUOUS IV INFUSION

- Adults: Dilute total daily dose in 500 - 1000 mL of IV fluid, and infuse over 24 hours.

INTRAMUSCULAR INJECTION

- Refer to the Parenteral Manual Usage Guidelines for recommended injection volumes.
- Neonates: IM administration is not recommended
- Infants/Children: Administer at a concentration less than or equal to 250 mg/mL
- Adults: Dilute vial to a final concentration of 125 – 250 mg/mL for IM use.

Text box

- Highlights important administration information or precautions.

Pediatrics:

- Recommendations for administration and dilution are taken from the most current edition of:
  - *Pediatric Dosage Handbook*
  - *Neofax*
  - *Neonatal/Pediatric Intravenous Medications Administration Guidelines, University of Alberta Hospital, Edmonton.*

Adults:

- Recommendations for administration and dilution are derived from a variety of sources, including previous site-specific parenteral drug manuals, references/ literature, and the product monograph/ e-CPS.

ADVERSE EFFECTS

ADVERSE EFFECTS

Less frequent (1 - 10%):

- Urticaria and/or maculopapular rash. An ampicillin rash is maculopapular and occurs within 3 to 14 days of starting therapy. It begins on the trunk and spreads, and is most intense on knees and elbows. Patients with Epstein-Barr virus infection, acute lymphocytic leukemia or cytomegalovirus have an increased risk for these ampicillin rashes.
- Diarrhea, nausea, vomiting, abdominal cramps, glossitis, oral candidiasis, and allergic reactions/hypersensitivity reaction (rare in neonates).
- Large doses may cause CNS excitation or seizure activity in neonates.
- Parenteral: Pain at injection site.

Rare (less than 1%):

- Dizziness, headache, lymphocytopenia, eosinophilia, granulocytopenia, hemolytic anemia, leukopenia, neutropenia, thrombocytopenia, hepatic dysfunction, increased AST and/or ALT, interstitial nephritis, and seizures (with large doses, especially in patients with renal failure or with rapid administration).

- Most common or serious side effects listed (may include frequency). This section does not necessarily contain all the side effects that may be encountered.
- Consult other references or your Pharmacy for more information.

CLINICAL IMPLICATIONS

CLINICAL IMPLICATIONS

- With prolonged treatment, monitor renal, hepatic, and hematologic function periodically.
- Assess for hypersensitivity/allergic reactions.
- Monitor for diarrhea, which may be an indication of *C. difficile*-associated diarrhea.
- Observe patients for rash. Evaluate rash to differentiate a non-allergic rash from a hypersensitivity reaction - see Adverse Effects section for details.
- Observe for evidence of thrush or candidal diaper rash.

- Information regarding the most common administration, patient care, and patient assessment criteria associated with the drug.
- Information on serum level monitoring and antidotes will be in this section.
- Recommendations from site specific monographs, various references, and the product monograph/ e-CPS.

STABILITY

STABILITY

(Please note that stability information does not apply to parenteral products mixed by Pharmacy).

VIAL

- Available as 250 mg, 500 mg, 1 g and 2 g vials. Store at room temperature.

IV SOLUTION STABILITY

- Ampicillin is stable in the following solutions and concentrations:
  - NS: 21 - 30 mg/mL - 8 hours at room temperature.
  - NS: 16 - 20 mg/mL - 12 hours at room temperature.
  - NS: 15 mg/mL or less - 24 hours at room temperature.
  - D5W: 20 mg/mL or less - 2 hours at room temperature.

- This information is from the manufacturer's recommendations in the product monograph/ e-CPS.
- The infusion stability information is for products mixed in PVC (polyvinyl chloride) bags (e.g. Baxter minibags), unless otherwise indicated. The syringe stability information applies to polypropylene syringe (e.g. Becton-Dickinson).
- These recommendations refer to the preparation of parenteral products on the patient care unit, and DO NOT include sterile products prepared in a pharmacy-based Centralized IV Additive (CIVA) service.

COMPATIBILITY

COMPATIBILITY (If a medication is not listed, please contact pharmacy for information.)

Y-SITE:

Ampicillin is compatible with the following (usual administration concentrations for both drugs) in **NS ONLY** (unless indicated):

alfentanil	chloramphenicol	fluconazole	meperidine	procainamide
ascorbic acid	cimetidine	folic acid	metoclopramide	propranolol
atracurium	clindamycin	furosemide	metoprolol	pyridoxine
atropine	cyclosporine	glycopyrrolate	metronidazole	ranitidine
aztreonam	dexamethasone	heparin	morphine	streptokinase
benztropine	digoxin	hydralazine	naloxone	succinylcholine
bretylium	enalaprilat	imipenem-cilastatin	nitroglycerin	sufentanil
calcium chloride	ephedrine	insulin regular	norepinephrine	thiamine
calcium gluconate	epinephrine	isoproterenol	oxytocin	ticarcillin
cefazolin	epoetin	ketorolac	penicillin G K	ticarcillin-clavulanate
cefotaxime	erythromycin	labetalol	penicillin G Na	vancomycin
cefoxitin	esmolol	lidocaine HCl	phenylephrine	vasopressin
ceftazidime	famotidine	magnesium sulfate	piperacillin	vitamin K1
ceftriaxone	fentanyl	mannitol	potassium Cl	vitamin B12
cefuroxime				vitamins multiple

INCOMPATIBILITY

- Note 1: Ciprofloxacin incompatibility:

Precipitation has occurred when ciprofloxacin and ampicillin are infused consecutively through the same line, even after the line was flushed. When possible, infuse each drug through a separate line or lumen. If only one line is available, flush the line thoroughly (with more than 10 mL IV solution) between administrations of these two drugs.

amikacin	diazepam	haloperidol	ondansetron	phenytoin
aminophylline	diphenhydramine	hydrocortisone	papaverine	prochlorperazine
amphotericin B	dobutamine	hydroxyzine	pentamidine	promethazine
azathioprine	dopamine	indomethacin	pentazocine	protamine
chlorpromazine	doxycycline	methylprednisolone Na	pentobarbital	quinidine gluconate
ciprofloxacin - see Note 1	ganciclovir	midazolam	phenobarbital	sodium bicarbonate
co-trimoxazole	gentamicin	nitroprusside	phentolamine	tobramycin
dantrolene				verapamil

Y-Site Compatibility

- Data is taken from the most current edition of *Trissel's Tables* when possible. The other references used include the most current editions of *Trissel's Handbook on Injectable Drugs*, or *King Guide to Parenteral Admixtures.*
- This is not a complete listing of all compatibility data but should be used as a guide for nurses, physicians and pharmacists when administering two intravenous drugs simultaneously via Y-site.

Incompatibility:

- This is a documented physical interaction (precipitation, color change) or chemical interaction (drug degradation, drug interaction). These two drugs should NOT be infused through the same intravenous site.
- Where there are conflicting reports, factors such as concentration or additives, intravenous solutions used, pH of the solution, and percentage of drug degradation are considered, and a conclusion is made.
- Where no compatibility data is available, avoid infusing the drugs simultaneously.

MISCELLANEOUS

MISCELLANEOUS

- **Sodium Content:** 3 mEq/gram of ampicillin.

- Information relating to the drug or drug therapy that doesn't fit into the other sections.
- Examples include vial ingredients that may be problematic (e.g. propylene glycol), sodium content of the drug, half-life, onset of action, etc.

REFERENCES

- The references used in developing the monograph are available for each section of the monograph – click on the *"Reference"* link.
- The entire reference list for the monograph can also be printed.

FOOTER at end of document

FOR ALBERTA HEALTH SERVICES USE ONLY.	Unauthorized distribution, copying or disclosure PROHIBITED. Sep 13, 2010 Ampicillin (Version 6)

- The AHS disclaimer, version date, version number, and drug name appear on the last page of the monograph.

6. Appendices

Appendix A: Intramuscular and Subcutaneous Injection Volumes and Sites

INTRAMUSCULAR Injections Suggested Maximal Volumes (NOT including vaccines) [1, 2]

Muscle Group	Infant less than 4 months (mL)	Infant 4 months & older (mL)	Toddler (mL)	Preschool & Older Child (mL)	Adolescent (mL)	Adult (mL)
Deltoid	N/R	N/R	N/R	N/R unless other sites are not available.	0.5	1
Vastus lateralis	0.5 – 1 [a]	0.5 – 1 [a]	0.5 – 1 [a]	1	1.5	3 [b]
Ventro-gluteal	1	1	1 – 2	2 – 3	2 – 5	3 [c] – 5

N/R = not recommended

a. Minimum volume of injection 0.1 mL using a 1 mL syringe
b. Use Z-track method for volumes greater than 2.5 mL, to prevent seepage of the drug out along the needle track. This technique laterally displaces tissues by a small amount when the needle is "darted" into place. When the needle is quickly withdrawn, the tissue is released and it slides back into place, trapping the medication.
c. Use smaller injection volumes for geriatric patients.

SUBCUTANEOUS Injections Suggested Maximal Volumes (NOT including vaccines) [1, 2]

Birth – 1 year	0.5 mL
1 – 8 years	1 mL
8 years – adult	2.5 mL

VACCINE Injection Sites [3]

- Intramuscular: Inject into the vastus lateralis muscle for infants less than 1 year of age, and the deltoid muscle for ages 1 and older. Injection volumes depend on the vaccine. Do NOT administer into the buttocks for active immunization.
- Subcutaneous: Usually administered into the upper triceps. Injection volumes depend on the vaccine.

References:
1. Potter PA, Perry AG. Fundamentals of nursing. 6th ed. St. Louis, Mo: Elsevier Mosby: 2005.
2. Wong DL. Wong's nursing care of infants and children. 7th ed. St. Louis, MO: Mosby; 2003.
3. Canadian immunization guide [Online reference]. 7th ed. 2006. Available from URL http://www.intranet2.capitalhealth.ca/pharmacy/ePublications1/linksave.asp?ejournal_id=3271

Appendix B: new Lactated Ringer's (LR) Y-Site Compatibility

- For information on drugs not listed in this table, contact your site pharmacy OR Drug Information North: phone 407-7404; druginfonorth@albertahealthservices.ca.
- Make comments online at http://www.intranet2.capitalhealth.ca/pharmacy/pm/contact_us.asp

Lactated Ringer's Y-SITE compatibility with the following drugs (at usual administration concentrations) in D5W, NS and D5-½S (unless indicated):

alfentanil amikacin aminophylline ascorbic acid atracurium atropine azathioprine – reconstituted in sterile water aztreonam benztropine bretylium calcium chloride calcium gluconate cefazolin cefotaxime cefoxitin ceftazidime cefuroxime chloramphenicol chlorpromazine cimetidine ciprofloxacin –mix in D5W or NS only clindamycin cyclosporine dexamethasone digoxin diphenhydramine	dobutamine dopamine doxycycline enalaprilat ephedrine epinephrine epoetin erythromycin esmolol famotidine fentanyl fluconazole – in NS only folic acid furosemide ganciclovir gentamicin glycopyrrolate haloperidol – in D5W only heparin hydralazine – in NS only hydrocortisone hydroxyzine imipenem-cilastatin indomethacin – reconstituted in sterile water insulin, human regular isoproterenol ketorolac labetalol	levofloxacin – in D5W only lidocaine HCl magnesium sulfate mannitol meperidine methylprednisolone Na – reconstituted in sterile water metoclopramide metoprolol metronidazole midazolam morphine naloxone nitroglycerin nitroprusside - mix in D5W only norepinephrine ondansetron oxytocin pantoprazole papaverine penicillin G K - mix in NS only penicillin G Na pentamidine pentazocine pentobarbital phenobarbital phentolamine – reconstituted in sterile water	phenylephrine piperacillin piperacillin-tazobactam (new **Tazocin and Sandoz brands ONLY**) – mix in in D5W or NS only potassium Cl procainamide prochlorperazine promethazine propranolol protamine pyridoxine quinidine gluconate ranitidine sodium bicarbonate streptokinase succinylcholine sufentanil thiamine ticarcillin ticarcillin-clavulanate tobramycin vancomycin vasopressin verapamil vitamin K1 vitamin B12 vitamins, multiple

LR INCOMPATIBILITY via Y-site:

- LR is compatible with ciprofloxacin. However, precipitation has occurred when ciprofloxacin in LR and ampicillin in NS are infused consecutively through the same line, even after the line was flushed, as ciprofloxacin and ampicillin are incompatible. Each drug must be given through a separate tubing or lumen.

- Other drugs incompatible with LR:

amphotericin B ampicillin in D5W and D5-½S ceftriaxone co-trimoxazole	dantrolene diazepam haloperidol in NS and D5-½S hydralazine in D5W and D5-½S	phenytoin new piperacillin-tazobactam - Apotex & SteriMax brands ONLY

References

- Apotex Inc. Product monograph: Piperacillin & tazobactam for injection. Prepared June 13, 2008. Revised Dec. 2, 2008. Available from http://webprod5.hc-sc.gc.ca/dpd-bdpp/start-debuter.do?lang=eng
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- Trissel LA, Leissing NC. Trissel's Tables. Multimatrix Inc., Lake Forest, Illinois, 1996.

Appendix C: Preparation of Various Dextrose-Saline Concentrations Using IV Infusion Bags

Although it is assumed that there is no overfill in the premixed IV solutions, the following concentrations are APPROXIMATIONS only.

Desired dextrose-saline concentration	Start with the following IV bags	WITHDRAW the following amounts	ADD the following amounts
Dextrose 5% – Saline 0.3%	500 mL 2/3–1/3	17 mL	18 mL D50W
Dextrose 7.5% – Saline 0.3%	500 mL 2/3–1/3	42 mL	45 mL D50W
Dextrose 10% – Saline 0.3%	500 mL 2/3–1/3	67 mL	71 mL D50W
Dextrose 12.5% – Saline 0.3%	500 mL 2/3–1/3	92 mL	98 mL D50W
Dextrose 7.5% – Saline 0.45%	1000 mL D5–½ NS	50 mL	55 mL D50W
Dextrose 10 % –Saline 0.45%	1000 mL D5–½ NS	100 mL	110 mL D50W
Dextrose 7.5% – Saline 0.9%	500 mL D5S	25 mL	28 mL D50W
Dextrose 10% – Saline 0.9%	500 mL D5S	50 mL	55 mL D50W
Dextrose 12.5% – Saline 0.9%	500 mL D5S	75 mL	83 mL D50W
Dextrose 7.5%	500 mL D5W	25 mL	28 mL D50W
Dextrose 10%	500 mL D5W	50 mL	55 mL D50W
Dextrose 12.5%	500 mL D10W	25 mL	28 mL D50W
Dextrose 15%	500 mL D10W	50 mL	55 mL D50W

Legend: NS = normal saline = 0.9% NaCl; **D5W** = 5% dextrose in water; D5S = 5% dextrose in NS; **2**/3-1/3 = dextrose 3.3% + saline 0.3%

Reference:

Tawfik G, Yule H, Birkness T, Nazarali S. Information Sheet for the Preparation of IV Fluids with Various Dextrose Concentrations. Neonatal/Pediatric Intravenous Medications Administration Guidelines. Edmonton: Capital Health Regional Pharmacy Services; 2001.

Appendix D: Preparation of Various Dextrose-Saline Concentrations Using a Buretrol

The final volume will be **100 mL**, but the following concentrations are APPROXIMATIONS only.

Desired dextrose-saline concentration	START with the following solution and volume in the buretrol	ADD the following to the buretrol
Dextrose 5% – 0.3% Saline	96 mL 2/3–1/3	4 mL D50W
Dextrose 7.5% – 0.3% Saline	91 mL 2/3–1/3	9 mL D50W
Dextrose 10% – 0.3% Saline	86 mL 2/3–1/3	14 mL D50W
Dextrose 12.5% – 0.3% Saline	80 mL 2/3–1/3	20 mL D50W
Dextrose 7.5% – 0.45% Saline	94 mL D5–½ NS	6 mL D50W
Dextrose 10% – 0.45% Saline	89 mL D5–½ NS	11 mL D50W
Dextrose 12.5% – 0.45% Saline	83 mL D5–½ NS	17 mL D50W
Dextrose 15% – 0.45% Saline	78 mL D5–½ NS	22 mL D50W
Dextrose 17.5% – 0.45% Saline	72 mL D5–½ NS	28 mL D50W
Dextrose 20% – 0.45% Saline	67 mL D5–½ NS	33 mL D50W
Dextrose 7.5% – 0.9% Saline	94 mL D5S	6mL D50W
Dextrose 10% – 0.9% Saline	89 mL D5S	11mL D50W
Dextrose 12.5% – 0.9% Saline	83 mL D5S	17mL D50W
Dextrose 15% – 0.9% Saline	78 mL D5S	22 mL D50W
Dextrose 17.5% – 0.9% Saline	72 mL D5S	28 mL D50W
Dextrose 20% – 0.9% Saline	67 mL D5S	33 mL D50W
Dextrose 12.5%	94 mL D10W	6 mL D50W
Dextrose 15%	88 mL D10W	12 mL D50W
Dextrose 17.5%	81 mL D10W	19 mL D50W
Dextrose 20%	75 mL D10W	25 mL D50W

Legend: NS = normal saline = 0.9% NaCl; D5W = 5% dextrose in water; D5S = 5% dextrose in NS; 2/3-1/3 = dextrose 3.3% + saline 0.3%

Reference:

Tawfik G, Yule H, Birkness T, Nazarali S. Information Sheet for the Preparation of IV Fluids with Various Dextrose Concentrations. Neonatal/Pediatric Intravenous Medications Administration Guidelines. Edmonton: Capital Health Regional Pharmacy Services; 2001.

Appendix E: Exceptional Circumstances of Parenteral Drug Administration Form

The following sample of the CH-0165 form is for example purposes only. Please note that the white copy of the completed form must remain on the patient's chart. The canary copy must be faxed to the MAPAS chairperson c/o the Regional Drug Information Centre (RDIC) at 407-7855, or mailed to the RDIC at WMC 2K3.29.

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Exceptional Circumstances of Parenteral Drug Administration Form

This form will be used to monitor aspects of parenteral drug administration that are not covered in, or are inconsistent with, the parenteral manual monographs. (Guidelines for use on back.)

Date _____ Hospital site _____ Drug name _____

Dose, route and schedule _____

_____

Duration of therapy _____

Reason for order _____

_____

_____

_____

Discussed with (discussion must include the physician, and others as required) _____

_____

_____

Summary of discussion and outcome (consideration must be given to alternate acceptable means of drug administration, to alternate means of monitoring, to patient safety and to patient consent)

_____

_____

_____

_____

☐ Patient specific / ☐ general request? Permanent change required to the monograph? ☐ Yes ☐ No

Comments _____

Date _____

Print Name _____

Signature _____

Contact Phone Number _____

This form to remain on patient's chart.
(Send copy to MAPAS Chairperson, c/o Regional Drug Information Centre, UAH Site, Fax 407-7855)

EXCEPTIONAL CIRCUMSTANCES OF PARENTERAL DRUG ADMINISTRATION PROCESS

This process will be documented and used to monitor aspects of parenteral drug[+] administration that are not covered in, or are inconsistent with, the parenteral manual monographs. This process will be followed for non-patient specific changes requested to either regional or site-based parenteral manual monographs, or for immediate exceptional circumstances involving a particular patient.

A. Immediate Exceptional Circumstances Involving a Particular Patient:

1. Parenteral administration issues that should be addressed through this process are orders inconsistent with: policy (regarding who can administer, route of administration, who can monitor, and monitoring requirements); or, guideline (regarding dosage, concentration, and rate of administration). This process can also be tailored for any drug[+] without a parenteral manual monograph but for which an order to administer the drug parenterally has been written.

    1.1 A nurse who receives a request that is inconsistent with a parenteral manual monograph, as outlined above, shall advise the requesting physician. The physician may choose to administer the drug and monitor the patient, in accordance with the policy set out in the parenteral manual monograph, in the interim.

    1.2 If the nurse and physician agree that this is an exceptional circumstance and it is in the interest of patient care to administer the drug as per the request, even though it is inconsistent with the parenteral manual monograph, this procedure must be followed.

        1.2.1 The nurse and physician shall discuss the situation with a pharmacist, the nurse in charge and others as appropriate to review whether the drug should be given in a manner that is inconsistent with the parenteral manual monograph. Consideration will be given to alternate acceptable means of drug administration, to alternate means of monitoring, to patient safety and to patient consent. The nurse in charge and physician will make the decision and advise the patient care manager and the Medication Administration Policy Advisory Subcommittee (MAPAS) chairperson through the *Exceptional Circumstances of Parenteral Drug Administration Form*.

2. The chart copy of the *Exceptional Circumstances of Parenteral Drug Administration Form* serves to communicate the situation to other staff. If subsequent staff are not in agreement with the decision this process shall be reinitiated.

3. MAPAS will review the *Exceptional Circumstances of Parenteral Drug Administration Forms* at the next meeting, and discuss any changes that may be required to existing parenteral manual monographs. The Drugs and Therapeutics Committee will be informed periodically of these issues through MAPAS.

4. The *Exceptional Circumstances of Parenteral Drug Administration Process* and *Form* will be completed within 24 hours.

B. General Requests for Changes to Existing Monographs - Not Patient Specific

1. General requests for changes to existing parenteral manual monographs are made on the *Exceptional Circumstances of Parenteral Drug Administration Form*. The form would not require patient specific information but should outline clearly the reason for the request, the persons it was discussed with and the name and contact number of the requester. The requester will keep one copy of the form and the other copy will be forwarded to the MAPAS chairperson. MAPAS will review the request at the next meeting.

+ Refers to any formulary, nonformulary, restricted, investigational or emergency release drug.

Appendix F: Decision Tree for LPN Administration

See the next page for a decision tree on whether LPN administration of intravenous, intramuscular, and subcutaneous routes, which are currently not permitted in the regional parenteral monographs. Refer to section 2.4 of these guidelines for complete details.

Site/Program/Unit

Decision Path for Medication Administration for Alberta Health Services – Edmonton Area (AHS-Edm)

Regional parenteral monograph says YES (or does not list provider)

↓

Consider each of the following for implementation in your area

↓

Patient Factors

- Predictability.
- Stability.
- Complexity.
- Indication for medication in your specific clinical setting. For example, oxytocin in L & D versus Post-Partum.
- Expected outcomes of medication administration

Provider Factors

- Scope of practice under Health Professions Act.
- Competencies.
- Opportunities to maintain competency.

Consider Environment

- Is clinical supervision and/or support available? If necessary, when and where is medication is being administered?
  For example, is the medication being given while working alone or in a team environment?
- Overall care requirements of clinical setting.

Regional parenteral monograph says NO (or is silent)

↓

See Parenteral Manual Usage Guidelines sections 2.3 & 2.4 on LPN and NP administration

↓

It is the intent of AHS-Edm to ensure that the regional parenteral monographs are current. To initiate any monograph changes, please contact your MAPAS site rep and/or e-mail the Regional Drug Information Centre (RDIC) at druginfo@albertahealthservices.ca)