

Stadium Medical Emergency Medical Services



CLINICAL PROTOCOLS FOR INTERFACILITY TRANSPORT

Version 1.0.0

These protocols are effective 6/01/2025

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PROTOCOL VERSIONING SCHEME

Protocol Versions

- A. All further revisions will be numbered in the x.y.z scheme as follows:
 - 1. A change to the number in position x reflects significant changes to the protocols, including:
 - a. A complete review and revision of the protocols
 - b. Major additions to the protocols
 - c. Any other change determined to be sufficiently significant in nature as to necessitate a whole number change in protocol version number.
 - 2. A change to the number in position y reflects a minor change to the protocols, including:
 - a. Addition or deletion of protocols
 - b. Changes to the wording or content of individual protocols, such as a change in drug dosages
 - c. Any other change determined to be greater in scope than a z number change, but lesser than an x number change
 - 3. A change to the number in position z reflects a very minor change, including:
 - a. Fixed grammatical errors
 - b. Changed page numbering
 - c. Any other change determined to be insignificant to the meaning or usage of the protocols

Historical tracking of protocol changes

- A. Each protocol version, including any changes in z numbering will be saved as a locked, protected document.
- B. An accompanying master protocol changes list will be kept. This list will detail what changes were made in each revision number change.

1000 INTRODUCTION

The following protocols define the rules of medical care for Stadium Medical EMS providers during interfacility transport; (for prehospital treatment refer to the Denver Metro EMS Medical Director's protocols). These protocols delineate the expected practice, actions, and procedures of EMS providers during interfacility transport. When protocol variance occurs it should be approached in a logical and knowledgeable manner, done in the best interests of the patient, and well documented. In essence, it should be done "in good faith." Deviation from the protocols is occasionally necessary due to the vast array of complex clinical presentations. It should always be done with the patient's best interest in mind and backed with documentation and defensible clinical reasoning and judgment. Deviations will be reviewed by the Medical Director and require the completion of an unusual circumstance report. Please remember that protocols define process; people provide care.

In the protocols, there are acts allowed tables. An "X" in the box below the provider level indicates this is an act allowed by the Medical Director. The following is an example of the table:

Acts Allowed Table	B	IV/ A	I	P	P+	Adv
Treatment, medication, or procedure listed here	X	X	X	X	X	X

"P+" indicates paramedic level procedure/medications that require additional training before a provider is eligible to attend on the transport.

"Adv" indicates advanced paramedic level procedures/medications that have been outside of the Colorado scope of practice that the Medical Director has obtained a waiver specifically for select providers to perform.

1010 INTERFACILITY TRANSPORTS

Type of Interfacility Requests

Interfacility transport requests can be broken down into the following categories:

- A. Stable patients with therapies within the scope of these protocols
 - 1. These transports do not require any special considerations and are considered routine.
- B. Stable patients with therapies outside the scope of these protocols
 - 1. No treatment outside of protocol should be provided, however, these patients may still be transported provided the requirements in [Patient Monitored Therapies](#) or [Out of Protocol Transport Requests](#) protocols are met.
 - 2. Complete an unusual circumstances report for any requests for therapies outside of protocol.
- C. Unstable patient
 - 1. Hemodynamically unstable patients may require special monitoring (i.e. CVP, ICP), multiple cardioactive/vasoactive medications, or specialized critical care equipment (i.e. intra-aortic balloon pump). Unstable patients should be referred to a specialty care program experienced in the management of acutely ill and/or complex patient therapies whenever possible. [Code of Colorado Regulations, 6 CCR 1015-3, Chapter 2, Section 16.4](#)
 - 2. There are instances where a specialty care program is not available and the responding unit may be called upon to transport a patient requiring time sensitive definitive care at another facility
 - a. The responding crew, with assistance of the Stadium Medical operations staff, should ensure reasonable attempts have been made to locate a specialty care program able to provide the transport.
 - b. If a specialty care program is unavailable and the patient therapies are within the scope of these protocols the patient may be transported by responding unit.
 - c. If a specialty care program is unavailable and the patient has any therapies outside of protocol scope refer to protocol [Out of Protocol Transport Requests](#)
 - d. If the criteria of [Out of Protocol Transport Requests](#) cannot be met, the patient must remain at the sending facility for transport by a specialty care program.
 - 3. For the transport of any potentially unstable patient, consider an addition of supplemental personnel to ensure at least two providers are available to care for the patient in addition to the vehicle operator.
 - 4. Consider rendezvous with a specialty care program enroute.
- D. Physician office to an out of county facility
 - 1. Be prepared to run these calls more like a 911. We often arrive to pick up a patient who is not receiving immediately needed interventions or assessment.
 - 2. Patients should have transfer orders from the sending physician for out of county transports. Like any other interfacility transport, make sure that you have reviewed the orders prior to departure and ensure that they comply with protocol.
 - 3. Confirm there is a receiving physician.
 - 4. Also confirm the sending facility has contacted the receiving facility with a patient report and there is a bed available for the patient. The bed assignment should be documented on the transfer orders.
 - 5. If you have concerns about the appropriateness of the transport, contact Medical Control. It is up to the discretion of the provider to divert to the closest appropriate facility within the county per the destination guideline.

Training Requirement

- A. Even though a patient therapy exists in this protocol, if a provider has not received the appropriate training they cannot provide care to the patient.
- B. Any protocol marked for "P+" requires completion of additional training prior to the provider being allowed to attend.
- C. Any protocol marked for "Adv" is limited to a small number of providers who have received the appropriate training.

EMS Provider Right to Decline a Transport

An EMS provider may decline to transport any patient that they deem to require a level of care beyond their capabilities.

"The transporting EMS provider may decline to transport any patient he or she believes requires a level of care beyond his or her capabilities." [Code of Colorado Regulations, 6 CCR 1015-3, Chapter 2, Section 16.2](#)

Commented [WC1]: Jenn, review please.

Commented [J02R1]: done

1020 TRANSFER ORDERS

The goal is to continue care based on the physician's assessment. To accomplish this, the sending physician needs to provide clear and concise orders that provide guidance and restrictions. In addition, interfacility transports are governed by EMTALA (Emergency Medical Treatment & Active Labor Act); the following information provides guidance to abide by this law.

The Basics of Transfer Orders

- A. Physician transfer orders provide guidance on:
 - 1. Maintaining, initiating, and discontinuing treatments
 - 2. Patient monitoring during transport (e.g. ECG, continuous pulse oximetry)
- B. Transfer orders must be completed and signed by a physician. The physician is also responsible for making any edits to the transfer orders.
- C. A nurse may not provide or edit orders without physician review and approval.
- D. A nurse practitioner or physician's assistant can provide transfer orders. These orders should be reviewed by a physician. Document if orders were reviewed verbally by a physician.

Level of care to be provided

- A. If the sending physician requires ALS-Paramedic level of care, it must be noted on the written orders.
- B. The physician must cross out and initial any orders that are out of the scope of the attending provider's protocols.

Review Transfer Orders

- A. Review transfer orders prior to leaving the sending medical facility. If the physician has not provided clear and concise orders, ask him/her to clarify.
- B. There are circumstances where the physician can only provide verbal changes to the written orders. Verify the verbal orders by repeating them back to the sending physician and document them as "verbal orders" in the PCR narrative.

Medications

- A. Medication orders must include the following
 - 1. Name of the medication
 - 2. Route of administration
 - 3. Dose to be administered (including dosing units)
 - 4. Approved time intervals for administration, if applicable
 - 5. Indication for administration (ex. Fentanyl for pain, Valium for muscle spasms)
 - 6. Parameters for administration (e.g. maintain blood pressure above 100 mmHg systolic, maintain oxygen saturation greater than 90%)
 - 7. Guidance on infusion maintenance
 - a. If titratable, parameters for titration
 - b. If infusion to be finished while en-route, document any specific actions required after completion

Procedure Maintenance

- A. Physicians need to provide written guidance for the maintenance or monitoring of procedures initiated at the sending facility (e.g. continuous, intermittent, or no suction for a nasogastric tube).

Changing Orders En-route

- A. Sometimes, unforeseen circumstances occur requiring a change in transfer orders. Try to contact the sending physician first. If the sending physician is not available, contact Medical Control for orders.

Commented [WC3]: Is this still the case?

Commented [WC4R3]: Yes, orders should come from a physician for IFT.

1030 PATIENT MONITORED THERAPIES

Some medications, nutrition systems, and medical devices, both prehospital and interfacility, can be transported even though we do not have training, experience, or a protocol to monitor, adjust, or discontinue. These medications and medical devices are things a patient, with minimal instruction from a healthcare provider, can self monitor at home.

911 Calls

- A. If a medication, nutrition system, or medical device is encountered during a 911 call, transport remembering you are not responsible to manage, alter, or discontinue these items.
- B. For any problems with a patient monitored medication or device follow these steps:
 - 1. Talk to the patient and/or caregiver about what is occurring with the medication or device.
 - 2. Review therapy information, if available. Most of these products have information cards with the therapy/device.
 - 3. Contact Medical Control for orders before altering or discontinuing the therapy/device.

Interfacility Transport

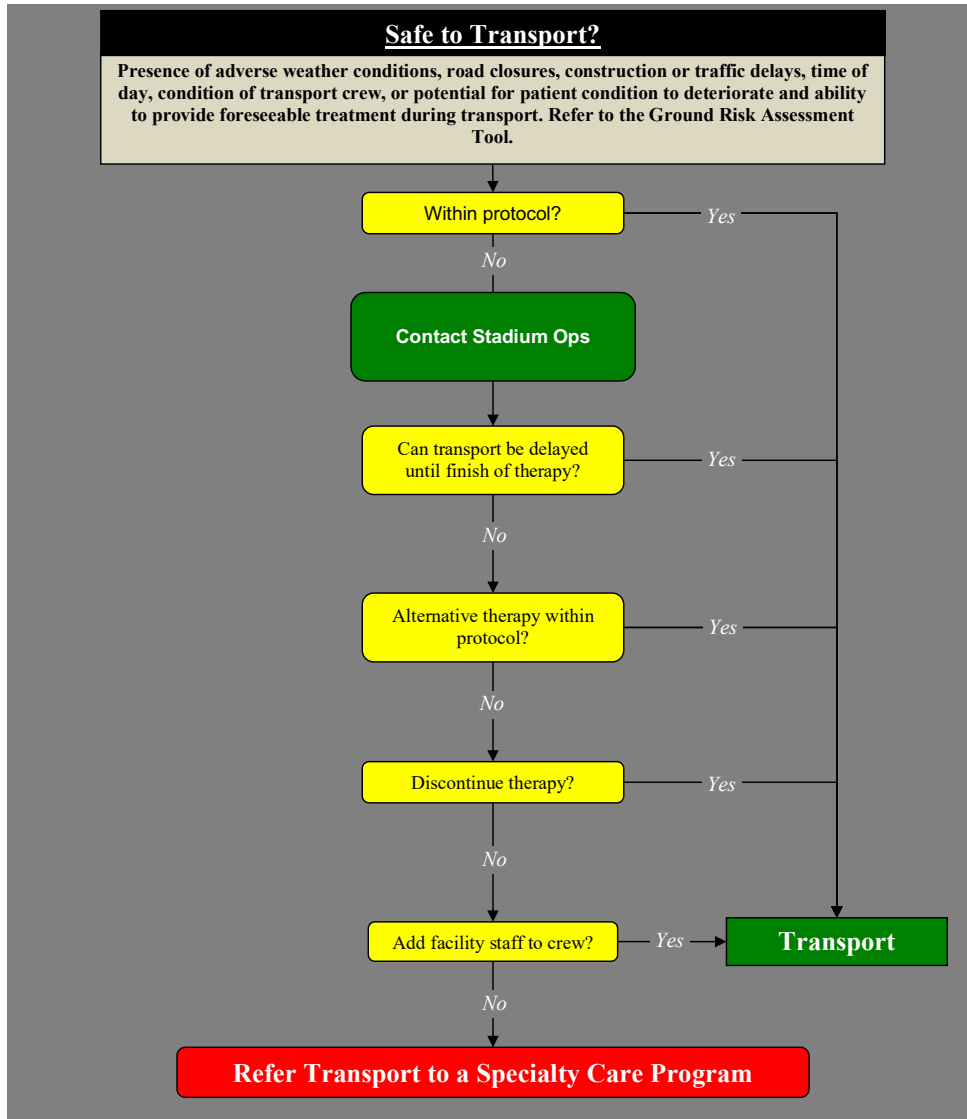
- A. If a medication, nutrition system, or a medical device in a healthcare facility (hospital, clinic, etc.) is a therapy that may be monitored by the patient or a caretaker (someone who is not a healthcare provider), talk to the sending physician and verify the patient or a caretaker could monitor the therapy outside of a healthcare facility. Contact Medical Control for orders before altering or discontinuing the therapy/device.

Level of Attendant

- A. For 911 calls, if a patient monitored medication or device is managed daily by the patient, family member or aid it may be appropriate for a BLS attendant. If a physician or nurse must monitor/adjust the medication or device daily it is an ALS call. Remember, it is always better to be cautious and defer to the higher-level of care.
- B. For interfacility transports, it is up to the sending physician to determine what level of care is needed. The sending physician must document the level of provider on the transfer orders.

1040 OUT OF PROTOCOL TRANSPORT REQUESTS

The following provides guidance when a facility requests a transport outside of protocol. An unusual circumstance report must be submitted for all therapy requests outside of protocol.



2000 INTERFACILITY PROCEDURES

2010 URINARY CATHETER MONITORING

Urinary Catheter Monitoring	B	IV/ A	I	P	P+	Adv
Interfacility Transport – Standing order	X	X	X	X	X	X

Description

- A. For the monitoring of a urinary catheter that is inserted prior to arrival of a physician ordered interfacility transport
- B. Types of urinary catheters:
 - 1. Foley catheter – soft tube inserted into the bladder through the urethra with a balloon near the end which is filled with sterile water inside the bladder to keep the catheter in place
 - 2. Suprapubic catheter – catheter inserted through the abdominal wall by a physician when a catheter cannot be inserted through the urethra

Indications

- A. The indication for use is determined by the sending physician and may include:
 - 1. Temporary management of a dysfunctional bladder
 - 2. Postoperative care
 - 3. Accurate measurement of urinary output
 - 4. For spinal column/cord injury or the inability to rule it out at sending facility

Procedure

- A. Verify sending nurse catheter is patent and secured, obtain a copy of the nurses documentation and document the size and type of catheter used
- B. Measure and document urinary output, urine color, and if urine is cloudy/malodorous prior to transport
- C. Assess for:
 - 1. Bladder distention
 - 2. Leakage of urine around the catheter
 - 3. Pain and bladder spasms
 - 4. Hematuria and bleeding around catheter
- D. Confirm and document that the catheter is properly secured to the patient (either leg or abdomen) prior to moving.
- E. After patient is transferred to ambulance, place the drainage bag below the level of the patient's bladder and correct any kinking of the drainage tubing
- F. While en-route, assess for continued output and any complications
 - 1. Adequate urine output
 - a. Adult ≈ 30mL/hour
 - b. Pediatric ≈ 1-2mL/kg/hour
- G. Upon arrival at receiving facility measure and document the urinary output and any changes in urine color and if cloudy/malodorous

Complications

- A. Occlusion of the catheter by clot, tissue, or mucous
- B. Some people have discomfort from the catheter being in the urethra or experience bladder spasms; have the sending facility treat the discomfort (e.g., medication, insertion of a smaller catheter) prior to departure
- C. Dislodgement of the catheter can cause bleeding and trauma to the urethra, notify the receiving facility if this occurs
- D. Catheterization can be a major cause of urinary tract infection

Commented [J05]: Bill – can you review – not entirely sure what this sentence should say?

Commented [WC6R5]: It is recommending it be placed in this circumstance.

2020 GASTRIC TUBE MAINTANENCE

Gastric Tube Maintenance	B	IV/ A	I	P	P+	Adv
Interfacility Transport – Written physician order				X	X	X

Indication

- A. To maintain and use an established nasogastric or orogastric tube during transport

Procedure

- A. Verify tube placement was confirmed with an x-ray.
- B. Disconnect patient from suction
- C. Assure patency and placement of tube by instilling at least 30mL of air into the tube while auscultation with a stethoscope over the stomach
- D. Confirm tube is secured to the patient before moving
- E. Follow the sending physician orders:
 - 1. Low continuous suction (30-40mmHg) or intermittent suction \leq 120mmHg
 - 2. With Levine tube, or if continuous suction is not required, place a 60mL Toomey syringe on the outlet, aspirate for air and gastric contents every 10 minutes, and document any changes.
- F. Restrain patient's hands if you anticipate any problems with the patient pulling the tube
- G. Document description and amount of output before and after the transport

Complications

- A. In the event the tube becomes dislodged or removed during transport, document the time and integrity of the tube and notify the receiving facility

Commented [WC7]: This seems low.

2030 CENTRAL VENOUS CATHETER MAINTANENCE

Central Venous Catheter Maintenance	B	IV/ A	I	P	P+	Adv
Interfacility Transport – Written physician order			X	X	X	X

Purpose

- A. Maintain catheter patency
- B. Administration of IV fluids, medications, and blood products through central venous catheters

Procedure

- A. Complete the central venous catheter section of the transport checklist prior to departure
- B. Have sending physician or nurse initial each of these items on the checklist prior to departure:
 - 1. Catheter placement is confirmed by x-ray or documented physician statement
 - 2. Catheter secured with tape and suture
 - 3. Insertion site is covered with sterile dressing
 - 4. All lines and ports not in use are clamped and locked

Catheter Care	
Flush Solution	Normal saline 10 mL
Flush Procedure	<ul style="list-style-type: none"> • Flush before and after each medication administration • After flushing clamp lumen prior to syringe removal
Syringe Size	Do not use syringe smaller than 10 mL
Ordered Rate	When "to keep open" (TKO) or "keep vein open" (KVO) rate ordered and not specified use 25 mL/hour for adults and 10 mL/hour for 1-12 years old

Examples of central venous catheters include

- A. Non-tunneled catheters
 - 1. Short central venous catheters inserted via the subclavian, jugular, or femoral approach
 - 2. For short term use
- B. Tunneled catheters
 - 1. Venous catheter inserted into a central vein and subcutaneously tunneled to an exit site approximately 10 cm from insertion site
 - 2. Examples include Broviac, Groshong®, and Hickman
- C. PICC
 - 1. Peripherally inserted catheter for use long-term use (longer than 1 week)
- D. Implanted port
 - 1. Venous catheter that is accessed through a port placed in the subcutaneous tissue usually on the chest wall
 - 2. Examples include Port-A-Cath®, Smart Port®, and Bard PowerPort®
 - 3. Must use non-coring (Huber) needle to access implanted port
 - a. Verify if it is a Bard PowerPort® which must be accessed with the appropriate Power needle

Complications

- A. In the event the catheter becomes dislodged or severed during transport, immediately stop all infusions and place a **clamp** between the damaged portion of the catheter and patient. Notify receiving facility.
- B. Should the catheter become completely dislodged during transport apply pressure to the insertion site and maintain seal with Vaseline gauze or tape and sterile dressing. Save the catheter and notify the receiving facility.
- C. If the flow to the infusion(s) becomes positional or stops double check the equipment, attempt to reposition the patient, and notify the receiving facility.

Commented [308]: I don't know what this is? Should we stock these?

2040 CHEST TUBE MAINTENANCE

Chest Tube Maintenance	B	IV/ A	I	P	P+	Adv
Interfacility Transport – Written physician order					X	X

Purpose

- A. Maintaining chest tube patency
- B. Maintaining chest tube drainage systems

Types of Chest Tube Drainage Systems

- A. Drainage system seal types:
 - 1. Water seal system
 - a. Water is used to allow air from pleural space to escape during exhalation but not enter during inspiration
 - b. Drainage system must be upright at all times to maintain air seal
 - 2. Dry seal
 - a. Utilizes a one way valve to allow air from pleural space to escape during exhalation but not enter during inspiration
 - b. Does not require the system to be upright to maintain air seal
- B. Suction controls
 - 1. Water suction controls
 - a. Amount of suction controlled by height of water in the suction control chamber
 - 2. Dry suction control
 - a. Does not require water to adjust suction pressure levels
 - b. Will generally allow for higher suction pressures than water suction systems
 - 3. Typical suction level
 - a. 20 cm H₂O for adult
 - b. For children and patient's with weak lung tissue amount of suction is generally lower than the recommended adult setting
- C. HeimLich valve / Atrium Pneumostat™
 - 1. Flutter valve systems only used to maintain seal and not intended for drainage collection

Procedures

- A. Perform hand hygiene and use personal protective equipment for possible bodily fluid exposure
- B. Maintain chest tube patency
 - 1. **NEVER** clamp off the chest tube
 - 2. **DO NOT MILK CHEST TUBE**
 - 3. Ensure the tube has been secured with suture, tape, and is sealed with non-occlusive dressing around chest tube
 - 4. Keep all equipment and tubes below the level of the patient's chest in order to prevent reflux of drainage into the pleural cavity
 - 5. Keep all tubing straight and free of kinks or dependent loops
 - 6. Keep chest drain system upright at all times during transport
- C. Document the following:
 - 1. Obtain vital signs every 15 minutes during transport
 - 2. Monitor continuous pulse oximetry and end tidal CO₂ capnography during transport
 - 3. Auscultate breath sounds at beginning of transport and with any changes in patient condition
 - 4. Amount of suction used
 - 5. Level of drainage at start of transport
 - 6. Color and consistency of drainage
 - 7. Cumulative level of drainage at end of transport
 - 8. Chest tube left connected to drainage system and NOT clamped at receiving facility.
- D. If water seal system, confirm fill chamber is at manufacturer recommended level prior to transport
- E. Attach chest tube drainage system to suction vacuum source (e.g. portable suction, wall suction), if ordered by the sending physician
 - 1. Suction vacuum source is not always required; may transport patient without at the discretion of the sending physician
 - 2. For water suction systems
 - a. Adjust vacuum source to create gentle bubbling in the suction chamber

3. For dry suction systems
 - a. Adjust vacuum suction source to manufacturers recommended setting; usually -80 cmH₂O or greater
 - b. Ensure indicator on chest tube system indicates adequate vacuum is being applied.
- F. Monitor for air leaks
 1. With water seal systems - The water level in the water seal chamber should rise with inhalation and return to normal with exhalation; continuous bubbling means there is an air leak in the system
 2. With dry seal systems - Will have an air leak monitor indicator utilizing water; continuous bubbling means there is an air leak in the system
 3. If air leak present
 - a. Confirm all tubing is securely fastened together and intact
 - b. Confirm chest tube has not been dislodged
 - c. If unable to correct air leak, contact Medical Control for consult
- G. If chest tube becomes dislodged:
 1. Partially dislodged
 - a. Do not attempt to push tube back into chest
 - b. Secure in position and contact Medical Control
 2. Completely dislodged
 - a. Cover the insertion site with occlusive dressing secured on three sides
 - b. Watch for signs of potential tension pneumothorax and contact Medical Control
- H. Contact Medical Control for consult with any complications during transport and notify the receiving facility about any issues

Commented [J09]: Not sure this is right? Or where this comes from?

Commented [J010R9]: Confirmed with chest tube kit instructions, but added the required negative sign.

Complications

- A. If chest tube drainage system tips over return it to the upright position and note any changes to drainage chamber the levels
- B. Observe for any signs of hemorrhage, respiratory distress, or subcutaneous emphysema and treat accordingly
- C. If patient shows signs of rapid decompensation (i.e. dyspnea, cyanosis, tachypnea, or deviated trachea) listen to breath sounds, evaluate for possible problems with the system, and consider needle thoracostomy

2050 MECHANICAL VENTILATION – ZOLL EMV+ 731

Mechanical Ventilation Utilizing Zoll EVM+ 731	B	IV/ A	I	P	P+	Adv
Inter-facility transport – Written physician order						X
Second attendant	X	X	X	X	X	X

Indications

- A. Physician evaluated patients requiring mechanical ventilation during interfacility transport through a secured advanced airway with physician confirmation of correct placement. Advanced airways include:
1. Orotracheal intubation
 2. Nasotracheal intubation
 3. Supraglottic airway
 4. Cricothyrotomy
 5. Tracheostomy

Contraindications

- A. Patients ≤ 20 kg
B. Patients requiring >10 cmH₂O of PEEP

Precautions

- A. Have a bag-valve with the mask readily available in case the ventilator fails or the tube becomes dislodged
- B. If complications arise, remember the mnemonic **DOPES**:
1. Dislodged tube
 2. Obstructed tube
 3. Pneumothorax
 4. Equipment
 5. Stacking breaths
- C. Watch for signs of under-sedation, such as:
1. Tachycardia
 2. Hypertension
 3. Lacrimation
 4. Diaphoresis
- D. A video laryngoscope should be available during transport for confirmation of tube placement, if necessary
- E. Ventilator settings and circuit patency should be confirmed with any change in patient status
- F. Tidal volume increases when rising in elevation and decreases when going lower in elevation which can cause the delivered tidal volume of the ventilator to be inaccurate. Consider this if the patient's condition changes during the transport with an elevation change
- G. Follow recommended steps for preventing ventilator-associated pneumonia (VAP) as described below
- H. If the patient requires extubation:
1. Prepare equipment to ventilate patient
 2. Suction secretions from the pharynx and around the cuff
 3. Deflate the cuff
 4. Hold cricoid pressure while pulling the tube out
 5. Maintain ventilation and oxygenation

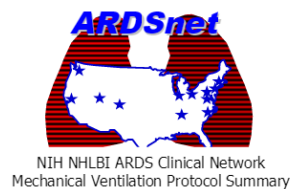
Initial Ventilator Settings based on etiology

*May not be changed unless otherwise noted via waiver, medical direction, or scope-specific Underlined parameters may be changed by the APP as needed

Respiratory-based etiology (COPD, Asthma, ARDS, Pneumonia)	Non-Respiratory-based etiology (Head-injury / Stroke, ROSC, Overdose, Sepsis)
Mode: AC-volume FiO₂: 100% (1.0) PEEP 5cmH ₂ O (initial) Adjust FiO ₂ & PEEP to maintain appropriate SaO ₂ (see ARDSnet card) Tidal Volume: 4-6 mL/kg in Predicted Body Weight (PBW) – see table below Respiratory Rate: 10 breaths/minute (initial) Try to maintain a minute ventilation (TV x RR) of at least 3 L/min if possible I:E ratio*: 1:3 (default) Pplat: Ensure that Pplat does not exceed 30 cmH ₂ O, with a normal range of 25-30 cmH ₂ O. Change Tidal volume as needed to maintain appropriate Pplat (see ARDSnet card)	Mode: AC-volume FiO₂: 100% (1.0) PEEP 5cmH ₂ O (initial) Adjust FiO ₂ & PEEP to maintain appropriate SaO ₂ (see ARDSnet card) Tidal Volume: 6 mL/kg in Predicted Body Weight (PBW) – see table below Respiratory Rate: 16 breaths/minute (initial) Try to maintain a minute ventilation (TV x RR) of at least 5 L/min if possible I:E ratio*: 1:3 (default) Pplat: Ensure that Pplat does not exceed 30 cmH ₂ O, with a normal range of 25-30 cmH ₂ O. Change Tidal volume as needed to maintain appropriate Pplat (see ARDSnet card)

TROUBLESHOOTING Hypoxia or Deterioration DOPEs		RESPONSE to Hypoxia or Deterioration DOTT	
D	Dislodged ETT or cuff leak	D	Disconnect ventilator, squeeze chest if auto-PEEP, Decompress if pneumothorax
O	Obstruction of ETT or circuit	O	Oxygen 100% FiO2, BVM and check compliance
P	Pneumothorax, Pneumonia, Pulmonary embolism or edema, Plug (mucous)	T	Tube position and function, check EtCO2
E	Equipment problem	T	Tweak ventilator settings or equipment
S	Stacked breaths, air trapping, or auto-PEEP		

Pressure Alarm Troubleshooting		Problem Location	Consider	
High PIP	+	High Plateau > 30	Alveoli	Compliance problem: Pneumothorax, Pneumonia Pulmonary Edema or Embolism, CHF
High PIP	+	Normal Plateau < 30	Airway problem	Airway, ventilator, or circuit problem: DOPE, Right Main stem intubation, Air trapping or auto-PEEP, Mucous plug, Patient out of synchrony with ventilator



INCLUSION CRITERIA: Acute onset of

1. $\text{PaO}_2/\text{FiO}_2 \leq 300$ (corrected for altitude)
2. Bilateral (patchy, diffuse, or homogeneous) infiltrates consistent with pulmonary edema
3. No clinical evidence of left atrial hypertension

PART I: VENTILATOR SETUP AND ADJUSTMENT

1. Calculate predicted body weight (PBW)
Males = $50 + 2.3 [\text{height (inches)} - 60]$
Females = $45.5 + 2.3 [\text{height (inches)} - 60]$
 Select any ventilator mode
2. Set ventilator settings to achieve initial $\text{V}_T = 8 \text{ ml/kg PBW}$
3. Reduce V_T by 1 ml/kg at intervals ≤ 2 hours until $\text{V}_T = 6 \text{ ml/kg PBW}$.
4. Set initial rate to approximate baseline minute ventilation (not $> 35 \text{ bpm}$).
5. Adjust V_T and RR to achieve pH and plateau pressure goals below.

OXYGENATION GOAL: PaO_2 55-80 mmHg or SpO_2 88-95%

Use a minimum PEEP of 5 cm H_2O . Consider use of incremental FiO_2 /PEEP combinations such as shown below (not required) to achieve goal.

Lower PEEP/higher FiO_2

FiO_2	0.3	0.4	0.4	0.5	0.5	0.6	0.7	0.7
PEEP	5	5	8	8	10	10	10	12

FiO_2	0.7	0.8	0.9	0.9	0.9	1.0
PEEP	14	14	14	16	18	18-24

Higher PEEP/lower FiO_2

FiO_2	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.5
PEEP	5	8	10	12	14	14	16	16

FiO_2	0.5	0.5-0.8	0.8	0.9	1.0	1.0
PEEP	18	20	22	22	22	24

PLATEAU PRESSURE GOAL: $\leq 30 \text{ cm H}_2\text{O}$

Check Pplat (0.5 second inspiratory pause), at least q 4h and after each change in PEEP or V_T .

If Pplat $> 30 \text{ cm H}_2\text{O}$: decrease V_T by 1 ml/kg steps (minimum = 4 ml/kg).

If Pplat $< 25 \text{ cm H}_2\text{O}$ and $\text{V}_T < 6 \text{ ml/kg}$, increase V_T by 1 ml/kg until Pplat $> 25 \text{ cm H}_2\text{O}$ or $\text{V}_T = 6 \text{ ml/kg}$.

If Pplat < 30 and breath stacking or dys-synchrony occurs: may increase V_T in 1 ml/kg increments to 7 or 8 ml/kg if Pplat remains $\leq 30 \text{ cm H}_2\text{O}$.

pH GOAL: 7.30-7.45

Acidosis Management: (pH < 7.30)

If pH 7.15-7.30: Increase RR until pH > 7.30 or $\text{PaCO}_2 < 25$ (Maximum set RR = 35).

If pH < 7.15 : Increase RR to 35.

If pH remains < 7.15 , V_T may be increased in 1 ml/kg steps until pH > 7.15 (Pplat target of 30 may be exceeded).

May give NaHCO_3

Alkalosis Management: (pH > 7.45) Decrease vent rate if possible.

I: E RATIO GOAL: Recommend that duration of inspiration be \leq duration of expiration.

Predicted Body Weight (PBW) by Gender

HEIGHT	PBW	4 ml	5 ml	6 ml	7 ml	8 ml
4' 0" (48)	17.9	72	90	107	125	143
4' 1" (49)	20.2	81	101	121	141	162
4' 2" (50)	22.5	90	113	135	158	180
4' 3" (51)	24.8	99	124	149	174	198
4' 4" (52)	27.1	108	136	163	190	217
4' 5" (53)	29.4	118	147	176	206	235
4' 6" (54)	31.7	127	159	190	222	254
4' 7" (55)	34	136	170	204	238	272
4' 8" (56)	36.3	145	182	218	254	290
4' 9" (57)	38.6	154	193	232	270	309
4' 10" (58)	40.9	164	205	245	286	327
4' 11" (59)	43.2	173	216	259	302	346
5' 0" (60)	45.5	182	228	273	319	364
5' 1" (61)	47.8	191	239	287	335	382
5' 2" (62)	50.1	200	251	301	351	401
5' 3" (63)	52.4	210	262	314	367	419
5' 4" (64)	54.7	219	274	328	383	438
5' 5" (65)	57	228	285	342	399	456
5' 6" (66)	59.3	237	297	356	415	474
5' 7" (67)	61.6	246	308	370	431	493
5' 8" (68)	63.9	256	320	383	447	511
5' 9" (69)	66.2	265	331	397	463	530
5' 10" (70)	68.5	274	343	411	480	548
5' 11" (71)	70.8	283	354	425	496	566
6' 0" (72)	73.1	292	366	439	512	585
6' 1" (73)	75.4	302	377	452	528	603
6' 2" (74)	77.7	311	389	466	544	622
6' 3" (75)	80	320	400	480	560	640
6' 4" (76)	82.3	329	412	494	576	658
6' 5" (77)	84.6	338	423	508	592	677
6' 6" (78)	86.9	348	435	521	608	695
6' 7" (79)	89.2	357	446	535	624	714
6' 8" (80)	91.5	366	458	549	641	732
6' 9" (81)	93.8	375	469	563	657	750
6' 10" (82)	96.1	384	481	577	673	769
6' 11" (83)	98.4	394	492	590	689	787
7' 0" (84)	100.7	403	504	604	705	806

PBW and Tidal Volume for Females

From: http://www.ardsnet.org/files/pbwtables_2005-02-02.pdf

HEIGHT	PBW	4 ml	5 ml	6 ml	7 ml	8 ml
4' 0" (48)	22.4	90	112	134	157	179
4' 1" (49)	24.7	99	124	148	173	198
4' 2" (50)	27	108	135	162	189	216
4' 3" (51)	29.3	117	147	176	205	234
4' 4" (52)	31.6	126	158	190	221	253
4' 5" (53)	33.9	136	170	203	237	271
4' 6" (54)	36.2	145	181	217	253	290
4' 7" (55)	38.5	154	193	231	270	308
4' 8" (56)	40.8	163	204	245	286	326
4' 9" (57)	43.1	172	216	259	302	345
4' 10" (58)	45.4	182	227	272	318	363
4' 11" (59)	47.7	191	239	286	334	382
5' 0" (60)	50	200	250	300	350	400
5' 1" (61)	52.3	209	262	314	366	418
5' 2" (62)	54.6	218	273	328	382	437
5' 3" (63)	56.9	228	285	341	398	455
5' 4" (64)	59.2	237	296	355	414	474
5' 5" (65)	61.5	246	308	369	431	492
5' 6" (66)	63.8	255	319	383	447	510
5' 7" (67)	66.1	264	331	397	463	529
5' 8" (68)	68.4	274	342	410	479	547
5' 9" (69)	70.7	283	354	424	495	566
5' 10" (70)	73	292	365	438	511	584
5' 11" (71)	75.3	301	377	452	527	602
6' 0" (72)	77.6	310	388	466	543	621
6' 1" (73)	79.9	320	400	479	559	639
6' 2" (74)	82.2	329	411	493	575	658
6' 3" (75)	84.5	338	423	507	592	676
6' 4" (76)	86.8	347	434	521	608	694
6' 5" (77)	89.1	356	446	535	624	713
6' 6" (78)	91.4	366	457	548	640	731
6' 7" (79)	93.7	375	469	562	656	750
6' 8" (80)	96	384	480	576	672	768
6' 9" (81)	98.3	393	492	590	688	786
6' 10" (82)	100.6	402	503	604	704	805
6' 11" (83)	102.9	412	515	617	720	823
7' 0" (84)	105.2	421	526	631	736	842

PBW and Tidal Volume for Males

3000 INTERFACILITY MEDICATIONS

3010 MEDICATION ADMINISTRATION – SAFETY

Infusion Pump Failure

To be prepared for an infusion pump failure, determine the drip set rate and calculate the gravity drip rate prior to departure from sending facility.

Combined Administration/Procedural Sedation

- A. Medications are to be administered for their specific indications; such as fentanyl or morphine for pain and diazepam or versed for muscle spasms
- B. Do not administer medications at the same time; allow each medication time for it to have taken effect.
Document a patient assessment including vitals prior to the next medication administration.

6 Rights of Medication Administration

Right Medication	<ul style="list-style-type: none">• Inspect the medication label 3 times – When removing the drug from the bag, as the medication is drawn into the syringe, and immediately before administration• Consider showing or verbalizing the medication to your partner for confirmation
Right Dose	<ul style="list-style-type: none">• Most medications administered in the ambulance require opening 1-package• If opening more than 1-package; verify the intended dose, the medication concentration, and all dosing calculations are correct before administration• Consider reviewing the dosage with your partner for confirmation
Right Time	<ul style="list-style-type: none">• If administering medications by written order; review the physician orders for the appropriate administration time• In order to maintain the medication's effect, subsequent doses should be administered before the effects of the previous dose wear off
Right Route	<ul style="list-style-type: none">• Medications may not be absorbed by the body as effectively when administer by the wrong route• A concentration of a medication administered by the wrong route can have serious side effects
Right Patient	<ul style="list-style-type: none">• If transporting multiple patients; confirm the physician orders before administration
Right Documentation	<ul style="list-style-type: none">• Document treatments provided for the receiving facility• Review transfer orders; ask the sending physician for clarification or additional orders if needed
Confirm each “Right” 3-times before administration of the medication	

3020 MEDICATION ADMINISTRATION – PATIENT CARE REPORT DOCUMENTATION

Vital signs

- A. Document every 10-15 minutes if clinically stable, every 5-10 minutes if unstable
- B. In the first and last sets of patient vitals document all of the following:
 - 1. Systolic blood pressure
 - 2. Heart rate
 - 3. Respiratory rate
 - 4. Oxygen saturation
 - 5. Glasgow Coma Scale
 - 6. Capnography for certain patients
 - 7. Blood glucose monitoring for certain patients
 - 8. Temperature for certain patients

Medication Documentation

Document the following information for each medication:

- A. Medication name/blood product infused
- B. Route of administration
- C. If applicable, bolus dose administered prior to infusion
- D. Drug concentration
- E. Infusion rate (e.g. mL/hour, etc.)
- F. Dose (e.g. mg, mg/hour, units/hour, etc.)
- G. Infusion IV/IO location and size
- H. Amount of fluid infused:
 - 1. Prior to ambulance arrival
 - 2. During transport
- I. Outcome/effects of administration
- J. If applicable, time infusion initiated and/or completed and/or titrated

Commented [WC11]: Should it be a minimum of every 15 minutes? Drop the range. Also, is the vital sign list still appropriate?

Commented [JO12R11]: I think it should say every 15 minutes unless critically ill patient who should be monitored more frequently. The list for first/last seems appropriate. Maybe add consider capnography for certain patient subsets?

3030 ACTIVASE (ALTEPLASE)

Activase (alteplase)	B	IV/ A	I	P	P+	Adv
Infusion maintenance – Written physician order					X	X

Action

- A. Tissue plasminogen activator (tPA)
- B. Administration of thrombolytic agents results in the dissolving of blood clots

Indication

- A. Acute myocardial infarction
- B. Non-hemorrhagic ischemic stroke patient
- C. Frostbite with <24 hours of warm ischemia time

Contraindications

- A. Contraindications for acute myocardial infarction and non-hemorrhagic ischemic stroke
 - 1. Previous CVA or intracranial bleed
 - 2. History of coagulopathy or other bleeding disorders
 - 3. Surgery or trauma in previous 2 months
 - 4. GI or GU bleeding in previous 4 weeks
 - 5. Pregnancy or post-partum
 - 6. Uncontrolled hypertension (>200mmHg systolic or >100mmHg diastolic)
- B. Contraindications for hypothermia
 - 1. Absolute
 - a. Repeated freeze-thaw cycles
 - b. Greater than 24 hours warm ischemia time
 - 2. Relative contraindications
 - a. Concurrent or recent (within 1 month) intracranial hemorrhage, subarachnoid hemorrhage, or trauma with active bleeding
 - b. Recent intracranial or intraspinal surgery, serious head trauma (within 3 months)
 - c. History of or active gastrointestinal bleeding
 - d. Traumatic or prolonged CPR (greater than 10 minutes)
 - e. Dementia or altered mental status
 - 3. Caution
 - a. Age greater than 75 years old
 - b. Prior intracranial hemorrhage, known structural intracranial process, intracranial neoplasm
 - c. Current or recent use of anticoagulants
 - d. Non-compressible vascular punctures
 - e. Recent internal bleeding (within 2-4 weeks)
 - f. Remote history of ischemic stroke (greater than 3 months)
 - g. Recent major surgery (within 3 weeks)
 - h. Severe uncontrollable hypertension
 - i. Pregnancy

Commented [J013]: Did you take this from the slides/info I sent? I did not review/compare/contrast (yet?)

Commented [WC14R13]: I did, directly.

Complications

- A. A reperfusion arrhythmia per se is not an indication to discontinue the thrombolytic infusion. If the patient becomes symptomatic, treat the reperfusion arrhythmia per protocol and contact Medical Control
- B. Thrombolytic infusion should be discontinued and the Medical Control notified for any of the following complications:
 - 1. Bleeding from any site not controlled with direct pressure.
 - 2. Decreased level of consciousness; complaint of headache, seizure or new neurologic complaint, change, or finding the may suggest intracranial hemorrhage.
 - 3. GI or GU bleeding
 - 4. Unexplained hypotension (systolic blood pressure <100mmHg) not readily reversed with a fluid bolus or Trendelenburg position.
 - 5. When prolonged chest compressions are anticipated.

Procedure

- A. Thrombolytic drugs must be infused via a separate IV line. **DO NOT MIX WITH OTHER MEDICATIONS.**
- B. Infusion may be from a glass vial, use an infusion set with an air inlet

- C. In the ischemic stroke patient, blood pressure should be maintained at:
 - 1. Systolic blood pressure: 165-180mmHg
 - 2. Diastolic blood pressure: 95-105mmHg
- D. Concentration
 - 1. 100mg reconstituted in 100mL diluent (Sterile Water for infusion)
 - 2. 50mg reconstituted in 50mL diluent (Sterile Water for infusion)
 - 3. Do not shake or agitate the mixture
- E. Dosing:
 - 1. Standard dosing for MI / stroke:
 - a. 0.9mg/kg; maximum dose 90mg
 - b. 10% of the total dose is administered as an IV bolus over 1 minute (must be administered by the sending facility)
 - c. Remaining 90% infused over 60 minutes, may be monitored during interfacility transport
 - 2. Dosing for frostbite:
 - a. Loading dose = 0.15mg/kg
 - b. IVPB = 0.15mg/kg/hr x 6 hours (max dose 100mg total)

3040 AMIODARONE

Amiodarone	B	IV/ A	I	P	P+	Adv
Infusion maintenance – Written physician order					X	X

Action

- A. Slows conduction and prolongs refractoriness of myocardial cells
- B. Negative inotropic effect
- C. Decreases peripheral vascular resistance

Indications

- A. Treatment and prophylaxis of ventricular tachycardia and ventricular fibrillation

Contraindications

- A. Known hypersensitivity to amiodarone or any of its components
- B. Cardiogenic shock
- C. Bradycardia
- D. Junctional arrhythmias
- E. Second- or third-degree AV block
- F. Pregnancy (Category D)

Complications

- A. Hypotension is the most common side effect; usually occurs within the first several hours of therapy and is rate related
- B. Bradycardia
- C. Congestive heart failure
- D. Continuous ECG monitoring is mandatory to observe for arrhythmias
 - 1. Watch for QTc prolongation which may cause arrhythmias (torsades de pointes)
 - 2. Monitor for bradycardia and AV block
- E. Hypokalemia and hypomagnesemia should be corrected before use; may exaggerate a prolonged QTc and cause arrhythmias (torsades de pointes)

Concentration

- A. Maintenance infusion
 - 1. 360mg/200mL D5W premade bag
 - 2. Final concentration 1.8mg/mL

Procedure

- A. Whenever possible, use in-line filter set with administration
- B. Concentrations greater than 3 mg/ml are associated with high incidence of peripheral vein phlebitis
- C. For infusions longer than one hour, amiodarone concentrations should not exceed 2 mg/ml unless a central venous catheter is used
- D. Document amount of bolus dose administered prior to arrival (typical loading dose of 150mg over 10 minutes)
- E. Continuous infusion to follow bolus dosing
 - 1. Initial rate: 1 mg/minute for 6 hours (360 mg/6 hours) = 33 mL/hour x 6 hours
 - 2. Maintenance infusion rate to 0.5 mg/minute for 18 hours (540 mg/18 hours) = 17 mL/hour x 18 hours
- F. Maximum daily dose: 2.2 g

Monitoring

- A. ECG/12-Lead
- B. Blood pressure
- C. Heart rate

3050 ANTIBIOTICS AND ANTIVIRALS

Antibiotics	B	IV/ A	I	P	P+	Adv
Infusion maintenance – Written physician order					X	X

Indications:

- A. Antibiotics and antivirals may be given IV in serious or life threatening infections to rapidly achieve high blood levels of drug for maximum bacterial or virus killing power.
- B. For [Remdesivir \(VEKLURY\)](#) administrations, refer to specific medication protocol.

Contraindications:

- A. The treating physician will have considered the contraindications to antibiotic administration
- B. Review the patient's allergies to medications; if there is a history of an allergic reaction to the drug, the infusion should be discontinued and notify Medical Control

Complications:

- A. If signs or symptoms of an allergic reaction develop (i.e. itching, rash, difficulty breathing, wheezing, hypotension, etc.) discontinue the infusion and notify Medical Control
- B. Treat allergic reactions per protocol
- C. If local irritation at the IV site develops:
 - 1. Decrease the infusion rate by half
 - 2. Contact Medical Control

Procedures:

- A. Infuse as ordered by the treating physician

3060 BLOOD/ BLOOD PRODUCTS

Blood/Blood Products	B	IV/ A	I	P	P+	Adv
Infusion maintenance – Written physician order					X	X
Initiate infusion – Physician evaluated patient with written orders						X

Blood Products

- A. Whole Blood
 1. Indication - Massive blood loss
 2. Infusion rate - As fast as patient can tolerate; must be administered within 4 hours of starting
 3. 18 ga or larger IV catheter preferred
- B. Packed Red Blood Cells (RBC)
 1. Indication - When patient's red blood cell count must be increased
 - a. Anemia
 - i. 1 unit PRBCs raises the HCT by about 3 percent, hemoglobin (Hgb) by 1g/dL
 - b. Acute hemorrhage after crystalloid resuscitation
 - i. Crossmatched blood has been checked by the blood bank for ABO-RH compatibility
 - ii. Uncrossmatched blood (O-Negative) is ABO-RH antigen free.
 2. Raises hematocrit and hemoglobin levels without significantly increasing blood volume
 3. Infusion rate - Slow for first 15 minutes then as fast as patient can tolerate; must be administered within 4 hours of starting
 4. 18 ga or larger IV catheter preferred
- C. Fresh Frozen Plasma (FFP)
 1. Indication
 - a. Treatment of thrombotic thrombocytopenia purpura (TTP)
 - b. Some bleeding or coagulation disorders when no factor-specific concentrate is available
 2. Infusion rate - Usually 30-60 minutes; must be administered within 4 hours of starting
 3. 22 ga or larger IV catheter preferred
- D. Platelets
 1. Indication - Treatment of thrombocytopenia and platelet function abnormalities
 2. Infusion rate - 30-60 minutes; must be administered within 4 hours of starting
 3. 20 ga or larger IV catheter preferred

Indications:

- A. Blood or blood products may be life saving in hemorrhagic and certain anemic states and for other disorders of the hematologic system
- B. The treating physician will have considered the indications prior to the onset of transfusion and order the monitoring and maintenance or set guidelines for initiating an infusion of packed red blood cells, platelets, or fresh frozen plasma

Contraindications:

- A. The treating physician will have considered the contraindications to blood transfusions.
- B. Some people may object to transfusion of blood products for religious reasons (i.e. Jehovah's Witness), notify the receiving facility

Complications:

- A. Transfusion reactions and hypersensitivity reactions can occur after the onset of blood product infusion
- B. Transfusion reactions are much more likely with uncrossmatched blood.
- C. Rapid rate of infusion can increase the likelihood and severity of reaction.
- D. Caution in patients with CHF or renal failure as these transfusions are a significant volume load.

Procedure:

- A. Verify sending physician orders
- B. Verify consent has been obtained from patient if required
- C. Verify all the following has been confirmed by 2 providers prior to departing facility
 1. Patient information – document the following on the Transfusion Record
 - a. Patient name
 - b. Hospital number
 - c. Patient blood type
 - d. Patient armband with patient hospital #Consent has been signed, if applicable

2. Unit information
 - a. Unit blood type (O, A, B, AB)
 - b. Unit number
 - c. Component (PRBC, platelets, plasma)
 - d. Expiration date
3. Patient hospital armband, unit label, product tie tag, and transporting agency Transfusion Record must have matching information
- D. Verify all the following before administering the unit of blood product
 1. Verify identity by visually inspecting
 - a. Unit tie tag
 - b. Unit label
 2. Confirm
 - a. Patient name
 - b. Patient hospital number
 - c. Patient blood type
 - d. Unit blood type
 - e. Unit number
 - f. Component
 - g. Expiration date
- E. **DO NOT ADMINISTER BLOOD PRODUCT IF ANY DISCREPANCY IS NOTED IN ANY IDENTIFYING INFORMATION DURING VERIFICATION PROCESS**
- F. If there are concerns, speak to the blood bank lab tech either in person or by phone.
- G. Record the following vital signs prior to start of infusion, every 15 minutes after start of infusion, and within 1 hour after completion of unit infusion
 1. Temperature
 2. Pulse rate
 3. Respiratory rate
 4. Blood pressure
- H. All blood products listed must be administered with a 170-micron filter blood administration set
- I. Observe patient closely for first 15 minutes of infusion; most likely reactions will occur within this time.
- J. Maintain or initiate infusion at rate as indicated by the treating physician or within 4 hours of starting
- K. Once infusion completed, remove blood product bag and tubing, discard as biohazard waste

Commented [JO15]: I don't know what this is?

Commented [WC16R15]: I vote delete.

Transfusion Reactions

- A. If transfusion reaction occurs:
 1. Discontinue the transfusion
 2. Disconnect tubing at IV catheter; tie knot in tubing and leave attached to the blood product bag.
 3. Replace the drip set and infuse normal saline
 4. Obtain vital signs
 5. Contact Medical Control for consultation and notify the receiving facility
- B. Hemolytic reactions
 1. These are the most life-threatening transfusion reactions.
 2. Clinical manifestations:
 - a. Fever
 - b. Headache
 - c. Chest or back pain
 - d. Pain at the infusion site
 - e. Hypotension
 - f. Nausea
 - g. Generalized bleeding
 - h. Shock
 3. Most common cause is ABO incompatibility
 4. Chance of survival is dose dependent; stop the transfusion immediately
 5. Treatment
 - a. Give fluid challenge of NS – it is acceptable to use the angiocath already placed if it will flow
- C. Febrile non-hemolytic reaction
 1. Chills and fever
 2. Rise in baseline temperature of 1°C or 1.8°F
 3. Treatment
 - a. Monitor for signs of more severe reaction and treat per protocol

- D. Allergic reaction
 - 1. Urticaria – generalized itching rash
 - 2. Treatment
 - a. Treat per DMEMSMD Allergy/Anaphylaxis protocol
- E. Anaphylaxis
 - 1. May occur after a few CCs of blood product
 - 2. Clinical Manifestations:
 - a. Cough/bronchospasm
 - b. Respiratory distress
 - c. Nausea, vomiting, diarrhea
 - d. Abdominal cramps
 - e. Vascular instability
 - f. Shock
 - g. Loss of consciousness
 - 3. Treatment
 - a. Treat per DMEMSMD Allergy/Anaphylaxis protocol
- F. Volume Overload
 - 1. Clinical manifestations:
 - a. Dyspnea
 - b. Headache
 - c. Peripheral edema
 - d. Coughing
 - e. Frothy sputum
 - 2. Treatment
 - a. Discontinue the infusion of fluids
 - b. Consider Furosemide IV when clinically indicated
- G. Transfusion-related Acute Lung Injury (TRALI)
 - 1. Clinical manifestations:
 - a. Fever
 - b. Chills
 - c. Dyspnea
 - d. Tachypnea
 - e. Tachycardia
 - f. Hypoxemia
 - g. Non-cardiogenic bilateral pulmonary edema
 - 2. Treatment
 - a. Provide cardiovascular and airway support

3070 CALCIUM

Calcium	B	IV/ A	I	P	P+	Adv
Magnesium toxicity bolus administration – Written physician order				X	X	X
Hyperkalemia and calcium channel blocker overdose in acute setting - Refer to DMEMSMD Protocols						

Indications:

- A. For pregnant patients receiving magnesium that develop magnesium toxicity:
 - 1. Respiratory depression
 - 2. CNS depression
 - 3. Hypotension
 - 4. Arrhythmia
 - 5. Depressed reflexes

Contraindications:

- A. Hypercalcemia
- B. Digitalis toxicity

Complications:

- A. Bradycardia
- B. Hypotension
- C. Metallic taste in the mouth
- D. Local necrosis
- E. Nausea and vomiting
- F. Coronary and cerebral artery spasm
- G. Peripheral vasodilation

Procedure:

- A. Follow sending physician orders
- B. Calcium Gluconate
 - 1. Preferred medication
 - 2. Give 1.5 g - 3 g (15-30 mL) SLOW IV push over 2-5 minutes
- C. Calcium Chloride
 - 1. Use only if calcium gluconate is not available
 - 2. Give 500 mg - 1 g (5-10 mL) SLOW IV push over 2-5 minutes
 - 3. INJECT SLOWLY with a small needle into a large vein; very irritating to tissues

3080 CARDENE (NICARDIPINE)

Cardene (nicardipine)	B	IV/ A	I	P	P+	Adv
Infusion maintenance and titration – Written physician order					X	X

Actions

- A. Cardene is a dihydropyridine calcium channel blocker that is more selective towards smooth muscle than cardiac muscle causing vasodilation of coronary vasculature and relaxation of myocardium
- B. Blood pressure will start to fall within minutes but the effect will slow down over time
- C. It reaches about half of its overall blood pressure decrease in 45 minutes

Indications

- A. For short-term control of hypertension during transport
- B. Control of blood pressure in acute ischemic stroke and spontaneous intracranial hemorrhage, perioperative hypertension, subarachnoid hemorrhage associated cerebral vasospasm

Contraindications

- A. Aortic stenosis
- B. Asphyxia (perinatal)

Precautions:

- A. Congestive heart failure (CHF)
- B. Exacerbation of angina
- C. Hepatic or renal impairment
- D. Pheochromocytoma
- E. Portal hypertension

Complications

- A. Headache
- B. Hypotension
- C. Nausea and vomiting
- D. Tachycardia
- E. Peripheral edema
- F. Less frequent adverse effects include ECG abnormalities, postural hypotension, premature ventricular contractions, injections site reactions, dizziness, sweating, and polyuria

Over dosage

- A. Symptoms include: Marked hypotension, bradycardia, palpitations, flushing, drowsiness, confusion, or slurred speech
- B. Contact Medical Control with signs of overdose
- C. Calcium gluconate slow IV push may reverse the calcium blocking effects
- D. Vasopressors are indicated for patients exhibiting profound hypotension

Concentration

- A. Premixed: 40mg/200mL bag for emergent situations
- B. Mixed:
 1. 66mL is removed from a 250mL NS IV bag
 2. 40mg (16mL) is added to the NS IV bag
 3. Final concentration is 0.2mg/mL

Procedure

- A. Starting rate: 5 mg/hour IV infusion
- B. Titrate by 2.5 mg/hour every 5 to 15 minutes; maximum rate of 15 mg/hour = 75mL/hour
- C. Suggested maintenance rate: 3 mg/hour IV = 15mL/hour (after reaching BP goal)

Monitoring

- A. Blood pressure
- B. Heart rate
- C. ECG/12-lead

Infusion rate for standard IV concentration of 0.2 mg/mL	
Dose rate	Volume rate
3 mg/hour	15 mL/hour
5 mg/hour	25 mL/hour
7.5 mg/hour	38 mL/hour
10 mg/hour	50 mL/hour
12.5 mg/hour	63 mL/hour
15 mg/hour	75 mL/hour

Commented [JO17]: Why did all this guidance get deleted?

Commented [WC18R17]: To be more consistent with the SASMC facility guide. Also, is this still the recommended parameters?

3090 CARDIZEM (DILTIAZEM)

Cardizem (diltiazem)	B	IV/ A	I	P	P+	Adv
Infusion maintenance – Written physician order					X	X

Action:

- A. Calcium channel inhibition in cardiac pacemaker cells lowers atrioventricular (AV) node conductivity
- B. Decreases peripheral vascular resistance and causes relaxation of the vascular smooth muscle resulting in a decrease of both systolic and diastolic blood pressure

Indications:

- A. Control of ventricular rates in the interfacility transfer setting due to:
 - 1. PSVT
 - 2. Atrial flutter
 - 3. Atrial fibrillation

Contraindications:

- A. Wide complex tachycardia
- B. Hypotension
- C. Second degree AV block
- D. Third degree AV block

Complications:

- A. Bradycardia
- B. AV blocks
- C. Chest pain
- D. Syncope
- E. Dizziness
- F. Headache
- G. Nausea and vomiting

Concentration

- A. Diltiazem 125 mg/25mL vial is attached to AddEase adapter, then attached to 100 mL NS bag to activate and mix
- B. Final concentration is 1mg/mL

Procedure:

- A. Follow the sending physician orders
- B. Document amount of bolus dose (if administered) prior to arrival
- C. Typical dose range is 5-15mg/hr

Monitoring

- A. ECG

3100 DOPAMINE

Dopamine	B	IV/ A	I	P	P+	Adv
Infusion maintenance and titration – Written physician order					X	X

Description

- A. Dopamine is chemically related to epinephrine and norepinephrine. It is an α - and β -adrenoceptor agonist
- B. β -agonism produces positive inotropic and chronotropic effects on the myocardium, thus increasing heart rate and cardiac contractility
- C. α -agonism produces vasoconstriction and increased blood pressure
- D. Dominant effect is dependent on dose:
 1. Low dose (2-5 mcg/kg/min): increase renal blood flow and urine output
 2. Moderate dose (5–10 mcg/kg/min): increased renal blood flow, heart rate, myocardial contractility, and cardiac output (β effect)
 3. High dose (more than 10 mcg/kg/min): potent vasoconstriction and increased blood pressure (α effects)

Indications

- A. Septic shock
- B. Cardiogenic shock
- C. Congestive heart failure (CHF)
- D. Decreased cardiac output
- E. Shock due to myocardial infarction, trauma or open heart surgery
- F. Renal failure

Contraindications

- A. Pheochromocytoma
- B. Tachyarrhythmias/ventricular fibrillations

Precautions

- A. Angina pectoris
- B. Ventricular arrhythmias
- C. Extravasation (may cause tissue necrosis)
- D. Hypovolemia
- E. Occlusive vascular disease
- F. Recent use of monoamine oxidase inhibitors (MAOIs)
- G. Sensitivity to sulfites

Adverse Reactions

- A. Dose-related tachydysrhythmias
- B. Hypertension
- C. Increased myocardial oxygen demand

Concentration

- A. Premix: 400mg/250mL D5W
- B. Mix: Add 400mg to 250mL D5W
- C. Concentration: 1600mcg/mL

Dosage and Administration

- A. Initial IV infusion rate: 2-5 mcg/kg/min by continuous infusion (may start higher depending on the clinical situation)
- B. Titrate in 5-10 mcg/kg/min increments to desired effect
- C. Maximum infusion rate: 50 mcg/kg/min

Special Considerations

- A. May become ineffective if added to solutions containing alkaloids
- B. At low doses, decreased blood pressure may occur due to peripheral vasodilatation. Increasing infusion rate will correct this.
- C. Tissue extravasation at the IV site can cause skin sloughing due to vasoconstriction. Be sure to make Emergency Department personnel aware if there has been any extravasation of dopamine-containing solutions, so that proper treatment can be instituted.
- D. Can cause hypertensive crisis in susceptible individuals

E. Certain antidepressants potentiate the effects of this drug. Check for medications or other medications that are being used, especially monoamine oxidase inhibitors (MAOIs).

Infusion Rate Table

mcg/kg/min	1	2	3	4	5	6	7	8	9	10	15	20	25	30	35	40	50
Wt (kg) ↓	*****Infusion rate below is in mL/hr using 400 mg/250 mL (1600 mcg/mL drip)*****																
40	2	3	5	6	8	9	11	12	14	15	23	30	38	45	53	60	75
45	2	3	5	7	8	10	12	14	15	17	25	34	42	51	59	68	84
50	2	4	6	8	9	11	13	15	17	19	28	38	47	56	66	75	94
55	2	4	6	8	10	12	14	17	19	21	31	41	52	62	72	83	103
60	2	5	7	9	11	14	16	18	20	23	34	45	56	68	79	90	113
65	2	5	7	10	12	15	17	20	22	24	37	49	61	73	85	98	122
70	3	5	8	11	13	16	18	21	24	26	39	53	66	79	92	105	131
75	3	6	8	11	14	17	20	23	25	28	42	56	70	84	98	113	141
80	3	6	9	12	15	18	21	24	27	30	45	60	75	90	105	120	150
85	3	6	10	13	16	19	22	26	29	32	48	64	80	96	112	128	159
90	3	7	10	14	17	20	24	27	30	34	51	68	84	101	118	135	169
95	4	7	11	14	18	21	25	29	32	36	53	71	89	107	125	143	178
100	4	8	11	15	19	23	26	30	34	38	56	75	94	113	131	150	188
105	4	8	12	16	20	24	28	32	35	39	59	79	98	118	138	158	197
110	4	8	12	17	21	25	29	33	37	41	62	83	103	124	144	165	206
115	4	9	13	17	22	26	30	35	39	43	65	86	108	129	151	173	216
120	5	9	14	18	23	27	32	36	41	45	68	90	113	135	158	180	225
125	5	9	14	19	23	28	33	38	42	47	70	94	117	141	164	188	234
130	5	10	15	20	24	29	34	39	44	49	73	98	122	146	171	195	244

3110 EPINEPHRINE INFUSION

Epinephrine Infusion for Interfacility Transport	B	IV/ A	I	P	P+	Adv
Infusion maintenance and titration – Written physician order					X	X

Action

- A. α and β -adrenergic agonist
- B. Causes vasoconstriction through its effect on α -adrenergic receptors
- C. Induces bronchial smooth muscle relaxation through action on β -adrenergic receptors

Indications

- A. For 911 response - refer to DMEMSMD protocols
- B. Interfacility transport - Circulatory shock

Contraindications

- A. Cardiac dilatation and coronary insufficiency (injection)
- B. Shock (non-anaphylactic)
- C. Where vasopressor drugs are contraindicated: thyrotoxicosis, diabetes, in obstetrics when maternal blood pressure is in excess of 130/80, hypertension
- D. Labor; may delay the second stage (injection)
- E. Narrow-angle glaucoma
- F. Organic brain damage

Precautions

- A. Asthma (long-standing) and emphysema with degenerative heart disease
- B. Cardiac arrhythmias, coronary insufficiency, organic or ischemic heart disease
- C. Concurrent use with drugs which may sensitize the heart to arrhythmias (eg, digitalis, mercurial diuretics, quinidine)
- D. Concurrent use with MAOI or tricyclic antidepressants, sympathomimetic drugs
- E. Chronic conditions: diabetes, elderly, hypertension, peripheral constriction and cardiac stimulation, seizures, thyroid disease, prostatic hypertrophy
- F. Hypersensitivity to sulfites
- G. Pregnancy

Side Effects/Adverse Reactions

- A. Common
 - 1. Palpitations/ Tachyarrhythmia
 - 2. Dyspnea
 - 3. Tremor
 - 4. Anxiety
 - 5. Dizziness
 - 6. Sweating
- 7. Asthenia
- 8. Nausea/vomiting
- 9. Headache/ Eye pain
- B. Serious
 - 1. Cardiac dysrhythmia
 - 2. Hypertensive crisis
 - 3. Pulmonary edema

Concentration

- A. 4 mg/250 mL NS

- B. Final concentration = 16 mcg/mL

Dosing and Administration

- A. Initial infusion rate: 1 mcg/min, titrated to response/goal mean arterial pressure (MAP)
B. Usual range: 2-10 mcg/min

Monitoring

- A. ECG/continuous cardiac monitoring
B. Blood pressure, heart rate, respiratory rate

Continuous IV infusion (4mg/250 mL) (16 mcg/mL)	
Dose	Infusion rate
1 mcg/min	4 mL/hour
2 mcg/min	8 mL/hour
3 mcg/min	11 mL/hour
4 mcg/min	15 mL/hour
5 mcg/min	19 mL/hour
6 mcg/min	23 mL/hour
7 mcg/min	26 mL/hour
8 mcg/min	30 mL/hour
9 mcg/min	34 mL/hour
10 mcg/min	38 mL/hour

3120 HEPARIN

Heparin	B	IV/A	I	P	P+	Adv
Infusion maintenance – Written physician order					X	X

Action:

- A. Inhibits reactions that lead to the clotting of blood and thrombus formation
- B. Inhibits further coagulation once a thrombus has formed by inactivating thrombin, preventing the conversion of fibrinogen to fibrin

Indications:

- A. Heparin is frequently administered as an anticoagulant to prevent blood clotting in the setting of ischemic coronary disease, pulmonary embolism, or peripheral vascular conditions such as deep vein thrombosis.

Contraindications:

- A. Severe thrombocytopenia
- B. Active bleeding

Complications:

- A. Hemorrhage from any site may occur
- B. Hypersensitivity signs and symptoms
- C. If any condition occurs, discontinue the infusion and notify the receiving facility.

Procedure:

- A. Cardiac heparin infusion:
 - 1. Bolus: 60 units/kg IV x1 (rounded to nearest 500 units, maximum dose 4000 units)
 - 2. Continuous infusion: 12 units/kg/hour, round to nearest 50 units
 - a. Max initial rate: 1000 units/hour
 - b. Titrate per protocol from facility system; adjusted per anti-Xa levels
 - c. Do not exceed 1000 units/hour if patient has received thrombolytics

Weight (kg)	Bolus: 60 units/kg rounded to nearest 500 units (units)	Starting infusion dose: 12 units/kg/hour rounded to nearest 50 units (units/hr)	Starting rate (mL/hour)
40	2500	500	10
45	2500	550	11
50	3000	600	12
55	3500	650	13
60	3500	700	14
65	4000	800	16
70	4000	850	17
75	4000	900	18
80	4000	950	19
85	4000	1000	20
90	4000	1000	20
95	4000	1000	20
100 and over	4000	1000	20

C. Neurology infusion: No bolus

1. Continuous infusion: 12 units/kg/hour, round to nearest 50 units
 - a. Max initial rate: 1000 units/hour
 - b. Titrate per protocol from facility system; adjusted per anti-Xa levels
 - c. Use premixed drug (0.45% NaCl) for first bag; change to NS as diluent for ongoing bags (made in pharmacy)

Weight (kg)	Starting infusion dose: 12 units/kg/hour rounded to nearest 50 units (units/hr)	Starting rate (mL/hour)
40	500	10
45	550	11
50	600	12
55	650	13
60	700	14
65	800	16
70	850	17
75	900	18
80	950	19
85	1000	20
90	1000	20
95	1000	20
100 and over	1000	20

D. DVT/PE heparin infusion:

1. Bolus: 80 units/kg IV x 1, round to nearest 500 units (maximum dose: 10,000 units)
2. Continuous infusion: 18 units/kg/hour, round to nearest 50 units
 - a. Max initial rate: 2000 units/hour
 - b. Titrate per protocol from facility system; adjusted per anti-Xa levels

Weight (kg)	Bolus: 80 units/kg rounded to nearest 500 units (units)	Starting infusion dose: 18 units/kg/hour rounded to nearest 50 units (units/hr)	Starting rate (mL/hour)
40	3000	700	14
45	3500	800	16
50	4000	900	18
55	4500	1000	20
60	5000	1100	22
65	5000	1150	23
70	5500	1250	25
75	6000	1350	27
80	6500	1450	29
85	7000	1550	31
90	7000	1600	32
95	7500	1700	34
100	8000	1800	36
105	8500	1900	38
110	9000	2000	40

115	9000	2000	40
120	9500	2000	40
125	10000	2000	40
130	10000	2000	40

- E. Low Molecular Weight Heparin
1. Administered subcutaneously; must be administered by sending facility prior to transport
 2. Monitor for effects of medication during transport
 3. **Contact Medical Control** with any adverse events

Monitoring

- A. ECG
- B. 12-lead

3130 INSULIN

Insulin	B	IV/A	I	P	P+	Adv
Infusion maintenance – Written physician order				X	X	X

Mechanism of Action/Pharmacology:

- A. Hormone involved in storage, metabolism, and uptake of carbohydrates, protein and fat
- B. Stimulates protein and free fatty acid synthesis and promotes conversion of glucose to glycogen
- C. Directly lowers glucose level by increasing uptake into tissues and reducing releasing glucose stores from the liver

Indications:

- A. Diabetic ketoacidosis
- B. Hyperglycemia
- C. May be used with dextrose solutions to treat patients with hyperkalemia

Contraindications:

- A. Hypoglycemia
- B. Hypokalemia
- C. The transporting ambulance must have a functioning glucometer for evaluation of blood sugar during the transport.

Precautions:

- A. Alcohol and salicylates may potentiate the effects of insulin.
- B. Pregnancy and lactation
- C. Patients with decreased insulin requirements:
 - 1. Diarrhea
 - 2. Nausea/vomiting
 - 3. Malabsorption
 - 4. Hypothyroidism
 - 5. Renal impairment
 - 6. Hepatic impairment
- D. Patients with increased insulin requirements:
 - 1. Fever
 - 2. Hyperthyroidism
 - 3. Trauma
 - 4. Infection
 - 5. Surgery

Side Effects/Adverse Reactions

- A. Hypoglycemia
- B. Injection site reaction
- C. Lipodystrophy (long-term use)

Concentration

- A. 100 units/100 mL NS

Dosing/Administration:

- A. Obtain printed copy of dose adjustment order set from sending facility. This must be printed at the sending facility.
- B. If the patient received a loading dose of insulin document on the patient care report including how much was administered.
- C. Refer to the dose adjustment order sets for how often blood glucose should be checked with resulting indication for insulin adjustment per the order set.
- D. Refer to dose adjustment order set for details about when the infusion should be stopped altogether.
 - 1. Starting dose of insulin is the result of a complex equation that considers blood glucose and weight.
 - 2. In the absence of the dose adjustment order set, the usual dose of insulin is:
 - a. Adult: 0.1units/kg/hour
 - b. Pediatric: 0.1units/kg/hour

Monitoring:

- A. Symptoms of hyperglycemia, ketosis, and hypoglycemia
- B. Blood glucose tests at least every 30 minutes or per the dose adjustment order set

Infusion Rate:

Use standard drip (1 unit/mL)

Drip rate (100 units/100 mL) Standard drip concentration	
Units/hour	mL/hour
0.5	0.5
1	1
1.5	1.5
2	2
2.5	2.5
3	3
3.5	3.5
4	4
4.5	4.5
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
16	16
17	17
18	18
19	19
20	20

Commented [JO19]: I think this should stay.

3140 KETAMINE

Insulin	B	IV/A	I	P	P+	Adv
Bolus for analgesia/sedation with mechanical ventilation – Written physician order						X

Action

- A. Ketamine is a dissociative anesthetic agent, structurally similar to phencyclidine (PCP). It is unique among sedative agents in that it provides analgesia along with amnestic and sedative effects
- B. Onset of action
 - 1. Time to effect – 45 to 60 seconds
 - 2. Duration of action – 10 to 20 minutes

Indications

- A. Analgesic and sedation agent for maintenance of intubation with mechanical ventilation

Contraindications

- A. Known hypersensitivity to the drug
- B. Penetrating eye trauma is a relative contraindication

Precautions

- A. Caution should be used in the hypertensive patient
- B. Caution should be used in the patient with existing tachyarrhythmias

Complications

- A. Laryngospasm: this very rare adverse reaction presents with stridor and respiratory distress
- B. Emergence reaction: presents as anxiety, agitation, apparent hallucinations or nightmares as ketamine is wearing off. For severe reactions, consider benzodiazepine
- C. Nausea and Vomiting: always have suction available after ketamine administration.
- D. Hypersalivation: Suction usually sufficient. If profound hypersalivation causing airway difficulty, administer atropine 0.5 mg IV

Procedure

- A. Dose
 - 1. Maintenance dose: 0.25-0.5 mg/kg IV every 5-10 minutes or with [signs of undersedation](#)

3150 LIDOCAINE

Lidocaine	B	IV/A	I	P	P+	Adv
Infusion maintenance – Written physician order					X	X

Action:

- A. It is a class 1B antiarrhythmic medication
- B. It suppresses the automaticity in the Bundle of HIS-Purkinje system by suppressing spontaneous depolarization of the ventricles during diastole, slowing down the rate of contraction.

Indications:

- A. To treat ventricular arrhythmias

Contraindications:

- A. Sinus bradycardia
- B. Heart block
- C. Known hypersensitivity to the drug
- D. Administer with caution:
 - 1. Congestive heart failure
 - 2. Liver disease
 - 3. Elderly

Complications:

- A. Signs and symptoms of toxicity:
 - 1. Dizziness
 - 2. Tinnitus (ringing in the ears)
 - 3. Tremulousness
 - 4. Agitation
 - 5. Seizures
- B. Cardiovascular side effects:
 - 1. Exacerbation of heart block
 - 2. Hypotension
 - 3. Bradycardia
 - 4. May speed the ventricular rate in patients with atrial fibrillation

Procedures:

- A. Infusions of 1-4 mg/min are acceptable, maximum of 300mg total dose per hour
 - 1. The usual initial maintenance dose of lidocaine is 2 mg/min
 - 2. Slower rates should be used in patients with liver disease or congestive heart failure

Concentration

- A. Typically, a maintenance infusion of lidocaine is 2 grams of lidocaine in 250 cc D5W for a concentration of 8 mg/cc; therefore, the drip rates should be:

mg/min	mL/hr
1	7.5
1.5	11.25
2	15
3	22.5
4	30

- B. In cases of lidocaine toxicity the medication drip should be discontinued immediately and the patient should be treated with supportive measures
 - 1. Administer atropine for heart block and prepare for pacing
 - 2. Administer diazepam for seizures

Monitoring:

- A. Monitor for signs and symptoms of malignant hyperthermia
- B. ECG to detect for lidocaine toxicity
- C. Watch for CNS depression

Commented [WC20]: Table added!

Commented [WC21]: Wording seems off.

3160 MAGNESIUM SULFATE

Magnesium sulfate	B	IV/A	I	P	P+	Adv
Infusion maintenance – Written physician order					X	X

Action:

- A. Decreases the amount of acetylcholine released at the myoneuronal junction, resulting in depression of neuromuscular transmission.
- B. Depressant effect on smooth muscle and may cause central nervous system (CNS) depression
- C. Causes coronary vasodilation, reduction in peripheral vascular resistance, platelet aggregation inhibition, and an effect on the calcium current
- D. Decreases myometrial contractility by altering calcium uptake, binding, and distribution in smooth muscle cells
- E. Increases uterine blood flow secondary to vasodilation of uterine vessels

Indications:

- A. To inhibit preterm labor (tocolysis)
- B. Pregnancy induced hypertension
- C. Other magnesium deficiencies as per written sending order

Contraindications:

- A. Patients with myocardial damage
- B. Heart block
- C. Administer with caution:
 - 1. Impaired renal function
 - 2. Patients receiving CNS depressants or neuromuscular blocking agents

Complications:

- A. Signs and symptoms of magnesium toxicity include:
 - 1. Flushing
 - 2. Sweating
 - 3. Hypotension
 - 4. Sedation
 - 5. Confusion
 - 6. Decreased or absent reflexes
 - 7. Heart block
 - 8. Respiratory paralysis

Procedures:

- A. Calcium gluconate or calcium chloride must be available when transporting magnesium sulfate drips
- B. Infusion rates will be ordered by the treating physician
- C. Typical infusion range is 2 g/hour for OB patients, 1g/hour for magnesium deficiencies (range 1-4g/hour)
- D. Reflexes and signs of muscle weakness should be assessed during transport every 15 minutes. Notify the receiving facility if reflexes decrease while en-route.

Assessment of Reflexes	Score
None	0
Sluggish	+1
Normal	+2
Brisk	+3
Brisk/Transient clonus (fades away)	+4
Brisk/Sustained clonus (remains with continued pressure on the foot)	+5

- E. In case of magnesium toxicity, discontinue the infusion, administer [calcium per protocol](#) and notify the receiving facility

Monitoring

- A. Urine output
- B. Level of consciousness
- C. Respiratory rate/breath sounds
- D. Pulse oximetry
- E. Patellar/deep tendon reflexes
- F. Muscle weakness
- G. Magnesium deficiency: symptomatic improvement
- H. Cardiac monitoring (QT prolongation)

Commented [J022]: Edit to be more inclusive

Commented [J023]: WORDSMITH PLEASE!

Commented [WC24R23]: No wordsmith needed! Looks good.

Commented [J025]: Add more to this?

3170 MULTIVITAMIN INFUSION

Multivitamin infusion	B	IV/A	I	P	P+	Adv
Infusion maintenance – Written physician order				X	X	X

Indications:

- A. As a daily multivitamin supplement for patients receiving parenteral nutrition
- B. Most commonly, multivitamin infusions (MVI) will be given to patients suspected of being malnourished (e.g. chronic alcoholics).
- C. For magnesium or potassium, refer to specific protocol.

Contraindications:

- A. Preexisting hypervitaminosis
- B. Known hypersensitivity to any vitamins or other ingredients
- C. These will have been previously considered by the treating physician

Precautions:

- A. Not physically compatible with alkaline solutions or moderately alkaline drugs; tetracycline; or ampicillin. Avoid y-site administration in these circumstances.
- B. Infusion rate should be slowed if any burning or irritation occurs at the infusion site.

Administration:

- A. Multivitamins may be mixed into normal saline, lactated ringer's, or dextrose solutions.
- B. Carefully note the size of the bag and what is in the mix, including amounts of thiamine, folate, potassium, magnesium, and dextrose.
 - 1. In particular, note amount of potassium being infused. Usual amount is 20 mEq of potassium.
 - 2. Refer to [potassium](#) protocol for ECG monitoring requirements
- C. Administration via infusion pump recommended, however, follow [potassium](#) protocol for infusion pump requirements for solutions containing [potassium](#).
- D. Maintain at ordered rate, generally 100 to 120 mL/hr but no faster than 500 mL/hr.

3180 NITROGLYCERIN

Nitroglycerin	B	IV/A	I	P	P+	Adv
Infusion maintenance and titration – Written physician order					X	X
Paste maintenance – Written physician order				X	X	X

Action:

- A. Smooth muscle relaxation and consequent dilation of peripheral arteries and veins
- B. Results in:
 - 1. Pooling of blood
 - 2. Decreased left ventricular end diastolic pressure and wedge pressure (preload)
 - 3. Coronary artery dilation

Indications:

- A. Ischemic coronary states
- B. Hypertension

Contraindications:

- A. Hypersensitivity
- B. Patients taking erectile dysfunction medications
- C. Administer with caution:
 - 1. Evidence of right ventricular infarction
 - 2. Hypotension
- D. Rapid withdrawal of nitroglycerin infusion may result in worsening of ischemia

Procedure:

- A. Nitroglycerin is a concentrated drug that should be administered after dilution. Usual mixtures include:
 - 1. 50mg in 500mL of D5W or NS (100mcg/mL concentration)
 - 2. 50mg in 250mL of D5W or NS (200mcg/mL concentration)
- B. Maintain infusion rate ordered by sending physician
- C. Infusion rates may be increased by physician order. Obtain order for parameters for titration and maximum dosing. Nitroglycerin rate may be increased for:
 - 1. Worsening ischemic chest pain
 - 2. Hypertension
- D. Dosing and administration
 - 1. Hypertension
 - a. Starting IV rate: IV: 5 mcg/min
 - b. Increase rate by 5 mcg/min every 3-5 minutes as needed up to 20 mcg/min
 - c. If no response at 20 mcg/min, increase by 10 mcg/min every 3-5 minutes up to maximum of 100 mcg/min
 - 2. Unstable angina and congestive heart failure associated with AMI
 - a. Starting IV rate: 10-20 mcg/min
 - b. Increase by 5-10 mcg/min every 5-10 minutes until desired hemodynamic response
 - c. Maximum dose usually 100 mcg/min
- E. Treatment goals of IV nitroglycerin
 - 1. Relief of ischemic chest discomfort
 - a. Titrate to effect
 - b. Keep SBP greater than 90 mmHg
 - c. Limit drop in SBP to 30 mmHg below baseline in hypertensive patient
 - 2. Improvement of pulmonary edema and hypertension
 - a. Titrate to effect
 - b. Limit drop in SBP to 10% of baseline in normotensive patients
 - c. Limit drop in SBP to 30 mmHg below baseline in hypertensive patients

Necessary Flow Rates (mL/hr)		
Desired Dose (mcg/min)	Solution Concentration (mcg/mL)	
	100	200
5	3	1.5
10	6	3
15	9	4.5
20	12	6
30	18	9
40	24	12
50	30	15
60	36	18
70	42	21
80	48	24
90	54	27
100	60	30

Notes

- A. Nitrates absorb in plastic so the amount of drug exiting the IV tubing may be much less than the amount entering the tubing
- B. Decrease the infusion rate by half if a systolic blood pressure <100mmHg or signs of poor perfusion occur which may include:
 - 1. Pallor
 - 2. Sweating
 - 3. Decreased capillary refill
 - 4. Decreased mental alertness
- C. Notify the receiving facility in the event of complications.
- D. If paste, document dose. Monitor as for drip; remove paste if needed.

Monitoring

- A. The patient should be observed clinically for:
 - 1. Pain relief
 - 2. Blood pressure changes
 - 3. Other signs of poor perfusion
 - 4. Tachycardia, which should be avoided if possible when trying to reduce myocardial demand
- B. Blood pressure every 2 minutes during titration, then every 10 minutes
- C. ECG
- D. 12-lead

Written Orders

- A. Initial rate
- B. Target mean arterial pressure (MAP)
- C. Indications to adjust rate up or down
- D. Maximum dosing

3190 NOREPINEPHRINE (LEVOPHED)

Norepinephrine (Levophed)	B	IV/A	I	P	P+	Adv
Infusion maintenance and titration – Written physician order					X	X

Action:

- A. Norepinephrine is a catecholamine with potent alpha-adrenergic vasoconstriction and beta-adrenergic action
- B. α - and β -adrenergic activity:
 - 1. α – effect: peripheral vasoconstriction,
 - 2. β -effect: inotropic stimulation of the heart and coronary artery vasodilation
- C. Vasoconstrictive properties are used to treat hypotension caused by low peripheral vascular resistance such as septic shock

Indications:

- A. This protocol is for maintenance of hospital supplied medication or hospital initiated medication during interfacility transport only.
- B. Symptomatic hypotension

Contraindications:

- A. Norepinephrine is contraindicated in hypovolemic/hemorrhagic shock. Any pressor agent worsens tissue hypoxia in hypovolemia (e.g. diuretics and poor intake).

Precautions

- A. Pregnancy class C: Use in pregnancy only if clearly needed.
- B. Profound hypoxia or hypercarbia
- C. Concurrent MAOI or tricyclic antidepressant therapy
- D. Sulfite allergy
- E. In case of infusion site extravasation – watch for tissue sloughing
- F. Mesenteric or peripheral vascular thrombosis

Dosing:

- A. Concentration:
 - 1. 8 mg/250 mL NS; final concentration 32 mcg/mL
 - 2. Administer into a central vein (preferred) or large vein (e.g., antecubital)
- B. Hypotension (standard) dosing:
 - 1. Initial: 8-12 mcg/minute continuous IV drip (maintenance dose usually 2-4 mcg/minute)
 - 2. Titrate up or down one or two dose ranges not faster than every 2 minutes on the chart to maintain a MAP of >65, HR <140bpm – per sending physician orders, maximum 30 mcg/min
 - 3. Refractory shock patients may require 8 to 30 mcg/min
 - 4. Titrate down or off slowly

mcg/minute (standard) dosing chart using 8 mg/250 mL (32 mcg/mL) standard IV drip															
mcg/min	1	2	3	4	5	6	7	8	9	10	11	12	15	20	30
mL/hour	1.9	3.8	5.6	7.5	9.4	11.3	13.1	15.0	16.9	18.8	20.6	22.5	28.1	37.5	56.3

- C. Sepsis (weight based) dosing – See dosing table on next page:
 - 1. Weight based dosing: 0.1-0.5 mcg/kg/min (concentration 8 mg/250 mL; 32 mcg/mL)
 - 2. Titrate up one or two dose ranges not faster than every 2 minutes on the chart to maintain a MAP of >65, HR <140bpm – per sending physician orders
 - 3. Titrate down or off slowly

Commented [J026]: Should be 0.1 – 0.5 mcg/kg/min

Commented [WC27R26]: It is in chpt 2 now so does not need a waiver or be reviewed by EMPAC. FYI, this is the

mcg/kg/minute (alternative weight-based) dosing chart using 8 mg/250 mL (32 mcg/mL) standard IV drip					
mcg/kg/min	0.1	0.2	0.3	0.4	0.5
Wt (kg) ↓	Infusion rate below is mL/hour using 8mg/250 mL (32 mcg/mL) drip				
40	7.5	15.0	22.5	30.0	37.5
45	8.4	16.9	25.3	33.8	42.2
50	9.4	18.8	28.1	37.5	46.9
55	10.3	20.6	30.9	41.3	51.6
60	11.3	22.5	33.8	45.0	56.3
65	12.2	24.4	36.6	48.8	60.9
70	13.1	26.3	39.4	52.5	65.6
75	14.1	28.1	42.2	56.3	70.3
80	15.0	30.0	45.0	60.0	75.0
85	15.9	31.9	47.8	63.8	79.7
90	16.9	33.8	50.6	67.5	84.4
95	17.8	35.6	53.4	71.3	89.1
100	18.8	37.5	56.3	75.0	93.8
105	19.7	39.4	59.1	78.8	98.4
110	20.6	41.3	61.9	82.5	103.1
115	21.6	43.1	64.7	86.3	107.8
120	22.5	45.0	67.5	90.0	112.5
125	23.4	46.9	70.3	93.8	117.2
130	24.4	48.8	73.1	97.5	121.9

Dark shaded areas of chart are rates that exceed usual maximum dose of 30 mcg/min

- D. Pediatric Dosing:
1. Begin infusion at 0.1 mcg/kg/min, titrate to effect or a max of 2 mcg/kg/min
 2. Titrate only per sending physician orders

Monitoring

- A. Blood pressure every 2 minutes until target blood pressure is obtained, then every 5 minutes
- B. IV site for signs of extravasation which can cause skin sloughing due to vasoconstriction. Notify receiving facility if there has been any extravasation of a norepinephrine solution so that proper treatment is instituted.
- C. Signs of organ perfusion ie: urine flow
- D. ECG
- E. 12-lead

Side effects and Special Notes:

- A. Common side effects:
 1. Bradycardia
 2. Hypertension – hypertensive crisis in susceptible individuals
 3. Extravasation injury / necrosis
 4. Nausea/vomiting
 5. Confusion
 6. Headache
 7. Tremor/anxiety/restlessness.
- B. Norepinephrine can induce tachydysrhythmias. If the heart rate exceeds 140, consult base physician.
- C. Tissue extravasation at the IV site can cause skin sloughing due to vasoconstriction. Notify receiving facility if there has been any extravasation of a norepinephrine solution so that proper treatment is instituted..
- D. Norepinephrine can cause hypertensive crisis in susceptible individuals
- E. Certain antidepressants such as a MAOI potentiate the effects of norepinephrine

Written Orders

- A. Initial rate
- B. Target to mean arterial pressure (MAP)
- C. Indications to adjust rate up or down

Commented [WC28]: Not currently in protocol but was in draft. Keep?

Commented [JO29R28]: yes

3200 OXYTOCIN

Oxytocin	B	IV/A	I	P	P+	Adv
Infusion Maintenance – Written physician order				X	X	X

Action

- A. Uterine stimulant, uterine vascular constrictor.
- B. Antidiuretic effect.
- C. Shifts calcium into uterine myofibril segments, increasing contraction strength.
- D. Increases uterine prostaglandin release, increasing contraction strength.

Indications

- A. Postpartum hemorrhage control

Contraindications

- A. Known hypersensitivity to oxytocin or any of its components
- B. Active pregnancy in-utero.

Complications

- A. Hypotension is the most common side effect to aggressive administration rapidly, though often hypotension is due to blood loss rather than medication.
- B. Acute hyponatremia from excessive antidiuretic effect if given in large doses or for prolonged periods, especially if given with free water rather than saline or lactated ringers.

Administration

- A. Maintenance infusion
 - 1. 30 units in 500mL normal saline is standard.
 - 2. IV Bolus is 10 units, or 167mL, over 30 minutes.
 - 3. Followed by maintenance drip of 5.7 units per hour until final 20 units are given. Total time is 30 minute bolus + 3.5 hour infusion.
- B. Intramuscular bolus (10 units) can be followed by same maintenance infusion schedule.

Procedure

- A. Determine if sending facility gave IV or IM bolus.
- B. Document amount of bolus dose administered prior to arrival.
- C. Continuous infusion to follow bolus dosing. (As detailed in administration)
- D. Maximum daily dose: 40 units

Monitoring

- A. Blood Pressure, heart rate.
- B. Amount of vaginal bleeding.
- C. Mental status.

3210 PARENTERAL NUTRITION

Parenteral Nutrition	B	IV/A	I	P	P+	Adv
Infusion maintenance – Written physician order					X	X

Abbreviations:

- A. PN – Parenteral Nutrition
- B. TPN – Total Parenteral Nutrition; administered via central line
- C. PPN – Peripheral Parenteral Nutrition; administered via peripheral intravenous line
- D. CVC/PICC – Central Venous Catheter/Peripheral Intravenous Central Catheter; TPN may be administered through both types of central venous lines

Description:

- A. Parenteral Nutrition (PN) is feeding a patient intravenously
- B. PN may contain any combination of salts, glucose, amino acids, lipids, and vitamins; it is mixed based on the patient's nutritional needs
- C. Total Parenteral Nutrition (TPN) means the patient is receiving nutrition intravenously only; no food/nutrition is given by other routes

Indications:

- A. To prevent the adverse effects of malnutrition in patients who are unable to obtain adequate nutrients by oral or enteral routes

Contraindications:

- A. The treating physician will have considered the contraindications to TPN administration

Procedure:

- A. Review the following before transporting:
 - 1. Verify there is a sending physician order for TPN infusion; the physician may order as per orders on the parenteral nutrition formulations physician order form
 - 2. Determine if blood glucose should be monitored and how frequently
 - 3. Obtain a copy of the parenteral nutrition formulations physician order form for your documentation and a second copy for the receiving facility
 - 4. Ask for D10W from the sending facility to transport with the patient
 - 5. Document the patient's weight
- B. Inspect the PN container/formulation
 - 1. Look for leaks, color changes, emulsion cracking, or precipitates
 - 2. If any present, discontinue the infusion
- C. Review the PN label
 - 1. Verify the patient's name
 - 2. Expiration date
 - 3. The formulation matches the parenteral nutrition formulations physician order form
 - 4. **NOTE IF THERE IS INSULIN IN THE FORMULATION**
- D. PN can only be administered by infusion pump with an in-line filter
 - 1. 1.2 micron filter below lipid emulsion insertion at the Y-site
 - 2. 0.22 micron filter if no lipid emulsion
- E. Maintain infusion rate ordered by sending physician
- F. Document input/output amounts prior to and during transport
- G. If the PN infusion is discontinued, follow these steps:
 - 1. Flush CVC lines with 10 mL of fluid and PICC lines with 30 mL of fluid
 - 2. Insulin lasts longer than glucose, so immediately start an infusion of D10W at the TPN ordered rate. It does not need to run in the same line as the TPN.
 - 3. Contact the sending physician for additional orders
- H. If any complications contact the sending physician and notify the receiving facility

Notes

- A. Treat hypoglycemia per protocol
- B. Watch for signs of infiltration and/or phlebitis if PN is administered through a peripheral line
- C. No medications are to be infused via the PN catheter unless otherwise ordered
- D. Aseptic technique is critical

1. Patients receiving PN have an increased risk of infection, usually due to having an indwelling central venous catheter
 2. Using a separate catheter or lumen to administer PN and minimizing manipulation of the catheter reduces the risk of infection
- E. Patients receiving PN for the first time may become hyperglycemic
- F. If an infusion of TPN has to be discontinued, D10W and D5W are administered since insulin is usually a component of TPN that even after being discontinued can cause hypoglycemia
- G. Insulin may be a component of the PN formulation
- H. Use of an in-line filter is required during the administration of PN formulations
1. Due to the multiple additives used in PN, a large number of particulates may contaminate the fluid
 2. A clogged filter and associated pump alarm is a sign of precipitate in the fluid
 3. NEVER REMOVE A CLOGGED FILTER AND ALLOW THE PN TO INFUSE WITHOUT A FILTER
 4. If the filter clogs, replace the drip set with an appropriate for PN filter set or hang D10W at the same rate.
 5. Lipid emulsion may not be administered thru PVC containers or administration set.

3220 POTASSIUM INFUSION

Potassium Infusion	B	IV/A	I	P	P+	Adv
Infusion maintenance – Written physician order					X	X

Indications

- A. Electrolytes may be infused when there is confirmed or suspected deficiencies
- B. In conjunction with an insulin infusion

Precautions

- A. Direct injection of any concentrated solution of potassium can be instantly fatal
- B. Exceeding the prescribed rates of potassium solutions may result in cardiac conduction abnormalities

Dose and Administration

- A. Use of an infusion pump is recommended in all situations and required with any dose exceeding 2.5mEq/hr
- B. Maximum infusion rate of potassium is 10 mEq/hr
- C. ECG monitor should be utilized for all potassium replacement therapy and is required when administered at 10 mEq/hr

3230 PROTONIX (PANTOPRAZOLE SODIUM)

Protonix (pantoprazole sodium)	B	IV/A	I	P	P+	Adv
Infusion maintenance – Written physician order					X	X

Action:

- A. Blocks the hydrogen/potassium adenosine triphosphatase enzyme system; acts specifically to block hydrogen production in the gastric lumen reducing acid production

Indications:

- A. Upper gastrointestinal bleeding

Contraindications:

- A. Sensitivity to pantoprazole or any of its components

Complications:

- A. Abdominal discomfort/pain
- B. Diarrhea
- C. Headache

Precautions

- A. Incompatible with midazolam – use separate line or flush before and after

Dosage and Administration:

- A. Concentration
 - 1. 0.8 mg/mL (80 mg/100 mL usually D5W)
- B. Administration
 - 1. Follow sending physician orders
 - 2. Typical dosing
 - a. Bolus: **SENDING FACILITY ONLY** (typically 80 mg IV)
 - b. Infusion rate: 8 mg/hour (10 mL/hour with a 0.8 mg/mL concentration)
 - 3. Titration of medication is not required

3240 REMDESIVIR (VEKLURY)

Remdesivir (VEKLURY)	B	IV/A	I	P	P+	Adv
Infusion maintenance – Written physician order					X	X

Mechanism of Action

- A. Remdesivir binds to viral RNA, inhibiting viral replication through premature termination of RNA transcription. In studies, remdesivir-treated subjects had lower virus levels in the lungs and less lung damage than in the control group.

Indications

- A. For the treatment of hospitalized COVID-19 patients

Contraindications

- A. Known clinically significant hypersensitivity reactions to the medication

Complications

- A. Hypersensitivity reactions, including infusion-related and anaphylactic reactions, have been reported during and following remdesivir administration. Signs/symptoms may include angioedema, bradycardia, diaphoresis, dyspnea, hypotension, hypertension, hypoxia, fever, nausea, rash, shivering, tachycardia, and wheezing; slowing infusion rate (maximum infusion time: 120 minutes) may be considered to potentially prevent these reactions.
- B. If the patient experiences pain during the infusion stop the infusion, elevate extremity, and apply warm compress.

Precautions

- A. May not be indicated for patients with decreased renal function
- B. Do not administer simultaneously with any other medication or IV solutions other than NS

Side Effects

- A. Nausea
- B. Increased AST and ALT

Procedure / Dosage and Administration

- A. Supply – supplied as a powder that is reconstituted in 20mL sterile water, then diluted to the following concentrations:
 - 1. 2mg/mL = 200mg mixed in 100mL NS OR
 - 2. 1mg/mL = 100mg mixed in 100mL NS
 - 3. Either dose could be diluted in 250mL NS instead
- B. Adult, weighing at least 40kg:
 - 1. Loading dose of 200mg on day 1
 - 2. 100mg on day 2-5 (not on mechanical ventilation)
 - 3. 100mg on day 2-10 (on mechanical ventilation)
- C. Pediatric (<12 years):
 - 1. Loading dose = 5mg/kg (max 200mg) on day 1
 - 2. 2.5mg/kg on day 2-5 (not on mechanical ventilation)
 - 3. 2.5mg/kg on day 2-10 (on mechanical ventilation)
- D. Infusion rate
 - 1. Infuse over 2 hours
 - a. 200mg / 100mL / 2 hours = 50 mL/hour
 - b. 100mg / 100mL / 2 hours = 50 ML/hour
- E. With clear written transport orders, may be infused over 30 minutes or 1 hour instead
 - a. If patient experiences hypersensitivity reaction, slow the rate of the infusion to over 2 hours
- F. After infusion complete, flush with 30mL NS at same infusion rate

Special Considerations

- A. Will be reconstituted and diluted by the sending facility pharmacy. Infusion MUST be completed within 24 hours of dilution.
- B. Infusion must be completed within 2 hours of initiation

3250 SANDOSTATIN (OCTREOTIDE ACETATE)

Sandostatin (octreotide acetate)	B	IV/A	I	P	P+	Adv
Infusion maintenance – Written physician order					X	X

Action:

- A. Effective in reducing hepatic blood flow, wedged hepatic venous pressure, and azygous blood flow by inhibiting the release of vasodilatory hormones, like glucagon, and promotes splanchnic vasoconstriction and decreased portal flow

Indications:

- A. Esophageal varices

Contraindications:

- A. Sensitivity to octreotide or any of its components

Complications:

- A. Abdominal discomfort/pain
- B. Diarrhea
- C. Nausea
- D. Backache
- E. Dizziness/headache

Precautions

- A. May affect blood glucose level in patients who have pre-existing diabetes or who may be at risk for developing Type I diabetes mellitus; consider baseline blood glucose level and be aware of the potential for changes in blood sugar

Dosage and Administration:

- A. Concentration
 - 1. 5 mcg/mL (500 mcg/100 mL usually D5W)
- B. Administration
 - 1. Follow sending physician orders
 - 2. Typical dosing
 - a. Bolus: **SENDING FACILITY ONLY** (typically 50 mcg IV)
 - b. Infusion rate: 50 mcg/hour (10 mL/hour with a 5 mcg/mL concentration)
 - 3. Titration of medication is not required

3260 TNKASE (TENECTEPLASE)

Tenecteplase (TNKase)	B	IV/A	I	P	P+	Adv
Monitor for effects post-administration				X	X	X

TNKase (Tenecteplase) is a thrombolytic administered for acute myocardial infarction as a single bolus over 5 seconds. The following protocol is to monitor for the effects of the administered medication. The administered TNKase (Tenecteplase) will still be active during the interfacility transport.

Action

- A. Tissue plasminogen activator (tPA)
- B. Administration of thrombolytic agents results in the dissolving of blood clots

Half-life

- A. Initial half-life – 20 to 24 minutes
- B. Terminal phase half-life – 90 to 130 minutes

Indication

- A. Acute myocardial infarction

Contraindications

- A. Active internal bleeding
- B. History of CVA
- C. Intracranial or intraspinal surgery or trauma within 2 months
- D. Intracranial neoplasm, AV malformation, or aneurysm
- E. Known bleeding diathesis
- F. Severe uncontrolled hypertension

Complications

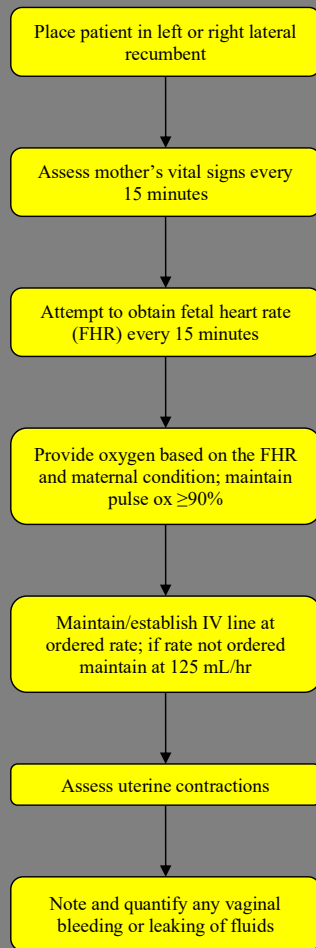
- A. Bleeding, the most common
 - 1. Should serious bleeding (not controlled by local pressure) occur, any concomitant heparin or antiplatelet agents should be discontinued immediately
- B. Reperfusion arrhythmias – Treat according to protocol
- C. Administering anticoagulants and drugs that alter platelet function with TNKase may increase the risk of bleeding
- D. Notify the receiving facility with any of the following complications:
 - 1. Bleeding from any site not controlled with direct pressure
 - 2. Decreased level of consciousness; complaint of headache, seizure or new neurologic complaint, change, or finding the may suggest intracranial hemorrhage
 - 3. GI or GU bleeding
 - 4. Unexplained hypotension (systolic blood pressure <100mmHg) not readily reversed with a fluid bolus or Trendelenburg position
 - 5. When prolonged chest compressions are anticipated

Monitoring

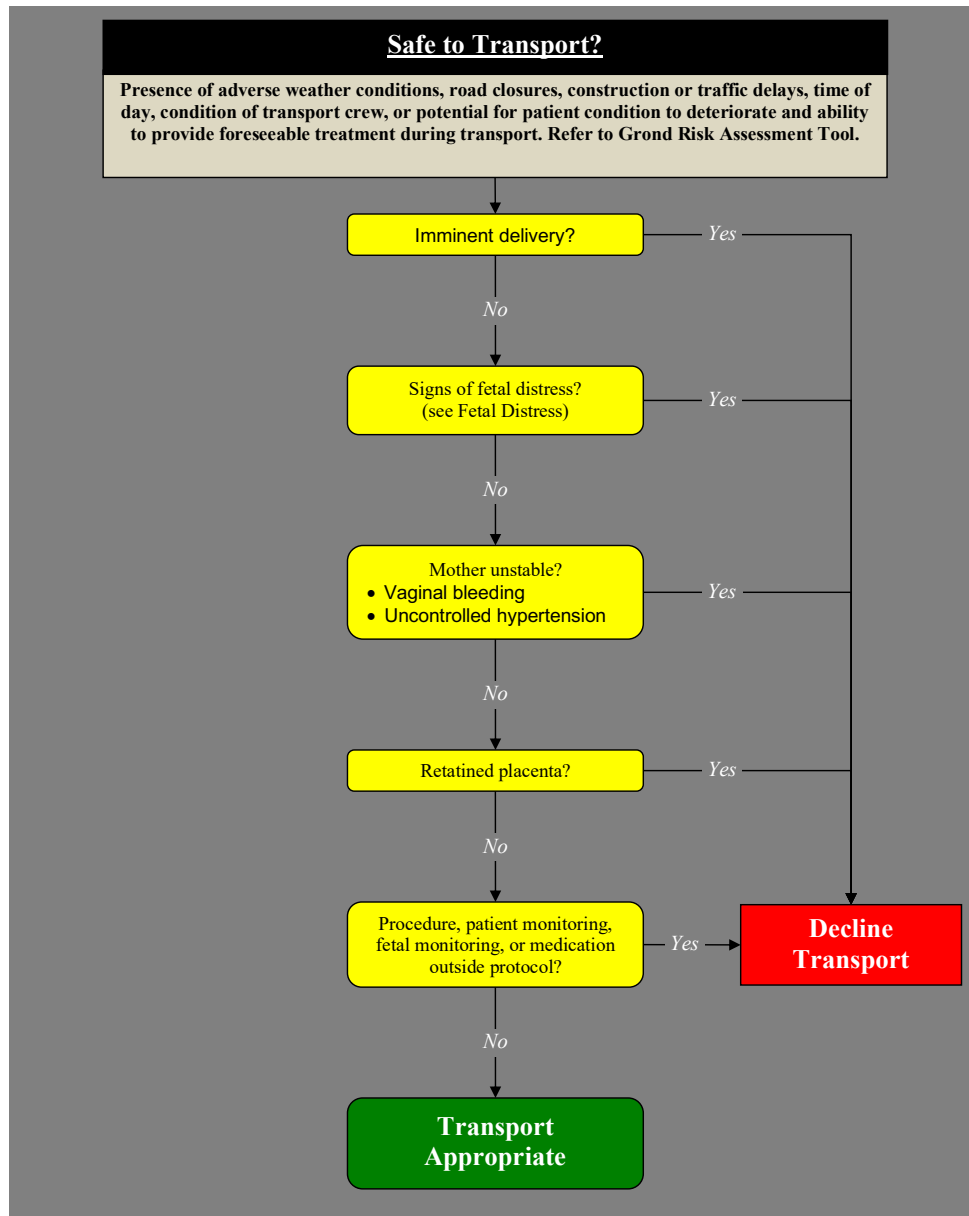
- A. Blood pressure every 5 minutes
- B. ECG
- C. 12-lead

4000 INTERFACILITY OBSTETRIC TRANSPORTS

4010 GENERAL GUIDELINES FOR ASSESSMENT AND TREATMENT OF THE OBSTETRIC PATIENT



4020 CONTRAINDICATIONS TO MATERNAL TRANSPORT



4030 SPECIFIC INFORMATION NEEDED

This section lists information to obtain from the sending nurse and/or physician. Determine what information is important to provide to the receiving nurse and/or physician.

- A. Patient's age - Teenagers and women over 35-years-old are predisposed to many obstetric complications
- B. Gravida (G) / Parity (P) / Abortions (Ab)
 - 1. Gravida - How many times has the patient been pregnant?
 - 2. Parity (Para) - How many deliveries has the patient had at or beyond 20 weeks?
 - a. Delivery of multiples (e.g. twins, triplets, etc.) is counted as 1
 - b. Stillborn deliveries are counted
 - 3. Abortions - Documented as spontaneous or elective
- C. Weeks Gestation
 - 1. Full-term is considered anywhere from 36-40 weeks gestation
- D. Estimated Date of Confinement (EDC) - Approximately when the patient is expected to deliver
- E. Obstetric History - Consider and document, if appropriate, for the pregnant and post-partum patient
 - 1. Were the deliveries vaginal or cesarean? Has the patient had a vaginal delivery after a previous cesarean section?
 - 2. Did the mother or previous babies have any complications with previous pregnancies or deliveries?
 - 3. Has the mother had any pre-term deliveries? If so, at what gestation did she deliver and what was the outcome?
 - 4. What was the length of the last labor?
 - 5. How many living children does she have? What was the birth weight of each child?
 - 6. Has there been less than 1 year between the last delivery and beginning of this pregnancy?
- F. Current pregnancy
 - 1. Is the patient having contractions?
 - a. When did they start?
 - b. Any change in intensity and frequency?
 - c. Is there any accompanying backache and pelvic or rectal pressure?
 - 2. Is there any vaginal bleeding or spotting present? Is there currently active bleeding?
 - a. When did the bleeding begin and was there anything associated with it that may have precipitated it? Was the blood bright red or dark? Any bloody show (mucus combined with blood)?
 - b. Is the bleeding painless or with combined with abdominal pain or contractions?
 - c. Attempt to quantify the amount of bleeding (number of pads changed)
 - 3. Is the bag of waters (BOW) intact or ruptured?
 - a. If ruptured, was there a gush or intermittent trickle of fluids? - Leakage of amniotic fluid is uncontrollable and a small amount of clear fluid may be confused with incontinence.
 - b. What time did it happen?
 - c. What color is the fluid and is there an odor? - Meconium stained, dark indicating the presence of blood, clear
 - d. Is the Chux pad under the patient wet or is fluid pooling?
 - 4. Does the patient have any current medical problems or complications with the pregnancy? Is the patient taking any medications and for what?
 - 5. Prenatal care
 - a. Document as consistent, limited (3 or fewer), or none
 - b. Has the patient had an ultrasound?
 - 6. Multiple gestation - pregnancy with more than 1 fetus
 - 7. Amount of weight gain during pregnancy
 - 8. Patient blood type
 - 9. Rubella immunization status
 - 10. Group Beta Streptococcus (GBS) status if ≥ 36 weeks gestation
 - 11. History of smoking, alcohol consumption, or substance abuse - Frequency, last use

4040 SPECIFIC OBJECTIVE FINDINGS

Consider assessing and documenting these specific items. A vaginal examination can only be performed by the sending physician or nurse. Document the findings for the most recent vaginal examination prior to departure.

- A. Assessments performed by physicians or nurses only - Document prior to transport
 - 1. Dilation - Widening of the cervix opening for delivery of the baby
 - a. Measured in centimeters
 - b. 0 cm - 10 cm
 - 2. Effacement - As labor nears the cervix will thin and shorten eventually becoming a part of the uterine wall,
 - a. Measured as a percentage (0% - 100%)
 - 3. Station - How far down the baby's head has come into the pelvis, measured in centimeters as follows:
 - a. -3 cm to -1 cm: The baby has dropped but not settled into the pelvis, referred to as a negative station
 - b. 0 cm: The baby has settled into the pelvis but not started descent to the birth canal, referred to as a zero station
 - c. 1 cm to 3 cm: The baby descent to the cervix from the pelvis, referred to as a positive station
 - 4. Other objective findings to consider obtaining from sending physician or nurse
 - a. Fundal height - Documented in centimeters, it is the measurement from the pubis symphysis to the fundus; only document if provided by the sending facility, do not measure
 - b. Fetal position - How the fetus is presenting for delivery; for example, head-down, breech, transverse
 - i. If the fetus position is known, fetal heart tones can be heard clearest over the fetal spine
 - c. Location of placenta implantation - Note if there is any concern about placenta previa or placenta abruption
 - d. Fetal heart tones - Information from fetal heart monitoring at the sending facility
 - i. Rate obtained by the sending facility
 - ii. Document any rate variability, acceleration, or deceleration which may be a sign of fetal distress observed by the sending facility
- B. Objective findings that can be assessed by the ambulance crew - Document findings prior to transport from the sending facility in order to establish a baseline for comparison
 - 1. Fetal activity
 - a. Document if the activity of the fetus has changed
 - b. Reassess during transport and ask the mother to notify you of any changes
 - 2. Fetal heart rate
 - a. Attempt to obtain the fetal heart rate every 15 minutes with the Doppler stethoscope
 - b. Normal rate is between 110-160 beats per minute; if not within this range contact the sending facility
 - 3. Contractions - Can be assessed by palpating the fundus and noting:
 - a. Strength
 - i. Mild contractions - Can freely indent the fundus
 - ii. Moderate contractions - Can indent the fundus slightly
 - iii. Strong contractions - Firm tension of the fundus
 - b. Frequency
 - c. Duration
 - d. Document the patient's responses to the contractions
 - i. Observed by you - Gestures, posture, facial expressions
 - ii. Verbal description provided by patient
 - e. Palpate the abdomen between contractions for localized or general tenderness
 - 4. Observe for indications of advancing labor - Apprehension, restlessness, increasing difficulty coping with contractions, screaming, nausea and vomiting, bearing-down effort, bulging perineum

4050 FETAL DISTRESS

Definition

- A. Fetal heart rate <60 or >160 beats per minute

Signs of Fetal Distress

- A. Decreased fetal movement
- B. Changes in fetal heart rate
 - 1. Variable decelerations – Variable slowing of the heart rate, possibly due to cord compression
 - 2. Late decelerations – Slowing of the fetal heart rate at the apex of a contraction, indicative of uteroplacental insufficiency
 - 3. Early decelerations – Slowing of the heart rate at the beginning of a contraction, indicative of active labor
 - 4. Bradycardia – Fetal heart rate less than 110 beats per minute
 - 5. Tachycardia – Fetal heart rate greater than 160 beats per minute
 - 6. Prolonged deceleration

Treatment

- A. Check for imminent delivery
- B. Use “key” formula on the LOCK
 - 1. L - Left-lateral recumbent position, place the mother in this position
 - 2. O - Oxygen, 100% by non-rebreather
 - 3. C - Correct contributing factors
 - 4. K - Keep reassessing the fetal heart rate (FHR) and treat when indicated
- C. Hypotension – Administer a 500 mL fluid bolus
- D. Contact the sending facility; consider rendezvousing with a specialty care program or diverting to the closest hospital
- E. Variable decelerations in fetal heart rate – If not relieved with the mother in the left-lateral recumbent position, reposition in the following order:
 - 1. Right side
 - 2. The hands and knees
 - 3. The knee-chest position

4060 POSTPARTUM HEMORRHAGE

Definition

- A. Blood loss of 1000 mL or greater after delivery
- B. Can occur up to 48 hours after delivery

Assessment

- A. Abdominal palpation may reveal a boggy, enlarged, soft uterus
- B. Note the discharge of large clots with hemorrhage

Treatment

- A. Perform fundal massage every 5-15 minutes, note the fundus location relative to umbilicus, firmness, and blood flow/discharge of clots
- B. Do not attempt to stop bleeding by packing or applying pressure with bandages over the vaginal opening
- C. Contact the sending facility; consider rendezvousing with a specialty care program or diverting to the closest hospital
- D. Reference TXA protocol for postpartum hemorrhage

4070 PREGNANCY INDUCED HYPERTENSION (PIH)

Pregnancy induced hypertension (PIH) occurs due to a chain reaction of events that leads to vasoconstriction and increased peripheral vascular resistance. Perfusion of body organs is decreased; the function of the kidneys, liver, brain, and placenta are impaired.

- A. Preeclampsia
 - 1. Characterized by hypertension, proteinuria, and edema
- B. Eclampsia
 - 1. Development of clonic-tonic seizures in a preeclamptic patient
 - 2. Can occur before or during labor or early postpartum
 - 3. Signs of impending seizure
 - a. Headache
 - b. Vision changes
 - c. Anxiety
 - d. Epigastric pain
 - e. Hyperreflexia/clonus – clonus is the rapid contraction and relaxation of a muscle after forceful extension or flexion; can be assessed in the calf muscle by forcibly pushing the foot up
 - 4. Seizures usually begin as a facial twitch around the mouth
- C. HELLP syndrome
 - 1. Serious complication of preeclampsia
 - 2. Stands for:
 - a. Hemolysis
 - b. Elevated Liver enzymes
 - c. Low Platelets
- D. Assessment
 - 1. Hypertension
 - a. Check blood pressure in left-lateral recumbent position
 - b. Hypertension associated with PIH may be unstable, changing between blood pressure taken consecutively
 - c. Rise in systolic pressure of 30 mmHg or diastolic pressure of 15 mmHg based on previously known pressures; or
 - d. Blood pressure of 140/90 or greater; if systolic >170 mmHg or diastolic >110 mmHg treat per Seizures with Pregnancy (Eclampsia/Pre-eclampsia) in the Obstetric/Gynecological Emergencies protocol
 - 2. Edema
 - a. Edema of the eyelids, face, and hands is typical of PIH
 - b. May have pitting edema of the lower extremities

Assessment of Edema	Score
Minimal edema of lower extremities	+1
Marked edema of extremities	+2
Edema of lower extremities, face, and hands	+3
Generalized edema including abdomen and sacrum	+4

- 3. Central nervous system irritability
 - a. Headache
 - b. Nausea and vomiting
 - c. Anxiety and apprehension
 - d. Hyperreflexia and ankle clonus

Assessment of Reflexes	Score
None	0
Sluggish	+1
Normal	+2
Brisk	+3
Brisk/Transient clonus (fades away)	+4

Commented [WC30]: Reference to 911 protocol criteria. Does it match?

Commented [JO31R30]: Guidance from SMC OB Dept was to change to match their protocol which was to change to 170 or 110 instead of 180 or 120

Brisk/Sustained clonus (remains with continued pressure on the foot)	+5
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4. Impaired renal function
 - a. Oliguria – Urine output < 30mL/hour
5. Hepatic involvement
 - a. Epigastric pain
 - b. Nausea and vomiting
 - c. Malaise
 - d. Jaundice
- E. Treatment and Transport
 1. Perform obstetric assessment and obtain history of any symptoms prior to transport
 2. Follow sending physician orders
 3. Consider oxygen administration, watch for pulmonary edema
 4. Verify patency and maintain IV
 5. Evaluate blood pressure every 10-15 minutes or more frequently with signs and symptoms of eclampsia
 6. Assess fetal heart tones every 15 minutes
 7. Decrease sensory stimulation during transport, including lowering lights, keeping sirens off, minimizing noise including equipment sounds
 8. Prepare to treat shock per protocol with signs of coagulopathy, which may include:
 - a. Petechia
 - b. Bruising
 - c. Bleeding IV sites
 9. Treat eclamptic seizures per protocol
 10. Contact the sending facility; consider rendezvousing with a specialty care program or diverting to the closest hospital

APPENDIX A. COMMON LAB VALUES

HEMATOLOGY Red Blood Cells

RBC (Male)	4.2 - 5.6 M/ μ L
RBC (Female)	3.8 - 5.1 M/ μ L
RBC (Child)	3.5 - 5.0 M/ μ L

HEMATOLOGY White Blood Cells

WBC (Male)	3.8 - 11.0 K / mm ³
WBC (Female)	3.8 - 11.0 K / mm ³
WBC (Child)	5.0 - 10.0 K / mm ³

HEMOGLOBIN

Hgb (Male)	14 - 18 g/dL
Hgb (Female)	11 - 16 g/dL
Hgb (Child)	10 - 14 g/dL
Hgb (Newborn)	15 - 25 g/dL

HEMATOCRIT

Hct (Male)	39 - 54%
Hct (Female)	34 - 47%
Hct (Child)	30 - 42%
MCV	78 - 98 fL
MCH	27 - 35 pg
MCHC	31 - 37%
neutrophils	50 - 81%
bands	1 - 5%
lymphocytes	14 - 44%
monocytes	2 - 6%
eosinophils	1 - 5%
basophils	0 - 1%

CARDIAC MARKERS

troponin I	0 - 0.1 ng/mL (onset: 4-6 hrs, peak: 12-24 hrs, return to normal: 4-7 days)
troponin T	0 - 0.2 ng/mL (onset: 3-4 hrs, peak: 10-24 hrs, return to normal: 10-14 days)

myoglobin (Male)	10 - 95 ng/mL (onset: 1-3 hrs, peak: 6-10 hrs, return to normal: 12-24 hrs)
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myoglobin (Female)	10 - 65 ng/mL (onset: 1-3 hrs, peak: 6-10 hrs, return to normal: 12-24 hrs)
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GENERAL CHEMISTRY

acetone	0.3 - 2.0 mg%
albumin	3.5 - 5.0 gm/dL
alkaline phosphatase	32 - 110 U/L
anion gap	5 - 16 mEq/L
ammonia	11 - 35 μ mol/L
amylase	50 - 150 U/dL
AST,SGOT (Male)	7 - 21 U/L
AST,SGOT (Female)	6 - 18 U/L
bilirubin, direct	0.0 - 0.4 mg/dL
bilirubin, indirect	total minus direct
bilirubin, total	0.2 - 1.4 mg/dL
BUN	6 - 23 mg/dL
calcium (total)	8 - 11 mg/dL
carbon dioxide	21 - 34 mEq/L
carbon monoxide	symptoms at greater than or equal to 10% saturation
chloride	96 - 112 mEq/L
creatinine (Male)	0.2 - 0.6 mg/dL
creatinine (Female)	0.6 - 1.0 mg/dL
creatinine	0.6 - 1.5 mg/dL
ethanol	0 mg%; Coma: greater than or equal to 400 - 500 mg%
folic acid	2.0 - 21 ng/mL
glucose	65 - 99 mg/dL (diuresis greater than or equal to 180 mg/dL)

HDL (Male)	25 - 65 mg/dL
HDL (Female)	38 - 94 mg/dL
iron	52 - 169 µg/dL
iron binding capacity	246 - 455 µg/dL
lactic acid	0.4 - 2.3 mEq/L
lactate	0.3 - 2.3 mEq/L
lipase	10 - 140 U/L
magnesium	1.5 - 2.5 mg/dL
osmolarity	276 - 295 mOsm/kg
parathyroid hormone	12 - 68 pg/mL
phosphorus	2.2 - 4.8 mg/dL
potassium	3.5 - 5.5 mEq/L
SGPT	8 - 32 U/L
sodium	135 - 148 mEq/L
T3	0.8 - 1.1 µg/dL
thyroglobulin	less than 55 ng/mL
thyroxine (T4) (total)	5 - 13 µg/dL
total protein	5 - 9 gm/dL
TSH	Less than 9 µU/mL
urea nitrogen	8 - 25 mg/dL
uric acid (Male)	3.5 - 7.7 mg/dL
uric acid (Female)	2.5 - 6.6 mg/dL

ARTERIAL VALUES

pH	7.35 - 7.45
PaCO ₂	35 - 45 mm Hg
HCO ₃	22 - 26 mEq/L
O ₂ saturation	96 - 100%
PaO ₂	85 - 100 mm Hg
BE	-2 to +2 mmol/L

VENOUS VALUES

pH	7.31 - 7.41
PaCO ₂	41 - 51 mm Hg
HCO ₃	22 - 29 mEq/L

O ₂ saturation	60 - 85%
PaO ₂	30 - 40 mm Hg
BE	0 to +4 mmol/L

URINE

color	Straw
specific gravity	1.003 - 1.040
pH	4.6 - 8.0
Na	10 - 40 mEq/L
K	Less than 8 mEq/L
Cl	Less than 8 mEq/L
protein	1 - 15 mg/dL
osmolality	80 - 1300 mOsm/L

24 HOUR URINE

amylase	250 - 1100 IU / 24 hr
calcium	100 - 250 mg / 24 hr
chloride	110 - 250 mEq / 24 hr
creatinine	1 - 2 g / 24 hr
creatinine clearance (Male)	100 - 140 mL / min
creatinine clearance (Male)	16 - 26 mg / kg / 24 hr
creatinine clearance (Female)	80 - 130 mL / min
creatinine clearance (Female)	10 - 20 mg / kg / 24 hr
magnesium	6 - 9 mEq / 24 hr
osmolality	450 - 900 mOsm / kg
phosphorus	0.9 - 1.3 g / 24 hr
potassium	35 - 85 mEq / 24 hr
protein	0 - 150 mg / 24 hr
sodium	30 - 280 mEq / 24 hr
urea nitrogen	10 - 22 gm / 24 hr
uric acid	240 - 755 mg / 24 hr

COAGULATION

ACT	90 - 130 seconds
APTT	21 - 35 seconds
platelets	140,000 - 450,000 /mL

plasminogen	62 - 130%
PT	10 - 14 seconds
PTT	32 - 45 seconds
FSP	Less than 10 µg/dL
fibrinogen	160 - 450 mg/dL
bleeding time	3 - 7 minutes
thrombin time	11 - 15 seconds

LIPID PANEL (Adult)

cholesterol (total)	Less than 200 mg/dL desirable
cholesterol (HDL)	30 - 75 mg/dL
cholesterol (LDL)	Less than 130 mg/dL desirable
triglycerides (Male)	Greater than 40 - 170 mg/dL
triglycerides (Female)	Greater than 35 - 135 mg/dL

CEREBRAL SPINAL FLUID

appearance	clear
glucose	40 - 85 mg/dL
osmolality	290 - 298 mOsm/L
pressure	70 - 180 mm/H2O
protein	15 - 45 mg/dL
total cell count	0 - 5 cells
WBCs	0 - 6 / µL

HEMODYNAMIC PARAMETERS

cardiac index	2.5 - 4.2 L / min / m ²
cardiac output	4 - 8 LPM
left ventricular stroke work index	40 - 70 g / m ² / beat
right ventricular stroke work index	7 - 12 g / m ² / beat
mean arterial pressure	70 - 105 mm Hg
pulmonary vascular resistance	155 - 255 dynes / sec / cm to the negative 5
pulmonary vascular resistance index	255 - 285 dynes / sec / cm to the negative 5
stroke volume	60 - 100 mL / beat

stroke volume index	40 - 85 mL / m ² / beat
systemic vascular resistance	900 - 1600 dynes / sec / cm to the negative 5
systemic vascular resistance index	1970 - 2390 dynes / sec / cm to the negative 5
systolic arterial pressure	90 - 140 mm Hg
diastolic arterial pressure	60 - 90 mm Hg
central venous pressure	2 - 6 mm Hg; 2.5 - 12 cm H2O
ejection fraction	60 - 75%
left arterial pressure	4 - 12 mm Hg
right atrial pressure	4 - 6 mm Hg
pulmonary artery systolic	15 - 30 mm Hg
pulmonary artery diastolic	5 - 15 mm Hg
pulmonary artery pressure	10 - 20 mm Hg
pulmonary artery wedge pressure	4 - 12 mm Hg
pulmonary artery end diastolic pressure	8 - 10 mm Hg
right ventricular end diastolic pressure	0 - 8 mm Hg

NEUROLOGICAL VALUES

cerebral perfusion pressure	70 - 90 mm Hg
intracranial pressure	5 - 15 mm Hg or 5 - 10 cm H2O