Summit County Pre-hospital Emergency Medical Services

CLINICAL PROTOCOLS FOR INTERFACILITY TRANSPORT AND SYSTEM SPECIFIC ITEMS

Version 3.2.0

These protocols are effective October 1, 2017

TABLE OF CONTENTS

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 Summit County Ambulance Service EMS providers during interfacility transport; for prehospital treatment refer to the Denver Metro Protocols St. Anthony Mountain protocol set. 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 defendable clinical reasoning and judgment. Deviations will be reviewed by the Medical Director and in the CQI process and require the completion an incident 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	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 Summit County Ambulance Service providers to perform.

1010 INTERFACILITY TRANSPORTS

Type of Interfacility Requests

Interfacility transport requests can be broken down into three 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. Any requests for therapies out side of protocol IR
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).
   2. Unstable patients should be referred to a specialty care program experienced in the management of acutely ill and/or complex patient therapies whenever possible.
   3. 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 definintive care at another facility
      a. The responding crew, with assistance of EMS 10, 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.
   4. 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.
   5. Consider rendezvous with a specialty care program enroute.

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 full-time SCAS employees who have received the appropriate training and select SCAS per diem employees who provide this care as part of their regular full-time employment (e.g. Flight Paramedic, etc.)

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 hemodynamically unstable patient (typically from an Intensive Care setting) who requires special monitoring (e.g. central venous pressure, intracranial pressure), multiple cardioactive/vasoactive medications, or specialized critical care equipment (i.e. intra-aortic balloon pump) should remain under the care of an experienced critical care practitioner, and every attempt should be made to transport that patient while maintaining the appropriate level of care. The capabilities of the institution, the capabilities of the transporting agency and, most importantly, the safety of the patient should be considered when making transport decisions.” Code of Colorado Regulations, 6 CCR 1015-3, Chapter 2, Section 15.4

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

Physician transfer orders provide guidance on:

A. Maintaining, initiating, and discontinuing treatments
B. Patient monitoring during transport (e.g. ECG, continuous pulse oximetry)

Transfer orders must be completed and signed by a physician. The physician is also responsible for making any edits to the transfer orders.

A nurse may not provide or edit orders without physician review and approval.

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).

Level of care to be provided

If the sending physician approves of an EMT-Basic or Intermediate attending, it must be written on the orders (ex. EMT-Basic may attend). The physician must cross out and initial any orders that are out of the scope of the attending provider's protocols.

Review Transfer Orders

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.

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

Medication orders must include the following

A. Name of the medication
B. Route of administration
C. Dose to be administered (including dosing units)
D. Approved time intervals for administration, if applicable
E. Indication for administration (ex. Fentanyl for pain, Valium for muscle spasms)
F. Parameters for administration (e.g. maintain blood pressure above 100 mmHg systolic, maintain oxygen saturation greater than 90%)
G. Guidance on infusion maintenance
    1. If titratable, parameters for titration
    2. If infusion to be finished while en-route, is there any specific actions required after completion

Procedure Maintenance

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

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.

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

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.

For any problems with a patient monitored medication or device follow these steps:

A. Talk to the patient and/or caregiver about what is occurring with the medication or device.
B. Review therapy information, if available. Most of these products have information cards with the therapy/device.
C. Contact Medical Control for orders before altering or discontinuing the therapy/device.

Inter-facility Transport

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.

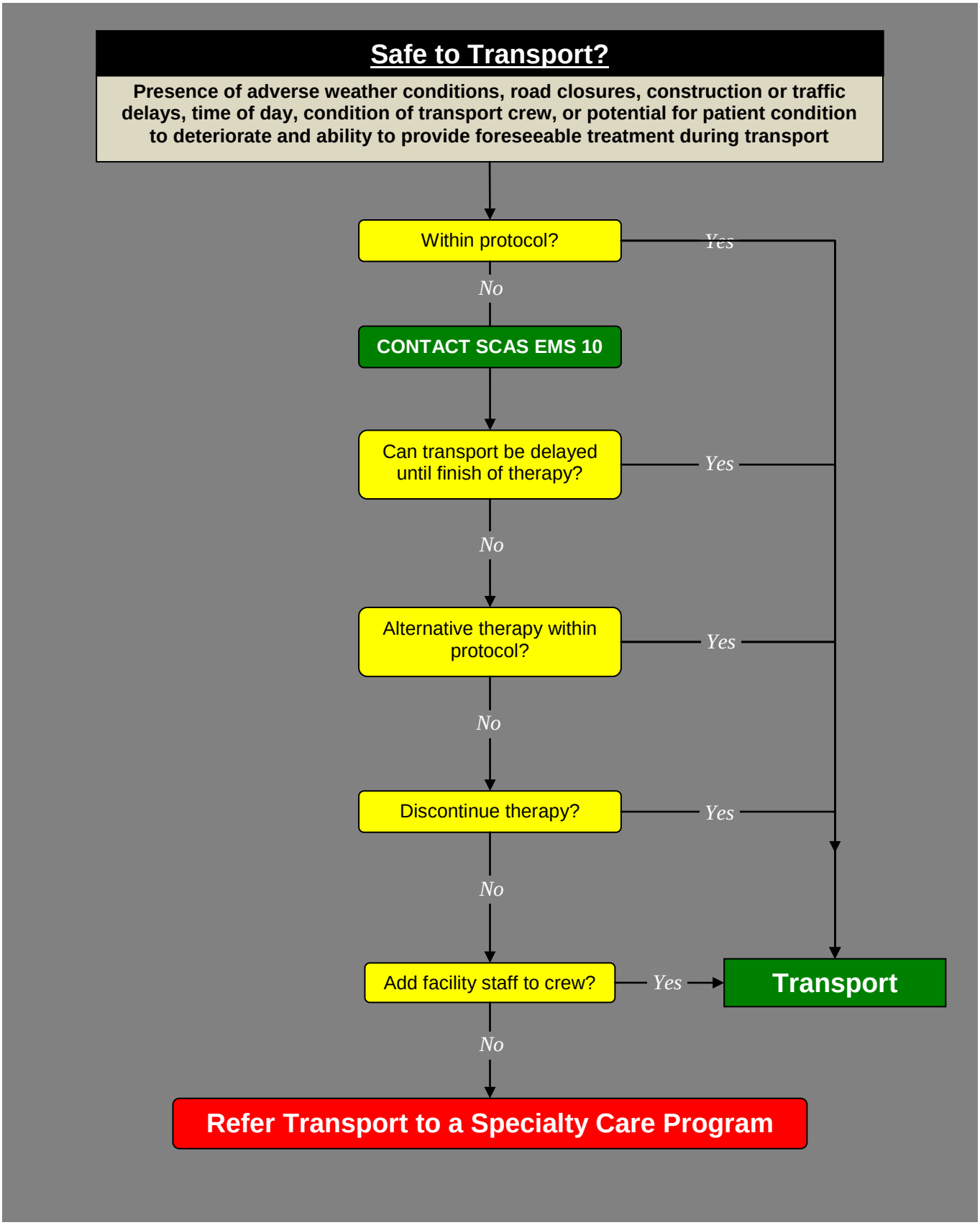
Level of Attendant

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.

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 incident report must be submitted for all therapy requests outside of protocol.***



2000 INTERFACILITY PROCEDURES

2010 URINARY CATHETER MONITORING

Urinary Catheter Monitoring	B	IV	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, prior 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. 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
E. While en-route, assess for continued output and any complications
    1. Adequate urine output
        a. Adult ≈ 30mL/hour
        b. Pediatric ≈ 1-2mL/kg/hour
F. Upon arrival at receiving facility measure and document the urinary output and any changes in urine color and if urine is 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

2020 GASTRIC TUBE MAINTANENCE

Gastric Tube Maintenance	B	IV	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. Disconnect patient from suction
B. Assure patency and placement of tube by instilling at least 30mL of air into the tube while auscultation with a stethoscope over the stomach
C. Confirm tube is secured to the patient before moving
D. Follow the sending physician orders:
    1. Low continuous suction (20mmHg or less)
    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.
E. Restrain patient's hands if you anticipate any problems with the patient pulling the tube
F. 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

2030 CENTRAL VENOUS CATHETER MAINTANENCE

Central Venous Catheter Maintenance	B	IV	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 Summit County Ambulance Critical Care 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	• 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. Vencous 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 soft 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.

2040 CHEST TUBE MAINTENANCE

Chest Tube Maintenance	B	IV	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 H_2O 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 15 minutes during transport
    2. Monitor continuous pulse oximetry and end tidal CO_2 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
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 cmH_2O 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 Base** for medical 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 Base**
   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 Base**

H. **Contact Base** for consult with any complications during transport and notify the receiving facility about any issues

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 – LTV 1200

Mechanical Ventilation Utilizing LTV 1200	B	IV	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. King airway
   4. Cricothyrotomy
   5. Tracheostomy

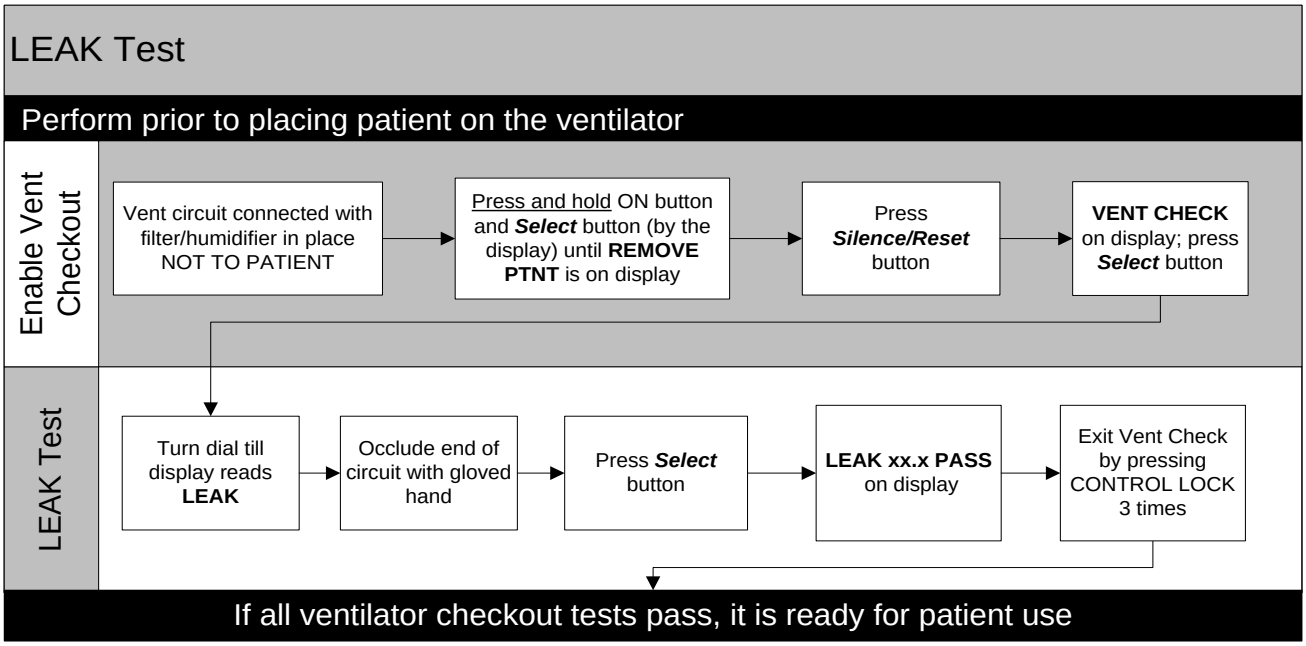
Contraindications

A. Patients ≤ 20 kg
B. Patients requiring >10 cmH20 of PEEP

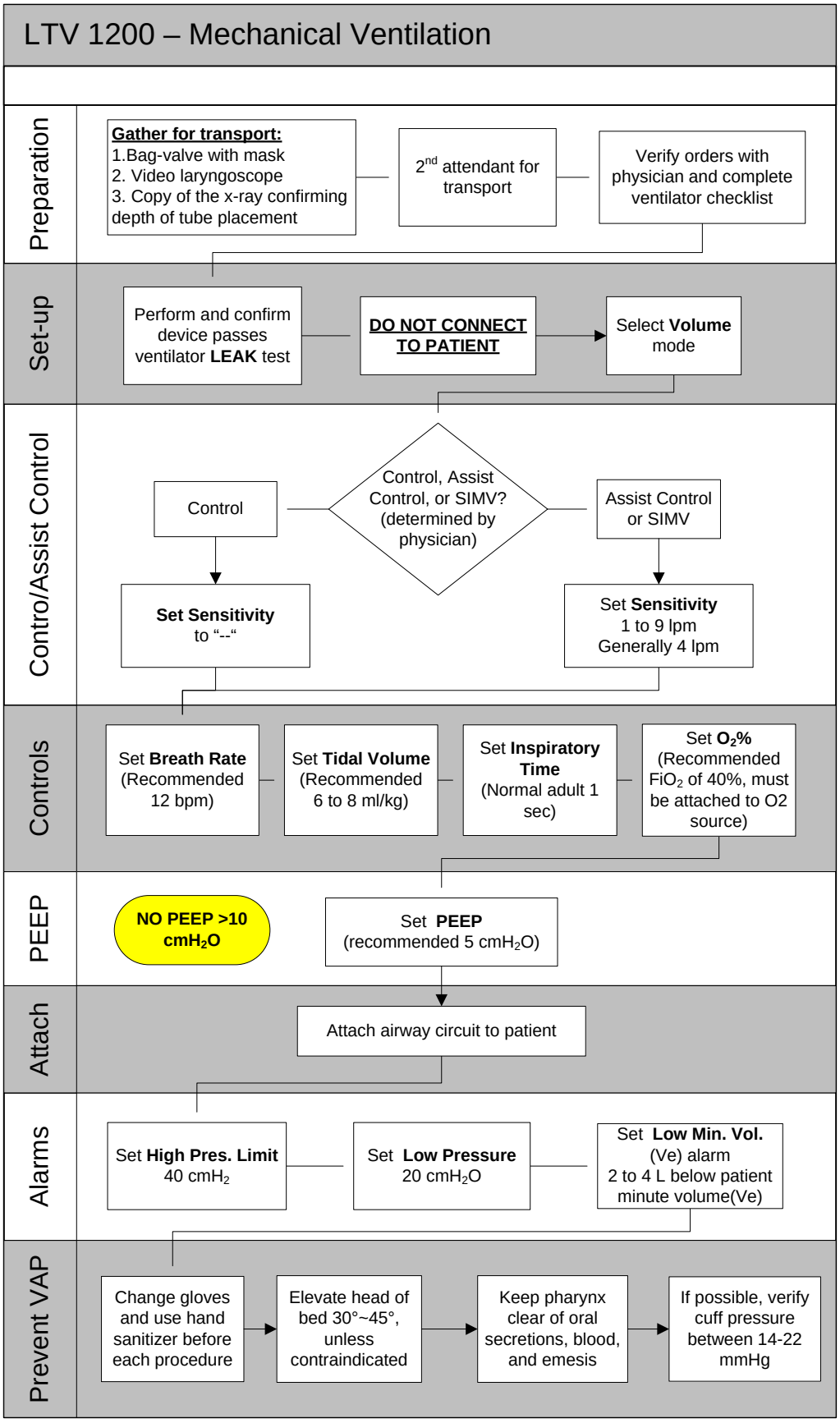
Precautions

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 or trended increases, such as:
   1. Tachycardia
   2. Hypertension
   3. Lacrimation
   4. Diaphoresis
D. Transport a video laryngoscope (King or Glidescope) with the patient for confirmation of tube placement
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)
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

Test Prior to Patient Use



Technique – Mechanical ventilation



VAP = Ventilator Associated Pneumonia

Paralytic, Sedation, and Analgesia

Follow sending physician orders. The following are approved medications.

Paralytic

Vecuronium Bromide – 0.1 mg/kg for patients over 11 years old, given within 25 to 30 minutes of the previous dose

Sedation

Diprivan – Infusion at 5 to 100 mcg/kg/min

Diazepam – 5 mg IV/IO every 25-30 minutes or with signs of undersedation

Midazolam – 0.03 mg/kg IV/IO every 20 minutes or with signs of undersedation

Analgesia

Morphine Sulfate – 0.1mg/kg up to 10mg every 25 to 30 minutes

Fentanyl – 1-2 mcg/kg up to 100 mcg every 25 to 30 minutes

Analgesia/Sedation

Ketamine – Maintenance 0.25 to 0.5 mg/kg of 50 mg/ml solution every 5-10 minutes

Ventilation Modes:
All deliver a set tidal volume
Control – Does not allow patient to take a breath
Assist Control – Allows patient to take a breath delivering the set tidal volume
SIMV (Synchronized Intermittent Mechanical Ventilation) – Allows patient to take a breath but does not deliver the set tidal volume

Obtaining plateau pressure (pPLAT):
1. Press **Insp/Exp Hold** once
2. Press again and hold down during next inspiration
3. Hold until number appears on screen

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

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

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

2060 THERAPEUTIC INDUCED HYPOTHERMIA – CONTINUATION OF INDUCTION AND MAINTENANCE

Therapeutic Induced Hypothermia – Continuation of Induction/Maintenance	B	IV	I	P	P+	Adv
Inter-facility transport - Written physician order						X
Second attendant	X	X	X	X	X	X

Indication

A. Physician evaluated patient requiring maintenance of therapeutic induced hypothermia

Technique

Method	Cooling Rate
Chilled NS	-2.5° to -3.5° C/hr
Ice packs	-0.9° to -1°C/hr
Turley pad	-0.9° to -1°C/hr

A. Target temperature of 32°- 34°C (89°- 93°F); ***remaining within the target temperature range is crucial***
   1. Warming above the target range once it is reached is very detrimental to the patient
   2. Patients cooling to rapidly or lower than the target range run the risk of converting into asystole
B. Continuation of induction
   1. Continue induction initiated by sending facility without interrupting the cooling process
   2. Methods for initiating and maintaining induced hypothermia include:
      a. Bolus of chilled normal saline up to 2 L
      b. Ice packs to head, groin, or axillae as needed, avoid direct contact with skin
      c. Turley gel pad placed on patient
C. Maintenance
   1. Apply and remove Turley pad and ice packs from patient's head, groin, or axillae as needed to maintain target temp
D. Temperature monitoring
   1. Continuous monitoring with temperature probe placed by the sending facility
   2. Document temperature every 15 minutes
E. Mechanical ventilation
   1. Maintain $EtCO_2$ between 35 to 45 mmHg
   2. Refer to mechanical ventilation protocol for ventilation settings
F. Medication administration – Follow sending physician orders; the following are recommendations
   1. For shivering and to counter warming
      a. Fentanyl 1 mcg/kg IV every 25-30 min with administration of vecuronium
      b. Vecuronium bromide 0.06 mg/kg IV bolus every 25-30 minutes
   2. Sedation
      a. Diprivan 5-100 mcg/kg/min IV infusion
      b. Midazolam 0.03mg/kg IV as needed every 20 minutes for signs of under-sedation, which may include:
         i. Increase in heart rate
         ii. Increase in blood pressure
         iii. Tearing
         iv. If not paralyzed, extra ventilations triggered from ventilator by patient
   3. To prevent hypotension avoid back-to-back administration of midazolam and fentanyl
   4. Follow recommended medication orders for therapeutic induced hypothermia; these supersede recommended medication orders for mechanical ventilation and can be utilized to maintain analgesia, sedation, and paralysis
G. Notify medical control immediately for any of the following
   1. Heart rate < 50 or > 120 beats per minute
   2. Systolic blood pressure < 80 or > 180 mmHg; or, mean arterial pressure < 65 mmHg
   3. Uncontrolled shivering
   4. Patient awakens and follows commands

3000 INTERFACILITY MEDICATIONS

3010 MEDICATION ADMINISTRATION – SAFETY

Infusion Pump Failure

If an infusion pump fails remember with a 60 drops/mL drip set 1 mL/hr is equivalent to 1 drop/min.

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 prior to the next medication administration.

6 Rights of Medication Administration

Right Medication	• 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	• 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	• 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 be administered before the effects of the previous dose wear off
Right Route	• 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	• If transporting multiple patients; confirm the physician orders before administration
Right Documentation	• 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 ADMINSTRATION – PATIENT CARE REPORT DOCUMENTATION

Vital signs

A. Document every 10-15 minutes
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

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 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

3030 ACTIVASE (ALTEPLASE)

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

Contraindications

A. Previous CVA or intracranial bleed
B. History of coagulopathy or other bleeding disorders
C. Surgery or trauma in previous 2 months
D. GI or GU bleeding in previous 4 weeks
E. Pregnancy or post-partum
F. Uncontrolled hypertension (>200mmHg systolic or >100mmHg diastolic)

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. Standard dosing:
    1. 0.9mg/kg; maximum dose 90mg
    2. 10% of the total dose is administered as an IV bolus over 1 minute (must be administered by the sending facility)
    3. Remaining 90% infused over 60 minutes, may be monitored during interfacility transport

Drug Label Insert Link

Activase (alteplase)

3040 AMIODARONE

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

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 arrythmias
E. Second- or third-degree AV block

Complications

A. Hypotension is the most common side effect; usually occurs within the first several hours of therapy and is rate related
B. Continusous 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
C. Hypokalemia and hypomagnesemia should be corrected before use; may exaggerate a prolonged QTc and cause arrhythmias (torsades de pointes)

Procedure

A. Infusion rates may vary based on concentration used. Review orders with the sending physician prior to transporting.
B. Typical dose is as follows:
    1. Loading dose of 150mg over 10 minutes (15mg/min)
    2. Secondary infusion of 1mg/min for next 6 hours usually mixed as one of the following concentrations:
        a. 450mg in 250mL of D5W yielding 1.8mg/mL infused at 33.3mL/hour
        b. 150mg in 100mL of D5W yielding 1.5mg/mL infused at 40mL/hour.
    3. Maintenance infusion of 0.5mg/min for remaining 18 hours

Drug Label Insert Link

Amiodarone

3050 ANTIBIOTICS AND ANTIVIRALS

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

Indications:

A. Antibiotics and antivirals may be give IV in serious or life threatening infections to rapidly achieve high blood levels of drug for maximum bacterial killing power.

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

Drug Label Insert Link

Daily Med – Current Medication Information

3060 BLOOD/ BLOOD PRODUCTS

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

Blood Products

A. Whole Blood
   1. Indication - Massive blood loss
   2. Rarely used anymore
   3. Infusion rate - As fast as patient can tolerate; must be administered within 4 hours of starting
   4. 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
C. Verify all the following has been confirmed by 2 providers prior to departing facility
   1. Patient information
      a. Patient name
      b. Hospital number
      c. Patient blood type
      d. Blood Bank arm band number

e. Consent has been signed, if applicable
2. Unit information
   a. Blood type
   b. Unit number
   c. Component
   d. Expiration date
3. Unit label, product tie tag, and Component Pick Ups Sheet must have matching information

D. Verify all the following before administering the unit of blood product
1. Verify identity by visually inspecting
   a. Component Pick Up Sheet
   b. Blood Bank armband
   c. Unit tie tag
   d. Unit label
2. Confirm
   a. Patient name
   b. Patient hospital number
   c. Blood Bank armband number
   d. Patient blood type
   e. Unit blood type
   f. Unit number
   g. Component
   h. Expiration date

E. **DO NOT ADMINSTER BLOOD PRODUCT IF ANY DIISCREPANCY IS NOTED IN ANY IDENTIFYING INFORMATION DURING VERIFCIATION PROCESS**

F. 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

G. All blood products listed must be administered with a 170-micron filter blood administration set

H. Observe patient closely for first 15 minutes of infusion; most likely reactions will occur within this time.

I. Maintain or initiate infusion at rate as indicated by the treating physician or within 4 hours of starting

J. Once infusion completed, remove blood product bag and tubing, discard as biohazard waste

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 Base** for medical 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. Additional treatment
   a. Give fluid challenge of NS.

C. Febrile non-hemolytic reaction
1. Chills and fever
2. Rise in baseline temperature of 1°C or 1.8°F

3. Additional Treatment
    a. Monitor for signs of more severe reaction and treat per protocol

D. Allergic reaction
    1. Urticaria – generalized itching rash
    2. Additional 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. Additional 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. Additional 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. Additional treatment
        a. Provide cardiovascular and airway support
        b. Furosemide is not beneficial with this type of transfusion reaction

3070 CALCIUM

Calcium	B	IV	I	P	P+	Adv
Magnesium toxicity bolus administration – Written physician order				X	X	X
Hyperkalemia and calcium channel blocker overdose - Refer to St. Anthony Mountain Protocol set						

Indications:

A. For treatment of magnesium toxicity in pregnant patients
B. For patients receiving magnesium that develop
    1. Respiratory depression
    2. CNS depression
    3. Hypotension
    4. Arrhythmia
    5. Depressed reflexes
C. Follow sending physician's orders if any of these occur.

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

Drug Label Insert Link

Calcium gluconate

Calcium chloride

3080 CARDENE (NICARDIPINE)

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

Actions

A. Cardene is a calcium channel blocker that is more selective towards smooth muscle than cardiac muscle
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

Contraindications

A. Should be evaluated by the sending physician prior to transport

Complications

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

Precautions:

A. Precautions should be evaluated and reported by the treating physician prior to transport

Over dosage

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

Procedure:

A. Cardene is administered by a slow continuous infusion using a medication pump
    1. Cardene comes in 25 mg/10 mL ampule or 40 mg/200 mL premixed bag
    2. Ampule is diluted in 184 mL of compatible IV fluid to make a concentration 40 mg/200 mL
B. Administration
    1. Blood pressure should be maintained for a blood pressure per sending physician orders.
        a. Generally this will be a systolic blood pressure between 165-180mmHg and a diastolic blood pressure between 95-105mmHg in the ischemic stroke patient
    2. Initial therapy is 5mg/hour (25 mL/hour)
    3. If desired results are not achieved increase infusion rate by 2.5 mg/hour every 5 minutes until desired effect is achieved.
    4. Dosage should not exceed 15mg/hour (75 mL/hour).

Dose Rate (mg/hour)	Volume Rate (mL/hour)
3	15
5	25
7.5	38
10	50
12.5	63
15	75

C. Maintenance
    1. Follow sending physician written orders
    2. The rate of infusion should be adjusted as needed to maintain desired response

Drug Label Insert Link

Cardene (nicardipine)

3090 CARDIZEM (DILTIAZEM)

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

Action:

A. Calcium channel blocker

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. Nausea and vomiting

Procedure:

A. Administration
    1. Follow the sending physician orders
    2. Typical dose range is 5-15mg/hr

Monitoring

A. ECG
B. 12-lead

Drug Label Insert Link

Cardizem (diltiazem)

3100 DIPRIVAN (PROPOFOL)

Diprivan (propofol)	B	IV	I	P	P+	Adv
Infusion maintenance – Written physician order						X

Action

A. Unclear, may facilitate inhibitory transmitters mediated by gamma-aminobutyricacid (GABA)
B. Onset: 40-120 seconds
C. Half-life: 2-8 minutes after infusion stopped, up to 1-3 days after prolonged infusion

Indications

A. Sedation for patients requiring mechanical ventilation
B. Continuation of induction and maintenance of therapeutic induced hypothermia (TIH)

Contraindications

A. Known hypersensitivity
B. Soy or egg allergy

Complications

A. With any complications, verify endotracheal tube is still in place and still patent
B. Hypotension (calculated as 20% below baseline; criteria determined by sending physician) – Typically occurs during loading dose
    1. Contact medical control
    2. Treat with fluid challenge (250-500 mL)
    3. For persistent hypotension refractory to fluid
        a. Titrate dose downward
        b. If hypotension still persists discontinue infusion and switch to benzodiazepines for sedation per medical control
        c. Monitor for signs of under sedation
C. Bradycardia
    1. Verify endotracheal tube is still patent and in place
    2. Contact medical control
    3. Administer atropine
        a. Titrate dose downward
        b. If hypotension still persists discontinue infusion and switch to benzodiazepines for sedation per medical control
        c. Monitor for signs of under sedation
D. Agitation/under sedation
    1. Monitor for signs of under sedation
    2. Titrate dose upward
    3. If agitation/under sedation persists
        a. Contact medical control
        b. Consider discontinuing infusion and switch to benzodiazepines for sedation per medical control
E. Respiratory depression/apnea
F. Decreased cerebral blood flow
G. Bronchospasm

Procedure

A. Concentration
    1. 10mg/mL (1g/100mL)
B. Administration
    1. Follow sending physician orders
    2. Typical dosing - Adult and pediatric
        a. Bolus: **SENDING FACILITY ONLY**
        b. Infusion rate: 5-100 mcg/kg/min
        c. Decreased dosing should be considered in the elderly
    3. Titration – Adult and pediatric
        a. 5-10 mcg/kg/min, titrate every minute to effect
        b. Monitor for hypotension or bradycardia with titration
C. Diprivan (propofol) is administered in combination with an opiate analgesic

Infusion Rate Table

Diprivan (propofol) infusion rate (mL/h) for 10 mg/mL concentration												
Infusion rate		Patient Body Weight (kg)										
(mcg/kg/min)	(mg/kg/hr)	40	50	60	70	80	90	100	110	120	130	140
5	0.3	1.2	1.5	1.8	2.1	2.4	2.7	3	3.3	3.6	3.9	4.2
10	0.6	2.4	3	3.6	4.2	4.8	5.4	6	6.6	7.2	7.8	8.4
16.7	1	4	5	6	7	8	9	10	11	12	13	14
20	1.2	4.8	6	7.2	8.4	9.6	10.8	12	13.2	14.4	15.6	16.8
30	1.8	7.2	9	10.8	12.6	14.4	16.2	18	19.8	21.6	23.4	25.2
33.3	2	8	10	12	14	16	18	20	22	24	26	28
40	2.4	9.6	12	14.4	16.8	19.2	21.6	24	26.4	28.8	31.2	33.6
50	3	12	15	18	21	24	27	30	33	36	39	42
60	3.6	14.4	18	21.6	25.2	28.8	32.4	36	39.6	43.2	46.8	50.4
66.7	4	16	20	24	28	32	36	40	44	48	52	56
70	4.2	16.8	21	25.2	29.4	33.6	37.8	42	46.2	50.4	54.6	58.8
80	4.8	19.2	24	28.8	33.6	38.4	43.2	48	52.8	57.6	62.4	67.2
83.3	5	20	25	30	35	40	45	50	55	60	65	70
90	5.4	21.6	27	32.4	37.8	43.2	48.6	54	59.4	64.8	70.2	75.6
100	6	24	30	36	42	48	54	60	66	72	78	84

Drug Label Insert Link

Diprivan (propofol)

3110 DOPAMINE

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

Description

A. Dopamine is chemically related to epinephrine and norepinephrine.
B. It acts primarily on alpha-1 and beta-1 adrenergic receptors. Effects include
   1. Increasing systemic vascular resistance
   2. Exerting a positive inotropic effect on the heart.
C. In addition, the actions of this drug on dopaminergic receptors dilate renal and splanchnic vasculature, maintaining blood flow.
D. Dopamine is commonly used to treat hypotension associated with cardiogenic shock.

Indications

A. To monitor the administration of dopamine for a physician ordered interfacility transport

Contraindications

A. Patients with hypovolemia

Adverse Reactions

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

Dosage and Administration

A. 400 mg in 250 mL NS or 800 mg in 500 mL NS to produce concentration of 1600 mcg/mL
B. May only be titrated per physician order

Infusion Rate Table

Dopamine infusion rate (mL/h) for 1,600 mcg/mL concentration											
Infusion rate	Patient Body Weight (kg)										
(mcg/kg/min)	40	50	60	70	80	90	100	110	120	130	140
2.5	3.8	4.7	5.6	6.6	7.5	8.4	9.4	10.3	11.3	12.2	13.1
5	7.5	9.4	11.3	13.1	15	16.9	18.8	20.6	22.5	24.4	26.3
10	15	18.8	22.5	26.3	30	33.8	37.5	41.3	45	48.8	52.5
15	22.5	28.1	33.8	39.4	45	50.6	56.3	61.9	67.5	73.1	78.8
20	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105

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).

Drug Label Insert Link

Dopamine

3120 GLYCOPROTEIN IIB/IIIA INHIBITORS (REOPRO, AGGRASTAT, INTEGRILLIN)

Glycoprotein IIB/IIIA Inhibitors	B	IV	I	P	P+	Adv
Infusion maintenance – Written physician order					X	X

Indications:

A. Unstable angina prior to percutaneous coronary intervention to inhibit platelet aggregation
B. Usually used in combination with aspirin and heparin

Contraindications:

A. Active internal bleeding
B. Recent GI or GU bleeding
C. History of stroke
D. Recent surgery or anticoagulant use
E. Severe uncontrolled hypertension
F. History of aneurysm

Complications:

A. Bleeding
B. Allergic reactions
C. Anaphylaxis
D. Hypotension
E. Nausea and vomiting
F. Back or chest pain

Procedures:

A. Abciximab (ReoPro)
    1. Supplied in 10mg/5mL (2mg/mL) vials
    2. Dosing
        a. Initial bolus: 0.25mg/kg over 10-60 minutes
        b. Continuous infusion (after bolus): 0.125mcg/kg/minutes
    3. Infusion is usually mixed with 9mg (4.5mg) into 250mL NS or D5W yielding 36mcg/mL. Eli Lily dosing charts use this mixture.
B. Tirofiban (Aggrastat)
    1. Supplied in 6.25mg/25mL (250mcg/mL) vials or 5mg/100mL (50mcg/mL) premix solution
    2. Dosing
        a. Initial bolus: 0.4mcg/kg/minute over 30 minutes
        b. Continuous infusion (after bolus): 0.1mcg/kg/minute
    3. Infusion must be at the 50mcg/mL concentration. Use the premix solution, add 6.25mg (one 25mL vial) to a 100mL of fluid, or add 12.5mg (two 25mL vials) to 200mL of fluid (may need to remove 50mL from a 250mL bag). Merck supplied dosing charts use this mixture.
C. Eptifibatide (Integrilin)
    1. Supplied in 20mg/10mL or 200mg/100mL (2mg/mL) vials
    2. Dosing
        a. Initial bolus: 180mcg/kg
        b. Continuous infusion (after bolus): 2mcg/kg/minute
    3. Infusion is administered undiluted directly from a 200mg/100mL vial with an infusion pump. Millennium supplied dosing charts use this mixture.

Drug Label Insert Link

ReoPro (abciximab)
Aggrastat (tirofiban)
Integrilin (eptifibatide)

3130 HEPARIN

Heparin	B	IV	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. Heparin Infusion
    1. Bolus to be administered and maintenance infusion initiated by sending facility prior to transport
    2. Concentration of infusion will vary; verify infusion rate is correct prior to leaving sending facility
    3. Maintain rate ordered by sending physician; usual rate of administration is 1,000 units/hour in adults
B. 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 Base** with any adverse events

Monitor

A. ECG
B. 12-lead

Drug Label Insert Link

Heparin

3140 INSULIN

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

Action:

A. 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. Attention must be paid to any signs of hypoglycemia such as:
    1. Diaphoresis
    2. Weakness
    3. Tachycardia
    4. Confusion
    5. Nausea

Procedure:

A. If the patient received a loading dose of insulin document on the patient care report including how much was administered.
B. Blood glucose checks every 30 minutes with a decrease in blood sugar of 30-50dl/hour on average
C. Usual doses:
    1. Adult: 0.1units/kg/hour
    2. Pediatric: 0.1units/kg/hour

3150 KETAMINE

Insulin	B	IV	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. Induction agent for rapid sequence intubation
B. 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. Concentration for IV
    1. 500 mg/10 mL (50 mg/mL)
B. Dose
    1. Induction dose: 1-2 mg/kg IV
    2. Maintenance dose: 0.25-0.5 mg/kg IV every 5-10 minutes or with signs of undersedation

Drug Label Insert Link

Ketamine Hydrochloride injection

3160 LIDOCAINE

Lidocaine	B	IV	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.

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
    1. The usual initial maintenance dose of lidocaine in the average 70 kg man is 2 mg/min
    2. Slower rates should be used in patients with liver disease or congestive heart failure
B. Typically, a maintenance infusion of lidocaine is 1 gram of lidocaine in 250 cc D5W for a concentration of 4 mg/cc; therefore, the drip rates should be:
    1. 1 mg/min = 15 cc/hr
    2. 2 mg/min = 30 cc/hr
    3. 3 mg/min = 45 cc/hr
    4. 4 mg/min = 60 cc/hr
C. In cases of lidocaine toxicity the medication drip should be discontinued immediately and the patient should be treated with supportive measures
    1. Administer atropine heart block and prepare for pacing
    2. Administer diazepam for seizurese

3170 MAGNESIUM SULFATE

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

Action:

A. Inhibits uterine contractions via smooth muscle relaxation

Indications:

A. To inhibit preterm labor (tocolysis)
B. Pregnancy induced hypertension

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 should 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 (range 1-4g/hour)
D. Reflexes should be checked during transport every 15 minutes and notify the receiving facility if reflexes decrease en-route
E. In case of magnesium toxicity, discontinue the infusion and administer calcium and notify the receiving facility

Drug Label

Magnesium sulfate

3180 MULTIVITAMIN INFUSION

Multivitamin infusion	B	IV	I	P	P+	Adv
Infusion maintenance – Written physician order					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).

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 should be added administered in 500-1000 mL of dextrose, Maintain at prescribed rate with patient on a cardiac monitor (for electrolytes)

Drug Label

INFUVITE® *ADULT* - Multiple Vitamins for Infusion

3190 NITROGLYCERIN

Nitroglycerin	B	IV	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. The patient should be observed clinically for:
    1. Pain relief
    2. Blood pressure changes
    3. Other signs of poor perfusion
B. 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)
C. Maintain infusion rate ordered by sending physician
D. Infusion rates may be increased by physician order for:
    1. Worsening ischemic chest pain
    2. Hypertension.
E. Nitrates absorb in plastic so the amount of drug exiting the IV tubing may be much less than the amount entering the tubing
F. Decrease the infusion rate by half if, in conjunction with a systolic blood pressure <100mmHg or with signs of poor perfusion which may include:
    1. Pallor
    2. Sweating
    3. Decreased capillary refill
    4. Decreased mental alertness
G. Notify the receiving facility in the event of complications.

Necessary Flow Rates (mL/hr)		
Desired Dose (mcg/min)	Solution Concentration (mcg/mL)	
	100	200
5	3	1.5
10	6	3.0
15	9	4.5
20	12	6
30	18	9
40	24	12
50	30	15
60	36	18

Monitoring

A. Blood pressure every 2 minutes during titration, then every 10 minutes.
B. ECG
C. 12-lead

Written orders

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

Drug Label

Nitroglycerin

3200 NOREPINEPHRINE (LEVOPHED)

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

Action:

A. Norepinephrine is a catecholamine with potent alpha-adrenergic vasoconstriction and beta-adrenergic action
B. 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.

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. Sepsis (weight based) dosing:
   1. Weight based dosing: 0.01-3 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

Weight Based Dosing					
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	22.5	30	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	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	30	45	60	75
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	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	67.5	90	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					

C. 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

Standard Dosing Chart (concentration 8 mg/250 mL; 32 mcg/mL)																
mcg/min	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**15**	**20**	**25**	**30**
mL/hour	1.9	3.8	5.6	7.5	9.4	11.3	13.1	15	16.9	18.8	20.6	22.5	28.1	37.5	46.9	56.3

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. Norepineprhine can induce tachydysrhythmias. If the heart rate exceeds 140, consult base physician and be prepared to titrate medication down one or two dose ranges..
C. Certain antidepressants such as a MAOI potentiate the effects of norepinephrine

Written Orders

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

Drug Label

Norepinephrine (Levophed)

3210 PARENTERAL NUTRITION

Parenteral Nutrition	B	IV	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. 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. Immediately start an infusion of D10W at the TPN ordered rate
    3. If D10W is not available, start an infusion of D5W at the same rate
    4. 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 TPN 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
I. PVC containers and administration sets cannot be used if a lipid emulsion is being infused

3220 POTASSIUM INFUSION

Potassium Infusion	B	IV	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

Administration

A. Use of an infusion pump is recommended in all situations and required with any dose exceeding 60 mEq/24 hours
B. Maximum infusion rate of potassium is 10 mEq/hr
C. ECG should be monitor with potassium replacement and is required when administered at 10 mEq/hr

3230 PROTONIX (PANTOPRAZOLE SODIUM)

Protonix (pantoprazole sodium)	B	IV	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

Drug Label Insert Link

Protonix (pantoprazole sodium)

3240 SANDOSTATIN (OCTREOTIDE ACETATE)

Sandostatin (octreotide acetate)	B	IV	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 effect 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

Drug Label Insert Link

Sandostatin (octreotide acetate)

3250 TNKASE (TENECTEPLASE)

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

Drug Label

TNKase (tenecteplase)

3260 VECURONIUM BROMIDE

Vecuronium Bromide	B	IV	I	P	P+	Adv
Infusion maintenance – Written physician order					X	X

Pharmacology and Actions

A. Vecuronium bromide is a non-depolarizing neuromuscular blocking agent that prevent acetylcholine from binding to receptors on muscle end plate, thus blocking depolarization and resulting in complete paralysis
B. Onset of action to occur within 1 minute of administration and the effect persists for 25-35 minutes
C. 25% of muscle twitch strength returns within 24-40 minutes and there is 95% recovery within 45-60 minutes of administration

Indications

A. Maintenance of chemical paralysis for interfacility transport

Precautions

A. Proper assessment of endotracheal tube placement should be documented every 10 minutes
B. Continuous end tidal CO2 monitoring and pulse oximetry are to be used to ensure endotracheal tube patency
C. Assess and treat for under-sedation, signs may include:
    1. Tachycardia
    2. Hypertension
    3. Lacrimation
    4. Diaphoresis

Administration

A. Dose and administration time should be determined with the sending physician prior to initiating mechanical ventilation
B. Dosing and time calculations must be confirmed and signed by the sending physician

Dose

A. The recommended dose is 0.1mg/kg for patients over 11 years old, given within 25 to 30 minutes of the previous dose

Special Considerations

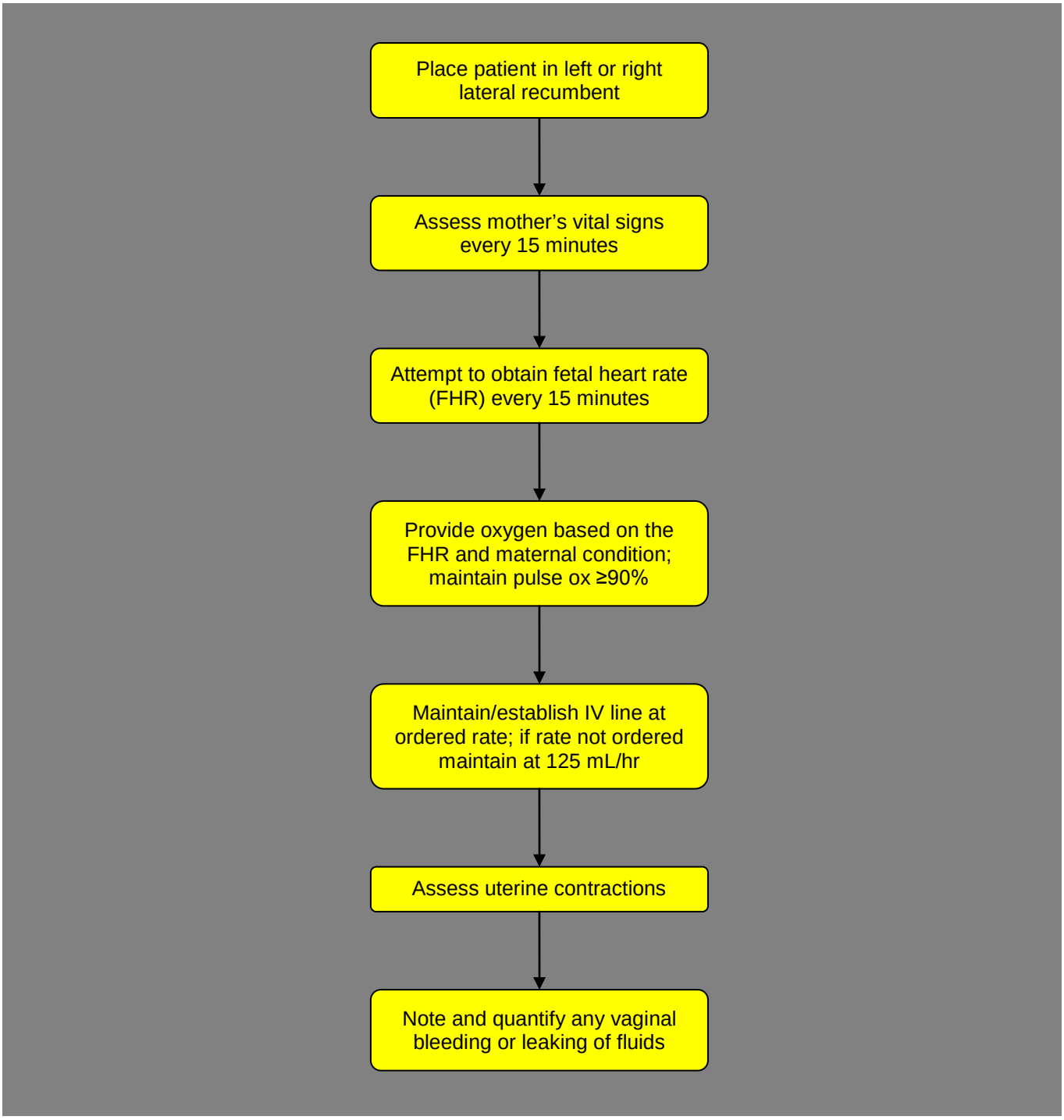
A. Neuromuscular blockers do not obtund consciousness or alter the pain threshold of your patient, so the administration of a sedative and analgesics is required for these patients
B. Vecuronium is well tolerated in patients with renal failure.

Drug Label

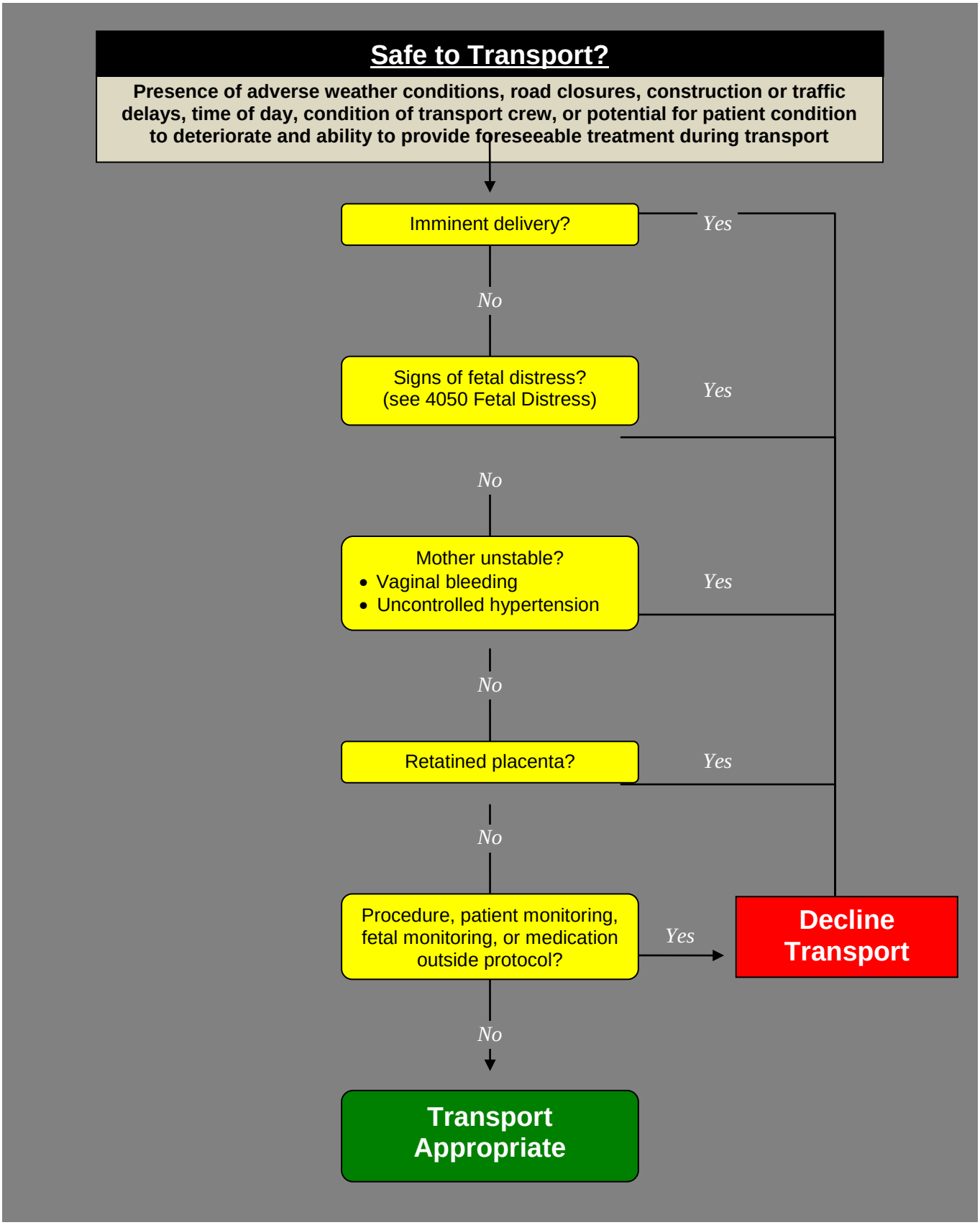
Vecuronium bromide

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
      b. 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, breach, 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 (St. Anthony Summit Medical Labor and Delivery guideline)
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

4070 PREGNANCY INDUCED HYPERTENSION (PIH)

Pregnancy induced hypertension (PHI) 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 >180 mmHg or diastolic >120 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 Hyperreflexia	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

   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

5000 SEARCH AND RESCUE PROTOCOLS

5010 CEFAZOLIN (ANCEF)
****FOR USE BY SCAS SAR ONLY***

Central Venous Catheter Maintenance	B	IV	I	P	P+	Adv
Search and Rescue - ONLY						

Indications:

A. Backcountry/Search and Rescue (SAR) patients with open soft tissue injuries or open fractures that are or will be greater than four (4) hours from the time of injury to arrival at a medical facility for definitive care.

Contraindications:

A. Cefazolin is contraindicated in patients with known allergy to the cephalosporin group of antibiotics (Rocephin, Keflex, Durecef, penicillin, etc)

Complications:

A. If signs or symptoms of an allergic reaction develop (i.e. itching, rash, difficulty breathing, wheezing, hypotension, etc.) discontinue the antibiotic and treat for allergic reaction per protocol.
B. Reported adverse effects include: lethargy, anxiety, depression, hallucinations, twitching, nausea, vomiting, and diarrhea.

Procedures:

A. Administer cefazolin (Ancef) 1 gram in 50 mL normal saline, IV over 15 minutes OR 1 gram IM.

APPENDIX A. COMMON LAB VALUES

HEMATOLOGY Red Blood Cells	
RBC (Male)	4.2 - 5.6 M/µL
RBC (Female)	3.8 - 5.1 M/µL
RBC (Child)	3.5 - 5.0 M/µL

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

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 µmol/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
creatine (Male)	0.2 - 0.6 mg/dL
creatine (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
PaCO2	35 - 45 mm Hg
HCO3	22 - 26 mEq/L
O2 saturation	96 - 100%
PaO2	85 - 100 mm Hg
BE	-2 to +2 mmol/L

VENOUS VALUES	
pH	7.31 - 7.41
PaCO2	41 - 51 mm Hg
HCO3	22 - 29 mEq/L
O2 saturation	60 - 85%
PaO2	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
C1	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
creatine clearance (Male)	100 - 140 mL / min
creatine clearance (Male)	16 - 26 mg / kg / 24 hr
creatine clearance (Female)	80 - 130 mL / min
creatine 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