

WREMAC



INTERFACILITY TRANSPORT PROTOCOLS

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To: All Western REMAC/Western NY EMS Agencies, Medical Directors, & EMS Providers
From: Michael O'Brien, MD, FACEP, FAEMS, FAMPA, Chair
Re: Western REMAC Interfacility Transport Protocols

The Western Regional Emergency Medical Advisory Committee (REMAC) is pleased to present its Regional Interfacility Transport Protocols. This document is the result of a painstaking effort by multiple EMS providers, program agency representatives, and other stakeholders.

It offers guidance to EMS crews participating in the interfacility transport of some of the most critically ill patients in the region. While no guidance document can anticipate all circumstances transport providers will encounter, it is a thorough reflection on the transfer complaints (and their management) commonly seen.

These protocols took effect on 1 July 2024 and are in effect until revised/withdrawn by the REMAC or superseded by New York State Department of Health directives. Final decisions regarding the use of some or the entirety of this document rest with the Agency Medical Director.

If transport crews have any questions pertinent to the care of a patient, they should not hesitate to contact medical direction for guidance.

Special thanks to all those who participated in the Ad Hoc Interfacility Transport Protocol workgroup, whose efforts spanned over 18 months. The Western REMAC also extends its gratitude to the nursing and physician partners who reviewed the document and provided important feedback & revisions.

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Policies and Procedures

Introduction

The decision to transfer a patient rests with the transferring physician (or other care provider, such as a physician assistant). This physician bears responsibility for the transfer decisions. It is the transferring physician who must:

- 1) Determine whether the benefits of transfer outweigh the risks.
- 2) Ensure that the patient is properly stabilized prior to departure.
- 3) Be responsible for complying with currently accepted community standards of practice regarding interfacility transfer.

The Paramedics/CCs and Medical Control Physician (MC) assume responsibility for management of the patient, given the circumstances of the patient's condition, while enroute between facilities.

This protocol recognizes there will be situations where potentially unstable patients will require transfer to another facility to obtain a higher level of care.

It should be noted that the Interfacility Transfer Protocol is a supplement to the Regional 911 Protocols and requires additional training. In this light, patient care during transport can be defaulted to that delineated by the Regional 911 Protocols.

Documentation

It is the responsibility of the transferring hospital/physician to provide appropriate documentation which includes a transfer form or other documentation indicating compliance with current statutes or laws regarding patient transfers. Included should be patient identifying information (name, address, date of birth, etc.), treatments, test results, preliminary diagnosis, reason for transfer, names of transferring/accepting physicians/institutions, pertinent medical records and orders.

Transport Crew Levels

The following is a description of which levels of care may transport what drugs and devices.

EMT

- Saline lock
- Patients with PCA pumps with settings unchanged for > 6 hours
- Stable patient with no anticipation of further interventions en route

AEMT

Above listed plus:

- Peripheral IV lines with no added drugs
- Stable, intubated patients with no anticipation of further interventions en route

AEMT-CC

Above listed plus:

- Peripheral IV lines
- Indwelling Lines /PICC lines that are already accessed and running
- Central venous lines that are running
- Cardiac monitor/defibrillator
- Intubated patients with stable ventilator settings
- Up to 3 IV drips and drugs except for those excluded from the list
- Only may transport patients on drugs listed in the protocol

AEMT-P

Above listed plus:

- All Intubated patients
- Arterial and Swann-Ganz lines- not to be used for monitoring by paramedic
- The medical director of the transporting service shall insure that all transporting providers are credentialed and trained for interfacility transfer and may transport drugs in the so-named categories at their discretion.

Contacting Medical Control

Medical Control (MC) may be defined as either the transporting service agency Medical Director, the transferring or receiving MD and as a last resort the ED physician of the transferring or receiving hospital.

Medical Control **MUST** be established in the following circumstances:

1. Ongoing administration of blood products or resuscitative medications
2. Intubated patients
3. Patients with chest tubes
4. Patients with temporary pacemakers
5. Changes in symptoms/ signs/ conditions potentially indicating deterioration
6. Unstable vital signs
7. Medications not specifically listed in the protocol

Patients on medications not specifically listed in the protocol may be transported by **EMT-Ps ONLY**.

These medications will need to be reviewed by MC and must fall into a similar category as other drugs **ALREADY LISTED** in the protocol.

A patient receiving a completely new category of drug may not be transported without further personnel trained in the use of that drug.

The Medical Director of the transporting service may set additional standards regarding contacting MC.

Transferring Patients with Drugs and Devices

During interhospital transfer crew members shall follow all regionally approved BLS/ALS protocols. In addition, the patients on the stated drugs and devices may only be transported if the respective drugs have been initiated at the referring hospital by the transferring physician/care provider **OR IF SPECIFIC CLINICAL PARAMETERS FOR THE USE OF THE DRUG IS CLEARLY SPECIFIED**. At the discretion of MC, the drug rates/doses may be altered or discontinued depending on the patient's clinical condition.

The following precautions should be kept in mind by transferring providers:

1. All medications have the potential to cause allergic reactions.
2. Some medications cause local irritation around the IV site. Several may even cause tissue necrosis if there is infiltration. If there is infiltration of any line, the IV should be immediately discontinued. However, it is recommended that the IV catheter is kept in place for possible administration of extravasation antidote at the destination facility.
3. Many of the listed drugs are incompatible with other medications. Therefore, additional medication should be given through a separate IV line, or, if one is not established, the

infusion should be stopped, and the line flushed before administering a second medication. This should only be done under direct MC guidance.

4. Most require infusion pumps and/or cardiac monitoring.
5. MC should be contacted if there is any change in patient condition or if any medication needs to be emergently discontinued during transport.
6. If the need arises for emergency medications to be given, infusions may need to be discontinued; contact MC.
7. The MC physician may determine that the number or types of drugs/devices may require the presence of additional personnel (such as a second paramedic, nurse or physician).
8. Transfer of patients with ongoing infusion of medication outside the scope of practice and training of the transporting crew (either because of lack of credentialing or medication not listed in the protocol) cannot be accomplished without additional personnel who possess a higher level of training.

Requesting Additional Personnel

When the EMS provider anticipates that they will require more assistance to appropriately care for the patient during transfer, they shall request the transferring physician/health care provider to provide appropriately trained hospital staff to accompany the patient and assist.

The transfer will not occur unless the EMS provider and MC are confident the personnel and equipment are appropriate for transfer.

Specialty Care Transport Introduction

Scope of Practice

The WREMAC Specialty Care Transport guidelines have been developed to safely provide interfacility transport of critically ill patients in our region. These Specialty Care Transport Protocols are to be used only by advanced level providers that have received additional training and have been credentialed by their System or Agency Medical Director. They are to be used in concert with the NYS Collaborative Advanced Life Support Adult & Pediatric Protocols. These Protocols are only to be used during Interfacility Transports of patients with additional medications or devices not listed in the collaborative protocol. The medications listed in the SCT guidelines should ideally be initiated at the referring hospital by the transferring physician/care provider or if specific clinical parameters for initiation and/or titration for their use is clearly specified via written transport orders.

Care Expectations

The Specialty Care Transport team will work collaboratively to achieve the following objectives:

1. Introduce yourself and the team members to the patient, family, and hospital staff.
2. Utilize full universal precautions.
3. Provide a primary and a secondary assessment prior to transport on every patient transported including a history and review of interventions by the sending facility and x-ray results/lab information when applicable.
4. Treatment for life-threatening problems detected during the primary and secondary assessment must be initiated before transport unless the patient is being transported for management of that problem.
5. Establish and maintain a patent airway. If the patient is on a ventilator, maintain the ventilator settings as per the sending facility unless otherwise indicated by the clinical condition of the patient or Medical Control.
6. Establish Medical Control & Consult with them unless all the following criteria are met:
 - a. The patient's condition is stable and an accurate report of the patient's condition has been given to the Transport Team.
 - b. The written protocols and any written orders currently address the immediate and foreseeable needs of the patient.
 - c. There is clear evidence of discussion between the sending and receiving facilities and the receiving facility has accepted care of the patient.
 - d. There is a completed hospital transfer form with the name of the accepting physician.
7. Before leaving the hospital, have the patient and family visit and, if possible, explain the patient's condition and probable course.
8. A phone report should be given to the receiving facility should any significant changes occur enroute. Before leaving the sending facility, try to obtain a contact person responsible for patient care at the receiving facility.
9. In the event of cardiac arrest of the patient during transport, the transport unit will proceed to the nearest appropriate Emergency Department. The Emergency Department should also be notified by the most appropriate means. The transporting paramedic should notify the responsible Medical Control as soon as practical.
10. Patients carrying a "Do Not Resuscitate" order or other advanced directive (e.g. MOLST) will not be transported until limitations of treatment in the form of a written order from the sending physician have been secured. This should be discussed with Medical Control before transport.
11. The ALS Provider will give a complete report to the staff on arrival at the receiving facility.
12. All procedures will be documented.

Routine Standard of Care

All patients being transported by the Specialty Care Transport Team should have the following in place prior to leaving the referring facility:

- Stable airway
- Cardiac monitor – 4-lead with 12-lead capability immediately available
- If clinically indicated, a minimum of two intravenous lines (peripheral or central)
- Continuous pulse oximetry, cardiopulmonary monitoring including: blood pressure (invasive or noninvasive), and capnography (when clinically indicated; required for any patient on a ventilator)
- Vital signs taken a **minimum** of every 15 minutes unless a change occurs which requires immediate repetition of them
- Vital signs taken a **minimum** of every 5 minutes if any vasoactive or sedating type medications are being infused
- Confirmation that any medications being infused in the same IV line are compatible
- Any continuous infusion requires the use of an infusion pump.

All patients should be maximally stabilized prior to transport, including intubation and peripheral or central venous access if necessary. It is the responsibility of the sending facility to ensure that stabilization is complete. In the event the Specialty Care Transport Team does not feel the patient is stable for transport, they must communicate with both the sending facility and the Medical Control before transport is initiated.

Medical Control

The use of the Specialty Care Transport Guidelines require the establishment of Medical Control prior to transport. The SCT Team must always have the means of direct communication to the Medical Control Physician responsible for the patient transfer during their care of the patient.

Specialty Care Transport Medical Control/Communication Failure

Contact with the established Medical Control will be dictated by protocol and should be available at all times during the transfer. For the Specialty Care Transport unit, the preferred medical control is the designated Medical Control physician established prior to the transport. In the event of being unable to contact the that Medical Control, the following mechanism will be instituted:

1. Direct contact with the receiving facility Medical Control
2. Direct contact with the accepting physician at the receiving facility.
3. Direct contact with the Agency Medical Director (if available).

Orders From Transferring/Receiving Physicians

During inter-hospital transport, medical crews will be asked to continue treatment initiated at the transferring hospital. These orders must be written and signed by the referring physician. If at any time the Specialty Care Transport Crew questions orders from a referring or receiving physician, the Agency Medical Director **MUST** be contacted. Likewise, any time a transferring or receiving physician asks the Specialty Care Transport crew to carry out medical treatment for which they have not been trained, or which appears to conflict with established treatment protocols, the Systems or Agency Medical Director **MUST** be contacted before initiating care.

Potentially Unstable Transports

It is the requirement of the sending facility to provide sufficient interventions to stabilize the patient prior to transport. If, in the opinion of the SCT Transport team, the patient is not stable for transport, discussions with the sending facility and possibly the Agency Medical Director should occur to determine how best to stabilize the patient for transport. Potential solutions include further interventions (such as intubation) at the sending facility or use of another Specialty Care Transport unit or agency with additional capabilities.

Intubation before transport is the responsibility of the sending facility and should be done by them. SCT Teams will not begin the transport until the sending facility has successfully managed to create a stable airway. In the event that they refuse, contact Systems or Agency Medical Director.

Specialty Care Transport Treatment Guidelines

Aortic Emergencies

INDICATIONS

Known or suspected aortic dissection or aneurysm.

MANAGEMENT GOALS

- Reduce afterload.
- Reduce HR and stroke volume to the lowest levels that allow for adequate systemic perfusion. Systolic blood pressures > 90 mmHg may be required to maintain MAP > 65 mmHg.
- MAP 80-100 mmHg (Should the MAP be markedly elevated, consider Hypertensive Emergencies Protocol)

$$MAP = \frac{SBP + 2(DBP)}{3}$$

- Reduce anxiety and pain.

CARE GUIDELINES

1. Routine medical care
2. Ensure two patent large bore IVs.
3. If HR is over 70 bpm, consider:
 - Metoprolol 5 mg q 10 minutes x 3 doses up to a max of 15 mg (hold for HR < 60 bpm).
 - Esmolol: Bolus 500 mcg/kg over 1 minute, then start infusion at 50 mcg/kg/min. May increase by 50 mcg/kg/min every 5 minutes up to a max of 200 mcg/kg/min (hold for HR < 60 bpm).
4. If SBP remains over 120 mmHg (goal is approximately 90 mmHg), consider:
 - **Nicardipine**: Initiate infusion at 2.5-5 mg/hr., increase by 2.5 mg/hr. every 10 minutes to a max of 15 mg/hr. When at goal, decrease the infusion rate to 3 mg/hr. and re-titrate to avoid hypotension from drug accumulation. **OR**
 - **Sodium Nitroprusside** (Only if Nicardipine is not available): Initiate infusion at 0.3 mcg/kg/min, increase by 0.5 mcg/kg/min every 5 minutes up to a maximum of 3 mcg/kg/min. May increase up to 10 mcg/kg/min but for no longer than 10 minutes total (usual dose 0.5 mcg/kg/min to 3 mcg/kg/min). **OR**
 - **Nitroglycerin** at 20-50 mcg/min (increase by 5 mcg/min every 5 minutes, up to a max of 100 mcg/min).

Titrate either agent to a systolic blood pressure of approximately 90 mmHg.

If Sodium Nitroprusside or Nitroglycerin are initiated, the patient must receive beta blockade to reduce the potential for reflex tachycardia and additional strain.

5. Consider pain management if SBP > 100 mmHg and RR > 8 rpm:
 - **Fentanyl** 0.5-1 mcg/kg (max 100 mcg/dose) IV, may repeat every 10 minutes to a max of 500 mcg.
 - OR**
 - **Morphine** 0.05-1 mg/kg (max 10 mg/dose) may repeat with 0.05 mg/kg every 10 minutes to a max of 50 mg (cautious use due to hypotension with other blood pressure lowering agents).
 - Do NOT use ketamine for analgesia for this disease state.

6. Consider mild sedation if patient is still anxious after adequate analgesia:
 - **Midazolam** 1-2.5 mg IV may repeat every 10 minutes to max 20 mg (cautious use due to hypotension with other blood pressure lowering agents).

 - Do NOT use ketamine for sedation for this disease state.

7. Consider nausea/vomiting management:
 - **Ondansetron** 4 mg IV, may repeat every 15 minutes up to 16 mg.

TREATMENT CONSIDERATIONS

Medications should be titrated by MAP and patient consciousness. Any evidence of EKG changes necessitates a higher MAP. MAP 80-100 mmHg (Should the MAP be markedly elevated, consider Hypertensive Emergencies Protocol)

$$MAP = \frac{SBP + 2(DBP)}{3}$$

Cardiogenic Shock

(Also see: Titration of Vasoactive Medications)

INDICATIONS:

- Known or suspected cardiac etiology.
- Heart Failure
- Acute Myocardial Infarction
- Structural cardiac abnormality
- Dysrhythmias / Arrhythmias (Treat underlying rhythm)
- Hypoperfusion with overt signs of left ventricular failure:
- Acute Pulmonary Edema
- Altered Mentation
- Cool, mottled extremities
- Low urine output

MANAGEMENT GOALS:

- Target MAP of 65 mmHg or greater, target SBP greater than 80 mmHg
- Maintain urine output of at least 0.5 mL/kg/hr.

CARE GUIDELINES

CC

- Continue infusion of vasoactive medications as ordered by sending facility.
- Vasopression, Norepinephrine, Dopamine, Dobutamine, Milrinone
- Verify vasoactive medication administration is performed via:
- Medication Infusion Pump (Gravity or flow restrictive membrane devices NOT permitted.)
- Dedicated vascular access only for vasoactive drips (DO NOT bolus any medication through same line)
- If acute pulmonary edema:
- Hold isotonic fluid administration.
- Consider CPAP / BiPAP / PEEP, as appropriate.

PARAMEDIC

- First line if HR > 60 bpm:
- Norepinephrine: 2 mcg/min, increase by 2 mcg/min every 5 minutes to max dose of 60 mcg/min.
- If Heart Rate > 130 or tachydysrhythmias:
- Wean Epinephrine, Dopamine, Norepinephrine.
- Initiate one of the following:
 - Dobutamine: 5 mcg/kg/min, increase by 5 mcg/kg/min every 5 minutes to max dose of 20 mcg/kg/min.
 - Phenylephrine: 25 mcg/min, increase by 25 mcg/min every 5 min as needed
 - If Heart Rate < 50:
 - Dopamine: 5-10 mcg/kg/min, increase by 5 mcg/kg/min every 5 minutes to max dose of 20 mcg/kg/min.
 - Epinephrine: 2 mcg/min, increase by 1 mcg/min every 5 minutes to max dose of 20 mcg/min. Hold if HR > 140.

CRITICAL CARE/PARAMEDIC

- If continued hypoperfusion, supplement with:
 - Vasopressin: 0.03 units/min, increase by 0.005 units/min every 10 minutes to max dose of 0.1 units/min.
 - Dobutamine: 5 mcg/kg/min, increase by 5 mcg/kg/min every 5 minutes to max dose of 20 mcg/kg/min.
 - Phenylephrine: 25 mcg/min, increase by 25 mcg/min every 5 min as needed.

MEDICAL CONTROL CONSIDERATIONS

- If inadequate perfusion persists, and the max dose of dobutamine has been achieved, or acute pulmonary edema:
 - Milrinone: 0.375 mcg/kg/min, increase by 0.125 mcg/kg/min every 15 minutes to max dose of 0.75 mcg/kg/min.
 - Monitor closely for hypotension
 - Monitor for ectopy

KEY POINTS / CONSIDERATIONS

- The patient in cardiogenic shock must be treated aggressively.
- If available, review chest x-ray for presence of pulmonary edema and/or infiltrates.
- If available, review all labs and/or diagnostic material; i.e. echocardiogram, BNP, etc.
- Central venous access is desirable if possible. If vasoactive medications are being administered.
- Continuous arterial pressure monitoring is desired if possible.
- If the patient is experiencing cardiogenic shock as a result of an MI, aspirin and anti-thrombin therapy should be initiated unless otherwise contraindicated.
- Vasodilators should be used with caution. Beta Blockers should be avoided.
- Be extremely cautious with afterload and/or preload reducing agents if instituted to increase cardiac output.
- Be cautious with Dobutamine and Milrinone. Although Dobutamine and Milrinone increase contractility, they also decrease systemic vascular resistance (SVR) which may lead to hypotension.

Elevated Intracranial Pressure

INDICATIONS

- History of brain injury (traumatic, intracranial hemorrhage, or mass) with GCS \leq 8

MANAGEMENT GOALS

- Prevention of secondary brain injury due to hypoxia or hypotension
- Reduction of cerebral oxygen demand
- Reduction of intracranial pressure while maintaining cerebral perfusion pressure
- MAP 80-100 mmHg (Should the MAP be markedly elevated, consider Hypertensive Emergencies Protocol).
- EtCO₂ 35-45 mmHg
- Minimize external stimuli and maintain normothermia
- Safe and expedient transfer to definitive care

CARE GUIDELINES

1. Routine medical care
2. Head of bed at 30 degrees
3. Consider early intubation. Maintain SpO₂ > 90% and EtCO₂ 35-45 mmHg. Avoid allowing EtCO₂ to fall below 30 mmHg.
4. Consider analgesia (optimize analgesia before initiating sedation):
 - **Fentanyl** 0.5-1 mcg/kg (max 100 mcg/dose) IV, may repeat every 10 minutes to a max of 500 mcg.
OR
 - **Morphine** 0.05-0.1 mg/kg (max 10 mg/dose) IV, may repeat with 0.05 mg/kg every 10 minutes to a max of 50 mg.
OR
 - **Ketamine** 0.3 mg/kg (max 30 mg) in 100 mL over 15 minutes, may repeat x 1 in 30 minutes.
5. Consider sedation. Level of sedation should be maintained to a RASS Scale (see appendix) score of -3 to -4:
 - **Midazolam** 1-2.5 mg IV, may repeat every 10 minutes to a max of 20 mg.
OR
 - **Propofol** –infusion at 10 mcg/kg/min, increase by 5-10 mcg/kg/min every 3-5 minutes to a max dose of 50 mcg/kg/min. Preferable to titrate fentanyl until a max dose is achieved, then increase propofol. Administer 10 mg boluses every 10 minutes only if needed (be cautious with bolus doses or aggressive titration and consider risk of hypotension and bradycardia).
OR
 - **Ketamine** (intermittent boluses) 0.5-1 mg/kg IV every 15 minutes as needed for sedation/analgesia OR (continuous infusion) 0.5-1 mg/kg IV bolus, then 0.5-1 mg/kg/hr, increase by 0.25-0.5 mg/kg/hr every 30 minutes.
6. Consider nausea/vomiting management:
 - **Ondansetron** 4 mg IV, may repeat every 15 minutes up to 16 mg
7. Consider paralysis per Intubated and Chemically Neuromuscularly Blocked Patient Protocol

8. Consider seizure prophylaxis:
 - **Levetiracetam** (Keppra) 20 mg/kg IV over 15 minutes (usual dose 500-1500 mg twice daily); status treatment doses may be as high as 40-60 mg/kg.
9. For cerebral edema and global swelling consider:
 - **Mannitol (20%-25%)** 1 g/kg IV bolus (rapid to develop osmotic gradient). Hypotension is an absolute contraindication to osmotic diuresis.
10. If an open skull fracture is suspected consider:
 - **Ceftriaxone (Rocephin)** 2 g IV (consider allergies).

Hypertensive Emergencies

INDICATIONS

- Blood pressure > 180/110 mmHg with:
- Acute end organ injury or failure thought to be directly secondary to severe hypertension
- Acute change in mental status
- New focal neurological deficit
- Acute ischemic ECG changes
- Acute LV dysfunction
- Renal failure (increased serum creatinine or increased urinary output less than 0.5 mL/kg/hr)

MANAGEMENT GOALS

- Prevention of serious cardiac or neurologic complications
- Initiation of gradual therapy to lower blood pressure to the point that immediate life-threatening complications (acute CHF, CVA) are avoided

CARE GUIDELINES

- Routine medical care
- Attempt to identify and correct the cause of the BP elevation (pain, pre-eclampsia, overdose, etc.) consult the appropriate collaborative protocol and consult with Medical Control.
- If blood pressure greater than 200/130 mmHg and asymptomatic; or blood pressure greater than 180/110 mmHg and accompanied by symptoms such as tachycardia, headache, nausea/vomiting, or confusion:
 - Consider Labetalol: 10-20 mg slow IV push over 2 minutes. Double the previous dose and repeat every 10 minutes as needed (max total dose 300 mg; hold for HR < 60 bpm)
 - Consider Nicardipine: Initiate infusion at 2.5-5 mg/hr, increase by 2.5 mg/hr every 10 minutes to a max of 15 mg/hr. Once at goal, reduce to 3 mg/hr and re-titrate to avoid hypotension.
 - Consider Esmolol: Bolus 500 mcg/kg over 1 minute, initiate infusion at 50 mcg/kg/min. Increase by 50 mcg/kg/min every 10 minutes up to a max of 200 mcg/kg/min.
 - Consider Nitroglycerin: Initiate infusion at 20-50 mcg/min, increase by 5 mcg/min every 5 minutes up to a max of 100 mcg/min.
 - Consider Nitroprusside infusion (Only if Nicardipine unavailable): Initiate infusion at 0.3 mcg/kg/min, increase by 0.5 mcg/kg/min every 5 minutes to a max of 3 mcg/kg/min. May increase up to 10 mcg/kg/min but for no longer than 10 minutes total (usual dose 0.5 mcg/kg/min).

TREATMENT CONSIDERATIONS

- Rapid reduction in BP is indicated in the setting of AMI, hypertensive encephalopathy, and subarachnoid hemorrhage. In all other cases, BP should be lowered no more rapidly than 10% per hour until a baseline blood pressure is reached.
- Consider adequate pain management as an initial step in patients with cephalalgia
- If an aortic emergency is known or suspected, see Aortic Emergencies Protocol
- If hypotension or bradycardia occurs, discontinue antihypertensive infusions, elevate patients' feet and administer 250 mL crystalloid fluid bolus as needed. Repeat as needed to maintain MAP of at least 65 mmHg and HR > 60 bpm and contact Medical Control.

Implanted Cardiac Devices – Total Artificial Heart (TAH)

INDICATIONS

Patients who have an implanted cardiac device

MANAGEMENT GOALS

Provide for patient comfort and safety

Ensure device functionality

Optimize patient perfusion

CARE GUIDELINES

- Routine medical care.
- TAH patients will have BP and HR obtainable by conventional means, but no electrical activity.
- Target SBP < 130 mmHg
- Pulse rate set and normal, between 120-135 bpm
- Normal fill volume is variable, 50-60 mL/beat and displayed on the unit
- Assess device functionality and operation
 - Defined by:
 - Device power
 - Fault alarms from driver unit
 - If driver is not operating, the patient has no pulse or blood pressure, or fault alarming; change to backup driver or hand pump
 - Hand pump at a rate of 120 bpm where 1 beat is equivalent to '1 down and up'
- Ensure patent IV access
- If problems continue, immediately contact Medical Control
- If SBP is > 110 mmHg, consider
 - Nitrates
 - **Nitroglycerin** 0.4 mg SL q 5 minutes
 - OR**
 - **Nitroglycerin infusion:** 20-50 mcg/min may increase by 5 mcg/min every 10 minutes to a max of 50 mcg/min or SBP < 110 mmHg
- If SBP elevation persists:
 - Consider **Labetalol** 10-20 mg slow IV push over 2 minutes. May double the previous dose and repeat every 10 minutes as needed for desired effect (max total dose 300 mg hold for HR < 60 bpm).
- Assess for hypervolemia:
 - If fill volumes are > 60 mL and patient has complaints of respiratory distress administer IV furosemide 40 mg
- Assess for hypovolemia:
 - If SBP < 90 mmHg or fill volumes < 45 mL with evidence of distributive shock, blood loss, or dehydration :
 - 250 mL bolus IV 0.9% **Normal Saline or Lactated Ringers**; May repeat if necessary.

ADDITIONAL CONSIDERATIONS

- Under no circumstances will chest compressions provide any benefit
- TAH patients are on multi-agent anticoagulation
- Insufficient cardiac support may be due to:
- Hypervolemia, not hypotension and hypovolemia; Kevlar chambers can accommodate no more than 70 mL at a time.
- Degradation or damage to the drivelines. Examine drivelines for venting air. Repair kit may be in patient support kit
- Transport patient with both drivers, hand pump, all batteries and power cords
- Contact receiving hospital
 - Strong Hospital Artificial Heart Program 1-800-892-4964
 - Rochester Regional VAD Program 585-922-9899
- Syncardia Emergency number 1-866-771-9437

Intubated And Chemically Neuromuscularly Blocked Patients

INDICATIONS

- Patients who are intubated and mechanically ventilated.

MANAGEMENT GOALS

- Provide for patient comfort and safety
- Optimize ventilator parameters

CARE GUIDELINES

ALL PATIENTS WHO ARE CHEMICALLY NEUROMUSCULARLY BLOCKED MUST HAVE ALSO RECEIVED AN ANALGESIC AND SEDATION UNLESS SPECIFICALLY CONTRAINDICATED.

Analgesia:

- **Fentanyl:** Bolus 0.5-1 mcg/kg (max 100 mcg/dose) IV once. Initiate infusion at 25-100 mcg/hr, increase by 25-50 mcg/hr every 10 minutes (bolus with each dose increase) up to max 3 mcg/kg/hr or 250 mcg/hr.
- **Ketamine** at analgesic doses is not appropriate for this indication.

Sedation - Must initiate and optimize with active neuromuscular blocking agents; (tachycardia or change in heart rate may be indicators of inadequate sedation in the setting of paralytic use)

- **Midazolam:** Bolus 1-2 mg, and initiate infusion at 1-2 mg/hr. Increase by 1-2 mg/hr every 10 minutes as needed up to 6 mg/hr.
OR
- **Propofol:** Initiate infusion at 10 mcg/kg/min, increase by 5-10 mcg/kg/min every 3-5 minutes to max of 50 mcg/kg/min. Administer 10 mg boluses every 10 minutes only if needed (be cautious with bolus doses or aggressive titration and consider risk of hypotension and bradycardia).
OR
- **Ketamine:** (intermittent boluses) 0.5-1 mg/kg IV every 15 minutes as needed for sedation/analgesia OR (continuous infusion) 0.5-1 mg/kg IV bolus, then 0.5-1 mg/kg/hr, increase by 0.25-0.5 mg/kg/hr every 30 minutes up to 4.5 mg/kg/hr. **OR**
- **Precedex:** 1 mcg/kg over 10 minutes* • Followed by 0.4 mcg/kg/hr • Titrate to effect with doses from 0.2-0.7 mcg/kg/hr • Rate of infusion should be adjusted to achieve targeted level of sedation.

1. If adequate sedation is not achieved with max doses of analgesics and sedating Medications the SCT Team will require consultation with Medical Control prior to transport.
2. Soft restraints should be used for patient safety.
3. All intubated patients may be re-dosed with neuromuscular blockers if needed to maintain ventilator synchrony or patient safety. If required, Rocuronium should be dosed at 0.5 mg/kg IV (ideal body weight) every 20-40 minutes. ****ALL patients MUST have continuing ANALGESIC and SEDATIVE agents with continued neuromuscular blockade.****
4. If continuous infusion of a different paralytic agent (e.g. atracurium, cisatracurium vecuronium) is started by the sending facility, continue it and re-dose with Rocuronium if a bolus is needed.
5. If unable to sedate/neuromuscular block. Consultation with the established Medical Control is required.

Post Thrombolytic (TPA; Alteplase Or Tenecteplase) Administration

INDICATIONS

- Patients who have had a thrombolytic administered prior to transfer for the conditions of Stroke (CVA), Pulmonary Embolus (PE), or Acute Myocardial Infarction (AMI)

MANAGEMENT GOALS

- Provide for patient comfort and safety
- Ensure completion of thrombotic medication
- MAP 80-100 mmHg (Should the MAP be markedly elevated, consider Hypertensive Emergencies Protocol)
- Close and frequent monitoring of patient's disease specific physical condition, neurologic condition, and bleeding events.

CARE GUIDELINES

1. Monitor patient's vital signs and neurologic exam at a minimum of every 15 minutes during the infusion as well as after the infusion during transport (i.e., NIHSS for patients being treated for stroke).
 - a. If the patient's neurologic exam decompensates, stop the infusion and contact the receiving facility and medical control.
 - b. Infusion should not be restarted until evaluated by the receiving facility.
2. Monitor for major/minor bleeding
 - a. Major bleeding i.e., intracranial, retroperitoneal, gastrointestinal, urinary
 - b. Minor bleeding i.e., gums, venipuncture sites, hematuria, hemoptysis, hematomas, ecchymosis
 - c. If bleeding complications occur, contact the receiving hospital and SCT Medical Control and consider stopping the infusion.
3. Monitor vital signs every 15 minutes
 - a. Special attention to blood pressure keeping the systolic < 185 mmHg and diastolic < 105 mmHg.
 - i. **Labetalol** 10-20 mg slow IV push over 2 minutes. May double the previous dose and repeat every 10 minutes as needed (max dose 300 mg and hold for HR < 60 bpm). **OR**
 - ii. **Nicardipine**: Initiate infusion at 2.5-5 mg/hr, increase by 2.5 mg/hr every 10 minutes to max of 15 mg/hr. Once at goal, reduce rate to 3 mg/hr and re-titrate to avoid hypotension. If BP drops below 140/80 mmHg immediately discontinue medication and contact MC.
 - iii. Contact SCT Medical Control in the setting of acute hypertension that has not responded to treatment. i.e., blood pressure that is continually elevated SBP > 185 mmHg or DBP > 105 mmHg despite 2 doses or titrations.

ADDITIONAL CONSIDERATIONS

Any decompensation in neurologic condition that occurs during transport needs to be immediately reported to Medical Control and the receiving facility. If the infusion is running at this time, it should be stopped immediately. The infusion will not be restarted prior to evaluation at the receiving facility or with SCT Medical Control.

Thoracostomy (Chest) Tubes

INDICATIONS

- Patients being transported with thoracostomy tubes in place

MANAGEMENT GOALS

- Render optimal care to minimize discomfort and monitor for changes in patient condition during transport.

CARE GUIDELINES

- All thoracostomy tubes must be securely attached to patient before transport. This should include: confirmation of suturing to the skin, occlusive dressing to thoracostomy site, and secure taping of the thoracostomy tube to the patient.
- All thoracostomy tubes should be connected to a commercially available chest drainage system or a Heimlich valve.
- If suction was being applied to the chest drainage system at the sending facility, it will be maintained during the transport at the same setting.
- In the event of a sudden deterioration in the patient's status, all thoracostomy tubes will be placed to suction.
- Thoracostomy tubes should be re-examined every 15 minutes during transport to ensure proper function.
- In the event that a thoracostomy tube becomes dislodged, no attempt will be made to reposition. The thoracostomy tube should be put to suction and the patient observed for signs of tension pneumothorax.
- If tension pneumothorax should develop, initiate appropriate care with needle decompression and contact Medical Control.
- Provide appropriate analgesia as needed (fentanyl, morphine, or ketamine).
- If the patient becomes hypotensive and tension pneumothorax is not suspected, refer to Collaborative Shock Protocol (General: Shock/Hypoperfusion or General: Trauma Associated Hypovolemia/Hypoperfusion).
- In the event the chest drainage system is damaged, remove tubing from chest drainage system and place end of chest tube in bottle of sterile water. Contact Medical Control if change in patient status.
- Monitor and record thoracostomy tube output every 15 minutes. Contact Medical Control if output exceeds 500 mL in 30 minutes.

Titration Of Vasoactive Medications

INDICATIONS

- Patients being transported with intravenous vasoactive medications.

MANAGEMENT GOALS

Provide for safe titration and use of intravenous vasoactive medication during transport.

CARE GUIDELINES

1. All vasoactive medications must be controlled utilizing a Continuous Electronic Infusion Device
2. Whenever possible, vasoactive medications should be given through a dedicated central access device (central line, PICC line, etc.).
3. If this is not possible, the vasoactive medication should be infused through the distal Y-site or stopcock of a peripheral IV of normal saline (0.9% NS). The normal saline (0.9% NS) should have a flow rate of 125 mL/hr and should not be titrated. This can be achieved with either a flow restricting device or as a channel on the Continuous Electronic Infusion Device. No other medications should be administered in the same PIV site where vasoactive medications are being infused.
4. NO medications should ever be bolused through the IV line infusing vasoactive medications.
5. Whenever possible, initial administration of vasoactive substances should begin in the sending facility. Addition of vasoactive medications during transport should be made after Medical Control consultation.
6. Unless otherwise specified by Medical Control, vasoactive medications should generally be titrated to achieve a MAP of 65 mmHg or greater.

$$MAP = \frac{SBP + 2(DBP)}{3}$$

7. Titration of vasoactive substance should be performed utilizing an understanding of the medication's pharmacokinetics, with typical half-life determining the period of observation to determine medication effect. Use the Appendix: Continuous Infusion Titratable Medical Reference.

Transvenous (Temporary) Pacemaker

INDICATIONS

- Patients being transported with a transvenous (temporary) pacemaker.

MANAGEMENT GOALS

- Provide for safe transfer of patients with a transvenous (temporary) pacemaker.

CARE GUIDELINES

- Check to assure the insertion site dressing is clean and dry and the pacing electrode position is anchored securely with tape.
- Secure the pacing generator and place the plastic cover over the pacemaker controls.
- Manage complications, should they develop, according to the following:
 1. Failure to capture – due to electrode displacement or a high stimulation threshold
 - Check and tighten all connections.
 - Call Medical Control immediately and report if effective capture is not regained after the above interventions.
 - Increase the pacemaker output/mA.
 - Turn the patient to a left lateral recumbent position.
 - Place the external pacer on the patient and pace if needed for symptomatic bradycardia following the Collaborative Protocol (General: Bradycardia/Heart Blocks – Symptomatic).
 - Turn off any internal pacer if one is present.
 2. Failure to pace with no spike present – caused by a broken or loose connection, electrode fracture, inhibition of pacemaker output, battery or circuit failure.
 - Check and tighten all connections.
 - Check for any equipment that might cause electrical interference and remove if possible.
 - Replace the battery and/or pacing generator.
 - Call Medical Control immediately and report if effective pacing is not regained after the above interventions.
 - Place the external pacer on the patient and pace if needed for symptomatic bradycardia following the Collaborative Protocol (General: Bradycardia/Heart Blocks – Symptomatic).
 - Turn off any internal pacer if one is present.
 3. Failure to sense – occurs when the pacemaker does not sense an intrinsic beat.
 - Check and tighten all connections.
 - Increase the sensitivity of the pacing unit.
 - Place the patient in a position where adequate sensing was last observed. A left lateral recumbent position is usually best.
 - Increase the pacing rate to override the intrinsic rhythm if possible.
 - Turn the pacemaker off if it is not needed, but do not disconnect from the electrode wires.
 - Call Medical Control immediately and report if effective pacing is not regained after the above interventions.
 - Place the external pacer on the patient and pace if needed for symptomatic bradycardia

4. Following the Collaborative Protocol (General: Bradycardia/Heart Blocks – Symptomatic).
5. Turn off any internal pacer if one is present.
6. Over-sensing – occurs when the pacemaker sensitivity is set too high. (It should be suspected when pauses are seen intermittently on the ECG or when the paced rate falls below that set on the pacemaker generator. The pacemaker-induced problem may be mistaken for electrode fracture or impending generator failure. Over-sensing leads to under-pacing).
 - Decrease the sensitivity on the pacemaker.
 - Replace the pacemaker generator if the problem continues.
 - Call Medical Control immediately and report if effective pacing is not regained after the above interventions.
 - Place the external pacer on the patient and pace if needed for symptomatic bradycardia following the Collaborative Protocol (General: Bradycardia/Heart Blocks – Symptomatic).
 - Turn off any internal pacer if one is present.
7. Sedation and Analgesia
 - Consider analgesia if SBP < 90 mmHg: Fentanyl 0.5-1 mcg/kg (max 100 mcg/dose) IV, may repeat every 10 minutes to a max of 500 mcg.
 - Consider sedation: Midazolam 1-2.5 mg IV, may repeat every 10 minutes to a max of 20 mg or SBP < 90 mmHg
 - i. **Do NOT** use ketamine for this indication.

STEMI/Acute MI Management

INDICATIONS

- Patients presenting to the outlying Hospital Emergency Departments lacking interventional cardiac capabilities, with ST elevation > 1 mm in 2 contiguous leads, new LBBB with symptoms less than 12 hours in duration or LBBB with ST/T wave abnormalities which meet diagnostic criteria for MI (e.g. Sgarbossa).

MANAGEMENT GOALS

- Provide for patient comfort and safety
- Optimize transport times to meet AHA guidelines for “door to balloon” time of 90 minutes or less.

CARE GUIDELINES

- Routine medical care.
- Serial 12 lead EKG’s during transport; do NOT delay transport to obtain.
- Ensure two patent IVs.
- Consider
 - **Aspirin** 324 mg chewed PO x 1
AND
 - **Clopidogrel (Plavix)**, 300-600 mg PO x 1 OR Ticagrelor 180 mg PO x 1
- Consider anticoagulation/antiplatelet administration (monitor for signs of bleeding):
 - **Heparin** 60 units/kg (max 4,000 units) IV bolus x 1, followed by 12 units/kg/hr infusion (max of 1,000 units/hr)**OR**
 - **Eptifibatide** (Integrilin): 180 mcg/kg (max 22.6 mg) IV bolus x 2, 10 minutes apart then 2 mcg/kg/hr infusion (max 15 mg/hr). If GFR or CrCl < 50 mL/min then only one bolus and reduce infusion to 1 mcg/kg/hr (max 7.5 mg/hr). If GFR or CrCl < 30 mL/min do not administer.
OR
 - **Tirofiban** (Aggrastat): 25 mcg/kg (max 3,825 mcg) IV over 5 minutes or less, then 0.15 mcg/kg/min (max 23 mcg/min) continued up to 18-48 hours. If GFR or CrCl < 60 mL/hr bolus is the same, but rate decreased to 0.075 mcg/kg/min (max 11.5 mcg/min).
- Consider nitrates if SBP > 110 mmHg in the absence of RV infarct:
 - **Nitroglycerin** 0.4 mg SL q 5 minutes prn pain
- Consider **Nitroglycerin infusion**: Initiate infusion at 20-50 mcg/min, increase by 5 mcg/min every 10 minutes up to a max of 100 mcg/min while maintaining SBP > 110 mmHg.
- Should patient’s condition deteriorate to MAP < 65 mmHg, contact Medical Control.

Appendices

Appendix A: Continuous Infusion Titratable Medication Reference

Medication (Drug Class)	Dose+	Additional Information Adverse Drug Effect (ADE)
Sedation/Analgesia (unless chemically paralyzed, then titrate sedation as appropriate)		
Midazolam (Sedative)	Intermittent: 0.05-0.1 mg/kg, may repeat every 10 min to max 20 mg Cont Infusion Initial: 1-2 mg/hr (bolus with initial starting dose) Titration: Increase by 1-2 mg/hr every 10 min as needed for sedation (bolus x 1 with the dose of the new rate at each titration) Usual: 1-6 mg/hr	Onset: 1-2 min Duration: 15-60 min ADE: hypotension
Propofol (Sedative)	Initial: 10 mcg/kg/min Titration: Increase by 5-10 mcg/kg/min every 5 min (may bolus with 10 mg every 10 min only if needed for sedation) Usual: 10-50 mcg/kg/min	Onset: 30-40 sec Duration: 1-3 min ADE: severe hypotension, bradycardia; be cautious with boluses and rapid titration
Fentanyl (Analgesic)	Intermittent: 0.5-1 mcg/kg, may repeat 0.5 mcg/kg every 10 min up to max 500 mcg Cont Infusion Initial: 25-100 mcg/hr (bolus with initial starting dose) Titration: Increase by 25-50 mcg every 5 min (bolus x 1 with the dose of the new rate at each titration) Usual: 50-250 mcg/hr	Onset: immediate Duration: 10-30 min ADE: serotonergic properties, do not use in suspected antidepressant overdose
Ketamine (Dissociative anesthetic – sedative and analgesic)	Intermittent: 0.5-1 mg/kg IV every 15 min as needed for sedation/analgesia (post-RSI), 1-2 mg/kg (RSI), 0.1-0.3 mg/kg max 30 mg in 100 mL NS over 15 min (analgesia, not intubated) Cont Infusion Initial: 0.5-1 mg/kg/hr (bolus with initial starting dose) Titration: Increase by 0.25-0.5 mg/kg/hr every 30 min (consider slower titration 0.1 mg/kg/hr if using lower doses; 0.05-0.5 mg/kg/hr) Usual: 0.1-4.5 mg/kg/hr	Onset: 1-2 min Duration: 15 min ADE: hypertension, tachycardia, do not use in cardiac ischemia
Vasopressors/Inotropes (Central line preferred. If only a peripheral line is available, Y-site with free flowing fluid)		
Norepinephrine (Vasopressor – alpha and beta [lesser effect] agonist)	Initial: 2 mcg/min (0.03 mcg/kg/min) Titration: Increase by 2 mcg/min (0.03 mcg/kg/min) every 5 min as needed for goal blood pressure Usual: 4-80 mcg/min If > 80 mcg/min (0.1 mcg/kg/min) contact Medical Control	Onset: immediate Duration: 2-5 min ADE: hypertension, bradyarrhythmias
Dopamine (Vasopressor – alpha and beta agonist; increasing dose increases alpha agonist effects)	Initial: 5-10 mcg/kg/min Titration: Increase by 5 mcg/kg/min every 5 min as needed for goal blood pressure up to 20 mcg/kg/min Usual: 5-20 mcg/kg/min	Onset: immediate Duration: 1-2 min ADE: hypertension, tachyarrhythmias

Epinephrine (Vasopressor – potent alpha and beta agonist)	Initial: 1 mcg/min (0.01 mcg/kg/min) Titration: Increase by 1 mcg/min (0.01 mcg/kg/min) every 5 min as needed for goal blood pressure Usual: 10-20 mcg/min (0.1-0.2 mcg/kg/min)	Onset: immediate Duration: 1-2 min ADE: hypertension, tachyarrhythmias
Phenylephrine (Vasopressor – potent alpha agonist)	Initial: 25 mcg/min Titration: Increase by 25 mcg/min every 5 min as needed for goal blood pressure Usual: 25-200 mcg/min	Onset: immediate Duration: 15-30 min ADE: hypertension, reflex tachycardia
Vasopressin (V1 agonist – vasoconstrictor; used in refractory sepsis)	Usual: 0.01-0.04 units/min	Onset: immediate Duration: 10-20 min ADE: hypertension, bradycardia, dysrhythmias
Dobutamine (Inotrope – beta agonist, increases cardiac output)	Initial: 5 mcg/kg/min Titration: Increase by 5 mcg/kg/min every 15 min as needed for tissue perfusion up to 20 mcg/kg/min Usual: 5-20 mcg/kg/min	Onset: immediate Duration: 1-2 min ADE: hypotension and tachydysrhythmias
Milrinone (Inotrope – phosphodiesterase III enzyme inhibitor, inhibits cAMP and increases ventricle contractility and cardiac output)	Initial: 0.375 mcg/kg/min Titration: Increase by 0.125 mcg/kg/min every 15 min as needed for tissue perfusion up to 0.75 mcg/kg/min Usual: 0.375-0.75 mcg/kg/min	Onset: 5-15 min Duration: 1-2 hr ADE: hypotension, ventricular arrhythmias (SVT, VT), shorten AV node conduction, dose reduce in renal impairment
Cardiovascular		
Esmolol (Beta-1 selective antagonist)	Load: 500 mcg/kg over 1 min Initial: 50 mcg/kg/min Titration: Increase by 50 mcg/kg/min every 5 min as needed for goal blood pressure and heart rate up to 200 mcg/kg/min Usual: 50-200 mcg/kg/min	Onset: 2-10 min Duration: 10-30 min ADE: hypotension, bradycardia, heart block
Nicardipine (Calcium channel blocker)	Initial: 2.5-5 mg/hr Titration: Increase by 2.5 mg/hr every 10 min as needed for goal blood pressure up to 15 mg/hr. Once at goal blood pressure, decrease rate to 3 mg/hr to prevent accumulation and hypotension (due to long half-life of the medication). Re-titrate as described above. Usual: 5-15 mg/hr	Onset: 5-10 min Duration: 15-30 min up to 4 hr ADE: hypotension
Nitroglycerin (Vasodilator – more effect on peripheral veins than arteries)	Initial: 20-50 mcg/min Titration: Increase by 5 mcg/min every 5 min as needed for goal blood pressure and pain control up to 100 mcg/min Usual: 20-100 mcg/min	Onset: immediate Duration: 1-3 min ADE: hypotension, bradycardia
Nitroprusside (Vasodilator – more effect on arteries than veins)	Initial: 0.3 mcg/kg/min Titration: Increase by 0.5 mcg/kg/min every 5 min as needed for goal blood pressure up to a max of 3 mcg/kg/min (may increase up to 10 mcg/kg/min but for no longer than 10 minutes total) Usual: 0.5-1 mcg/kg/min	Onset: < 2 min Duration: 1-10 min ADE: hypotension, reflex tachycardia, cyanide toxicity at high doses or renal impairment

*This chart is not all inclusive. Please consult electronic medication references or medical control with questions or unfamiliar medications.

*Doses outside of the ranges listed should be discussed with medical control.

Appendix B: Fibrinolytic Agents

Pharmacology

To promote lysis of the clot allowing return of blood flow to the infarct related vessel

INDICATIONS

- Acute stroke (within 3-4.5 hours of onset)
- Pulmonary embolism
- Acute myocardial infarction
- Intraarterial thrombosis (usually low continuous dose, no titration)

Agents and Dose

- The dose varies based upon the type of agent used and the specific indication. If a patient is receiving thrombolytics during the transport, ensure that proper physician orders have been written detailing dosing and timing of doses.
- Alteplase (rTPA)
- Ischemic Stroke: 0.9 mg/kg IV (max dose 90 mg), 10% administered over 1 minute and 90% over 60 minutes.
- PE: 100 mg IV over 2 hours (for low weight or elderly patients, may administer 50 mg)
- MI: 15 mg bolus over 1-2 minutes, then 0.75 mg/kg (up to 50 mg) x 30 minutes, then 0.5 mg/kg (up to 35 mg) x 60 minutes (max 100 mg over 90 minutes)
- Tenecteplase
- MI: One time bolus ≤ 60 kg = 30 mg; 61-70 kg = 35 mg; 71-80 kg = 40 mg; 81-90 kg = 45 mg; ≥ 90 kg = 50 mg

Pharmacokinetics

- Dose varies (depends on specific agent and indication)
- Half-life: 10-130 minutes (depends on specific agent used)

Adverse Effects

- Bleeding
- Hypersensitivity reactions
- Angioedema

If bleeding or severe angioedema – stop infusion after contact Medical Control

Contraindications for all patients

- Significant head trauma or prior stroke in previous 3 months
- Symptoms suggestive of subarachnoid hemorrhage
- History of previous intracranial hemorrhage (exception may be considered for remote traumatic hemorrhage)
- Recent (within 3 months) intracranial or intraspinal surgery
- Persistently elevated blood pressure (systolic > 185 mmHg or diastolic > 110 mmHg) despite lowering measures
- Active internal bleeding
- GI bleed within last 21 days or structural GI malignancy
- Aortic arch dissection
- Acute bleeding diathesis, including but not limited to:
 - Platelet count < 100,000/mm³
 - Heparin received within 48 hours, resulting in abnormally elevated aPTT

- Current use of warfarin with INR > 1.7 or PT > 15 seconds
- Use of full-dose low molecular weight heparinoids within 24 hours
- Use of direct thrombin inhibitors or direct factor Xa inhibitors within 48 hours assuming normal renal function
- Blood glucose concentration < 50 mg/dL (2.7 mmol/L) despite attempts to correct
- CT demonstrates clear hypoattenuation defined as frank hypodensity (obvious completed infarction)
- Intra-axial intracranial neoplasm
- Known or suspected infective endocarditis

Appendix C: Ideal Body Weight Table For Ventilator Tidal Volume Calculation

Male							Female						
Height (in)	IBW (Kg)	4mL /kg	5mL /kg	6mL /kg	7mL /kg	8mL /kg	Height (in)	IBW (Kg)	4mL /kg	5mL /kg	6mL /kg	7mL /kg	8mL /kg
46	26	103	129	155	180	206	46	26	102	128	153	179	205
47	28	110	138	166	193	221	47	27	109	136	163	191	218
48	29	118	147	177	206	236	48	29	115	144	173	202	231
49	31	125	157	188	219	250	49	31	122	153	183	214	244
50	33	133	166	199	232	265	50	32	129	161	193	225	257
51	35	140	175	210	245	280	51	34	135	169	203	237	271
52	37	147	184	221	258	295	52	35	142	177	213	248	284
53	39	155	194	232	271	310	53	37	148	186	223	260	297
54	41	162	203	243	284	324	54	39	155	194	233	271	310
55	42	170	212	254	297	339	55	40	162	202	243	283	323
56	44	177	221	266	310	354	56	42	168	210	252	294	337
57	46	184	231	277	323	369	57	44	175	219	262	306	350
58	48	192	240	288	336	384	58	45	181	227	272	318	363
59	50	199	249	299	349	398	59	47	188	235	282	329	376
60	52	207	258	310	362	413	60	49	195	243	292	341	389
61	54	214	268	321	375	428	61	50	201	252	302	352	403
62	55	221	277	332	387	443	62	52	208	260	312	364	416
63	57	229	286	343	400	458	63	54	214	268	322	375	429
64	59	236	295	354	413	472	64	55	221	276	332	387	442
65	61	244	305	365	426	487	65	57	228	285	342	398	455
66	63	251	314	377	439	502	66	59	234	293	351	410	469
67	65	258	323	388	452	517	67	60	241	301	361	422	482
68	66	266	332	399	465	532	68	62	247	309	371	433	495
69	68	273	342	410	478	546	69	64	254	318	381	445	508
70	70	281	351	421	491	561	70	65	261	326	391	456	521
71	72	288	360	432	504	576	71	67	267	334	401	468	535
72	74	295	369	443	517	591	72	68	274	342	411	479	548
73	76	303	379	454	530	606	73	70	280	351	421	491	561
74	78	310	388	465	543	620	74	72	287	359	431	502	574
75	79	318	397	476	556	635	75	73	294	367	441	514	587
76	81	325	406	488	569	650	76	75	300	375	450	525	601
77	83	332	416	499	582	665	77	77	307	384	460	537	614
78	85	340	425	510	595	680	78	78	313	392	470	549	627
79	87	347	434	521	608	694	79	80	320	400	480	560	640
80	89	355	443	532	621	709	80	82	327	408	490	572	653

STEP 1 **RICHMOND AGITATION-SEDATION SCALE (RASS)**
Sedation Assessment

Scale	Label	Description	
+4	COMBATIVE	Combative, violent, immediate danger to staff	V O I C E T O U C H
+3	VERY AGITATED	Pulls to remove tubes or catheters; aggressive	
+2	AGITATED	Frequent non-purposeful movement, fights ventilator	
+1	RESTLESS	Anxious, apprehensive, movements not aggressive	
0	ALERT & CALM	Spontaneously pays attention to caregiver	
-1	DROWSY	Not fully alert, but has sustained awakening to voice (eye opening & contact >10 sec)	
-2	LIGHT SEDATION	Briefly awakens to voice (eyes open & contact <10 sec)	
-3	MODERATE SEDATION	Movement or eye opening to voice (no eye contact)	
-4	DEEP SEDATION	No response to voice, but movement or eye opening to physical stimulation	
-5	UNAROUSEABLE	No response to voice or physical stimulation	
<p>If RASS is -4 or -5 → STOP (patient unconscious), RECHECK later</p>			

Sessler, et al., Am J Respir Crit Care Med 2002; 166: 1338-1344

Ely, et al., JAMA 2003; 286, 2983-2991

Appendix E: Ventilator Management

CARE GUIDELINES

- Sit patient up to 15-30 degrees whenever possible.
- Connect ventilator hose to the gas supply.
- Turn on gas supply and check cylinder contents.
- Set ventilation parameters to suit the patient. Refer to referring or receiving physician orders.

The following Specialty Care Transport unit standard (adult) ventilator settings will be initiated unless other physician orders/patient condition dictate:

- FIO₂ titrated to maintain SpO₂ > 90%
- Frequency = 10-12 rpm
- Tidal Volume = 4-8 mL/kg (Ideal Body Weight)
- PEEP = 5
- Mode = A/C [Volume Control]

Briefly occlude the patient connection port of the patient-valve with thumb and check that the peak inflation-pressure reading on the manometer is appropriate for the patient. Connect the patient valve to the endotracheal tube.

Monitor the inflation pressure manometer to ensure correct ventilation.

Make appropriate adjustments per patient's clinical condition. ETCO₂ should be maintained at 38-42 mmHg. ETCO₂ must be monitored by waveform capnography at all times.

Ensure patient compliance with the ventilator and the recommended settings prior to leaving the facility.

Adjustments beyond the following parameters require Medical Control or physician order.

- Frequency < 8 or > 16 rpm
- PEEP > 10 cm H₂O
- ETCO₂ < 38 or > 42 mmHg

Provide sedation and analgesia.

- a. Confirm OG/NG tube placement. If none present, assess the patient for gastric inflation.

Appendix F: Drug List

1. Cardiovascular Drugs
 - 1.1. Antiarrhythmic Agents
 - 1.1.1. Flecainide (Tambocor)
 - 1.1.2. Ibutilide (Corvert)
 - 1.1.3. Magnesium Sulfate
 - 1.1.4. Propafenone (Rhythmol)
 - 1.2. Beta blockers
 - 1.2.1. Atenolol (Tenormin)
 - 1.2.2. Esmolol (Brevibloc)
 - 1.2.3. Labetalol (Normodyne)
 - 1.2.4. Metoprolol (Lopressor)
 - 1.2.5. Sotalol (Betapace)
 - 1.3. Blood Pressure Lowering Drugs (Other)
 - 1.3.1. Hydralazine
 - 1.3.2. Nicardipene (Cardene)
 - 1.3.3. Nitroprusside (Nipride)
 - 1.3.4. Nesiritide (Natrekor)
 - 1.4. Calcium Channel Blockers
 - 1.4.1. Diltiazem Drip (Cardizem)
 - 1.4.2. Nicardipene Drip
 - 1.5. Glycoprotein IIb/IIIa Inhibitors
 - 1.5.1. Abcimab (Reopro)
 - 1.5.2. Tirofiban (Aggrastat)
 - 1.5.3. Eptifibatid (Integrilin)
 - 1.5.4. Clopidogrel (Plavix)
 - 1.6. Heparin Drip
 - 1.7. Inotropes
 - 1.7.1. Inamirone (Inacor)
 - 1.7.2. Milranone (Primacor)
 - 1.7.3. Dobutamine
 - 1.7.4. Dopamine
 - 1.8. Vasopressors
 - 1.8.1. Epinephrine
 - 1.8.2. Norepinephrine (Levophed)
 - 1.8.3. Phenylephrine
 - 1.8.4. Vasopressin
 - 1.9. Nitroglycerine Drip
 - 1.10. Thrombolytic Therapy
 - 1.10.1. Streptokinase
 - 1.10.2. APSAC
 - 1.10.3. TPA
 - 1.10.4. TNK
 - 1.10.5. Retavase
2. Sedation and Paralytic Agents
 - 2.1. Benzodiazepine Drips
 - 2.1.1. Lorazepam (Ativan)
 - 2.1.2. Midazolam (Versed)
 - 2.2. Sedation Agents
 - 2.2.1. Propofol
 - 2.2.2. Barbiturates
 - 2.2.3. Ketamine
 - 2.2.4. Dexmedetomidin (Precedex)
 - 2.3. Opioid Drips
 - 2.3.1. Morphine
 - 2.3.2. Fentanyl
- 2.4. Paralytic Agents
 - 2.4.1. Pancuronium
 - 2.4.2. Vecuronium
 - 2.4.3. Rocuronium
3. CNS Drugs
 - 3.1. Anticonvulsants
 - 3.1.1. Phenytoin
 - 3.1.2. Fosphenytoin (Cerebyx)
 - 3.1.3. Valproic Acid
 - 3.1.4. Levetiracetam (Keppra)
 - 3.2. Mannitol
 - 3.3. Steroids
 - 3.3.1. Methylprednisalone- High Dose
 - 3.3.2. Dexamethasone (Decadron)
4. HAL/TPN, Insulin and Electrolytes
 - 4.1. Hyperalimentation/TPN
 - 4.2. Insulin Drips
 - 4.3. Potassium Chloride
5. Obstetric Drugs
 - 5.1. Magnesium Sulfate
 - 5.2. Oxytocin (Pitocin)
6. Anti-Infective Therapy
 - 6.1. Antibiotics and Antivirals
 - 6.2. Antifungal
7. Pain Control
 - 7.1. Opioid Drips
 - 7.1.1. Morphine
 - 7.1.2. Fentanyl
 - 7.1.3. Hydromorphone (Dilaudid)
 - 7.2. PCA pumps and Subcutaneous pumps
 - 7.3. Anesthetic Sprays or Topical Gels
8. Antidotes
 - 8.1. N-Acetyl Cysteine/NAC (Mucomist)
 - 8.2. Cyanide Antidote Kit
 - 8.3. Thiamine
 - 8.4. Bicarbonate Drip
 - 8.5. Pyridoxine
 - 8.6. Atropine/2PAM
9. GI Drugs
 - 9.1. Antiemetics
 - 9.1.1. Metoclopramide (Reglan)
 - 9.1.2. Prochlorperazine (Compazine)
 - 9.1.3. Promethazine (Promethazine)
 - 9.1.4. Ondansetron (Zofran) and related
 - 9.2. Acid Reduction
 - 9.2.1. Pantoprazole (Protonix)
 - 9.2.2. Lansoprazole (Prevacid)
 - 9.2.3. GI Bleed related medications

Cardiovascular Drugs

Antiarrhythmic Agents

Use:

- Treatment and cardioversion of Atrial Fibrillation or Atrial Flutter
- Treatment and prophylaxis of refractory Ventricular Tachycardia

Adverse Effects:

- Hypotension,
- QT prolongation, Torsades, Ventricular Tachycardia
- AV Block

Dosing:

- Flecainide (Tambocor)
Infuse: 2 mg/kg over 20 minutes
- Ibutilide (Corvert)
Infuse: 1 mg IV over 10 minutes
- Magnesium Sulfate
Bolus: 1-2 grams over 5 minutes
Infusion: 6-12 grams over 24 hours
- Propafenone (Rhythmol)
Bolus: 2 mg/kg in 15-20 minutes; followed by
Infusion: 0.0067 - 0.0078 mg/kg/minute

Special Considerations:

- Use infusion pump for drips
- May not be compatible with heparin, lidocaine, amiodarone or bicarb
- Frequent BP checks for hypotension
- Increased risk for ventricular dysrhythmias if on certain antihistamines or antiemetics
- Medications
- Transport by EMT-Ps only (with exception of Magnesium Sulfate: may be transported by EMT-CC)

Beta blockers

Use:

- Slow ventricular response in SVT, Atrial Fibrillation and Atrial Flutter
- Slow sinus node rate

Adverse Effects:

- Hypotension, bradycardia
- Hypoglycemia (diabetics on medications); usual signs and symptoms are masked
- Bronchospasm
- Sinus node arrest

Dosing:

- Atenolol (Tenormin)
Infuse: 5 mg over 5 minutes - May be repeated in 10 minutes
- Esmolol (Brevibloc)
Bolus: 500 mcg/kg (0.5 mg/kg) over one minute
Infusion: 50 mcg/kg/minute for 4 minutes. If inadequate response, repeat bolus and increase drip rate by 50 mcg/kg/minute up to 3 times (total dose of 2000 mcg bolus and infusion @ 200 mcg/kg/minute)
Drug comes in a 100 mg (10 mg/ml) vial or
2500 mg ampule into 250 ml (10 mg/ml) or 500 ml (5 mg/ml) NS or D5W

- Labetalol (Normodyne)
Infusion: 2 mg/minute (concentration 1mg/ml; 2ml/min) duration from 25 minutes to 2.5 hours
- Metoprolol (Lopressor)
Inject: 2.5 mg IV slow push over 2 minutes
May repeat dose up to 5 times every 5 minutes for a total dose of 15 mg
- Sotolol (Betapace)
Bolus: 1-1.5 mg/kg; followed by
Infusion: 0.008 mg/kg/minute = 8 mcg/kg/min

Special Considerations:

- Use infusion pump
- Check BP frequently; monitor heart rate
- Carefully monitor for hypotension, excessive bradycardia or new AV blocks
- Patient with DIABETES may have symptoms of hypoglycemia masked; watch
- carefully

Blood Pressure Lowering Drugs (Other)

Calcium Channel Blockers

Glycoprotein IIb/IIIa Inhibitors

Heparin Drip

Inotropes

Vasopressors

Nitroglycerine Drip

Thrombolytic Therapy

Sedation and Paralytic Agents

Benzodiazepine Drips

Moderate Sedation Agents

Opioid Drips

Paralytic Agents

CNS Drugs

Anticonvulsants

Mannitol

Steroids

HAL/TPN, Insulin and Electrolytes

Hyperalimentation/TPN

Insulin Drips

Potassium Chloride

Obstetric Drugs

Magnesium Sulfate

Oxytocin (Pitocin)

Anti-Infective Therapy

Antibiotics and Antivirals

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Antidotes

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Cyanide Antidote Kit

Thiamine

Bicarbonate Drip

Pyridoxine

Atropine/2PAM

GI Drugs

Antiemetics

Acid Reduction

GI Bleed related medications

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