University of Cincinnati Medical Center | UC Health

Air Care & Mobile Care Clinical Policies

General

General Patient Care Guidelines for Rapid Response (CLIN68)……4
Therapies Not Requiring Base Medical Direction (CLIN56)……..11
Use of Over the Counter Medications in Special Events (CLIN65)……...14
Pronouncing Death at an Accident Scene (CLIN42)……16
Pronouncing Death at a Referring Facility (CLIN41)……..18

Airway

Rapid Sequence Intubation (RSI) (CLIN10)……..19
Management of Nasotracheal Intubation (CLIN03)……25
Management of Orotracheal Intubation (CLIN09)……..28
Verification of Endotracheal Tube Placement (CLIN06)……31
Waveform Capnography (CLIN07)……34
I-Gel Supraglottic Airway (CLIN60)……..37
Use of the Airtraq Disposable Optical Laryngoscope (CLIN58)……40

Respiratory

Acute Chronic Obstructive Pulmonary Disease (COPD) Exacerbation (CLIN45)……..43
Respiratory Acute Asthma Exacerbation-Adult (CLIN50)……46
Acute Decompensated Heart Failure/Pulmonary Edema (CLIN47)……48
Respiratory Pulmonary Embolus (CLIN46)……..50
Use of Non-Invasive Rescue CPAP device (CLIN66)……..53
Care of the Ventilated Patient and Use of the 731 Ventilator (CLIN59)……...56

Analgesia and Sedation

Pain Management (CLIN30)……....61
Sedation, Analgesia, and Paralysis of the Intubated Patient (CLIN49)……64

Cardiac

Management of the Acute Coronary Syndrome Patient(ACS) (CLIN17)……68
Management of the ST Elevation Myocardial Infarction (STEMI) Patient (CLIN20)……71
STEMI Limited Infusion Protocol (CLIN19)……75
Cardiac Aortic Emergencies (CLIN18)……...78
Cardiac Emergencies – Dysrhythmias (CLIN15)……82
Transcutaneous Cardiac Pacing (CLIN21)……87

Medical

Management of the Shock Patient (CLIN51)……89
Acute Limb Arterial Insufficiency (CLIN12)……93
Gastrointestinal Bleeding (CLIN23)……..95

Neurologic

Seizures/Status Epilepticus (CLIN25)……..99
Management of Intracranial Hemorrhage (SAH, ICH) (CLIN24)……..102
Management of Traumatic Brain Injury (CLIN57)……107
Stroke (CLIN67)……..111

Obstetrics

Emergency Delivery (CLIN27)……..116
Pediatric Neonate Delivery at referring Facility (CLIN32)……...121
Transfer of High-Risk Obstetric (OB) Patients (CLIN26)……..123
Vaginal Bleeding in Pregnancy (CLIN28)……...125

Pediatrics

Pediatric-Acute Asthma Exacerbation (CLIN31)……127
Cardiac Emergencies – Dysrhythmias in the Pediatric Population (CLIN16)……...130

Direct to OR

Direct Transfer to Operating Room (CLIN29)……138

Blood Administration

Blood Product Administration of Liquid Plasma (CLIN62)……140
Administration of O negative PRBC or type specific PRBC for Hemorrhagic Shock (CLIN13).146

Trauma

Management of Patients with Traumatic Injuries (CLIN55)……149
Spine and Spinal Cord Injury (CLIN53)……..152
Management of Major Thermal Burns (CLIN14)……...155
Management of Amputated Body Parts (CLIN52)……158
Administration of Tranexamic Acid (TXA) in Trauma Patients (CLIN59)……161
Use of Topical Hemostatic Gauze: Kaolin-Impregnated Gauze (Combat Gauze) (CLIN54)…..165

Procedures

Management of Intraosseous Access and Infusion with EZ IO Device (CLIN35)……167
Management of Needle Cricothyrotomy (CLIN36)……...170
Management of Surgical Cricothyrotomy (CLIN34)……173
Use of the Combat Application Tourniquet (CLIN33)……..176
Hydroxocobalamin (Cyanokit) Administration (CLIN63)……...179
Field Limb Amputation (CLIN61)……183
Lateral Canthotomy and Cantholysis (CLIN64)……186
Management of Pericardiocentesis (CLIN37)……188
Pleural Decompression (needle and finger thoracostomy) (CLIN38)……191
Tube Thoracostomy (CLIN40)……...194
Use of the TPod Pelvic Stabilizer (CLIN43)……197

University of Cincinnati Medical Center | UC Health

Additional Guides & Resources

Extracorporeal Membrane Oxygenation (ECMO)……198
Impella……200
Intra-Aortic Balloon Pump (IABP)……202
Left Ventricular Assist Device (LVAD)……204
My LVAD EMS Field Guide (website link)

University of Cincinnati Medical Center | UC Health

General Patient Care Guidelines for Rapid Response (CLIN68)

I. POLICY

Air Care & Mobile Care paramedic teams will be required to respond to associates, patients and visitors in the role of a first responder or medical assistance if the need arises. In this capacity, both BLS and ALS teams will provide care within their scope of practice and according to Air Care & Mobile Care Clinical Protocols.

II. PURPOSE

To provide guidelines for the care of patients in the rapid response/first responder setting. The conditions mentioned are possibly the most common conditions encountered. If a condition is not addressed in this protocol, medical team will revert to ACMC Clinical Protocols.

III. DEFINITIONS

Rapid Response-The terminology used to identify the need for medical assistance to associates, patients or visitors who are in areas where medical coverage is limited or in areas that are not inpatient units.

Paramedic Teams-Designated team who will respond to the designated areas and provide medical assistance/emergency care within their scope of practice. This could be in the configuration of two (2) paramedics, one paramedic and one EMT, or two (2) EMTs with a paramedic responding *enroute*.

IV. PROCEDURE

Paramedic teams will encounter a variety of medical conditions that need medical assistance and possible subsequent transport. Below are guidelines for the care of the most common emergent conditions. All patients will have a focus assessment, vital signs and documentation of treatment given placed in the approved electronic medical record. All patients are to be transport to UCMC for further medical care.

A. Chest Pain/Cardiac Arrest

1. Provide care in a calm and reassuring manner.
2. Place the patient in a position of comfort.
3. Obtain a focused history and physical. If there is the complaint of chest pain, the history should include: onset, provoking factors, quality, radiation, severity, time and pertinent negatives.
4. Maintain airway and administer oxygen if O2 Sat is less than 94%
5. Obtain 12 Lead EKG if possible
6. Establish IV access
7. If the patient has not taken any of the above medicines medicines (Viagra, Levitra, Cialis, Staxyn, Flolan, Revatio, Adcirca) within the last 24-72 hours, the patient's systolic blood pressure is greater than 100 mm Hg and is alert and responsive, administer nitroglycerin

- Nitroglycerin 0.4 mg sublingual every 3-5 minutes to a max of 3 doses only if SBP remains greater than 100
- Topical nitroglycerin (Nitropaste) may be used in lieu of sublingual nitroglycerin. Apply 1 inch of nitropaste to the anterior chest wall one time.
- For chest pain not relieved by nitrates, administer either
  - ✓ Fentanyl 25-50 micrograms IV/IO as long as systolic BP greater than 100 and pain persists. May repeat every 5 min to a total of200 micrograms.
  - ✓ Morphine sulfate 1-5 mg IV/IO over 2 minutes as long as systolic BP greater than 100 and pain persists. May repeat every 5 minutes to a total of 10 mg.
- Nausea and vomiting may be managed with ondansetron (Zofran) 4mg PO/IM/IV/IO.

8. Patients under cardiac arrest will be treated according to the most recent AHA updates for Advance Cardiac Life Support.

B. Asthma/COPD

1. The patient has a history of asthma, emphysema or COPD AND complains of a worsening shortness of breath.
2. Lung exam has wheezing, rales/rhonchi, or poor air exchange.
3. Place patient on face mask to assist breathing
4. Confirm the use of any over the counter medication or prescribed inhalers
5. Assist the patient with use of inhaler if present
6. If further medication is necessary beyond the patient's prescribed doses consider Administering Albuterol (Proventil) aerosol 2.5mg in 2.5ml normal saline via hand held nebulizer. Consider adding 1 vial Ipratropium Bromide (0.5mg of 0.017%) to the Albuterol aerosol. May substitute Duoneb (Albuterol plus Ipratropium Bromide that is premixed) for all Albuterol treatments.
7. If the patient is in impending respiratory failure, obtain IV access.
8. FOR ASTHMA: Consider epinephrine 1:1,000 solution intramuscularly (0.3 ml IM) if patient is not able to breathe in the nebulized medication.

C. Allergic Reaction

Assess for suspected exposure to allergen (insect sting, medications, foods, or chemicals). If patient is experiencing an anaphylaxis reaction maintain airway and administer Oxygen and Epinephrine should be administered as soon as possible.

1. Administer epinephrine 0.3 ml 1:1000 solution intramuscularly (IM). May repeat dose every 5-15 minutes as needed.
2. Monitor cardiac rhythm
3. If bronchospasm or wheezing is present, administer albuterol (Proventil) 2.5mg via nebulizer
4. Initiate IV access. If the patient is hypotensive, begin 1-liter normal saline IV wide open.
5. Administer diphenhydramine 25 -50 mg IV/IM/PO. Diphenhydramine may be used without preceding epinephrine in patients with isolated rash and no other symptoms.

D. Hyper/Hypoglycemia

Assess Blood Glucose
If unable to assess blood glucose use history and other assessment means to proceed with treatment. Treatment can be life saving for a hypoglycemic patient but will not necessarily cause a hyperglycemic patient excessive harm.

Hypoglycemia
Glucose Level is less than 70 mg/dL or glucometer reads "LOW"

1. If patient is able to swallow and maintain patent airway administer oral glucose 15g or appropriate high glucose content fluid (such as orange juice). Dispense in small amounts; keep fingers out of mouth; EMS provider can lightly massage the area between the cheek and gum to enhance swallowing.
2. If patient is unable to maintain airway, secure the airway and administer 12.5-25g Dextrose 50% IV/IO. It is acceptable to dilute D50 with normal saline due to the high viscosity based on IV size and vein conditions.
3. If unable to establish IV/IO access, administer 1mg Glucagon (Glucagen) IM

Hyperglycemia
Glucose Level is greater 400 mg/dL or glucometer reads "HIGH"
1. Administer a fluid bolus of 500-1000mL IV/IO during transport if no evidence of pulmonary edema
2. Place patient on Monitor for possibility of dysrhythmia.

E. Altered Mental Status

1. Patient with a decreased level of consciousness (GCS less than 15)
2. Assess patient and treat symptoms.
3. Maintain airway and administer Oxygen.
4. If the patient is in impending respiratory failure, proceed to appropriate airway management.
5. Allow patient to sit up in a position of comfort.
6. Apply cardiac monitor, if available.

F. Excited Delirium

Excited delirium, also known as agitated delirium is a triad of delirium, psychomotor agitation, and physiological excitation. Delirium is a mental state characterized by an acute circumstance of disorientation, disorganized thought process and disturbances in speech (1). Excited delirium is associated with mental health disease, drug use (cocaine, methamphetamine, alcohol, PCP, LSD), and violent/combative behavior.

When able to be safely completed:

1. Obtain serum blood glucose
2. Obtain complete set of vitals

A patient with excited delirium who is manifesting unusual behavior including violence, aggression, altered affect, or psychosis may require physical and/or chemical restraint (see Restraint Protocol).

If EMS intervention is indicated for the violent or combative patient, patients should be gently and cautiously persuaded to follow EMS personnel instructions. If EMS has cause to believe the patient's ability to exercise an informed refusal is impaired by an existing medical condition, EMS shall, if necessary, cause the patient to be restrained for the purpose of providing the EMS intervention indicated. Such restraint shall, whenever possible, be performed with the assistance of security or police officer (see Restraint Protocol). It is recognized that urgent circumstances may necessitate immediate action by EMS.

Urgent circumstances requiring immediate action are defined as:
1. Patient presents an immediate threat to the safety of self or others.
2. Patient presents an immediate threat to EMS personnel.

Urgent circumstances authorize, but do not obligate, restraint by EMS personnel. The safety and capabilities of EMS are a primary consideration. Security shall immediately be requested by EMS in any urgent circumstance requiring restraint of a patient by EMS personnel.

G. Narcotic Overdoes

Consider restraining patient before administration of naloxone (Narcan) especially if patient is unconscious upon initial contact.
1. If patient is able to self-maintain their airway and hemodynamically stable, treatment should be supportive.
2. If patient has a pulse but is unconscious and there is suspicion of opiate overdose, perform basic airway maneuvers (assisted respiration with BVM and NP/ OP airway) to maintain airway and ventilation. **Assisted respirations and basic airway maneuvers are the mainstay of treatment in an otherwise stable patient until the overdose can be reversed with naloxone**.
3. Advanced airway management with IGel or intubation should be deferred until appropriate dose of naloxone can be given as long as the patient is otherwise stable.
4. Patients in extremis may require advanced airway management (ie. if vomiting or not able to maintain airway with good basic maneuvers and good BVM),

5. Administer Naloxone with an initial dose of 0.4 mg - 2 mg IV/IM/IN/IO. EMT's may administer IN naloxone (see note below).
   - *The clinical goal of naloxone administration is improvement in the patient's respirations, not complete resolution of their mental status*. Starting with a lower dose is preferred to prevent negative side effects. Example dosing sequence: 0.4mg, then 1mg then 2 mg until respiratory status improves.
   - While IV/ IO naloxone may be effective within 1-2 minutes, IM and IN may take up to 5 minutes or more for full clinical effect.
   - In patients who are completely apneic or peri-arrest (ie. bradycardic, hypotensive), a larger first dose may be appropriate (ie. 1-2 mg IV)
   - In a patient who has a pulse and whose respirations can be assisted without difficulty via BVM, the preferable route of naloxone administration initially is intranasal 2 mg (1 mg per nostril). If patient condition allows, allow at least 5 minutes after IN administration before redosing.
6. If breathing is not improved after 3-5 minutes, administer a second dose of naloxone. Continue to repeat as necessary up to total of 10 mg.
   - If no improvement after 10 mg total of naloxone has been given, consider other possible causes for patient's symptoms.
   - IV naloxone typically has onset (ie. improvement in breathing) within 1-2 minutes, while the time to onset of IN/ IM naloxone is generally 5-8 minutes. As long as the airway can be maintained with basic maneuvers and BVM, a second dose of naloxone may be delayed beyond 5 minutes if the initial dose was IM/ IN, though up to 25% of patients may need an additional dose.
7. Be cautious to avoid aggressive use of Narcan in patients with suspected opiate overdose as a rapid administration may cause acute withdrawal symptoms. The opiate may also be controlling aggressive side effects of other drugs that have been consumed.
8. After naloxone administration, transport to an emergency department is recommended.

H. Restraints

Patient restraints are to be used only when necessary in situations where the patient is violent or potentially violent and may be a danger to themselves or others. EMS providers must remember that aggressive violent behavior may be a symptom of a medical condition. Primary assessment must be completed.

Patient health care management remains the responsibility of the EMS provider. The method of restraint shall not restrict the adequate monitoring

of vital signs, ability to protect the patient's airway, compromise peripheral neurovascular status or otherwise prevent appropriate and necessary therapeutic measures. It is recognized that the evaluation of many patient parameters requires patient cooperation and thus may be difficult or impossible.

The least restrictive means shall be employed.

Verbal de-escalation

(i) Validate the patient's feelings by verbalizing the behaviors the patient is exhibiting and attempt to help the patient recognize these behaviors as threatening.
(ii) Openly communicate, explaining everything that has occurred, everything that will occur, and why the imminent actions are required.
(iii) Respect the patient's personal space (i.e. asking permission to touch the patient, take pulse,

- All restraints should be easily removable by EMS personnel.
- Restraints applied by law enforcement (i.e. handcuffs) require a law enforcement officer to remain available to adjust the restraints as necessary for the patient's safety. The protocol is not intended to negate the ability for law enforcement personnel to use appropriate restraint equipment to establish scene control.
- To ensure adequate respiratory and circulatory monitoring and management, patients shall NOT be transported in a face down prone position.
- Restrained extremities should be monitored for color, nerve, and motor function, pulse quality and capillary refill at the time of application and at least every 15 minutes.

I. **CHEMICAL RESTRAINTS**

Chemical restraints may be required before, after, or in place of physical restraints. Any patient who continues to be a danger to themselves or others despite physical restraints, or those who present an extreme danger while attempting physical restraint, may be chemically restrained as follows.

1. Administer midazolam (Versed) 5 –10 mg IM/IN (based on weight and agitation). Exposure and cleaning of skin is highly recommended but may not be feasible; injection through clothing and prior to skin cleaning is allowed if crew safety would be compromised.
2. When able and safe, place patient on cardiac monitor and continuous pulse oximetry.
3. When able and safe, administer oxygen.
4. When able and safe, check blood glucose level.

5. At no time shall a patient be left unattended after receiving chemical restraint.
6. Any patient receiving chemical restraint must be attended to and transported by paramedic.
7. Repeat dose(s) of midazolam (Versed) may be ordered by on-line medical control.
8. Pre-arrival notification is highly recommended so the receiving Emergency Department can be prepared for the safe transfer of a combative or violent patient

V. RESPONSIBILITY

Mobile Care EMT, Paramedics, Nurses

VI. KEY WORDS

VII. APPENDIX

VIII. REFERENCES / CITATIONS

1. Southwest Ohio Paramedic Protocols
2. Di Maio TG. Excited Delirium Syndrome: Cause of Death and Prevention. CRC Publishing, September 2005.

Therapies Not Requiring Base Medical Direction (CLIN56)

I. POLICY

Because of the need for rapid assessment and treatment for many clinical conditions encountered in medical transport, trained and authorized transport team members must have the ability to apply therapeutic interventions without the advice and consent of the medical control physician. Authorized personnel must have completed all required training and have met the Air Care and Mobile Care competency verifications to institute the below therapies.

II. PURPOSE

To enumerate therapies that can be provided by the medical crew without a requirement for consent from the online medical control physician. The listed therapies can be performed by the Air Care & Mobile Care medical crew without on-line direction from the medical control faculty.

III. DEFINITIONS

None

IV. PROCEDURE

A. Therapeutic interventions which can be performed without on-line medical direction include:

1. Establishment of peripheral, central IV access (Flight Physician/MLP), intraosseous lines, umbilical vein catheterization
2. Airway interventions, including:

- Application of supplemental O2 by mask or nasal cannula.
- Assisted ventilation by bag-valve mask.
- Insertion of oral or nasal airways.
- Endotracheal intubation/Rescue Airway by either oral or nasal routes, by either standard, optical, or fiberoptic means.
- Surgical/needle cricothyrotomy.

- Insertion of rescue devices, such as the I-Gel,

3. Administration of IV fluids, including crystalloid and blood.
4. Administration of medications from vehicle stock.
5. Continued administration, or repeat dosing, of medications begun at the referring center or scene.
6. Application of immobilization devices, including:

   - Cervical collar and spine boards.
   - Traction splints.
   - Simple splints.
   - Anti-shock garments.
   - Restraints

7. Completion of an inevitable, imminent obstetric delivery.
8. Cardiopulmonary resuscitation, including:

   - Chest compressions.
   - Direct-current, synchronized cardioversion.
   - Defibrillation
   - Transthoracic pacing.
   - Transvenous pacing.

9. Needle, Finger or tube thoracostomy.
10. Pericardiocentesis (Flight Crews only)
11. Tourniquet application
12. Pelvic stabilizer application
13. ATLS/ACLS/PALS interventions.

Other procedures may occasionally be required for the treatment of uncommon conditions. These may include cranial burr-hole placement, completion of a traumatic extremity amputation, and perimortem C-section. When conditions permit, on-line medical direction should be sought prior to initiation of these procedures, but this may not always be possible in a timely enough fashion, in which case flight crews may proceed without on-line medical control.

The transport team is encouraged to seek on-line medical direction whenever therapeutic advice is desired and the clinical condition of the patient permits the time for advice to be sought.

V. RESPONSIBILITY

Flight Physicians, Mid-Level Practitioners, Critical Care Transport Nurses, Paramedics, Medical Control Physicians

VI. KEY WORDS

None

VII. APPENDIX

None

VIII. REFERENCES / CITATIONS

None

University of Cincinnati Medical Center | UC Health

Use of Over the Counter Medications in Special Events (CLIN65)

I. POLICY

This Policy is intended as a standing order for Paramedics employed by University of Cincinnati Medical Center (UCMC) as a Special Event Paramedics providing medical coverage for UCMC approved community/collegiate events

II. PURPOSE

To outline the OTC medications that can be dispensed by special event medical personnel during approved community/collegiate events.

III. DEFINITIONS

Special Events-Community/collegiate events that require medical coverage for patrons.
UCMC-University of Cincinnati Medical Center
OTC-Over the Counter medication

IV. PROCEDURE

A. When a medical issues arises that can be treated with OTC medication or a patron requests an OTC medication that is listed on approved medication list, the UCMC Special Event paramedic may dispense OTC medication in the following manner:

A. Dosage:

- The dispensing of medications shall be in accordance with the printed directions on the medication, based on age and weight.
- Allow the patient to choose an OTC medication that they are familiar with or have used in the past, provided they are going to use it in accordance with its indications and direction for use.
- UCMC paramedic must inquire about any known drug allergy before dispensing medication.
- Medication can only be dispensed if it is in their original packaging with direction for use readily available.
- If deemed necessary, the UCMC Special Event Paramedic can request the patron be observed after taking the medication to ensure desired effect was achieved.
- A consenting adult must be present before any medication can be dispensed to a minor.

B. Medical Control:

- UCMC Special Event Paramedic will operate under the "Use of Over the Counter Medication in Special Events "policy with dispensing OTC medications.

- All other medical procedures will remain in accordance with the Academy of Medicine of Cincinnati Protocols for Southwestern Ohio Paramedics.

If questions arise regarding the use or dosing of an over-the-counter medication, the paramedic should contact UCMC CEC attending at 584-2636(AMEN).

C. Documentation

- All over the counter medications dispensed should be documented on the "Over-the-Counter Medication Log Sheet" provided for each event. Documentation is not necessary when dispensing sunscreen.

V. RESPONSIBILITY

Event Medicine Paramedic, Registered Nurse, Physician

VI. KEY WORDS

None

VII. APPENDIX

Approved Medication List

Medication	Dosage	Indication for Use
Acetaminophen (Tylenol)	500 mg tablets	Fever reduction, pain relief
Acetaminophen (Tylenol)	Children's Liquid	Fever reduction, pain relief
Antacid Tablets (Maaloz/Mylanta)		Nausea, heartburn, upset stomach
Anti-Itch Cream		
Aspirin	325 mg tablets	Pain Relief
Diphenhydramine (Benadryl)	25 mg tablets	Allergy Symptoms
Ibuprofen (Advil/Motrin)	200 mg tablets	Fever reduction, pain relief
Pepto-Bismol Tab/Liquid		Nausea, heartburn, upset stomach, diarrhea
Sting Relief Swabs		Pain relief from insect Bites/Stings
Sunscreen-Adult/Children		Prevent Sunburn

VIII. REFERENCES / CITATIONS

None

University of Cincinnati Medical Center | UC Health

Pronouncing Death at an Accident Scene (CLIN42)

I. POLICY

In the event that life saving measures are taken but are futile, qualified and trained personnel are permitted to pronounce a patient dead at an accident scene.

II. PURPOSE

The purpose of this policy is to provide guidelines in the instance where the flight team has to make the decision to pronounce a patient dead at a scene.

III. DEFINITIONS

None

IV. PROCEDURE

A. INDICATIONS

1. A patient may be pronounced dead in the field if the following conditions are met:
2. It is the judgment of the Air Care physician that the patient is clinically dead with no chance of survival.
3. It is the judgment of the Air Care MLP and Flight Nurse that the patient is clinically dead with no chance of survival. In this circumstance contact must be made with the Air Care medical control physician to receive orders to terminate resuscitation.[A]
4. The requesting agency, rescue personnel and family members if and when present, are comfortable with the decision to terminate resuscitative efforts.
5. The following are specific situations that, if present, would prohibit pronouncing a patient in the field:
   - Rescue personnel have been working diligently to save the victim's life and feel that the patient should be transported to a higher level of care.
   - Patient is in the aircraft or on our helipad. Once loaded for transport, the resuscitation of the patient should continue until the receiving institution is reached and consultation with the receiving physician and nursing personnel can occur.
   - The flight team feels that their safety might be placed in jeopardy by pronouncement at the scene and not transporting the patient
   - Whenever there is a question as to whether a patient should be pronounced in the field, radio or telephone contact with the Air Care medical control physician should be established.
   - An electronic medical record will be initiated by the flight team and will document any care provided and the patient outcome.

V. RESPONSIBILITY

Flight Physician, Mid-Level Practitioners, Flight Nurse, Medical Control Physician

VI. KEY WORDS

None

VII. APPENDIX

None

VIII. REFERENCES / CITATIONS

. OAC: 4731-14-01 Pronouncement of death

University of Cincinnati Medical Center | UC Health

Pronouncing Death at a Referring Facility (CLIN41)

I. POLICY
Pronouncing Death at a Referring Facility

II. PURPOSE
To provide guidelines for the Flight Team when making the decision to pronounce a patient dead at another facility.

III. DEFINITIONS
None

IV. PROCEDURE
A. INDICATIONS
When it has been decided that a patient is to be pronounced dead at another hospital, this decision is to be made in collaboration with the nursing and medical staff at the referring institution. Pronunciation of death will be performed either by the flight physician or the referring physician at the outside facility if available. Mid-Level Providers can pronounce death at a referring facility in collaboration with referring physician or UCMC Attending.

1. An electronic medical record will be initiated by the flight team and they will document any care provided and patient outcome.
2. If the referring agency requests, a copy of the chart will be provided.
3. Whenever there is a question as to whether a patient should be pronounced at another facility, radio or telephone contact with the Air Care medical control physician should be established.

V. RESPONSIBILITY
Flight Physicians, Mid-Level Practitioners, Flight Nurses

VI. KEY WORDS
None

VII. APPENDIX
None

VIII. REFERENCES / CITATIONS
None

Rapid Sequence Intubation (RSI) (CLIN10)

I. POLICY

In the event that a patient needs assistance with ventilation and oxygenation, qualified and trained personnel are permitted to manage an airway by Orotracheal Intubation to ensure a patent airway. To optimize the first attempt, qualified and trained personnel are permitted to intubate using Rapid Sequence Intubation (RSI).

II. PURPOSE

The purpose of this policy is to provide guidelines to optimize orotracheal intubation in victims requiring advanced airway management with the assistance of RSI.

III. DEFINITIONS

None

IV. PROCEDURE

A. INDICATIONS:

1. Failure to oxygenate, failure to ventilate, inability to maintain a patent airway, patient with clenched jaw, active regurgitation risk, serious closed head injury (GCS<8) or combativeness, anticipated clinical course.

B. CONTRAINDICATIONS:

1. Ability to maintain a patent airway by less invasive methods.

C. EQUIPMENT:

1. Proper-sized oral or nasal airways
2. BVM with PEEP valve and reservoir attached to O2 source.
3. Nasal cannula
4. Working suction
5. Proper-sized ETT with tested, intact cuff, 10ml syringe, assorted spare tubes and malleable stylet
6. Laryngoscope with attached blade and tested light, assorted spare blades and spare C-cell batteries
7. King Vision video laryngoscopy
8. Cardiac monitor, pulse oximetry, ETCO2 waveform capnography

9. Endotracheal introducer (Bougie)
10. Available rescue adjuncts (i-gel, cric kit
11. Medications:
    - Succinylcholine: 200mg/ml vials
    - Rocuronium: 50 mg/5ml vials, 10mg/ml
    - Etomidate: 20mg vials, 2mg/ml Ketamine:
    - Propofol: 200mg/20ml, 10mg/ml
    - Midazolam: 5mg/ml vials, 1mg/ml
    - Fentanyl: 200mcg ampuls, 50mcg/ml
    - Diluent sterile saline: 30ml bottles
12. Secure, functional IV/IO line
13. Syringes
14. Twill tape
15. Ventilator

D. PROCEDURE and MANAGEMENT:

1. Universal precautions in use at all times.
2. Basic airway/ventilation therapy already initiated. Assign roles to care team.
3. Optimize and resuscitate unstable patients prior to initiating RSI if able.
    - Depending on etiology of patients shock, consider initiation of IV fluids, PRBC/FFP, and/or push dose pressors (ie. epinephrine or phenylephrine)
4. Assess for potential intubation difficulty.
    - LEMON
        - ✓ Look externally
        - ✓ Evaluate using 3:3:2 rule
        - ✓ Mallampati
        - ✓ Obstruction
        - ✓ Neck mobility
5. Maintain manual in-line spinal immobilization in all victims with potential C-spine injury.
6. Pre-oxygenate with 100% O2 by mask (BVM with PEEP valve or non-rebreather mask) with additional high flow NC for apneic oxygenation (NC at 15 lpm) for at least three (3) minutes prior to RSI if patient condition permits.
7. Appropriately position patient (ear to sternal notch) and care team.
8. Consider premedication. To facilitate the goals of premedication, allow 2-3 minutes between administration and introduction of the laryngoscope blade if patient condition permits. The potential benefits

of premedication should be weighed against the risk of 2-3 minutes' delay to arrival at definitive care (unless the RSI is occurring once the transport has already been initiated); premedication should not be considered mandatory.

- For suspected increased ICP, consider Lidocaine 1.5mg/kg IV and/or fentanyl 2-3 mcg/kg IV to attenuate increases in ICP resulting from pharyngeal stimulation.

- For pediatric patients <1 year premedicate with atropine 0.02mg/kg IVP (0.1mg minimum) to attenuate vagal response to pharyngeal manipulation.

- For patients with suspected limited cardiac reserve (ACS, TAA/AAA, dissection) consider fentanyl 2-3mcg/kg IVP to attenuate hypertensive response to intubation.

8. Strongly consider having the bougie available on every intubation, so that in the event of a poor laryngoscopic view there will not be a delay in obtaining the bougie.
9. Medication procedure – Induction:
   a) Etomidate (Amidate)
      - Dose: 0.3mg/kg IV/IO push.

      Considerations:
      - ✓ Onset 20-40 seconds
      - ✓ Duration 5 minutes
      - ✓ Pros: considered hemodynamically neutral
      - ✓ Drawbacks: adrenal suppression (caution in sepsis), myoclonus

   b) Ketamine (Ketolar)
      - Dose: 1.5 mg/kg slow IV/IO push (2.0 mg/kg in kids) or 4mg/kg IM

      Considerations:
      - ✓ Onset 45-60 seconds
      - ✓ Duration 10-20 minutes
      - ✓ Pros: considered hemodynamically neutral, okay to use in TBI, causes bronchodilation
      - ✓ Drawbacks: increased secretions, caution in cardiogenic shock and cardiovascular disease (increases HR and MAP), laryngospasm (rare)
      - ✓ May be used in young children and infants

c) Propofol (Diprivan)
- Dose: 1.5mg/kg IV/IO push

Considerations:
- ✓ Onset 15-45 seconds
- ✓ Duration 3-10 minutes
- ✓ Pros: Antiepileptic properties
- ✓ Drawbacks: can cause hypotension, myocardial depression, reduced cerebral perfusion
- ✓ Not the preferred agent in young children.

- Midazolam (Versed)
  - Dose: 0.05 – 0.3mg/kg IV push

Considerations:
- ✓ Onset: 2 to 3 minutes
- ✓ Duration 15-30 minutes
- ✓ Drawbacks: respiratory depression, , apnea, hypotension, slow onset

10. Medication Procedure – Paralysis

a) Succinylcholine
- Dose: 1.5 mg/kg IV/IO push (in rare circumstances when IV and IO access is not available, succinylcholine may be administered IM at a 4.0 mg/kg dose). Succinylcholine dosing should be based on total body weight.

Considerations:
- ✓ Onset 45-60 seconds
- ✓ Duration 6-10 minutes
- ✓ Drawbacks: many contraindications, fasciculations, elevated intra-ocular pressure
- ✓ *Contraindications to Succinylcholine:*
  - *Personal of FH of malignant hyperthermia*
  - *Large burns from 1 day post-burn to complete healing*
  - *Crush injuries from 3 days post-crush to complete healing*
  - *Known hyperK+ >6.5*
  - *Denervation (stroke, spinal cord injury) from 3 days post-injury or post-stroke to about 6 months*
  - *Other forms of denervation (GBS, wound botulism, ALS, MS)*

- *Myopathies (includes difuse atrophy in the old person found down if down several days). Succinylcholine is absolutely contraindicated in known inherited myopathies like muscular dystrophy.*
- *Intra-abdominal sepsis from 3 days post illness to resolution.*

b) Rocuronium

- Dose: 1.5 mg/kg IV/IO push (in rare circumstances when IV and IO access is not available, Rocuronium may be administered IM at a 2.0 mg/kg dose). Rocuronium dosing should be based on ideal body weight. (Mnemonic: Sux to be you; I rock.)

Considerations:

- ✓ Onset 60 seconds
- ✓ Long duration of action
- ✓ Drawbacks: allergy (rare)

11. Insert endotracheal tube by standard or paraglottic technique to 21cm – 23cm in adult females, 22cm – 25cm in adult males and to indicated depth reference Pediatric Advanced Life Support (PALS) in infants and children.
12. In the event of a poor laryngoscopic view, success on the first attempt may be able to be salvaged (assuming the patient is still maintaining pulse oximetry >90%) by a combination of the following: laryngeal manipulation (BURP – backward upward rightward pressure) or use of the bougie.
13. Abort intubation and re-oxygenate patient (BMV with PEEP valve or consider using i-gel) when oxygen saturation approaches 90% to prevent critical desaturation.
14. Confirm tube placement. Check for capnography waveform, (consider using EtCO2 colorimetric change if capnography unavailable), bilateral breath sounds, absence of breath sounds over the stomach, condensation in tube, and adequate pulse oximetry. Once tracheal tube placement is confirmed, secure tube with twill tape.
15. Place patient on ventilator with appropriate settings.
14. Post intubation analgesia and sedation –

G. POTENTIAL COMPLICATIONS:

1. Failed airway
2. Esophageal intubation

3. Exacerbation of C-spine injury.
4. Emesis with aspiration.
5. Perforation of esophagus/pharynx. False passage of tube.
6. Mainstream bronchus intubation.
7. Laryngospasm/bronchospasm.
8. Hypoxemia with anoxic injury.
9. Dysrhythmias
10. Increased ICP.

V. RESPONSIBILITY

Flight Physicians, Mid-level Practitioner, Critical Care Nurses, Critical Care Paramedics

VI. KEY WORDS

None

VII. APPENDIX

None

VIII. REFERENCES / CITATIONS

None

Management of Nasotracheal Intubation (CLIN03)

I. POLICY

In the event that a patient needs assistance with ventilation and oxygenation, qualified personnel are permitted to manage an airway by Nasotracheal Intubation to ensure a patent airway in the spontaneously breathing victim with failure to oxygenate, failure to ventilate or inability to protect their airway.

II. PURPOSE

The purpose of this policy is to provide guidelines to ensure a patent airway in the spontaneously breathing victim with failure to oxygenate, failure to ventilate or inability to protect their airway.

III. DEFINITIONS

None

IV. PROCEDURE

A. INDICATIONS:

1. Failure to oxygenate, failure to ventilate or inability to maintain a patent airway in the setting of a spontaneously breathing patient where orotracheal intubation is contraindicated or not possible.

B. CONTRAINDICATIONS:

1. Apnea
2. Suspected epiglottitis
3. Suspected mid-face or basilar skull fracture
4. Suspected coagulopathy
5. Penetrating neck trauma or suspected laryngeal injury
6. Ability to maintain a patent airway by less invasive methods

C. EQUIPMENT:

1. As for orotracheal intubation (see Policy – Orotracheal Intubation.)
2. Endotrol or standard ETT. *Note – ETT size for nasal intubation should generally be 0.5 to 1.0mm smaller than tube size for orotracheal intubation in same patient.*
3. Lubricant
4. Oxymetazoline spray (Afrin.)

D. MANAGEMENT:

1. Utilize general measures for airway management (see Policy – Orotracheal Intubation.)
2. Instill Afrin spray (2 puffs) into each nostril.
3. Consider IV analgesia and/or sedation if not otherwise contraindicated.
4. Lubricate nostrils liberally. Lubricate end of ETT.
5. Select nostril for insertion. Insertion of a nasal airway or gloved pinky finger into the nostrils will generally identify the larger caliber nare.
6. Insert ETT into larger nare with the point of the bevel toward the nasal septum. The direction of insertion should be in a plane parallel to the victim's hard palate to facilitate passage of the tube through the inferior nasal meatus.
7. Gently advance tube, pausing and rotating the tube slightly if resistance is encountered. Do not use excessive force when resistance is encountered.
8. Between 6cm to 10cm depth in adults, expect slight resistance as the tube tip encounters the adenoid. The tube should pass freely after it enters the posterior oropharynx.
9. At 12cm to 15cm depth, listen to air exchange. Advance tube on inspiration. Breath sounds through the tube will become louder as the glottic opening is neared and will fade if it is passed.
10. If C-spine is not a concern, may need to flex head slightly or lift jaw up.
11. Sellick Maneuver may be very useful but do not release till balloon inflated.
12. Surface of neck – Consider use of laryngoscope and Magill forceps to pass tube through cords if difficulty encountered.
13. If resistance is met, rotate tube to left or right.
14. Once tube is in trachea, advance to approximately 24cm on adult female and 26cm on adult male. Inflate cuff.
15. Check for bilateral breath sounds, condensation in tube, cough on insertion, adequate pulse oximetry and accurate EtCO2. If tube placement confirmed, secure tube; if not, remove and reintubate.

E. POTENTIAL COMPLICATIONS:

1. As for orotracheal intubation (see Policy – Orotracheal Intubation.)
2. Epistaxis
3. Avulsion of nasal turbinate
4. Late sinusitis
5. False passage of tube into cranial vault if occult skull fracture is present

V. RESPONSIBILITY

Flight Physicians, Mid-level Providers, Flight Nurses

VI. KEY WORDS

None

VII. APPENDIX

None

VIII. REFERENCES / CITATIONS

None

University of Cincinnati Medical Center | UC Health

Management of Orotracheal Intubation (CLIN09)

I. POLICY

In the event that a patient needs assistance with ventilation and oxygenation, qualified personnel are permitted to manage an airway by Orotracheal Intubation to ensure a patent airway.

II. PURPOSE

The purpose of this policy to provide guidelines to ensure a patent airway in the victim with failure to oxygenate, failure to ventilate or inability to protect their airway, consider in association with RSI (rapid sequence induction.)

III. DEFINITIONS

None

IV. PROCEDURE

A. INDICATIONS:

1. Failure to oxygenate, failure to ventilate, inability to maintain a patent airway.

B. CONTRAINDICATIONS:

1. Ability to maintain a patent airway by less invasive methods.

C. EQUIPMENT:

1. Proper-sized oral or nasal airways.
2. BVM with reservoir attached to O2 source.
3. Nasal Cannula
4. Working suction.
5. Proper-sized endotracheal tubes (ETT) with tested, intact cuff. 10ml syringe. Assorted spare tubes and malleable stylet.
6. Laryngoscope with attached blade and tested light. Assorted spare blades and spare C-cell batteries.
7. Cardiac monitor, pulse oximetry, ETCO2.
8. Endotracheal Introducer

D. PROCEDURE AND MANAGEMENT:

1. Universal Precautions in use at all times.

2. Basic airway/ventilation therapy already initiated. Assign roles to care team.
3. Maintain manual in-line spinal immobilization in all victims with potential C-spine injury.
4. Pre-oxygenate with 100% O2 by mask. Pre-oxygenate for three (3) minutes prior to sedation or RSI if patient condition permits.
5. In addition to pre-oxygenation with 100% O2 by mask, utilize apneic oxygenation with 15liters O2 by nasal cannula from the start of pre-oxygenation until intubation is complete.
6. For elevated ICP, consider lidocaine 1.5mg per kg IVP. For pediatric patients <1yo, premedicate with atropine 0.02mg/kg IVP (0.1mg minimum.) Allow 2-3 minutes prior to introduction of the laryngoscope blade if patient condition permits.
7. Consider sedation, where appropriate. (See RSI Policy.)
8. Appropriately position patient and care team.
9. Insert endotracheal tube by standard or paraglottic technique to 21cm – 23cm in adult females, 22cm – 25cm in adult males and to indicated depth per PALS in infants and children.
10. Confirm tube placement. Check for waveform capnography (use colormetric as back up confirmation device), quality of breath sounds, absence of breath sounds over the stomach, condensation in tube, adequate pulse oximetry. If tracheal tube placement is confirmed, secure tube.
11. If poor laryngoscopic view is encountered, while still on the first attempt (assuming the patient is maintaining his pulse oximetry >90%), bimanual laryngoscopy, and/or employment of the Bougie.

E. POTENTIAL COMPLICATIONS:

1. Failed airway
2. Esophageal intubation.
3. Exacerbation of C-spine injury.
4. Emesis with aspiration.
5. Perforation of esophagus/pharynx.
6. False passage of tube.
7. Mainstem bronchus intubation.
8. Laryngospasm/bronchospasm.
9. Hypoxemia with anoxic injury.
10 Dysrhythmias.
11. Increased ICP.

V. RESPONSIBILITY

Flight Physicians, Mid-level Practitioners, Critical Care Nurses, Paramedics

VI. KEY WORDS

VII. APPENDIX

VIII. REFERENCES / CITATIONS

University of Cincinnati Medical Center | UC Health

Verification of Endotracheal Tube Placement (CLIN06)

I. POLICY

Upon the intubation of a patient, qualified and trained personnel are required to perform endotracheal tube placement verification.

II. PURPOSE

The purpose of this policy is to provide guidelines for the endotracheal tube verification. All intubated patients will have the tracheal position of the endotracheal tube confirmed prior to transport by Air Care & Mobile Care.

III. DEFINITIONS

None

IV. PROCEDURE

A. INDICATIONS:

1. Endotracheal intubation by the transport team.
2. Endotracheal intubation by scene EMS providers.
3. Endotracheal intubation by personnel at referring hospitals.

B. CONTRAINDICATIONS:

None

C. EQUIPMENT:

1. Colorimetric CO2 detector.
2. Stethoscope
3. Laryngoscope
4. ETCO2 capnography

D. MANAGEMENT:

1. After intubation, a colorimetric ETCO2 detector should be placed on the adapter flange of the ETT or Shiley prior to the first breath delivered through the tube.
2. The first breath delivered should be of low volume.
3. As the first breath is delivered, observe the ETCO2 for appropriate color change. If the color change is inconsistent with endotracheal intubation, immediately discontinue bagging, and either remove the tube or reassess

placement by direct visualization using a laryngoscope. Reintubate as indicated.

4. If color change is noted, or is equivocal, observe the chest wall for rise and fall with bagging and listen over the epigastrium for gurgling sounds, and over the hemithoraces for breath sounds. If gurgling is heard over the epigastrium or breath sounds are absent, either remove the tube or reassess placement by direct visualization using a laryngoscope. Observe the response of the pulse oximeter. If the waveform is good and correlates with the ECG tracing, and the pulse oximetry reading is low and no other physiological reason for low reading can be determined, either remove the tube or reassess placement by direct visualization using a laryngoscope. Reintubate as indicated.
5. If breath sounds are present over the hemithoraces, but are asymmetric, check for the depth of tube placement at the lip line. Generally, the reading at the lip line should be 21 to 23cm in an adult female (>14 years,) and 22 to 25cm in an adult male (>14 years.) In children, the appropriate depth of the tube can be estimated by the formulae:

    - Depth of insertion (cm) = internal tube diameter (mm) x 3.
    - Depth of insertion (cm) = (age in years/2) + 12.

    If an endotracheal tube is used for cricothyrotomy, the tube should be inserted only until the proximal portion of the balloon is past the opening in the cricothyroid membrane. After depth assessment, withdraw the tube as needed to obtain ventilation of both lungs.
6. Periodically reverify the placement of the ETT during transport, particularly after transfers of the patient from ground or bed to stretcher, from stretcher to the vehicle and from vehicle to another stretcher.
7. Except in extraordinary circumstances, intubated patients should have continuous waveform capnography monitored and documented during the transport.

E. PRECAUTIONS:

1. Never trust the placement of an ETT placed by another care provider. Always verify placement by one of the methods described above when receiving a patient that was previously intubated.
2. When any doubt about the placement of the tube exists, verify placement by revisualizing the tube passing through the glottic opening using a laryngoscope. Verify placement whenever there is a decline in the O2 saturation as measured by pulse oximetry, if there is a compliance change in the chest noted with bagging, or when the tube has moved from the original placement position.
3. There can be a time lag of 15 to 30 seconds between changes in actual arterial oxygen saturation and saturation as measured by pulse oximetry. If you are otherwise confident of tube placement, do not immediately remove an ETT

because of hypoxemia as measured by the oximeter. Rather, assess placement by direct visualization or other indicators as described above.

V. RESPONSIBILITY

Flight Physicians, Mid-Level Provider, Critical Care Transport Nurses, Paramedics

VI. KEY WORDS

None

VII. APPENDIX

None

VIII. REFERENCES / CITATIONS

None

University of Cincinnati Medical Center | UC Health

Waveform Capnography (CLIN07)

I. POLICY

To ensure proper endotracheal tube placement and monitoring of patient clinical status, waveform capnography is required to be placed on all intubated patients. In the event that the patient is not intubated and monitoring of ETCO2 would prove beneficial, nasal cannula with ETco2 monitoring capabilities should be initiated.

II. PURPOSE

The purpose of this policy is to provide guidelines for the use of waveform capnography. Capnography serves many useful rolls in transport medicine, including, but not limited to:

1. Immediate and continuous airway confirmation in the intubated patient
2. Assessment of the adequacy of ventilation in the patient with an extraglottic device
3. Detection of bronchospasm in the undifferentiated dyspneic patient
4. Continuous, labor free measurement of the patient's respiratory rate
5. Suggestion of the adequacy and futility of resuscitation of the patient in cardiac arrest
6. Treatment of herniation in the patient with intracranial hemorrhage or elevated ICP
7. Avoidance of inadvertent respiratory acidosis and alkalosis in the intubated patient
8. Monitoring for bradypnea and hypopnea in patient that are given narcotic analgesia or undifferentiated ingestions
9. Insight into the adequacy of perfusion in patient with or at risk for shock

III. DEFINITIONS

None

IV. PROCEDURE

A. INDICATIONS:

1. All intubated patients
2. All patients with an extraglottic device
3. Consider its use in patients that have been given narcotic analgesia and or depressed sensorium

4. Consider its use in patients in or at risk for shock (e.g. trauma patient)
5. All patients with signs and/or symptoms of respiratory distress

B. CONTRAINDICATIONS:

1. None

C. EQUIPMENT:

1. Waveform capnography device
2. Capnography cable and ETT adapter or ETCO2 Sampling Nasal Cannula with O2 Deliver

D. MANAGEMENT:

1. Place the patient on either inline capnography (endotracheal tube (ETT) or extra-glottic device (EGD)) or nasal cannula capnography (patients without ETT or EGD).
2. Note the initial ETCO2 and respiratory rate, as changes can suggest that the patient is having changes in the ventilation, perfusion, or metabolism.

    - Decreases in ETCOs suggest hyperventilation or hypoperfusion
    - In the setting of suspected hypoperfusion and metabolic acidosis, ETCO2 measurements can be inaccurate and that value should not be corrected.

3. Increases in ETCOs suggest hypoventilation or improvements in perfusion. Loss of waveform in a patient with an ETT or EGD suggests that the patient has been extubated or there is a failure of the device or ventilator.
4. If the patient has an acute hemorrhagic intracranial lesion or condition causing increased intracranial pressure with signs of herniation, see the respective policies on ETCO2 management
5. If the patient has flattening of their waveform, consider bronchodilators (see policies on Asthma and COPD).

E. POTENTIAL COMPLICATIONS:

1. Equipment failure giving erroneous readings.

V. RESPONSIBILITY

Flight Physicians, Mid-level Providers, Critical Care Transport Nurses, Paramedics

VI. KEY WORDS

None

VII. APPENDIX

None

VIII. REFERENCES / CITATIONS

None

University of Cincinnati Medical Center | UC Health

I-Gel Supraglottic Airway (CLIN60)

I. POLICY

When a failed airway occurs, the i-gel supraglottic airway should be considered as a method for obtaining a temporizing airway. Another indication for use of the i-gel is in the situation when you have limited access (or time) to obtain an emergency airway (i.e. patient entrapment, patient respiratory/cardiac arrests in transport).

II. PURPOSE

To permit use of the i-gel supraglottic airway by Air Care and Mobile Care staff.

III. DEFINITIONS

A. Failed Airway:
   1. Two (2) unsuccessful intubation attempts.
   2. Failed laryngoscopy in a patient who cannot be oxygenated using BVM (O2 saturation <90%), regardless of the number of attempts.

IV. PROCEDURE

A. RATIONALE

1. An essential component of an RSI algorithm is a method of securing the airway should the procedure fail. When RSI is unsuccessful in the paralyzed or sedated patient, or when patients are in cardiopulmonary arrest with a failed airway, measures must be taken to immediately provide ventilation and oxygenation. While this can be accomplished in many patients using BVM, the risk for aspiration of gastric contents remains high. BVM can be ineffective in a substantial subset of patients (cannot intubate, cannot ventilate). In this situation, the use of an airway adjunct for rescue of the failed airway is necessary. The i-gel is a method for non-invasive, rapid airway management that provides a temporizing airway when initial methods of airway management fail.
2. The i-gel will generally be used as a *rescue device*, and not as an alternative to RSI or crash intubation, although there is support in the literature for the concept of RSA (rapid sequence airway), whereby the airway adjunct (in this case, the i-gel) is utilized without prior attempts at laryngoscopy following induction and paralysis.

B. INDICATIONS:

1. Failed airway after RSI.
2. Sedated patient with the inability to maintain own airway.
3. Failed airway in the setting of cardiopulmonary arrest.
4. Patient deemed to have a difficult airway
5. Patient requiring airway with limited access (ie; entrapped in car)

C. CONTRAINDICATIONS:

1. Ability to maintain a patent airway, and adequate oxygenation and ventilation, by less invasive methods.
2. Conscious or semi-conscious patient.
3. Limited mouth opening or upper airway obstruction.
4. Does not allow for peak airway; pressure > 40 cm H20
5. Do not leave in for > 4 hours

D. EQUIPMENT:

1. All standard airway equipment (see Policy – Orotracheal Intubation).
2. I-gel sizes 1 → 5 (see packaging for sizing information).
3. Lubricant (water based)
4. Gastric tube (i-gel can accommodate a 10-14 French gastric tube – see sizing information) for gastric decompression.

E. MANAGEMENT:

1. All standard airway procedures (see Policy – Orotracheal Intubation.)
2. Pre-insertion preparation:

- Select i-gel size according to patient weight (see sizing information)
- Lubricate device by placing lubricant on middle / smooth surface of cradle. Lubricate the back, sides and front of the cuff with a thin layer
- Avoid touching the cuff with ones hands
- Place the i-gel back in protective cradle awaiting insertion (∅ on
- patient's chest or pillow)
- Remove patient's dentures prior to insertion

3. Insertion technique:

- Remove i-gel from cradle
- Place patient's head and neck in sniffing position (if not contraindicated d/t trauma), open victim's mouth & press chin down
- Grasp i-gel along bite block and position so the cuff outlet is facing the patient's chin
- Insert device in the mid-sagittal plane along anatomic curve of airway following the hard palate, gently advance until resistance is felt (one may feel resistance → giveway d/t passage of the i-gel through the facial pillars)
- If meets <u>early</u> resistance, performing a jaw thrust or insertion with deep rotation is recommended. Avoid undue force during insertion.

- The horizontal line located on the bite block should be aligned with the teeth or gums
- Secure the i-gel in, maxilla→ maxilla.

4. Assess patient for proper placement of device
5. Insert a gastric tube (for proper size – see packaging information), as desired, through the gastric channel to allow for gastric decompression. Properly lubricate both the gastric tube and gastric channel prior to insertion

F. POTENTIAL COMPLICATIONS:

1. As for standard orotracheal intubation (see Policy – Orotracheal Intubation.)
2. Note: The i-gel does not provide definitive protection against aspiration of gastric contents. Once in a more controlled setting, one can intubate the trachea through the i-gel utilizing the proper equipment. Under normal circumstances where the i-gel is providing adequate oxygenation and ventilation, our crews are likely better off initiating transport and delaying further attempts at intubation until arrival at definitive care.

G. QUALITY ASSURANCE:

1. To ensure proper usage of the i-gel supraglottic airway device, all patients receiving an air way with this devise with be reviewed and tracked through the department's internal quality management process by department clinical manager and medical directors.

V. RESPONSIBILITY

Flight Physicians, Critical Care Transport Nurses, Paramedics, EMT

VI. KEY WORDS

None

VII. APPENDIX

None

VIII. REFERENCES / CITATIONS

None

University of Cincinnati Medical Center | UC Health

Use of the Airtraq Disposable Optical Laryngoscope (CLIN58)

I. POLICY

In the event that assistance is needed in the intubation of a patient that has a failure to oxygenate or ventilate, qualified and trained personnel are permitted to use the Airtraq disposable Optical Laryngoscope.

II. PURPOSE

The purpose of this policy is to provide guidelines to enable successful intubation of patients with predictors of difficult intubation, or patients in a sitting or upright position.

III. DEFINITIONS

None

IV. PROCEDURE

A. INDICATIONS:

1. Indications for intubation (failure to oxygenate, failure to ventilate, inability to protect the airway, anticipated clinical course) in a patient with predictors of difficult intubation or a patient in an upright position.

B. CONTRAINDICATIONS:

1. There are no contraindications per se to the use of this device in the setting of predicted difficult intubation although, like all optical and fiberoptic devices, it may likely be defeated by significant blood, vomit, or mucus in the airway.

C. EQUIPMENT:

1. Proper-sized oral or nasal airways.
2. BVM with reservoir attached to O2 source.
3. Working suction.
4. Proper-sized, lubricated endotracheal tube (ETT) with tested, intact cuff. 10ml syringe. Assorted spare tubes.
5. Airtraq
6. Laryngoscope with attached blade and tested light. Assorted spare blades and spare C-cell batteries.
7. Cardiac monitor, pulse oximetry, EtCO2.
8. Bougie
9. Rescue airway (or cric kit) in case of failed airway.

D. PROCEDURE AND MANAGEMENT:

1. Maintain universal precautions.

2. Prior to attempt at laryngoscopy, follow pre-intubation preparation as per oroendotracheal intubation protocol.
3. The patient need not be in sniffing position; most authors prefer a neutral position for use with the Airtraq.
4. The Airtraq may be used either with RSI or during "awake" intubation.
5. Flip the switch to turn on the LED light at least thirty seconds prior to insertion into the mouth; otherwise, the scope will fog.
6. The adult device is designed for use with 7.0 to 8.5 ETTs, though smaller tubes may be used successfully. The pediatric device size 1 is designed for use with 3.5 to 5.5 ETT's. Check the cuff of the ETT, deflate the cuff, and lubricate and load the tube into the Airtraq's channel. Check the view from the eyepiece to ensure that the tube is not loaded too deep to obscure the view.
7. Insert the Airtraq blade into the mouth in the midline and follow the curvature of the airway. Look through the eyepiece, identify the epiglottis, and place the tip of the blade in the vallecula.
8. Lift vertically until the cords are centered in the view. If you cannot see the cords, you are likely either too deep or not in the midline.
9. Advance the ETT down the channel, through the cords. Inflate the ETT cuff, and confirm placement. Then peel the ETT out of the Airtraq channel and remove the Airtraq. Secure the tube. If you can see the cords but can't pass the tube, ensure that the cords are centered in the view, that the ETT isn't too big, and that the ETT cuff is deflated. You can also try withdrawing the Airtraq blade slightly, lifting vertically, and trying again. Finally, you can consider trying removing the ETT from the channel and replacing it with the bougie, and intubating the trachea with the bougie under visualization through the eyepiece.
10. Standard post-intubation management.
11. Provide appropriate analgesia, sedation, and/or paralysis as indicated.

E. POTENTIAL COMPLICATIONS:

1. Failed airway.
2. Esophageal intubation.
3. Exacerbation of C-spine injury.
4. Emesis with aspiration.
5. Perforation of esophagus/pharynx. False passage of tube.
6. Mainstem bronchus intubation.
7. Laryngospasm/bronchospasm.
8. Hypoxemia with anoxic injury.
9. Dysrhythmias.
10. Increased ICP

V. RESPONSIBILITY

Flight Physicians, Mid-Level Practitioners, Flight Nurses

VI. KEY WORDS

None

VII. APPENDIX

None

VIII. REFERENCES / CITATIONS

None

University of Cincinnati Medical Center | UC Health

Acute Chronic Obstructive Pulmonary Disease (COPD) Exacerbation (CLIN45)

I. POLICY

Acute Chronic Obstructive Pulmonary Disease (COPD) Exacerbation

II. PURPOSE

To rapidly transport the patient with an acute severe COPD exacerbation to an institution with critical care capabilities and to aggressively manage respiratory function.

III. DEFINITIONS

None

IV. PROCEDURE

A. INDICATIONS:

1. Patient suffering from an acute COPD exacerbation. If the patient does not have a history of COPD and they are suffering from an asthma exacerbation or other lung injury with acute bronchospasm (e.g. inhalation), please refer to the policy on Asthma Exacerbation.

B. CONTRAINDICATIONS:

1. There are no contraindications per se to the use of this protocol in the patient with an acute COPD exacerbation.

C. EQUIPMENT:

1. Cardiac monitor and pulse oximetry
2. Oxygen
3. Medications as indicated
4. Nebulizer
5. IV pump for controlled infusion
6. Airway equipment, including NIPPV (CPAP/BiLevel)
7. Waveform Capnography

D. PROCEDURE AND MANAGEMENT:

1. Maintain universal precautions.
2. Support ABCs.
3. Endotracheal intubation is generally indicated in the case of failure to oxygenate, failure to ventilate and inability to protect airway. Often intubation can be avoided with the use of CPAP. (See CPAP Policy)
4. Administer supplemental oxygen as indicated.

5. Maintain continuous cardiac monitoring and pulse oximetry and document frequent vital signs.
6. First line therapy is inhaled Albuterol/ Atrovent combination (Duoneb)
7. Second line therapy is Albuterol-2.5mg-5mg nebulized every 20 minutes. Consider IV Methylprednisolone, 125mg, if not previously administered at the referring center or PO Prednisone 40mg.
8. All intubated patients must be given adequate sedation and analgesia.

   Refer the "Pain Management and Sedation" Policy.
9. If the patient is intubated and on a ventilator at the referring facility, attempt to obtain the following prior to disconnecting from their ventilator:
   a) Plateau Pressure
   b) Peak Inspiratory Pressure (PIP)
   c) ETCO2
10. When ventilating the intubated COPD patient, maximize exhalation times. Pressure control ventilation is preferred. Use low tidal volume (6 mL/kg of Ideal Body Weight (IBW)), low RR (8-10 bpm), and set I-Time to start, at 1.0 second and adjust to prevent air trapping and for patient comfort. Attempt to keep plateau pressure <30 cmH20 and PIP <40cmH2O. If these goals are difficult to achieve, increase the sedation. If still difficult to achieve despite adequate sedation, consider paralyzing with Rocuronium if able. When possible, continue in-line Albuterol/ Atrovent combination (Duoneb) therapy. Remember to allow for permissive hypercapnia.
11. If PIP begins to increase, check the Plateau Pressure. If the plateau PIP is increased, evaluate for (d-f).
    - Air trapping (auto-PEEP)
    - Pneumothorax
    - Mainstem Intubation (migration of tube in transport)
    - Worsening bronchospasm (see ETCO2 waveform)
    - Obstructing secretions in airway or ET tube
    - Kinking of vent tubing
12. If the patient develops hypotension or PEA arrest, evaluate for increased plateau pressures, PIP, or intrathoracic volumes (check tidal volume/ minute ventilation), as an increase may have obstructed venous return, leading to a decrease in preload and therefore cardiac output.
13. If air trapping (auto-PEEP) is present, attempt one or more of the following:
    - If the PEEP is less than 10 cm H2O, increase by 2 cm H2O.
    - Decrease the RR by 2/ minute.
    - Decrease tidal volume by 1-2 mL/kg of IBW. Do not go below 4 mL/ kg of IBW.
    - Increase the I:E ratio to 1:>5.

14. If plateau pressures, PIPs, or air trapping does not respond to the above interventions, contact medical control and consider disconnecting from the ventilator for 20 seconds (while avoiding hypoxia) to allow for a period of prolonged expiration.

E. POTENTIAL COMPLICATIONS:

1. Pneumothorax, including tension, and other pulmonary barotraumas
2. Hypotension from volume depletion and decreased venous return
3. Respiratory arrest
4. CO2 narcosis
5. Tachycardia, commonly supraventricular, as a medication side effect.

V. RESPONSIBILITY

*** Flight Physician, Critical Care Transport Nurse,**
(*Rarely, we have arranged to take a respiratory therapist with us on a transport, which may be appropriate if it can be arranged very quickly, but this is not typical.)

VI. KEY WORDS

None

VII. APPENDIX

None

VIII. REFERENCES / CITATIONS

None

Respiratory Acute Asthma Exacerbation-Adult (CLIN50)

I. POLICY

Acute Asthma Exacerbation-Adult

II. PURPOSE

To provide guidelines to rapidly transport the patient with severe acute asthma to an institution with critical care capabilities, and to aggressively manage bronchospasm.

III. DEFINITIONS

None

IV. PROCEDURE

A. INDICATIONS:

1. Air Care and Mobile Care may be called to transport a patient whose primary issue is acute asthma, particularly in interhospital transports from institutions without ICUs. Often, these are pediatric patients. Also, occasionally patients transported for other primary issues may secondarily (i.e. inhalational injury) or coincidentally develop acute bronchospasm. *A separate policy exists for acute chronic obstructive pulmonary disease exacerbation.*

B. CONTRAINDICATIONS:

1. There are no contraindications per se to the use of this protocol in the patient with acute asthma exacerbation and acute bronchospasm.

C. EQUIPMENT:

1. Cardiac monitor and pulse oximetry
2. Oxygen
3. Medications as indicated
4. Nebulizer
5. IV Pump for controlled infusion
6. Airway equipment

D. PROCEDURE AND MANAGEMENT:

1. Maintain universal precautions
2. Support ABCs

3. Endotracheal intubation is generally indicated in the case of failure to oxygenate, failure to ventilate, and inability to protect airway.
4. Administer supplemental oxygen: consider titrating to keep sats ≥92% in adults and ≥95% in children.
5. Maintain continuous cardiac monitoring and pulse oximetry, and document frequent vital signs.
6. First line therapy is inhaled (inhaled Albuterol/Atrovent combination)
7. Second line therapy is Albuterol-Adult: 2.5 mg –5mg nebulized
   a) Consider IV Methylprednisolone (adult:125 mg) or PO Prednisone (Adult: 40mg), if not administered previously by referring facility.
8. For symptoms refractory to or worsening despite albuterol, consider epinephrine 1:1000 concentration (0.3-0.5mg subcutaneous adult, 0.01mg/kg subcutaneous).
9. Consider Magnesium 1-2g/100ml normal saline over one (1) hour. Strongly consider sedation of intubated patients.
10. Keep tension pneumothorax near the top of your differential for the asthmatic patient who precipitously decompensates, develops PEA or asystolic arrest. However, hypotension may also be due to a combination of volume depletion and decreased venous return from elevated intrathoracic pressure, indicating a bolus of normal saline.
11. Attempt to maximize exhalation times by using low tidal volume (4-6 mL/kg), low RR (8-10 bpm), and short I-Time (initially, 1.0 seconds; adjust to prevent air-trapping and maximize patient comfort). Attempt to keep plateau pressure <30 cm H2O, and PIP <50cm H2O. If these goals are difficult to achieve, paralyze with rocuronium or vecuronium as able. When possible, continue in-line albuterol therapy. Remember to allow for permissive hypercapnia.

E. POTENTIAL COMPLICATIONS:

1. Pneumothorax, including tension, and other pulmonary barotrauma
2. Hypotension from volume depletion and decreased venous return
3. Respiratory arrest
4. CO2 narcosis
5. Tachycardia, commonly supraventricular, as a medication side effect.

V. RESPONSIBILITY

Flight Physician, Mid-Level Practitioners, Critical Care Transport Nurses

VI. KEY WORDS

None

VII. APPENDIX

None

VIII. REFERENCES / CITATIONS

None

Acute Decompensated Heart Failure/Pulmonary Edema (CLIN47)

I. POLICY

Acute Decompensated Heart Failure/Pulmonary Edema

II. PURPOSE

To provide guidelines to rapidly transport the patient with severe decompensated heart failure/pulmonary edema to an institution with critical care capabilities.

III. DEFINITIONS

None

IV. PROCEDURE

A. INDICATIONS:

1. Air Care and Mobile Care may be called to transport a patient whose primary issue is acute decompensated heart failure or pulmonary edema, particularly in interhospital transports from institutions without intensive care capabilities. Also, sometimes patients that Air Care or Mobile Care is transporting for other primary issues (i.e. acute myocardial ischemia) may secondarily or coincidentally develop acute pulmonary edema.

B. CONTRAINDICATIONS:

1. There are no contraindications per se to the use of this protocol in the patient with acute decompensated heart failure or pulmonary edema.

C. EQUIPMENT:

1. Zoll cardiac monitor (with pacing and defibrillation capabilities) and pulse oximetry.
2. Oxygen
3. Medications as indicated.
4. IV Pump for controlled infusion.
5. Airway equipment
6. Consider placement of pacer/defibrillation pads for the patient with ectopy, arrthymia, unstable hemodynamics or bradycardia.

7. Non-invasive positive pressure ventilation device(s) and ventilator equipment.

D. PROCEDURE AND MANAGEMENT

1. Maintain universal precautions.
2. Administer supplemental oxygen. Consider CPAP, BiLevel (See NIPPV & CPAP Protocols)
3. Endotracheal intubation is generally indicated in the case of failure to oxygenate, failure to ventilate, or inability to protect airway, particularly when unresponsive to NIPPV.
4. Maintain continuous cardiac monitoring, pulse oximetry, capnography and document frequent vital signs.
5. For the hemodynamically unstable and hypertensive patient, emphasis should be given to afterload and preload reduction, prior to diuresis. If a patient remains hypertensive after three (3) 0.4mg sublingual nitroglycerin tablets spaced every five minutes, consider initiation of a Nitroglycerin IV drip, starting at 10-20 mcg/min and titrating aggressively as necessary to a maximum of 200 mcg/min.
6. In the event of concern that a patient's pre-transport diuresis is inadequate, further IV diuretics may be administered after discussion with the receiving physician or medical control. In general, lasix (furosemide) doses should be administered no more frequently than every 6 hours, at IV doses equal to or double the patient's home PO dose.

E. COMPLICATIONS

1. Cardiogenic Shock
2. Arrhythmia
3. Myocardial ischemia
4. Respiratory failure

V. RESPONSIBILITY

* Flight Physician, Critical Care Transport Nurse,
(*Rarely, we have arranged to take a respiratory therapist with us on a transport, which may be appropriate if it can be arranged very quickly, but this is not typical.)

VI. KEY WORDS

None

VII. APPENDIX

None

VIII. REFERENCES / CITATIONS

Respiratory Pulmonary Embolus (CLIN46)

I. POLICY

Trained personnel of Air Care & Mobile Care are permitted to care for and transport patients suffering from a suspected or diagnosed Pulmonary Embolus.

II. PURPOSE

To provide guidelines for the rapid and safe transport the patient with diagnosed or suspected acute pulmonary embolus to a source of definitive care while maximizing oxygenation and the patient's hemodynamics.

III. DEFINITIONS

Pulmonary Embolus-PE

IV. PROCEDURE

A. INDICATIONS:

1. Rarely, Air Care & Mobile Care will be called to transport a patient whose primary issue is diagnosed acute pulmonary embolus, typically from institutions without intensive care, angiography or cardiothoracic surgery capabilities. These patients will typically be hemodynamically unstable and/or markedly hypoxic. Even more rarely, patients that Air Care & Mobile Care transports for other primary issues may secondarily or coincidentally develop acute pulmonary embolus.

B. CONTRAINDICATIONS:

1. Contraindications to the use of tPA include low-risk PE, high risk for bleeding complications (recent surgery, intracranial hemorrhage, bleeding ulcers or trauma).

C. EQUIPMENT:

1. Zoll Cardiac Monitor (with pacing and defibrillation capabilities) and pulse oximetry.
2. Oxygen
3. Medications as indicated.
4. IV Pump for controlled infusion.

5. Airway equipment.
6. Consider placement of pacer/defibrillation pads for the patient with ectopy, arrhythmia, unstable hemodynamics or bradycardia.

D. PROCEDURE and MANAGEMENT

1. Maintain universal precautions.
2. Endotracheal intubation is generally indicated in the case of failure to oxygenate, failure to ventilate and inability to protect airway.
3. Administer supplemental oxygen.
4. Maintain continuous cardiac monitoring and pulse oximetry and document frequent vital signs. Use the ventilator and document waveform capnography for intubated patients except when extraordinary circumstances are prohibitive.
5. Generally, patients with diagnosed PE should receive antithrombotic medication (either low molecular weight or unfractionated heparin) in the absence of contraindications. Air Care & Mobile Care does not carry these medications. If one of these medications has not already been given or initiated at the referring institution but is available there, strongly consider obtaining and administering the antithrombotic medication.
6. Consider the use of fibrinolytic therapy, when available, for the patient with diagnosed pulmonary embolus, <u>with clinical indicators of massive or sub-massive PE</u>, in the absence of contraindications and only in consultation with the receiving physician or medical control physician.
    - Massive PE is indicated by acute PE with persistent hypotension (SBP<90 for 15 min or more), persistent profound bradycardia (HR <40 with signs of shock), signs of shock, need for inotropic support, pulselessness
    - Sub-massive PE in indicated by RV dysfunction or myocardial necrosis resulting from acute PE, with clinical signs including those of heart failure, new EKG changes particularly new RBB, anteroseptal ST elevation/depression, or anteroseptal T-wave inversions; elevated troponin. If bedside ultrasound is available, RV dysfunction may be evidenced by RV dilation or systolic dysfunction, but these findings may only affect medical decision-making as appropriate based on the ultrasono~~a~~grapher's accreditation, experience, and discussion with medical control.
    - Alteplase dosing for massive and submassive PE: 100 mg over 2 hours administered as a 10 mg bolus followed by 90 mg over 2 hours. Administer the bolus dose over 1 to 2 minutes.
    - Contraindications to the use of tPA include low-risk PE, high risk for bleeding complications (recent surgery, intracranial hemorrhage, bleeding ulcers or trauma)
    - Dosing & Administration: tPA 100 mg IV over two hours.
    - Hold heparin if giving fibrinolytics

7. Particularly for the patient with diagnosed massive PE that has already received heparin and fibrinolytic therapy and remains hemodynamically unstable, consider discussion with medical control physician regarding attempted facilitation of transfer directly to angiography for IA fibrinolysis/embolectomy, or directly to OR for embolectomy.
8. PE patients are often preload dependent. Manage shock with administration of IV normal saline and, if refractory, pressor therapy.
9. Manage the patient's pain, if present, as hemodynamics allow in the absence of contraindications.
10. In the case of suspected or confirmed PE and subsequent cardiac arrest, fibrinolytics should be considered.
    - 50mg IVP of alteplase for cardiac arrest with suspected PE, then give the remaining 50mg over 1 hour based on studies if ROSC is obtained. Administer the bolus dose over 1 to 2 minutes.

E. COMPLICATIONS

1. Cardiogenic shock
2. Organ failure
3. Arrhythmia
4. ACS
5. Need for intubation
6. Cardiopulmonary arrest
7. Hemoptysis
8. Major or minor bleeding as a side effect of antithrombotic or fibrinolytic medications
9. Pulmonary hypertension

V. RESPONSIBILITY

Flight Physician, Mid-Level Practitioners, Critical Care Transport Nurse

VI. KEY WORDS

None

VII. APPENDIX

None

VIII. REFERENCES / CITATIONS

None

University of Cincinnati Medical Center | UC Health

Use of Non-Invasive Rescue CPAP device (CLIN66)

I. POLICY

Trained personnel of Mobile Care are permitted to care for and transport the patient on a Continuous Positive Pressure Airway Device (CPAP).

II. PURPOSE

This policy will provide guidelines for the care and transport of a patient on CPAP. This policy will provide basic instruction on how to maintain the respiratory status of a patient on CPAP and steps to take if patient decompensates.

III. PURPOSE

A. Indications
1. Acute pulmonary edema or
2. Acute respiratory failure or
3. Respiratory rate >35 or
4. 02 Sat <90% already on 100% oxygen with no acute need for endotracheal intubation or
5. Acute decompensation related to the following diagnoses: Pulmonary contusions, Flail chest, Pleural effusions, Pneumonia, Pulmonary/Fat embolus, Acute asthma/COPD.

B. Contraindication:
1. Laryngeal trauma
2. Recent tracheal/esophageal anastomosis
3. Severe hypotension <90 systolic, (relative contra-indication)
4. Persistent nausea and vomiting, (aspiration potential complication of CPAP)
5. Inability of patient to protect their airway
6. Unconsciousness
7. Gastric distention, untreated pneumothorax, (Pneumothorax potential complication of CPAP)
8. Hypovolemia with signs of hemodynamic instability (relative contra-indication

C. Consider discontinuing CPAP if
1. Pressure settings have been increased twice without improvement (e.g., in target RR, O2 sat)

2. Worsening hypercapnea
3. Inadequate O2 saturation
4. Increased RR
5. Vomiting
6. Failure to tolerate mask
7. Decreasing or poor mentation or level of consciousness

IV. PROCEDURE

A. Initiation of O2-ResQ CPAP
   1. Confirm patient meets indications and has no contra-indications for CPAP.
   2. Document Oxygen Saturation, Respiratory Rate, Blood Pressure, Heart Rate, ETCO2(if possible) prior to CPAP.
   3. Size O2-RESQ mask to patient.
   4. Place patient on CPAP pressure of 10 CM/H2O valve.
   5. Connect O2 supply line of CPAP to power take off of D tank. Flow will begin. May connect supply line to flow meter at 15 liter/min. This will achieve a flow rate of 140 liters/min and FIO2 of 30%.
   6. Explain to your patient what to expect (lots of air through mask)
   7. Place mask to patients face with your hands and hold there while assuring the patient this is to help them.
   8. Consider low dose anxiolytic e.g. Versed 1-2 mg. IVP.
   9. Encourage patient to take slow deep breaths and stay as calm as possible.
   10. Once patient is comfortable use strap to hold mask on patient.

B. Evaluate patient's respiratory response to CPAP after 5minutes.
   1. If patient fails to improve or demonstrates contraindications as described above, consider discontinuing CPAP therapy and/or proceeding to endotracheal intubation or NRB.
   2. If patient is on CPAP upon arrival, evaluate the patient's response to current setting to determine whether to continue treatment at current settings by
      - If patient is alert and oriented X 3
      - SpO2 >92%
      - Respiratory Rate <30 and >10bpm
      - Adequate ETCO 2
      - Shows no signs of respiratory distress
      - If symptoms observed, discontinue CPAP in favor of alternate therapy, or proceed to intubation.

V. RESPONSIBILITY

A. Critical Care Transport Nurses, Paramedic, EMT-B

VI. KEY WORDS

None

VII. APPENDIX

None

VIII. REFERENCES / CITATIONS

None

University of Cincinnati Medical Center | UC Health

Care of the Ventilated Patient and Use of the 731 Ventilator (CLIN59)

I. POLICY

Care of the Ventilated Patient and Use of the 731 Ventilator

II. PURPOSE

To provide guidelines to optimize oxygenation and ventilation of critically ill and injured patients requiring advanced airway support and to maintain adequate oxygenation and ventilation for ventilator-dependent patients.

III. DEFINITIONS

None

IV. PROCEDURE

A. INDICATIONS:

Patients requiring mechanical ventilation in the medical transport environment.

B. CONTRAINDICATIONS:

There are no contraindications per se to the use of the ventilator or continuous waveform capnography in patients requiring advanced airway support. All ventilators should be used according to manufacturer recommendations and appropriate age and weight limits.

C. EQUIPMENT:

1. Cardiac monitor, capnography cable, ETT adapter
2. Impact 731 ventilator with ventilation circuit, HME and Exhalation filter
3. Oxygen cylinder or Liquid oxygen (LOX) system
4. Medications as indicated

D. PROCEDURE AND MANAGEMENT:

1. University of Cincinnati Medical Center (UCMC), Air Care & Mobile Care follows UCMC and department policies as well as the protocols and guidelines of ATLS, PALS, and ACLS (which will not be reproduced here,) with consideration for individualization on a case-

by-case basis. This policy offers guidelines as a starting point to the wide variety of potential clinical challenges, and recognizes that the astute critical care team may be required to adjust ventilator settings and strategies for individual patients. In particularly challenging cases, the teams are strongly encouraged to request additional guidance from UC Health respiratory therapy back-up.

2. Transportation of the patient on a ventilator will be conducted by the critical care transport teams.
3. Maintain universal precautions.
4. When the medical crew is aware that a scene patient has received an advanced airway prior to the crew arrival, strongly consider bringing the ventilator out of the aircraft or ambulance to the patient to enable initiation of mechanical ventilation with our ventilator prior to loading. When the medical crew is aware that an inter-hospital transfer patient has received an advanced airway prior to the crew arrival, the ventilator should be brought out of the aircraft or ambulance to the patient and mechanical ventilation should be initiated prior to patient transport.
5. Except in cases of ventilator equipment failure or a failure to oxygenate despite maximal efforts with the ventilator, all patients with an advanced airway should be ventilated via the hospital approved transport ventilator as opposed to bag ventilation.
6. Except in cases of equipment malfunction, all patients with an advanced airway should be monitored by continuous waveform capnography. If waveform capnography is not available, quantitative (preferable) or qualitative capnography should be employed.
7. When transporting patients that were on a ventilator prior to Air Care & Mobile Care arrival, the following ventilator settings should be obtained and documented and changes made based on patient clinical condition when possible. Consider consulting the referring facility's respiratory therapist for assistance (if appropriate) and consider following guidelines:
    - Breath type and mode of Ventilation (See ventilator settings identifier algorithm) Place patient on most appropriate breath type and mode to maintain or increase adequate oxygenation, ventilation and synchrony.
    - Tidal Volume (Vt) Adult, adjust to 6-8ml/kg of ideal body weight. Pediatric, 6-8ml/kg actual weight, Neonate, 4-6ml/kg actual weight.
    - Respiratory Rate (RR) (spontaneous and the set rate) Adult 12, Neonate 30-50, infant 25-40. Child 15-25. Adjust to maintain Ve greater than or equal to 6.
    - Minute Ventilation(Ve)

- Pressure Support, (delta) Continue referring PS/Delta and adjust for target Vt.
- FIO2
- Inspiratory time (I), Utilize referring setting and adjust for PIP, Vt and synchrony. Adult 1.0, Infants 0.4-0.7, Children 0.5-1.0 Adjust to maximize pressure and ETCO2 wavefrom and overall patient synchrony.
- PEEP, Utilize referring setting and adjust for SPO2
- Peak Inspiratory Pressure (PIP), Utilize referring setting and adjust to maintain at lowest value to ensure targeted Vt and Ve to patient.
- Most recent ABG (if available)
- ETCO2
- Rise time/Slope. If using pressure or PS use referring facility setting and adjust for pressure waveform overshoot and flow requirements.
- Cycle off %. If patient is on cpap/ps NPPV start at 25% and adjust to compensate for mask leaks. This should be obtained while the patient is still on the referring facility's ventilator.

For patients with an advanced airway not already on a ventilator, apply lung-protective strategies.

- Mode: AC (pressure or volume). Place patient on most appropriate breath type and mode to maintain or increase adequate oxygenation, ventilation and synchrony.
- Tidal Volume (Vt): Adult, 6-8mL/ kg of ideal body weight. Pediatric, 6-8ml/kg actual weight, Neonate, 4-6ml/kg actual weight.
- I time Adult 1.0. Infants 0.4-0.7, Children 0.5-1.0 Adjust to maximize pressure and ETCO2 wavefrom and overall patient synchrony.
- FiO2 between 0.8 (80%) and 1.0 (100%). Wean aggressively to keep SpO2 greater than or equal to 94%.
- Respiratory Rate (RR) Adult 12, Neonate 30-50, infant 25-40, Child 15-25. Adjust to keep minute volume equal to or greater than 6 liters/minute.
- PEEP: 5-10 cm H2O.
- PIP: Maintain PIP at lowest value to ensure targeted Vt and Ve to patient.
- Rise time: if using a pressure form of ventilation start with a rise time of 2 and adjust for pressure waveform overshoot and flow requirements

8. If using volume ventilation and the Impact 731 ventilator obtain a tubing compliance factor and add value to desired tidal volume (3 ml tidal volume for each CM/H20 of peak pressure in adult circuit, 2ml tidal volume for each CM/H2O of peak pressure in pediatric circuit). Consider adding additional volume to compensate for HME and additional tubing length.
9. All patients on the ventilator should be monitored with continuous waveform capnography. Document ETCO2 per policy, as you would other vital signs.
    - In patients with initial ETCO2 >45 mmHg and no available blood gas, adjust RR to keep ETCO2 35-40 mmHg.
    - In patients with a known ABG or VBG, correlate the patient's ETCO2 and pCO2 to shoot for a pCO2 of 40 (unless the patient is known or suspected to normally live at a higher pCO2, as in COPD). In the acutely ill patient, ideally the blood gas should have been drawn within the last 30 minutes.
    - In patients with initial ETCO2 <35 mmHg and no available blood gas: if your assessment reveals a well perfused patient who seems unlikely to be in shock or significantly acidotic, adjust RR to keep ETCO2 35-40mmHg. However, if your assessment reveals a poorly perfused patient or one who you suspect is significantly acidotic, do not attempt to "fix" a low ETCO2.
10. If the patient is difficult to oxygenate, employ the following strategies:
    - Increase the FIO2 (except for pediatric patients with congenital cardiac abnormalities; take care to discuss treatment and goals with the appropriate physician prior to transport, knowing the increased difficulty.)
    - Increase the PEEP (caution with increases to greater than 10 or patients with hypotension or pneumothorax.)
    - Increase the I time (caution with patients that are tachypnic or have a prolonged expiratory phase, as you may need to decrease the I time.)
11. If the patient's PIP is increasing or tidal volume decreasing, consider and assess for the following etiologies:
    - Kinking of vent tubing
    - Obstructing secretions in airway or ET tube(see pressure waveform)
    - Worsening bronchospasm (see ETCO2 waveform)
    - Air trapping (auto-PEEP)(see ETCO2 and pressure wavefrom)
    - Pneumothorax
    - Mainstem Intubation (migration of tube in transport.)

12. All patients on mechanical ventilation require adequate sedation and analgesia. See sedation and analgesic protocols.

E. POTENTIAL COMPLICATIONS:

1. Complications of airway management as listed in other protocols.
2. Pneumothorax upon initiation of positive pressure ventilation, including tension pneumothorax.
3. Hypotension due to decreased venous return upon initiation of Positive Pressure Ventilation.
4. Respiratory Acidosis or Alkalosis.
5. Volutrauma or Barotrauma, increasing the risk or Acute Lung Injury (ALI) or Acute Respiratory Distress Syndrome. (ARDS)

V. RESPONSIBILITY

Flight Physicians, Flight Advanced Practice Nurses, Critical Care Transport Nurses, Critical Care Paramedics

VI. KEY WORDS

None

VII. APPENDIX

None

VIII. REFERENCES / CITATIONS

Ventilator settings identifier algorithm

University of Cincinnati Medical Center | UC Health

Pain Management (CLIN30)

I. POLICY

Pain Management

II. PURPOSE

A. To provide guidelines for the choice and dosage of agents to be administered for analgesia. The use of parenteral analgesic medications should be considered for adult and pediatric patients for pain from self-report, pathological conditions or procedures known to be painful, observed pain-related behaviors (grimacing, restlessness, vocalization, groaning), and physiological changes (increased pulse and blood pressure).

III. DEFINITIONS

A. Pain is defined by the International Association for the Study of Pain (IASP) as an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage. Pain management is the process of providing medical care that alleviates or reduces pain.

IV. PROCEDURE

A. Moderate to severe pain should be treated during transport whenever the clinical situation warrants and the administration will not compromise the patient's stability or subsequent evaluation. The need for analgesic medications will be determined by the medical transport team after assessment of the patient and review of the operational situation.

B. Conditions where analgesia during transport should be considered include but are not limited to:

1. Burns
2. Fractures
3. Severe abdominal, chest or back pain
4. Extensive soft tissue injuries
5. Ventilator Management
6. Procedural analgesia for invasive interventions

C. In non-verbal or preverbal patients, the inability to communicate does not negate the possibility that the patient is experiencing pain and is in need of appropriate pain-relieving intervention, therefore, assessment of pain should include a behavioral assessment tool for physical exam findings such as facial expression, leg movement, activity, cry and consolability (FLACC Score) for correlation of pain along with physiologic conditions such as BP, HR, RR, O2 saturation.

D. In verbal patients, self –reports of pain should utilize patient numerical scale verbalization of 0-10 with 0 being no pain, 1 being the least and 10 being the worse pain possible or the Wong-Baker FACES Pain Rating Scale (Figure 1.)

Figure 1. Wong-Baker FACES Pain Scale

Pain assessment should be documented in the electronic medical record. If pain medication is given, an appropriate pain reassessment must be done and documented to confirm effectiveness.

E. Decision to administer narcotic analgesics, consideration should be given to hemodynamic stability, respiratory sufficiency, mental status and airway maintenance. Although these conditions should not be compromised in favor of pain control, judicious dosing may permit pain control even in patients with potential instability. Dosing of medications should be titrated to effect, rather than route. Consideration of transport time should be factored into dosing decisions.
In general, short-acting medications such as Fentanyl should be used for analgesia, particularly in patients with the potential for deterioration. Longer-acting medications should be considered for stable patients with predictable clinical course and a high probability for continuing pain (i.e., conscious burn victim, isolated extremity injuries.)

1. Dosing Recommendations for Fentanyl and Morphine Sulfate
   - Morphine Sulfate: 0.1 to 0.15 mg/kg/dose, not to exceed 10mg/dose
   - Fentanyl: 1-3 mcq/kg/dose, not to exceed 200 mcq/dose

F. Note: The duration of most transport is brief and it is rare that repeat dosing of narcotic analgesics will be required once the maximum single dose is reached. It is best practice to titrate the medication to effect, using the minimum dose that meets the goals of analgesia, rather than applying

the maximum single dose as the first administration. In general, preference is given to the shorter acting agent (Fentanyl.) Be mindful of the possibility of inducing respiratory depression and hypotension but do not withhold narcotic analgesics in patient with obvious sources of moderate to severe pain.

Contraindications: Known allergies.
Risk of cross-reactivity with another opioid can be reduced if an analgesic from a different chemical class is used.

V. RESPONSIBILITY

Flight MDs, Mid-level Practitioners, Critical Care Transport Nurse, Paramedics

VI. KEY WORDS

None

VII. APPENDIX

None

VIII. REFERENCES / CITATIONS

http://www.iasp-pain.org/terms-p.html#Pain ISAP Pain Terminology. From: Classification of Chronic Pain, Second Edition, IASP Task Force on Taxonomy, edited by H.Merskey and N. Bogduk, IASP Press, Seattle, 1994, pp.209-214

http://www3.us.elsevierhealth.com/WOW/faces12b.html Wong-Baker FACES Pain Rating Scale

Kella (et.al.) (2006) Nonverbal Patient: Position Statement with Clinical Practice Recommendations. *American Journal of Pain Management Nursing*. 7(2), pp.44-52.

University of Cincinnati Medical Center | UC Health

Sedation, Analgesia, and Paralysis of the Intubated Patient (CLIN49)

I. POLICY

To provide optimal sedation, analgesia and paralysis to the critically ill/injured patient.

II. PURPOSE

Endotracheal intubation and mechanical ventilation produce variable degrees of pain and anxiety in the critically ill/injured patient. The purpose of this policy is to provide clinical guidelines for the delivery of sedation, analgesia and paralysis in the intubated, mechanically ventilated patient.

III. DEFINITIONS

Richmond Agitation-Sedation Score (RASS)- is a validated and reliable method to assess a patient's level of sedation in the intensive care unit setting most often when the patient is being mechanically ventilated.

SCORE	CLASSIFICATION	(RASS)
4	COMBATIVE	Overtly combative or violent, immediate danger to staff
3	VERY AGITATED	Pulls on or removes tubes, lines or aggressive behavior toward staff
2	AGITATED	Frequent non-purposeful movement or patient-ventilator dyssynchrony
1	RESTLESS	Anxious or apprehensive but movements not aggressive or vigorous
0	ALERT AND CALM	
-1	DROWSY	Not fully alert, but has sustained awakening
-2	LIGHT SEDATION	Briefly awakens with eye contact to voice
-3	MODERATE SEDATION	Movement or eye opening to voice but no eye contact
-4	DEEP SEDATION	No response to voice, but movement or eye opening to physical examination
-5	UNAROUSABLE	No response to voice or physical examination

IV. PROCEDURE

A. INDICATIONS:

1.All intubated and mechanically ventilated patients.

B. CONTRAINDICATIONS:

1. In general, there are no absolute contraindications for sedation, analgesia, and or paralysis however there may be specific contraindications for certain medications that will be outlined individually.

C. EQUIPMENT:

1.Cardiac monitor with waveform capnography, NIBP, and SPO2
2.Mechanical ventilator
3.BVM with oxygen reservoir and PEEP valve (back-up for ventilator)
4.Normal saline or Lactated Ringer's Infusion to counteract hypotension.
5.Medications:

- Fentanyl: 100mcg/2ml, 50 mcg/ml
- Morphine: 10mg/1ml, 10mg/mL
- Ketamine 200mg/20ml, 10mg/ml
- Midazolam: 5mg/1ml, 5mg/mL
- Propofol: 1000mg/100ml, 10mg/mL
- Dexmedetomidine 80mcg/20ml, 4mcg/ml
- Rocuronium: 50mg/5ml, 10mg/mL

D. MANAGEMENT:

1. Utilize universal precautions at all times.
2. ALL intubated and mechanically ventilated patients require some degree of analgesia and sedation.
3. VERY FEW intubated and mechanically ventilated patients will require paralysis. If paralysis is required patients must receive analgesia and sedation.
4. Discussion by the medical team will occur to determine the best dose and/or regimen to use for the patient's specific case.
5. Utilize the Richmond Agitation Sedation Scale (RASS) assessment to identify the patient's sedation level. An initial target of 0 to -2 is recommended. Due to the increased stimulation of the transport environment and the need for increased sedation with certain disease states or procedures *e.g.* ARDS or ECMO. RASS scoring may need to be adjusted up to and including -5. Keep in mind that there is no evidence of what RASS score is ideal for mechanically ventilated patients in the critical care transport environment.
6. Document the patient's RASS score and clinical decision making for targeted RASS score.
7. Monitor vital signs frequently.
8. Prior to giving sedatives or paralytics, document the patient's neurologic examination and document the time of administration of sedatives and paralytics.

E. ANALGESIA:

1.FENTANYL

- Incremental boluses: 1 to 3 mcg/kg. Start with 25-100mcg initial dosing. IV push over 30 seconds. Not to exceed 200mcg/dose.

- Continuous infusion: 25 to 200 mcg/hr Standard concentration 10mcg/ml (100mcg/100ml. Begin 25mcg/hr. Titrate by 25-50mcg increments per hour up to 200mcg. Titrate according to objective pain assessment or sedation scale.

2. MORPHINE
   - Incremental boluses: 0.1 to 0.15 mg/kg. Start with 2-4mg initial dosing. IV push over 30 seconds. Not to exceed 10mg/dose.
3. KETAMINE
   - Incremental boluses: 0.1 to 0.3 mg/kg. Start with 15-30 mg initial dosing. IV push over 60 seconds. Not to exceed 0.3mg/kg. May repeat in 2 hours.

F. SEDATION:

1. MIDAZOLAM
   - Incremental boluses: 0.05 to 0.3 mg/kg. Start with 1-2mg initial dosing. IV pushover 30 seconds.
   - Continuous infusion: Standard concentration 0.5mg/ml (50mg/100ml) or 1mg/ml (100mg/100ml). Start with 1mg/hr. Titrate by 2 mg/hr-Max 10mg/hr
2. PROPOFOL
   - Continuous infusion: 5 to 80 mcg/kg/min. Titrate in 5-10mcg/kg/min increments to achieve desired level of sedation. Allow 5 minutes between dose adjustment.
3. DEXMEDETOMIDINE-For continuation of therapy started at referring hospitals
   - Continuous infusion 0.2 to 0.7 mcg/kg/min.
4. Combination therapy with MIDAZOLAM and PROPOFOL is discouraged. Discussion by the medical team will occur to determine the best sedation agent for a specific patient clinical need.

G. PARALYSIS

1. ROCURONIUM
   - Bolus dose: 0.5 mg/kg IV. Approximate 40 minutes of paralysis. (If shorter paralysis is needed, 0.25mg/kg IV may be used. Repeat as needed.

H. POTENTIAL COMPLICATIONS:

1. Hypotension
2. Respiratory arrest
3. Cardiac arrest
4. Increased intracranial pressure
5. Bradycardia
6. Chest wall rigidity

V. RESPONSIBILITY

Flight Physicians, Flight APRNs, Critical Care Transport Nurses, Paramedics

VI. KEY WORDS

NONE

VII. APPENDIX

None

VIII. REFERENCES / CITATIONS

None

University of Cincinnati Medical Center | UC Health

Management of the Acute Coronary Syndrome Patient(ACS) (CLIN17)

I. POLICY

Management of the Acute Coronary Syndrome Patient (ACS)

II. PURPOSE

To provide the guidelines to rapidly and safely transport the ACS patient to an institution with interventional cardiologic and/or intensive care capabilities, to systematically assess and resuscitate the patient and to minimize further myocardial damage.

III. DEFINITIONS

None

IV. PROCEDURE

A. INDICATIONS:

1. Acute coronary syndrome includes unstable angina, NSTEMI, and STEMI (refer to STEMI Policy). This policy refers to ACS patients, regardless of whether or not they have received fibrinolytic therapy or whether or not percutaneous coronary intervention (PCI) is planned.

B. CONTRAINDICATIONS:

1. There are no contraindications per se to the use of this policy in the ACS patient.

C. EQUIPMENT:

1. Zoll cardiac monitor (with pacing and defibrillation/cardioversion capabilities) and pulse oximetry.
2. Oxygen
3. Medications as indicated.
4. IV pumps for controlled infusion.
5. Airway equipment.
6. Consider placement of pacer/defibrillation pads for the patient with ectopy, arrhythmia, hemodynamic instability or bradycardia.

D. PROCEDURE AND MANAGEMENT:

1. Employ universal precautions.
2. When available, strongly consider reviewing the patient's chest X-ray for evidence of aortic dissection or thoracic aortic aneurysm prior to giving anti-thrombotic, antiplatelet or fibrinolytic therapy.

3. Air Care and Mobile Care generally follows the Southwest Ohio Protocols for Paramedic Services for Chest Pain. (refer to Southwest Ohio treatment protocols that are available on each unit) with consideration for individualization on a case-by-case basis. In addition, Nitropaste one (1) inch may be applied by the transport registered nurse to patients who experience relief from chest pain through the administration of sublingual nitroglycerin, and whose systolic blood pressure is at least 100mmHg.

Nitroglycerin intravenous (IV) may be initiated and titrated by the transport registered nurse in patients with continued chest pain despite the administration of sublingual Nitroglycerin and whose systolic blood pressure is at least 100mmHg. Nitroglycerin IV is started at 10mcg/min and titrated at 10mcg/min every five (5) minutes until pain subsides or until systolic blood pressure is 100mmHg. Vital signs are checked every five (5) minutes during titration. (Refer to Drug Reference Guidelines).

A few notes specific to Air Care and Mobile Care, where our management will differ from the Southwest Ohio protocols:

4. For cardiogenic shock when pure inotropy is desired, dobutamine would be an alternative to dopamine. (Refer to Shock Policy)
5. The vast majority of STEMI patients we transport will be interhospital transfers. Many will have received beta blockade at the referring institution. For those that did not receive a full dose of beta blockade at the referring hospital and are hypertensive or tachycardic or still have chest pain despite morphine and NTG, consider administration of IV metoprolol (5mg IV every 5-10 minutes, up to 3 doses). Observe the following contraindications:
   - Signs of heart failure
   - Signs of low cardiac output state (BP <100 mmHg)
   - Bradycardia <60 bpm
   - PR > 240 msec
   - Second- or third-degree heart block
   - Active asthma
6. Older patients (>70yo) with longer duration of symptoms (they are at greater risk of cardiogenic shock)

E. COMPLICATIONS:

1. Symptomatic bradycardia.
2. Arrhythmia
3. Cardiac arrest.
4. Medication side effects including major and minor bleeding.

5. Ischemic cardiomyopathy with congestive heart failure
6. Cardiogenic shock.
7. Ventricular aneurysm.
8. Pericarditis

V. RESPONSIBILITY

Flight Physicians, Mid-Level Practitioners, Critical Care Transport Nurses, Paramedics

VI. KEY WORDS

None

VII. APPENDIX

None

VIII. REFERENCES / CITATIONS

University of Cincinnati Medical Center | UC Health

Management of the ST Elevation Myocardial Infarction (STEMI) Patient (CLIN20)

I. POLICY

To rapidly and safely transport the STEMI patient to an institution with percutaneous coronary interventions (PCI).

II. PURPOSE

AN ATTEMPT TO REDUCE DOOR-TO-BALLOON TIMES AND THEREBY IMPROVING THEIR CLINICAL OUTCOMES.

III. DEFINITIONS

STEMI-ST elevated Myocardial Infarction,
NSTEMI-Non ST Elevated Myocardial Infarction,
PCI-Percutaneous Intervention
MICU-Mobile Intensive Care Unit
OCC-Operational Control Center

IV. PROCEDURE

A. INDICATIONS:

1. Transferring facility physician obtains EKG and diagnoses STEMI requiring helicopter or MICU ground ambulance transfer to a cardiac cath lab.

B. CONTRAINDICATIONS:

1. NSTEMI/Unstable Angina patients or patient not going directly to the cath lab to undergo PCI.

C. EQUIPMENT:

1. Zoll cardiac monitor with pacer pads applied
2. Oxygen
3. Airway equipment
4. IV Pumps for controlled infusion prn

D. PROCEDURE & MANAGEMENT:

1. The transferring facility should immediately call the UC Health-University of Cincinnati Medical Center Air Care & Mobile Care Communication Center requesting an "Air Care Code STEMI" transfer for a cardiac ST elevation MI patient going directly to a cath lab.

- Receiving facility/cath lab may be unknown at the time of activation.
- Communication Specialist (Comm. Spec.) should request the transferring facility to draw up all IV infusion medications into 30 or 60mL syringes.

2. The helicopter will be the preferred method of transfer, but if not available, MICU will be offered. Following the normal weather check process, the Air Care or MICU team should be immediately activated for the Code STEMI transfer.

   - If the receiving facility is unknown, the OCC number should be obtained with UC Hospital/downtown Cincinnati as the default receiving institution.
   - If no Air Care team is available and the transferring facility is requesting helicopter transfer, ACMC Communication Specialist should notify transferring facility that we cannot arrange for transport by another CAMTS accredited helicopter program until an accepting physician/facility have been arranged. When an Air Care team becomes available, the facility should be contacted by a Comm. Spec. to offer transport unless alternate transportation has been arranged.

3. When preparing the patient for transport:

   - Employ universal precautions Minimize ground times by

     ✓ Team member planning
     ✓ Limited infusion protocol (see attached)
     ✓ Avoid reviewing paperwork (except EKG) until en-route.

4. When the patient is packaged and ready to leave the transferring hospital, the ACMC medical transport team will determine if the transferring facility staff have obtained an accepting cardiologist/facility/cath lab.

   If, at this time, there remains no accepting cardiologist, a discussion between the transferring physician, ACMC medical transport team, and the patient/patient's family should take place with one of two options being agreed upon:

   - Option 1: Default to UC Hospital/UC Health Cardiology as the accepting facility.
   - Option 2: Wait at the transferring facility until the transferring physician obtains an accepting cardiologist/facility/cath lab.

5 If Option 1 is selected:

- Transport RN or Paramedic will notify the Comm. Spec. and the pilot/driver, before departing the transferring ED, that The University of Cincinnati Medical Center will be the receiving institution.
- Air Care Flight Physician or Mobile Care RN will call the TUH A-pod attending at (513)584-2636 (4.AMEN) to provide a patient report.
- The TUH A-pod attending physician will immediately activate the TUH Cath Lab Team and provide a report to the team.
- Once the TUH cath lab team has been activated, the transport team will not be diverted to another facility.
- ACMC Comm. Spec. will contact the TUH Transfer Center to notify them of an Air Care Code STEMI with automatic cardiology acceptance. The Comm. Spec. will then fax a patient cover sheet to the Transfer Center at (513)584-1889 for advanced patient registration.
- Instruct nursing staff from the transferring ER to attempt to call report to TUH Cath Lab.
- In the event the TUH Cath Lab Team is not on premise to take report, the ACMC transport team will relay report at their earliest convenience.

6. If Option 2 is selected:

- ACMC medical team remains at transferring facility with the patient until receiving cardiologist/facility/cath lab are obtained.
- Once receiving facility is identified, the pilot and communication specialist should be notified by Air Care medical team via radio:
- If the receiving institution is not one of the six "common" receiving institutions (University Hospital/UC Health, Good Samaritan Hospital, The Christ Hospital, Bethesda North Hospital, Mercy Hospital Anderson, Mercy Hospital Fairfield) the ACMC Comm. Spec. should notify OCC and request a "diversion" to the newly determined receiving facility.

7. Consider hot/expedited loading of patient when departing facility and hot off-loading at receiving institution at the discretion of the transport team.

V. RESPONSIBILITY

Flight Physicians, Mid-Level Practitioners, Critical Care Transport Nurses, Paramedics, Medical Control Physician, Communication Specialist

VI. KEY WORDS
None

VII. APPENDIX
None

VIII. REFERENCES / CITATIONS
None

University of Cincinnati Medical Center | UC Health

STEMI Limited Infusion Protocol (CLIN19)

I. POLICY

For STEMI patients being transported from non- percutaneous coronary intervention (PCI)-capable hospitals direct to the cath lab for primary PCI or rescue PCI, Air Care & Mobile Care will minimize ground times at referring hospitals by not continuing heparin, GPIIbIIIa, or nitroglycerin drips. Antiarrhythmic, thrombolytic, and pressor drips will be continued without delay unless contraindications develop or, in the case of pressors, the patient's hemodynamics no longer require it. On a case by case basis, while en route to the accepting hospital in the transport vehicle, the transport team may, when appropriate and time allows, reinitiate heparin, GPIIbIIIa or nitroglycerin drips, but it is not required

II. PURPOSE

To define a "limited infusion" protocol when caring for and transporting patients with ST-elevation myocardial infarction.

III. DEFINITIONS

None

.

IV. PROCEDURE

A. INDICATIONS:

1. Care of the patient with a suspected or confirmed STEMI should include minimizing bedside and transfer times. IV infusions can be avoided (when able) to prevent unnecessary delays caused by transferring infusions. When infusions are already initiated, most can be stopped for transfer (i.e.; Nitroglycerin metered spray or sublingual tablets can be initiated in place of a Nitroglycerin infusion; Heparin and GB IIb/IIIa agents can be discontinued.) **Note: Fibrinolytics, pressors and antiarrythmics should all be continued via IV controller, if initiated prior to transport.**

B. CONTRAINDICATIONS:

1. NSTEMI/Unstable angina patients or patient not going directly to the cath lab to undergo percutaneous coronary interventions (PCI).

C. The following medications should be administered by the referring agency or the Air Care & Mobile Care medical team prior to/during transport:

1. Morphine Sulfate (or Fentanyl) prn for chest pain or other angina symptoms.

   - Morphine sulfate: 0.1 to 0.15mg/kg/dose, not to exceed 10mg/dose.
   - Fentanyl: 1 to 3mcg/kg/dose, not to exceed 200mcg/dose.

2. Nitroglycerin prn (infusion should be restarted in transport if patient continues to complain of chest pain or other angina symptoms). Alternative to maintenance infusion/give as close as possible to the timing of the drip being turned off:

   - If patient is on 5-10mcg/min and infusion is stopped, administer one 0.4mg sublingual tablet or one metered spray.
   - If patient is on 20mcg/min and infusion is stopped, administer two 0.4mg sublingual tablets or two metered sprays.
   - *Do not exceed three (3) sublingual tablets or metered sprays.

3. Aspirin 325 mg (avoid in patients with a true ASA allergy). If allergic to Aspirin, administer Plavix 75mg PO.

4. Heparin 60 IU/Kg IV bolus (max: 4,000 units).

5. Consider Metoprolol (5mg IV every 5 – 10 minutes, up to 3 doses) for those that did not receive a full dose of beta blockade at the referring hospital and are hemodynamically stable or tachycardic. *Re-evaluate after each dose.

6. Observe the follow contraindications:
   - Signs of heart failure
   - Signs of low cardiac output state
   - Bradycardia <60bpm
   - PR>240 msec
   - 2nd or 3rd degree heart block (use caution in 1st degree heart block)
   - Current asthma/COPD exacerbation
   - Older patients (>70yo) with longer duration of symptoms (greater risk of cardiogenic shock)

7. Observe the following contraindications:
   - Hypotension (SBP<100mmHg)
   - Use of erectile dysfunction med (i.e.; Viagra, Cialis, Levitra) in past 48hrs.
   - *Use with caution if concern for RV-involvement (i.e.; inferior MI pattern).

V. RESPONSIBILITY

All Staff

VI. KEY WORDS
None

VII. APPENDIX
None

VIII. REFERENCES / CITATIONS
None

Cardiac Aortic Emergencies (CLIN18)

I. POLICY

Air Care and Mobile Care will transport patients with suspicion or diagnosis of a cardiac aortic emergency.

II. PURPOSE

The purpose of this policy is to provide guidelines for the safe and rapid transport of the patient diagnosed with or suspicion of aortic aneurysm, dissection or rupture to an institution with cardiothoracic surgical and intensive care capabilities, to minimize the chance of worsening dissection or rupture and to resuscitate and stabilize the patient with aortic emergencies.

III. DEFINITIONS

AAA: Abdominal aortic aneurysm
TAA: Thoracic aortic aneurysm
Stanford A: Ascending aorta and/or arch. (Also DeBakey I and II).
Stanford B: Descending aorta and/or arch, distal to left subclavian artery. (Debakey III).

IV. PROCEDURE

A. INDICATIONS

1. Radiographic diagnosis of aortic dissection.
2. See also RED BLOOD TRANSFUSION/LIQUID PLASMA TRANSFUSION protocols (CLIN18, CLIN62) and TXA protocol (CLIN59).

B. CONTRAINDICATIONS

1. There are no contraindications per se to the use of this protocol in the patient with radiographically diagnosed or suspected aortic emergency. Please note that this protocol is not intended to address traumatic aortic injury.

C. EQUIPMENT

1. Cardiac monitor, pacing/defibrillation pads.
2. Medications as discussed below. Use UCMC drug reference appendix.
3. Two units O-negative or type specific PRBC. Platelets/cryo as available.
4. IV pumps for controlled infusions.

D. PROCEDURE AND MANAGEMENT

1. Support ABCs.
2. Consider placement of at least two large bore IVs.

3. Maintain continuous cardiac monitoring and document frequent vital signs.
4. Transport with pacer/defibrillator pads applied if patient has had significant ectopy, arrhythmia, instability or bradycardia.
5. Pain control should be addressed first and often. Reference CLIN30 for Pain Management parameters and guidelines.
6. Overall hemodynamic goals as follows: SBP 100-120mmHg, MAPs 60-80mmHg, heart rate less than 60bpm while maintaining mental status and urine output.
7. Cardiac aortic emergencies will be divided into the following:

- **Unruptured Stanford A and B aneurysms or dissections, stable or unstable**
  - ✓ Consider direct OR admission for radiographically diagnosed Stanford A dissections. The medical control physician can be the key to facilitating this.
  - ✓ Main priority is to minimize aortic wall stress. Manage hypertension aggressively with beta blockade as first line (assuming no contraindications). Options in order of preference:
    - Esmolol: load 250-500mcg/kg over 1-2 minutes followed by infusion 25-50mcg/kg/min titrating by 25-50mcg/kg/min every 3-5min. Max 300mcg/kg/min.
    - Metoprolol 5mg IV q 5-10 minutes.
    - Labetalol 10-80mg IV q 10-15 minutes (not to exceed a total dose of 300mg).
    - Beta blockade may be contraindicated in patients with acute aortic regurgitation as the compensatory tachycardia reflex may be blocked.
  - ✓ If HR is controlled with beta blockade but BP is not:
    - Consider nicardipine for management of hypertension (start 5mg/hr, titrate by 1-2.5mg/hr).
    - Consider continuing nitroprusside if initiated at referring for management of hypertension (start 0.3-0.5mcg/kg/min).
  - ✓ Vasodilator therapy should not be initiated prior to rate control so as to avoid associated reflex tachycardia, which could increase wall stress and expand a dissection/rupture.

- **Ruptured AAA/TAA with symptoms of shock**
  - ✓ A strategy of permissive hypotension, titrating resuscitation to maintenance of the patient's mental status as opposed to normotension.
  - ✓ Consider TXA administration (refer to CLIN59): 1g/100mL NS IV over 10 minutes with maintenance 1g/500mL IV at 60mL/hr.
  - ✓ Administer crystalloid and consider blood product transfusion early. Plasma:PRBC:platelets 1:1:1 when available. Reverse

coagulopathies when possible. Cryoprecipitate for low fibrinogen levels (CLIN18 and CLIN62).

- ✓ Use extreme caution with vasopressive therapy, avoid inotropic agents if possible.

- **Ruptured AAA/TAA with hypertension**
  - ✓ In the rare event a rupture has tamponaded, follow the above guidelines for unruptured dissections with close monitoring and preparation for possible subsequent rupture.

E. POTENTIAL COMPLICATIONS

1. ACS
2. Tamponade
3. Stroke
4. Acute aortic regurgitation with acute decompensated heart failure
5. Hemothorax
6. Acute renal failure
7. Acute mesenteric ischemia
8. Acute limb arterial insufficiency
9. Hemorrhagic shock

V. RESPONSIBILITY

Flight physician, mid-level practitioners, critical care transport nurse

VI. KEY WORDS

None

VII. APPENDIX

None

VIII. REFERENCES/CITATIONS

A. Bergmark BA, Sobieszczyk P, Gravereaux EC, Bonaca M, Giugliano RP. Acute Dissection of the Descending Aorta: A Case Report and Review of the Literature. *Cardiology and Therapy*. 2013;2:99. doi:10.1007/s40119-013-0021-4.

B. Gupta PK, Gupta H, Khoynezhad A. Hypertensive Emergency in Aortic Dissection and Thoracic Aortic Aneurysm – A Review of Management. *Pharmaceuticals*. 2009;2:66-76. doi:10.3390/ph2030066.

C. Hiratzka LF, Bakris GL, Beckman JA, Bersin RM, Carr VF, Casey DE Jr, Eagle KA, Hermann LK, Isselbacher EM, Kazerooni EA, Kouchoukos NT, Lytle BW, Milewicz DM, Reich DL, Sen S, Shinn JA, Svensson LG, Williams DM. 2010 ACCF/AHA/AATS/ACR/ASA/SCA/SCAI/SIR/STS/SVM Guidelines for the diagnosis and management of patients with thoracic aortic disease: a report of

the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines, American Association for Thoracic Surgery, American College of Radiology, American Stroke Association, Society of Cardiovascular Anesthesiologists, Society for Cardiovascular Angiography and Interventions, Society of Interventional Radiology, Society of Thoracic Surgeons, and Society for Vascular Medicine. *Circulation.* 2010;121:e266–e369.

D. Kodama K, Nishigami K, Sakamoto T, Sawamura T, Hirayama T, Misumi H, Nakao K. Tight Heart Rate Control Reduces Secondary Adverse Events in Patients With Type B Acute Aortic Dissection. *Circulation.* 2008;118(14):167-170. http://dx.doi.org/10.1161/CIRCULATIONAHA.107.755801.

E. Weingart S. Treatment of Aortic Dissection [Podcast]. EMCrit. http://emcrit.org/podcasts/aortic-dissection/. Accessed August 1 2016.

Cardiac Emergencies – Dysrhythmias (CLIN15)

I. POLICY
Cardiac Emergencies - Dysrhythmias

II. PURPOSE
To provide guidelines for the management of cardiac dysrhythmias

III. DEFINITIONS
None

IV. PROCEDURE

A. Air Care and Mobile Care follow ACLS guidelines, which will not be reproduced here, and the Southwest Ohio protocols for the prehospital management of cardiac rhythm disorders. These are reproduced below.

A few notes specific to Air Care, where our management will differ from the Southwest Ohio protocols:

B. If ROSC achieved refer to the ROSC in the Post Medical Arrest Patient Policy.

C. INCLUSION CRITERIA
1. Patient's age is 16 years and older
2. Patient is unresponsive.
3. Patient is without a pulse (pulse should be checked for a maximum of 10 seconds, when in doubt start CPR)

D. AED Findings
1. Shock Advised

E. MEDIC. EKG FINDINGS
1. Ventricular fibrillation, or
2. Ventricular tachycardia

F. ALL PROTOCOL
1. Begin the performance of 5 cycles (approximately 2 minutes) of CPR (30 compressions to 2 respirations) at a rate of 100 beats per minute before defibrillation. Assure that good CPR is being performed with adequate uninterrupted compressions and rise and fall of chest with ventilation.

    - Rotate compressor every 2 minutes

- Avoid excessive ventilations (goal is 10 breaths/minute)
- Push hard (>2inches) and fast (100-120/minute)
- Allow for chest recoil with each compression

2. Do not delay the use of an AED or Defibrillator. Use them as soon as they are attached.
3. Continue resuscitation in 2 minute cycles of CPR, brief pulse/rhythm check, and defibrillation (if indicated) until either Return of Spontaneous Circulation occurs or Termination of Resuscitation criteria are met.

G. EMT

1. If available, request ALS back-up or arrange to intercept an ALS unit as appropriate.
2. Perform CPR for at least 2 minutes or until the automated external defibrillator (AED) is attached and ready. If you are the only rescuer, proceed to the use of the AED.
3. Stop CPR, ensure all individuals are standing clear of the patient, press "Analyze" on the AED.
4. Follow directions given by the AED.
5. If "Deliver Shock" is advised at any time by the AED, clear all people from the patient and shock patient.

   - Immediately resume CPR for 2 minutes before another pulse or rhythm check is performed.

6. If "No shock" is advised, check pulse.
   - If pulse is present:
     - ✓ Assess ABCs.
     - ✓ If respirations are adequate, administer oxygen.
     - ✓ If respirations are not adequate, provide high flow oxygen, ventilate by bag-valve-mask, and be prepared to establish an airway if patient becomes pulseless and apneic per protocol T705.
     - ✓ Begin immediate transport of patient with ongoing patient assessments.
     - ✓ If at any time, a pulse is not detected, ensure all individuals are standing clear of the patient, and again press "Analyze" on the AED. Follow directions given by the AED for "Deliver Shock" or "No Shock" advisories.
   - If pulse is absent:
     - ✓ Immediately resume CPR for 2 minutes before another pulse or rhythm check is performed

H. MEDIC

1. Apply quick look paddles or pads if not already monitored. Do this IMMEDIATELY if arrest is witnessed by EMS or bystander CPR is in progress upon arrival.
2. If rhythm is ventricular fibrillation or ventricular tachycardia, DEFIBRILLATE IMMEDIATELY AT 360 JOULES (or biphasic equivalent) and immediately resume CPR.
3. Perform CPR for 2 minutes before another pulse or rhythm check is done. Chest compressions should be interrupted for as short of a time period as possible.
4. Manage the airway per protocol T705 on the patient. Ventilate SLOWLY at about 8 to 10 breaths per minute.
5. Initiate IV/IO.
6. Administer either epinephrine or vasopressin

    - Epinephrine 1 mg (10 ml of 1:10,000) IV/IO push. Repeat every 3 to 5 minutes as long as arrest continues.
    - A single dose of Vasopressin 40 U IV/IO can be administered to replace the first or second dose of Epinephrine

7. Administer Amiodarone 300 mg IV/IO push. Repeat Amiodarone 150 mg IV/IO push in 3 – 5 minutes if still in VF/VTach

    - If Amiodarone is not available, Lidocaine may be substituted as: Lidocaine 1.5 mg/kg IV/IO push. Repeat Lidocaine 0.5 to 0.75 mg/kg IV/IO in 3-5 minutes if still in VF/VTach

8. Recheck rhythm after each 2 minute cycle of CPR is complete and defibrillate at 360 Joules or biphasic equivalent, if indicated.
9. Continue CPR, monitor, transport, and contact receiving hospital as soon as possible.
10. If return of spontaneous circulation is achieved, continue care per Protocol C307 (Post-Return of Spontaneous Circulation Care).
11. If rhythm changes to another rhythm, go to the appropriate protocol.

I. EMT

1. Special Transport Considerations
    - BLS transport unit on the scene with ALS resources responding, but not yet on the scene.
        - ✓ Continue care as outlined in protocol.

- ✓ If ALS resources will be delayed more than 10 minutes, proceed with transport and arrange to intercept the ALS unit, if possible.

- No ALS resources responding or available.
  - ✓ Continue care as outlined in protocol.
  - ✓ Perform at least 10 cycles of CPR (4 minutes) on scene before moving to BLS transport unit.

J. ALL NOTES

1. If a pulseless patient is found to have agonal or gasping-type respirations that have no pattern and occur very infrequently, the AED or quick-look paddles should be applied immediately.
2. Good uninterrupted CPR is considered the mainstay of therapy for Cardiac Arrest victims.

K. EMT

1. If the patient has been successfully defibrillated (has a pulse) and then re-arrests, continue with rhythm analysis and follow directions of the AED for "Deliver Shock" or "No Shock" advisories.
2. The AED is to remain attached to the patient and left in the "on" position during the entire management of the patient, unless stated otherwise by the manufacturer's instructions.

L. MEDIC

1. If a patient develops a perfusing rhythm, AHA recommends that CPR be continued for 5 more cycles to support cardiac output.
2. Consider H's and T's (see C301)
3. ET administration of drugs is acceptable but not preferable. Amiodarone and Vasopressin cannot be given ET. ET administration is double the normal dose with 10 ml NS flush afterwards.
4. Medications given through a peripheral vein or IO should be followed by a 20-ml bolus of fluid.
5. Waveform End Tidal CO2 if available should be routinely used in Cardiac Arrests.
6. An abrupt sustained increase in ETC02 (>40) may indicate ROSC.
7. ETC02 (<10) should prompt re-evaluation of endotracheal tube's correct placement, quality of compressions, or consideration that future treatment is futile.

V. RESPONSIBILITY

Flight Physician, Mid-Level Practitioners, Critical Care Transport Nurse, Paramedics, EMTs

VI. KEY WORDS

None

VII. APPENDIX

None

VIII. REFERENCES / CITATIONS

None

Transcutaneous Cardiac Pacing (CLIN21)

I. POLICY

Air Care and Mobile Care may be required to safely transport a patient under transcutaneous cardiac pacing.

II. PURPOSE

To provide guidelines for the use of transcutaneous pacing in patients with hemodynamic instability due to bradydysrhythmia, or with brady-asystolic cardiac arrest.

III. DEFINITIONS

None

IV. PROCEDURE

A. INDICATIONS:

1. Symptomatic advanced heart block (chest pain, hypotension, syncope, CHF) unresponsive to atropine.
2. Brady-asystolic cardiac arrest.

   Note: Studies demonstrate improved survival in brady-asystolic cardiac arrest when pacing is implemented within five minutes of the event. If pacing is to be successful, it must be implemented EARLY in arrest patients.

B. CONTRAINDICATIONS:

1. Pharmocotherapy (i.e. Atropine or Dopamine) not yet attempted.
2. Hypothermia
3. Age less than 14.

C. EQUIPMENT:

1. External pacer.
2. Front and back pacer pads with cables.
3. Cardiac monitor.

D. PROCEDURE:

1. Air Care & Mobile care follows ACLS guidelines, which will not be reproduced here.
2. Place front pacer pad on left anterior precordium centered on point of maximum impulse (PMI.) Place back pacer pad in left dorsal, interscapular region. Attach pads to pacer.

3. In arrested patient, set rate at 100 bpm and current to maximum output. In conscious patient or patients with a pulse, set rate at 60 to 80 bpm, and set current at minimum. Power-up pacer and initiate pacing. If capture occurs, transport. If no capture is evident and current is sub-maximal, increase current until capture occurs. Capture is indicated by the presence of a QRS complex after each pacer spike, and a palpable pulse temporally associated with the QRS complexes.

   Note: Capture can be intermittent depending on patient position and current level. Observe monitor closely to ensure consistent capture and increase output as needed to maintain consistent capture, but pace at lowest threshold that results in consistent capture. Note also that acidosis, digitalis toxicity, and hyperkalemia can increase the threshold current required for capture.

4. Consider sedation or analgesia in conscious patients requiring higher currents (i.e. >60mA.)

E. POTENTIAL COMPLICATIONS:

1. Cutaneous burns.
2. Fire hazard secondary to arcing.
3. Pain in the conscious patient.
4. Dysrhythmia induction.

V. RESPONSIBILITY

Flight Physicians, Mid-Level Practitioners, Critical Care Transport Nurses

VI. KEY WORDS

None

VII. APPENDIX

None

VIII. REFERENCES / CITATIONS

None

University of Cincinnati Medical Center | UC Health

Management of the Shock Patient (CLIN51)

I. POLICY

Air Care & Mobile Care encounter patients in shock for a variety of different reasons. Trained and authorized personnel are permitted to treat and manage the patient in shock to preserve life or worsening of condition.

II. PURPOSE

To ensure the appropriate care of patient experiencing shock, the following procedures will be followed.

III. DEFINITIONS

Shock is defined as a whole-body response to an inadequate delivery of oxygen and nutrients to cells, tissues, and organs from one or multiple causes. The term implies evidence of tissue hypoperfusion, hypoxia, and end-organ dysfunction. While hypotension is often present in shock, shock CAN exist without hypotension, especially in children in whom frank hypotension is usually a late finding due to their ability to compensate. **Hypotension in children is SBP < (70 + Age x2) for age 0-9, or SBP <90 for age 10 or older.**

IV. PROCEDURE

V.

The appropriate management of shock is geared toward the suspected or known underlying cause. If the underlying cause is unknown and ultrasound is available as well as a provider capable of performing and interpreting it, consider performing bedside RUSH exam using the HIMAP mnemonic. If vasopressor infusion is indicated, temporary infusion through a patent peripheral IV or IO in the transport setting is very appropriate; central line is not mandatory. In general, for shock patients undergoing RSI, ketamine is the induction agent of choice.

A. ADRENAL INSUFFICIENCY

1. Patients who have known Adrenal Disorders such as Addison's Disease or have been on long standing steroid therapy and exhibit symptomatic hypotension may need IV steroids. Most commonly 100mg (adult) or 2 mg/kg (pediatric) of hydrocortisone IV is given. If hydrocortisone is not available, methylprednisolone 125mg (adult) or 2 mg/kg (child) IV may be substituted.

B. ANAPHYLACTIC SHOCK

1. For our purposes, we will define anaphylaxis as a likely or known allergic exposure plus *either* 1. hypotension *or* 2. at least two of the following: urticaria, mucosal angioedema, respiratory compromise, syncope, hypotonia, vomiting, or diarrhea.

C. MANAGEMENT

1. Maintain airway and administer Oxygen.
2. Airway assessment and management are extremely important since airway compromise may develop due to laryngeal edema and/or bronchospasm.
3. Initiate IV or IO access. Begin 1-liter (adult) or 20 mL/kg (child) of crystalloid IV wide open.
4. Administer epinephrine 0.3mg-0.5mg (0.3-0.5 mL) (adult) or 0.01 mg/kg (child) of a 1:1000 solution intramuscularly (IM) in the anterolateral thigh. Repeat Q5-15 minutes until symptom improvement.
5. Administer diphenhydramine 25-50 mg (adult) or 1 mg/kg (child) IV/IM
6. If patient remains hypotensive, consider epinephrine infusion (1 mg Epi in 100 ml NS) at 1-4 mcg/min (adult) or 0.1-1.5 mcg/kg/min (child), titrating to achieve normotension and symptom improvement. Consider methylprednisolone 125mg (adult) or 2 mg/kg (child) IV
7. If evidence of bronchospasm, consider albuterol therapy

D. CARDIOGENIC SHOCK

1. Cardiogenic Shock is usually secondary to poor left ventricular contractility, or arrhythmia. These patients may have pulmonary edema, rales, JVD, cold extremities, and/or hepatomegaly. Management:
   - If the underlying cause is arrhythmia / bradycardia, treat that per ACLS / PALS guidelines.If patient on intraaortic balloon pump, see IABP policy.
   - Be cautious with crystalloid resuscitation, as the patient may already be fluid overloaded. A small bolus of 250-500 mL (adult) or 5-10 mL/kg (child) may be appropriate.
   - If patient on vasopressor or inotrope IV infusion from referring hospital, consider continuing and titrating it according to physician orders.
   - If patient is requiring vasopressor or inotropic medication, then use the following medication
     a) Dobutamine 5-20 mcg/kg/min
     b) Dopamine-5-20 mcg/kg/min
     c) Epinephrine 1-4 mcg/min (adult) or 0.1-1.5 mcg/kg/min (child)
     d) Norepinephrine -Initial dose 2-10 mcg/min (adult) or 0.05-1.0 mcg/kg/min (child). Titrate to effect. Onset is rapid and duration is ½ min. after discontinuing infusion. Note: dopamine and epinephrine are generally preferred over norepinephrine in pediatric cardiogenic shock.
   - In suspected cardiogenic shock presenting in the first two weeks of life with a ductal-dependent lesion not yet ruled out by echo: if PGE1 is available, strongly consider giving it empirically at 0.05-1.0

mcg/kg/min. Hypotension and apnea are very common with PGE1, so be prepared to initiate concomitant vasopressor infusion, and strongly consider intubation prior to PGE1 initiation. These children should also generally be treated empirically for septic shock.

E. HEMORRHAGIC SHOCK

1. See Administration of O-Negative or Type Specific Blood for Hemorrhagic Shock Policy. Administer blood products early if hemorrhage is suspected. Plasma is restricted to patients weighing 50 kg or more, and TXA is restricted to patients 16yo or older, but there are no age / weight restrictions on the use of PRBC for the resuscitation of hemorrhagic shock.

F. HYPOVOLEMIC SHOCK

1. This refers to the patient with non-hemorrhagic hypovolemia
   - Administer 20 mg/kg IV or IO crystalloid. This dose may be repeated multiple times if shock remains refractory.
   - If patient continues to have refractory shock, consider norepinephrine 2-10 mcg/min (adult) or 0.05-1.0 mcg/kg/min (child), or dopamine 5-20 mcg/kg/min IV or IO via infusion pump.
   - For Burn patients, see Management of the Burn Patient Policy.

G. NEUROGENIC SHOCK

A type of distributive shock caused by loss of sympathetic tone. Common condition associated with disruption of sympathetic tone including but not limited to TBI and spinal cord injury. Characterized by warm shock and hypotension without the usual reflex tachycardia.
Management should focus on maintaining MAP > 65 or SBP > 90 (adult) or normotension for age (child)

- Initiate fluid therapy with crystalloid 20 mg/kg IV/IO if concomitant hemorrhage has already been ruled out or is very unlikely based on mechanism. Usually, neurogenic shock occurs in the setting of trauma, and often coexists simultaneously with hemorrhagic shock, so when in doubt and product is available, resuscitate with blood products
- Consider administration of vasopressors (dopamine, norepinephrine, phenylephrine) for persistent hypotension refractory to fluid resuscitation.
- Consider atropine or pacemaker therapy for profound bradycardia

*See Trauma _Spine and Spinal Cord Injury Policy_CLIN53

H. SEPTIC SHOCK

1. This refers to the patient with shock secondary to an infectious process. Consider continuing medication therapy from referring hospital and titrate according to physician orders. Septic shock patients should generally not be removed from the referring hospital without broad-spectrum antibiotic therapy having been either initiated, or having been obtained to initiate during transport. Lactate clearance (when lactate is available) is an effective method of gauging the patient's response to therapy in septic shock.
   - Initiate a fluid resuscitation of 30ml/kg of crystalloid IV or IO. This dose may be repeated if shock remains refractory.
   - If patient continues to be hypotensive, initiate vasopressor therapy. Norepinephrine is first-line in adults (2-10 mcg/min), with epinephrine (1-4 mcg/min) being second-line. In children, dopamine (5-20 mcg/kg/min) is first-line, with epinephrine (0.1-1.5 mcg/kg/min) being second line. Consider the following push dose pressors: Epinephrine 0.5 – 2 mL every 2-5 minutes (5-20 mcg) or Phenylephrine 0.5 -2 mL every 2-5 minutes (50-200mcg).
   - For continued hypotension in septic shock that is refractory to adequate crystalloid loading and vasopressor therapy, consider stress dose steroids (hydrocortisone or methylprednisolone) with the same dosing as listed above under "Adrenal Insufficiency".
   - Consider inotropic therapy with dobutamine 5-20 mcg/kg/min for ongoing signs of hypoperfusion, despite achieving adequate intravascular volume and adequate MAP.
   - If patient has hgb <7 g/dL strongly consider PRBC transfusion Cefepime (Maxipime) is available on critical care Air and Ground units. In the case of septic shock in a patient who has not received gram negative coverage at an outside hospital, administer 2g IV in adult patients (16 years old or greater). In children, administer 50mg/kg IV. *Cefepime should be administered over 30 minute.*

VI. RESPONSIBILITY

Flight MD, Mid-Level Practitioners, Critical Care Transport Nurses, Paramedics

VII. KEY WORDS

None

VIII. APPENDIX

None

IX. REFERENCES / CITATIONS

None

University of Cincinnati Medical Center | UC Health

Acute Limb Arterial Insufficiency (CLIN12)

I. POLICY

Air Care and Mobile Care might be requested to transport a patient with acute limb arterial insufficiency. To ensure safe patient transport, this policy has been created to provide guidelines for the care and safe transport of patient and limb.

II. PURPOSE

To rapidly and safely transport the patient with acute limb ischemia to a source of definitive care while minimizing tissue necrosis.

III. DEFINITIONS

None

IV. PROCEDURE

A. INDICATIONS:

1. Air Care and Mobile Care will occasionally be called to transport a patient with acute arterial insufficiency to a limb, particularly by interhospital transport from institutions without vascular surgery or angiography capabilities.

B. CONTRAINDICATIONS:

1. There are no contraindications per se to the use of this protocol in the patient with acute arterial insufficiency to a limb.

C. EQUIPMENT:

1. Cardiac monitor and pulse oximetry
2. Oxygen
3. Medications as indicated
4. IV pump for controlled infusion
5. Equipment for obtaining IV access

D. PROCEDURE AND MANAGEMENT

1. Maintain universal precautions.
2. Support ABCs.
3. If possible, transport with the affected extremity in a dependent position.
4. If not palpable, use a doppler to assess pulses in affected extremity.
5. Strongly consider administration of supplemental oxygen.
6. Consider administration of heparin in consultation with the accepting physician in the absence of contraindications (such as acute trauma as the etiology for ischemia.) See drug reference chart

7. In the instance of limb ischemia associated with orthopedic fracture and/or dislocation, the Flight Physician/MLP could consider attempting reduction. The clinician must be mindful of the risk/benefit ratio of delay of transport to definitive care to achieve reduction.
8. Manage the patient's pain should be a primary concern for the clinical team. Consider opioid analgesia in the absence of contraindications. (See Pain Management Policy)

E. POTENTIAL COMPLICATIONS:

1. Loss of limb or function
2. Infection, either local or systemic

V. RESPONSIBILITY

Flight Physician, Mid-Level Practitioners, Critical Care Transport Nurse

VI. KEY WORDS

None

VII. APPENDIX

None

VIII. REFERENCES / CITATIONS

None

University of Cincinnati Medical Center | UC Health

Gastrointestinal Bleeding (CLIN23)

I. POLICY

Air Care and Mobile Care safely transports patients with gastrointestinal bleeding with or without hemodynamic changes.

II. PURPOSE

The purpose of this policy is to provide guidelines for the safe and rapid transport the patient with GI bleeding to an institution with gastroenterology, general surgical, and intensive care capabilities and to resuscitate the patient in shock.

III. DEFINITIONS

None

IV. PROCEDURE

A. INDICATIONS:

1. Upper or lower GI bleeding with potential or actual hemodynamic compromise.

B. CONTRAINDICATIONS:

1. There are no contraindications per se to the use of this protocol in the patient with GI bleeding.

C. EQUIPMENT:

1. Cardiac Monitor
2. Two (2) units O Negative PRBC or Type Specific PRBC
3. Plasma
4. IV pump for controlled infusion
5. Blakemore/Minnesota Tube

D. PROCEDURE AND MANAGEMENT:

1. Support ABCs.
2. Strongly consider placement of two (2) large-bore peripheral IVs.
3. Maintain continuous cardiac monitoring and document frequent vital signs.
4. Treat shock aggressively with crystalloid, with strong consideration for early blood transfusion. See Administration of O Neg PRBC or Type Specific PRBC for Hemorrhagic Shock Policy/ Plasma Policy. Pressors may be needed as well.
5. If a patient was begun on an Octreotide, Pantoprazole or other IV infusion at the referring institution, maintain it. Similarly, if the referring institution has cross-matched blood products available, take them with you.

6. If the patient is hemodynamically unstable, consider the possibility of attempting to arrange surgical consultation (if not already done) at the receiving institution, or even transfer directly to OR.
7. When GI bleeding begins in transport in a patient on an antiplatelet, antithrombotic, or fibrinolytic infusion (usually an ACS patient,) the medical crew must consider the benefits of continuing the infusion, taking into account the patient's vital signs and degree of bleeding.
8. Patients with upper GI bleeding are often nauseated. Treat with IV antiemetics and/or gastric tube placement if needed.
9. With continued upper GI bleeding, consider the placement of a Blakemore/Minnesota Tube (see procedure protocol).

E. POTENTIAL COMPLICATIONS:

1. Worsening shock state
2. Organ failure
3. Transfusion reaction

V. RESPONSIBILITY

Flight Physicians, Mid-Level Practitioners, Critical Care Transport Nurses

VI. KEY WORDS

None

VII. APPENDIX

Blakemore Tube Placement Procedure:

Equipment List:

- Blakemore
- Salem Sump
- 60 ml Luer-lock Syringe
- 60 ml Slip-tip Syringe
- 2 x-mas tree to male luer lock converters
- 3 three-way stopcocks
- 3 medlock caps
- Surgilube
- Roller-bandage (curlex)
- Saline lock
- 1 1-liter bag of crystalloid

Purpose: Procedure for Blakemore tube placement in upper GI bleed.

Procedure:

1. Patient should be intubated and the head of the bed up at 45 degrees.
2. Test balloons on Blakemore and fully deflate. There are two balloons to check: the esophageal and the gastric. Mark salem sump at the 50 cm mark of the Blakemore with the tip 2 cm above gastric balloon (gastric) and then 2 cm above esophageal balloon (esophageal). This can be done with marking directly on the tube or with tape and pen. Attach the stopcock and x-mas tree converter set ups to the gastric (1 3 way stopcock) and esophageal ports (2 3-way stopcocks).
3. Insert the Blakemore tube through the mouth just like an NGT. A laryngoscope or sometimes McGill forceps may be needed to assist with placement. Make sure the depth-marker numbers face the patient's right-side. This ensures that the balloons are oriented properly.
4. Stop at 50 cm. Test with slip syringe while auscaltating over stomach and lungs (the third port without a stopcock setup). Inflate gastric lavage port with 50 ml of air or saline. This ensures that the Blakemore will be held in place while placement confirmation is performed.
5. Get a chest x-ray to confirm placement of gastric balloon in stomach. The balloon should be below the diaphragm.
6. Inflate an additional 200 ml of air (250 ml total) into the gastric port.
7. Apply 1 kg of traction using roller bandage (curlex) and 1 liter IV fluid bag hung over IV pole. Mark the depth at the mouth. The tube will stretch slightly over the next 10 minutes as it warms to body temperature. A slip knot can be used to attach the bandage to the Blakemore tube.
8. Insert the salem-sump until the depth marked gastric is at 50 cm on the Blakemore. Suction both Blakemore lavage port and salem sump. You may need to wash blood clots out of the stomach with sterile water or saline. Suction and irrigation through the gastric lavage port demonstrates bleeding below the gastric balloon. Suction through the salem sump demonstrates esophageal bleeding.
9. If bleeding continues through the salem sump, you will need to inflate esophageal balloon. If there is no bleeding, you do not need to inflate the esophageal balloon.
10. Pull salem sump back until the esophageal mark is at the 50 cm point of the Blakemore. The esophageal balloon is pressure based. Attach a manometer to the second 3-way stopcock on the esophageal port of the Blakemore. This can be done using a hospital manual sphingometer by disconnecting the cuff or using the manometer in the aircraft attached to saline lock tubing. Attach the saline lock to the second 3way stopcock and then attach the appropriate manometer. Inflate to 30 mm Hg. If bleeding continues, inflate to 45 mm Hg.

Minnesota Tube Placement Procedure:

Equipment List:

- 1 Minnesota Tube
- 60 ml Luer lock syringe

- 60 ml catheter tip syringe
- 2 Luer adapters
- 3 three-way stopcocks
- 3 medlock caps
- Surgilube
- 1 Roller-bandage (curlex)
- 1 Saline lock
- 1 1-liter bag of crystalloid

Purpose: Procedure for Minnesota tube placement in upper GI bleed.

Procedure:

1. Patient should be intubated and the head of the bed up at 45 degrees.
2. Test balloons on Minnesota tube and fully deflate. There are two balloons to check: the esophageal and the gastric. Attach the stopcock and Luer converter set ups to the gastric (1 3way stopcock) and esophageal ports (2 3-way stopcocks).
3. Insert the Minnesota tube through the mouth just like an OGT. A laryngoscope or sometimes McGill forceps may be needed to assist with placement. Make sure the depth-marker numbers face the patient's right-side. This ensures that the balloons are oriented properly. Stop at 50 cm.
4. Test with catheter tip syringe while auscultating over stomach and lungs (through the gastric aspiration port). Inflate gastric lavage port with 50 cc of air. This ensures that the tube will be held in place while placement confirmation is performed.
5. Get a chest x-ray to confirm placement of gastric balloon in stomach. The balloon should be below the diaphragm.
6. Inflate an additional 200 ml of air (250 ml total) into the gastric port.
7. Suction the gastric aspiration port. Gastric lavage may also be required.
8. Suction the esophageal aspiration port. With return of continued bleeding, esophageal balloon inflation is required. If there is no bleeding, you do not need to inflate the esophageal balloon.
9. To inflate the esophageal balloon, attach a manometer to the saline lock on the second 3-way stopcock on the esophageal port of the tube. This can be done using a hospital manual sphingometer by disconnecting the cuff or using the manometer in the aircraft attached to saline lock tubing. Inflate to 30 mm Hg (usually around 40-50 cc of air). If bleeding continues, inflate to 45 mm Hg. The balloon should be gradually inflated and pressure monitored closely.
10. Apply 1 kg of traction using roller bandage (curlex) and 1 liter IV fluid bag hung over IV pole. Mark the depth at the mouth. The tube will stretch slightly over the next 10 minutes as it warms to body temperature. A slip knot can be used to attach the bandage to the Minnesota tube.

VIII. REFERENCES / CITATIONS

None

Seizures/Status Epilepticus (CLIN25)

I. POLICY

Seizures/Status Epilepticus

II. PURPOSE

To provide guidelines for the management of seizures, status epilepticus or refractory seizures before or during transport.

III. DEFINITIONS

A. **Seizures**: uncontrolled electrical activity within the brain which may produce physical convulsions.
B. **Status Epilepticus**: Continuous seizure activity for 5 minutes or longer, or multiple seizures without returning to neurologic baseline between them.
C. **Refractory Seizures**: seizure activity which fails to respond to therapy. Delay in treating seizure activity can cause seizures to become refractory.
D. **Refractory Status Epilepticus**: continuous or repetitive seizures lasting longer than 60 minutes despite treatment with a benzo and another standard anticonvulsant in adequate loading dose.

IV. PROCEDURE

A. INDICATIONS

1. Patients meeting the above definitions.

B. CONTRAINDICATIONS:
1. None

C. MATERIALS:
1. Appropriately sized oral and nasopharyngeal airways.
2. O2 source, NRB masks, BVM.
3. Suction, catheters, tubing.
4. ECG and O2 saturation monitors. Consider EtCo2 monitoring.
5. Medications (see “Management”).

D. MANAGEMENT:
1. Maintain patent airway by chin-lift and jaw-thrust, consider oral or nasopharyngeal airway.
2. Suction as needed.
3. C-spine precautions as indicated by clinical setting.
4. Monitor ECG and O2 saturation.

5. Administer high flow O2, preferably by NRB at 12-15lpm. If spontaneous respirations are insufficient to maintain adequate saturation assist ventilations by BVM and consider intubation.
6. Establish IV or IO access with NS at KVO. Do not over hydrate.
7. Consider other causes of convulsions (only ~25% are from epilepsy).
   - Tumors, ICH, metabolic imbalances (hyponatremia, hypoglycemia), intoxicants, fevers, meningitis, TBI, alterations in anti-convulsant meds, etc.
   - Check finger-stick glucose, treat if value is < 70mg/dl.
     - ✓ Children:
       - Age <2, administer 10 cc/kg D10
       - Age >2 use D50 2cc/kg IVP to max 50 ml. Can dilute D50 1:1 with Normal Saline to make D25 concentration if concerned about caustic injection.
     - ✓ Adults:
       - D 50: 50ml (25g) IVP
8. Administer benzodiazepines. Do not delay for IV access to deliver lorazepam if patient is actively seizing.:
   - Lorazepam: For adults and children >40 kg initial dose is 4mg IVP. For pediatrics - 0.1 mg/kg /dose IVP. Can repeat q 2-5 minutes to max dose of 8mg before administering AED.

     OR
   - Midazolam IM, IN or IV.
     - ✓ Intravenous: 0.1mg/kg q2 minutes IVP, max dose 5mg. For adults and children >50kg initial dose is 5mg IVP. Can repeat every 5 minutes for persistent seizures. **No more than 2 doses should be given before adding an anticonvulsant for refractory seizures/status epilepticus.**
     - ✓ Intra-muscular: >40kg - 10mg. Pediatrics: 5mg (13-40kg) or 0.2mg/kg.
     - ✓ Intra-nasal: 2.5mg/0.5ml per nares, 1 dose max
9. Administer anticonvulsant of choice/availability (NOTE: Levetiracetam is carried on Air and Ground critical care transport units). After 1-2 doses of benzodiazepine, an anticonvulsant (AED) should be administered for refractory seizures or concern for non-convulsive status. First priority would be dose of patient's home AED. If unknown, consider one of the following options depending on clinical picture and patient comorbidities.
   - Levetiracetam: loading dose 60 mg/kg IV bolus over 15 minutes. Note: levetiracetam has most favorable side effect profile
   - Fosphenytoin: Loading dose 20 mg/kg IV bolus (or 5mg/kg for patients already taking phenytoin unless the serum level is known.) Rate of infusion should not exceed 1mg/kg/min in patients <50kg in weight, or 50mg/min in patients >50kg in weight. Use 15mg/kg IV bolus in the elderly (same infusion rates as above). Air Care & Mobile Care does not carry Phenytoin or IV Fosphenytoin though it may be

available from the referring institution on interhospital transfers. As seizures stop, slow infusion (possible hypotension is a side effect, especially in the elderly.).
Note: Phenytoin and fosphenytoin is contraindicated in patients with second or third degree heart block.
- Valproic acid 40 mg/kg at 5 mg/kg/min

10. Continued sedation/refractory status agents
    - Versed or propofol infusions for intubated patients are the preferred sedative when they can be obtained from the outside hospital.
11. Refer to CLIN26 for seizures in pregnancy/up to 6 weeks postpartum without history of seizures.

E. POTENTIAL COMPLICATIONS:
1. Respiratory depression/arrest due to medication administration (benzodiazepines, phenobarbital, magnesium).
2. Hypotension due to medication administration (benzodiazepines, phenobarbital, phenytoin, magnesium).
3. Heart block (phenytoin)
4. Cerebral hypoxia
5. Permanent encephalopathy can occur if seizures are uncontrolled. Remember that termination of the convulsive movements by muscular paralysis alone is ineffective because it does nothing to control the epileptiform activity.
6. Acidosis, hyperpyrexia or hypoglycemia if seizure is prolonged.

V. RESPONSIBILITY
Flight Physicians, Mid-Level Practitioners, Critical Care Transport Nurses, Paramedics

VI. KEY WORDS
None

VII. APPENDIX
None

VIII. REFERENCES / CITATIONS
Silbergleit R, Durkalski V, Lowenstein D, Conwit R, Pancioli A, Palesch Y, Barsan W, NETT Investigators. Intramuscular versus intravenous therapy for prehospital status epilepticus. N Engl J Med. 2012;366(7):591-600. doi: 10.1056/NEJMoa1107494.

University of Cincinnati Medical Center | UC Health

Management of Intracranial Hemorrhage (SAH, ICH) (CLIN24)

I. POLICY

Management of Intracranial Hemorrhage

II. PURPOSE

To effectively manage patients with intracranial hemorrhage, paying particular attention to suspected intracranial pressure and altered mental status. This protocol provides guidelines for patients who have been diagnosed with intracranial hemorrhage.

III. DEFINITIONS

None

IV. PROCEDURE

A. EQUIPMENT NEEDED:

1. Airway management equipment
2. Medications as indicated
3. Large bore IV access
4. Oxygen
5. Cardiovascular monitoring equipment including waveform capnography
6. Ventilator

B. INDICATIONS:

1. Diagnosed intracranial hemorrhage
2. Non-traumatic subarachnoid hemorrhage, intraparenchymal hemorrhage, intraventricular hemorrhage
3. In addition, please see 'TRAUMATIC BRAIN INJURY" policy. Although there may be some overlap involved, generally, the patients in this ICH protocol will not have a history of trauma beyond a fall from a standing height.

C. CONTRAINDIATIONS:

1. No radiographic evidence of intracranial hemorrhage

D. MANAGEMENT:

1. The management of patients with intracranial hemorrhage (ICH) involves vigilant monitoring of the patient's mental status, blood pressure and airway status. These patients require rapid transport to a facility with neurosurgical and critical care capabilities.
2. Airway
   1. Ensure optimal oxygenation and ventilation.

- ✓ Endotracheal intubation is generally indicated for failure to oxygenate, failure to ventilate and/or failure to protect the airway. Additionally, consider endotracheal intubation for patients in which progressive mental status decline is expected. Intubation should also be considered for combative patients where crew and patient safety may be compromised. (See Air Care & Mobile Care RSI Intubation protocol.)

3. Breathing
   - Intubated patients
     - ✓ All intubated patient must be placed on the transport ventilator in order to avoid hyperventilation and hypocapnia. If the patient is known to be intubated prior to arrival, bring ventilator from vehicle to patient on arrival.
       - o Adults: Pressure Control preferred
       - o Rate: 10 – 12 (targeted to EtCO 35-40mmHg)
       - o Target Tidal volume: 6-8 ml/kg of IBW
       - o Limit hyperoxia, wean O2 to saturation >94% on pulse oximetry or ABG
     - ✓ Monitor continuous waveform ETCO2. If the patient is well perfused (at least normotensive), or the ETCO2 is HIGH, ventilate with a goal of 35 mmHg. If the patient is in shock and the ETCO2 is low, do not use ETCO2 to guide ventilation. In this case, trying to increase the ETCO2 can make an already acidotic patient more acidotic.
     - ✓ Obtain and document a recent ABG/VBG if available. This can be done en route for prolonged transport requiring ventilator adjustments. Target pCO2 of 35-40 mmHg.
4. Circulation
   - Ensure large bore IV access if possible.
   - Continuous cardiac monitoring should be maintained en-route.
     - ✓ HR, BP, O2 saturation, respirations, ETCO2
   - Blood pressure:
     - ✓ Nontraumatic ICH/SAH: SBP should be maintained <160 for all non-traumatic ICH and SAH
       - o Start Nicardipine infusion to maintain SBP of 120-160 mmHg
         - a) start infusion at 5mg/hr and titrate for goal SBP <160. Hold or decrease infusion for SBP <120 mm Hg. Nicardipine infusion is preferred for titratable management of persistent hypertension over repeated labetalol dosing.
       - o Labetolol (10 – 40mg IV q 10 min until BP goal is reached, max dose 300mg). Labetolol would be first line as PRN and should be used only until nicardipine is ready for infusion.

5. Immobilization
   - The transport team should consider immobilizing the patient if there is any history or concern for a traumatic mechanism:
     - ✓ Elderly patients with SDH, SAH, EDH who may have fallen.
6. Intracranial Pressure (ICP)
   - Transport team will not have objective ability to measure ICP in the field or in transport. No specific treatment (other than HOB elevation) should be directed at intracranial hypertension in the absence of signs of transtentorial herniation or progressive neurologic deterioration not attributable to extracranial explanations.
   - Elevate the patient's head of bed to 30 degrees if possible. Use midline cervical spine positioning. Patients in full spinal precautions should have HOB raised in a manner to maintain neutral spine (towel roll or headblock if immobilized, stretcher tilt, etc).
   - Signs of cerebral herniation include coma + unilateral or bilateral blown pupil or posturing, CT evidence of midline shift or uncal herniation with depressed mental status, or decline in GCS during transport >2 points with suspected elevated ICP. These should be addressed quickly.
     - ✓ Administer 3% hypertonic saline, 250 mL initial bolus for adults. This can be repeated x1 for total dose of 500 ml. Pediatric patients should recieve 8 mL/kg bolus (max500mL)
     - ✓ Maintain eucapnea with target EtCO2 30-35.
     - ✓ Avoid hypoxia during intubation attempts or other airway management
     - ✓ Ensure optimal sedation in intubated patients.
     - ✓ Steroids do not have a role in the pre-hospital management of elevated intracranial pressure in intracerebral hemorrhage.

E. General Management

1. Seizure management:
   - Consider Keppra (1st line) or Fosphentyoin loading dosing per status protocol if the patient has already seized. Prophylactic dosing can be considered, though it is not critical in the transport medicine environment.
   - Benzodiazepine – Lorazepam 4mg IVP or Midazolam 5mg IVP/IM should be administered for acute seizures.
2. Coagulation status:
   - If the patient is known to be anticoagulated for any reason, medical control should request that the appropriate measures be taken to reverse this prior to transport team arrival at referring facility.
     - ✓ Prothrombin Complex Concentrates (PCC) or Fresh Frozen Plasma (FFP), and vitamin K for INR >1.5 should be administered in patients known to be taking warfarin. 4 factor

PCC (eg KCentra) will be the most efficient and effective for reversal of life-threatening or neurologically devastating injury and is preferred if available.

- ✓ For patients known to be taking target specific anticoagulants, FFP does not have a role in reversal. PCC (Factor X inhibitors) or hemodialysis (dabigatran) is needed.
- ✓ Platelet transfusion should be continued if initiated by referring facility or requested by consultant (e.g. neurosurgeon) who will be caring for the patient upon arrival to the accepting destination; however, do not delay transport if platelets are not immediately available.
- ✓ It is not prudent for the transport team to order or wait for these interventions at a referring hospital, but the team should typically continue the interventions unless medically contraindicated in transport if already started by referring institutions.

3. Procedures: Do not delay transport to place arterial lines or central venous access.
4. Sedation
   - Refer to CLIN30 and CLIN49
   - Non-intubated patients: Use short acting analgesics and sedatives ONLY to minimize disruptions in neurologic exam
   - Fentanyl, versed and propofol can be considered for analgesia and sedation as per standard post-intubation sedation protocol.
     - ✓ All intubated patients should be appropriately and optimally sedated if possible to prevent unnecessary increases in ICP
     - ✓ Refer to Air Care & Mobile Care Policy – Sedation
5. Paralysis:
   - The decision to paralyze a patient for transport is one that should be made with the best interests of the patient and transport crew safety in mind. A neurologic exam must be documented prior to prolonged paralysis. Paralytics should never be given without concomitant sedation.
6. Restraints:
   - Restraints should be considered only to protect crew or patient safety or to protect medical devices such as endotracheal tubes or IV sites. Sedation and redirection should be used before and in conjunction with restraints once applied. Documentation of the use of restraints must be completed in the event log of Golden Hour along with patient assessment as outlined in the UC Health Restraint Policy. Upon arrival to the referring facility, the accepting health care provider must be informed of the restraints and decision to continue restraint use must be evaluated by the receiving physician.

F. Potential Complications:

1. Neurologic deterioration
2. Medication side effects
3. Airway difficulty
4. Seizures or status epilepticus
5. Injury to patient or flight crew related to combativeness
6. Long-term neurologic morbidity
7. Vasospasm

V. RESPONSIBILITY

Flight Physicians, Mid-Level Practitioners, Critical Care Transport Nurses

VI. KEY WORDS

None

VII. APPENDIX

None

VIII. REFERENCES / CITATIONS

Management of Traumatic Brain Injury (CLIN57)

I. POLICY
Management of Traumatic Brain Injury

II. PURPOSE
Guidelines to optimally manage and begin resuscitation in patients who have suffered a traumatic brain injury.

III. DEFINITIONS
None

IV. PROCEDURE

A. EQUIPMENT NEEDED:

1. Airway management equipment
2. Medications as indicated.
3. Immobilization equipment.
4. Large-bore IV access.
5. Cardiovascular monitoring capability, including waveform capnography.
6. Oxygen
7. Ventilator

B. INDICATIONS:

1. Altered mental status and trauma, especially obvious signs of head trauma
2. Focal or lateralizing neurological deficits

C. CONTRAINDICATIONS/CAUTIONS:

1. Consider other causes of altered mental status, especially in trauma, including but not limited to:
   - Hypoglycemia
   - Intoxication
   - Myocardial infarction
   - Pain from distracting injury
   - Cerebral vascular injury

D. MANAGEMENT:

1. The management of patients with possible traumatic brain injury involves attention to multiple areas, including oxygenation, ventilation, airway protection, hemodynamics, cerebral perfusion pressure, intracranial pressure and concomitant injury. Many of these parameters are difficult or impossible to measure in transport. The transport team must use their clinical skills and available tools to best manage these difficult patients. When possible, avoid hypotension, avoid hypoxia, maintain normal ETCO2, and elevate head of bed and sedate to minimize ICP.
   - Airway/Breathing
     - ✓ Administer supplemental oxygen via nasal cannula, face mask or advanced airway management to prevent hypoxia (SpO2 <90%).
     - ✓ Indications for advanced airway management include failure to protect airway, failure to oxygenate or ventilate, or an anticipated decline in clinical course based on injuries observed. Refer to airway management protocol for details.
     - ✓ The cervical collar should be removed and manual in-line stabilization of cervical spine performed during intubation attempts for patients with concern for cervical spine injury warranting immobilization. Minimize flexion/extension of cervical spine during attempts and re-secure collar after intubation.
     - ✓ For hemodynamically unstable patients ketamine is the preferred induction agent. Succinylcholine should be used as paralytic unless otherwise contraindicated.
     - ✓ Following intubation supplemental O2 should be weaned to target O2 saturation >94%. Titrate ventilation to etCO2 35-40 or pCO2 35-40 if obtaining a post-intubation ABG/VBG.
   - Circulation
     - ✓ Establish 2 large-bore IVs. In patients with difficult IV access, I/O line is acceptable. Administer fluids and/or blood products for any systolic BP <90. Hypotension should be aggressively treated to minimize decreases in cerebral perfusion pressure.
     - ✓ Use of isotonic fluids is recommended. Blood products and TXA, if available, should be used for patients with external blood loss or suspected pelvic, intraabdominal or thoracic injuries.
   - Immobilization: Decision regarding level of immobilization may be made prior to AC/MC arrival.

- ✓ If immobilized on long board and head blocks, consider raising the head of bed by borrowing an extra head-block from the outside hospital to place under the backboard or roll towels to elevate the head of the patient. Consider raising the head of the stretcher if feasible.
- ✓ Patients who are not immobilized with low concern for thoracic/lumbar spinal injuries should be kept with HOB elevated at least 30 degrees. The decision to fully immobilize a patient will depend on the mechanism of injury and patient exam. Patients with isolated head injuries do not require full spinal immobilization.
- ✓ Maintain cervical spine immobilization for all patients with neck pain, distracting injury, concerning mechanism of injury, or depressed mental status (GCS <14).
- ✓ Patients who are removed from long board immobilization in accordance with AC/MC policies should transfer via logroll and have spine precautions maintained if there is a concern for thoracic or lumbar spinal injury. Consider raising the head of stretcher for these patients if feasible.
- ✓ Intracranial Pressure (ICP) Management – Signs of cerebral herniation include coma + unilateral or bilateral blown pupil or posturing, CT evidence of midline shift or uncal herniation with depressed mental status, or decline in GCS during transport >2 points with suspected ICP. These should be addressed rapidly.
  - Administer 3% hypertonic saline, 250 mL bolus for adults (can repeat x1 for maximum dose of 500 ml). For pediatric patients, administer 8 mL/kg bolus (max500mL)
  - Maintain eucapnea with target EtCO2 30-35.
  - Ensure optimal sedation in intubated patients.

E. GENERAL MANAGEMENT:

1. Patients should have continuous cardiac monitoring
   - HR, BP, oxygen saturation; waveform capnography is mandatory for intubated TBI patients
   - Multisystem trauma is often present in moderate to severe head injuries
   - Sedation
     - ✓ Reference CLIN30 and/or CLIN49 or pain management and sedation guidelines and parameters.
     - ✓ All intubated patients should be sedated to Richmond Agitation and Sedation Score (RASS) -2 to 0 during transport to prevent unnecessary increases in ICP

2. Paralysis

- The decision to paralyze a patient for transport is one that should be made with the best interest of the patient and crew safety in mind Patients should not receive paralytics without sedation.
  - ✓ Reference CLIN 30 and/or CLIN 49 for parameters/guidelines

3. Restraints
   - Restraints should be considered only to protect crew or patient safety or to protect medical devices such as endotracheal tubes or IV sites. Sedation and redirection should be used before and in conjunction with restraints once applied. Documentation of the use of restraints must be completed in the event log of Golden Hour along with patient assessment as outlined in the UC Health Restraint Policy. Upon arrival to the referring facility, the accepting health care provider must be informed of the restraints and decision to continue restraint use must be evaluated by the receiving physician.
     - ✓ Use of restraints must be documented in the electronic medical record along with appropriate physical assessment.

F. POTENTIAL COMPLICATIONS:

1. Neurologic deterioration
2. Medication side effect
3. Multi-system trauma
4. Airway difficulty
   a) Reference Air Care & Mobile Care RSI/DSI protocols
5. Seizures or status epilepticus
6. Injury to patient or flight crew related to combativeness
7. Long-term neurologic morbidity

V. RESPONSIBILITY

Flight Physicians, Mid-Level Practitioners, Critical Care Nurses

VI. KEY WORDS

None

VII. APPENDIX

None

VIII. REFERENCES/CITATIONS

None

University of Cincinnati Medical Center | UC Health

Stroke (CLIN67)

I. POLICY

Care and transport of acute ischemic stroke patients.

II. PURPOSE

The care of the patient with an acute ischemic stroke requires appropriate care and rapid transport to a comprehensive stroke center. Patients with intracranial hemorrhage are covered in a separate protocol.

III. DEFINITIONS

Stroke Team Pager: 513-844-7686

IV. PROCEDURE

A. Recognition of possible stroke:

1. Step 1: Identify signs of a possible stroke.
   - Facial Droop (have patient show teeth or smile)
   - Arm Drift (patient closes eyes and extends both arms straight out, with palms up for 10 seconds)
   - Abnormal Speech (have the patient say "you can't teach an old dog new tricks")
   - Note: If any 1 of these 3 signs is abnormal, the probability of a stroke is 72%
2. For many patients, stroke will already be recognized by the referring hospital. Prepare for rapid transport of the patient.
3. Confirm the last normal time with scene personnel or hospital staff. Note that last seen normal time may be different than the time a stroke was noted by the patient or family.
   - Occasionally, scene flights may be taken for acute strokes. If able and safe to do so, consider bringing a family member to verify last normal times. This may avoid a delay in administering tPA.

B. Treatment of the patient with an acute ischemic stroke
   1. Support ABCs
   2. Check blood glucose if not already performed
   3. If the patient is receiving intravenous (IV) tPA, monitor for complications
      - Bleeding
      - Angioedema
      - Hypotension: can be seen in patients receiving tPA. The goal is to raise the patient's blood pressure, ideally with a fluid bolus. However, if this cannot be maintained, vasopressors are not traditionally used due to the

ability of overshooting and increasing the risk for intracranial hemorrhage. Consider IVF if the patient can tolerate and head of bed flat. Also consider consultation with the stroke team.

4. Consider giving IV or subcutaneous insulin to patients whose serum glucose levels are greater than 200 mg/dL
   - Note: Patients with acute ischemic stroke who are hypoglycemic tend to have worse clinical outcomes, but there is no direct evidence that active glucose control improves outcomes.
5. Provide oxygen with a saturation less than 94%

C. Intravenous tPA specific indications and exclusions

1. Indications for the use of intravenous tPA
   - Age: 18 yrs or older
   - Diagnosis of an ischemic stroke with neurologic deficit
   - Time from last seen normal is within 3 hours
   - Consideration may also be given to treating patients in the 3 to 4.5 hour timeframe and should be done in consultation with the stroke team.
2. Exclusions for intravenous tPA
   a) Evidence of intracranial hemorrhage from CT scan
   - Clinical presentation suggestive of a subarachnoid hemorrhage, even with normal CT
   - Evidence of multilobar infarction in more than one-third of the cerebral hemisphere on CT
   - History of intracranial hemorrhage
   - Uncontrolled hypertension based on repeated measurements of > 185 mm Hg systolic pressure or > 110 mm Hg diastolic pressure
   - Known AV malformation, neoplasm, or aneurysm
   - Witnessed seizure at stroke onset
   - Active internal bleeding or acute trauma, such as a fracture
   - Acute bleeding diathesis
   - Intraspinal surgery, serious head trauma, or previous stroke within the past 3 months
   - Arterial puncture at a non-compressible site within the past 7 days
3. Relative contraindications and exclusions to the use of intravenous tPA
   - Minor or rapidly improving stroke symptoms
   - Major surgery or serious trauma within the past 14 days
   - Recent gastrointestinal or urinary tract hemorrhage within the past 3 weeks
   - Post-myocardial infarction pericarditis
   - Recent acute myocardial infarction within the past 3 months
   - Abnormal blood sugar level < 50 mg/dl or > 400 mg/dl
   - Platelet count < 100,000/mm3
   - Heparin received within 48 hours prior to onset of stroke, with elevated activated partial thromboplastin time (aPTT)

- Current use of anticoagulant (e.g., warfarin) with an elevated international normalized ratio (INR) > 1.7
- Note: If the stroke team has not already been consulted, please consider consultation in these cases.

D. Hypertension control in acute ischemic stroke patients
    1. If the patient is NOT an IV tPA candidate
        - Systolic ≤220 or diastolic ≤120: Observe patient unless there is other end-organ involvement. Treat the patient's other symptoms of stroke (headache, pain, nausea, etc). Treat other acute complications of stroke, including hypoxia, increased intracranial pressure, seizures, or hypoglycemia.
        - Systolic > 220 or diastolic >120: Labetalol 10 to 20 mg IV for 1–2 min—may repeat or double every 10 min to a maximum dose of 300 mg OR Nicardipine 5 mg/hr IV infusion as initial dose; titrate to desired effect by increasing 2.5 mg/hr every 5 min to max of 15 mg/hr.
        - Note: Aim for a 10% to 15% reduction in blood pressure
    2. If the Patient IS an IV tPA candidate
        - Pretreatment Systolic > 185 or diastolic > 110: Labetalol 10 to 20 mg IV for 1–2 min—may repeat 1 time
        - During or after treatment Systolic > 185 or diastolic > 110: Labetalol 10 mg IV for 1–2 min—may repeat or double every 10 min to maximum dose of 300 mg or give initial labetalol dose and then start labetalol drip at 2 to 8 mg/min OR Nicardipine 5 mg/hr IV infusion as initial dose and titrate to desired effect by increasing 2.5 mg/hr every 5 min to maximum of 15 mg/hr.
        - Note: Elevated blood pressures increase the risk of intracranial hemorrhage. If BP remains poorly controlled, consult the stroke team and if unavailable, 4.AMEN.

E. Dosing of intravenous tPA
    1. Total dose of IV tPA (bolus and infusion): 0.9 mg/kg to a maximum of 90 mg
    2. First 10% of calculated dose given as intravenous bolus dose
    3. Remaining 90% of calculated dose given in infusion over 1 hour
    4. Note: patients receiving tPA should be monitored closely as discussed above.
    5. Note: IV tPA should always be administered on a pump to ensure that it is not administered too quickly.
    6. Upon signover of the patient to the accepting team, the ACMC team must specifically state how many mg of tPA have been administered thus far, and how many mg of tPA remain (if any) in order to complete the dose.

F. Endovascular treatment (EVT) and transport of acute ischemic stroke (CODE STROKE)
    1. Large vessel occlusions in patients greater than 18 with an NIH stroke scale greater than or equal to 6 may be candidates for EVT. EVT can be initiated < 6 hours from stroke onset.

2. Patients with exclusions or contraindications to IV tPA should be considered for EVT treatment if it can be initiated ≤6 hours from stroke onset.
3. Typically both a CT and CTA are recommended prior to initiation of EVT, however, If baseline CTA has not been performed and either NIHSS≥10 or hyperdense large vessel is seen on CT, then consider taking patient directly to the EVT to avoid delays.
4. Do not delay IV tPA preparation and administration to plan EVT.
    - As soon as CT confirms no intracranial hemorrhage IV tPA should be prepared and administered according to the indications, exclusions, and relative contraindications above.
    - Rapid transport to the angiography suite is paramount for eligible patients. Please notify the stroke team with any updates or changes in the patient condition.
    - Do not delay moving the patient onto the angiography table. Report can be given during and after this process to allow the staff to begin preparing the patient.
    - If there is no one in the angiography suite, take the patient to the UCMC CEC. Please first attempt to contact the stroke team to establish an ETA unless a life-threatening condition exists requiring emergent transport to the UCMC CEC. If the ETA of the angio team arrival is <10 min and the patient is stable, the ACMC team may consider staying with the patient in the hallway by the angio suite to minimize time to reperfusion upon angio team arrival.
    - Transport the patient with head of bed flat if tolerated.

V. RESPONSIBILITY

A. All team members

VI. KEY WORDS

VII. APPENDIX

VIII. REFERENCES / CITATIONS

A. American Heart Association Stroke algorithms
B. University of Cincinnati Endovascular treatment of acute ischemic stroke
C. University of Cincinnati Code Stroke

University of Cincinnati Medical Center | UC Health

Emergency Delivery (CLIN27)

I. POLICY
Emergency Delivery

II. PURPOSE
To provide guidelines for the management of the delivery process if delivery cannot be avoided.

III. DEFINITIONS
None

IV. PROCEDURE

G. INDICATIONS:

1. Imminent vaginal delivery which cannot be delayed by tocolysis. Delivery by perimorteum C-section in recently arrested obstetric patient. Consider tocolysis for the laboring obstetric patient in whom transport by air is planned (which assumes that delivery is not felt to be imminent). Neonatal resuscitation, per NRP/PALS recommendations is indicated upon delivery of a neonate. Consider postmortem C-section in any woman with a viable (>24 week) pregnancy who suffers cardiopulmonary arrest.

H. CONTRAINDICATIONS:

1. Perimorteum C-section is contraindicated in a pre-viable pregnancy, in a woman who has not arrested, or in a woman who has been pulseless for 20 or more minutes (between 15-20 minutes should be up to the flight team's judgment, but outcomes are poor; <15 minutes the procedure should be considered relatively strongly.) In our setting, contraindications to tocolysis are relative, and should be viewed in consideration of the risk benefit ratio of proceeding with delivery in a setting with limited obstetric and neonatal resources vs delaying delivery and initiating transport. These potential contraindications to tocolysis include chorioamnionitis, eclampsia or severe preeclampsia, maternal vaginal hemorrhage or hemodynamic instability, singleton IUFD, and in utero fetal distress

I. EQUIPMENT:

1. Obstetric tray/pack
2. Neonatal resuscitation bag
3. PRBC cooler
4. Suction
5. Extra blankets

6. For postmortem C-section, scalpel and obstetric tray
7. Pump for administration of tocolytics or oxytocin

J. PROCEDURE AND MANAGEMENT:

1. Avoid delivery in flight if possible:
    - If delivery is imminent or felt likely to occur during transport, delay transport until delivery.
    - Consider Terbutaline for tocolysis if tocolysis indicated (<34 weeks), terbulaine is available available at referring institution, and other tocolytic therapy is not in use. until contractions cease or maternal side effects preclude additional dosing. Terbutaline is transiently effective in the cessation of contractions but it it not an effective tocolytic for a prolonged attempt at tocolysis. Dosing is 0.25 mg subcut q 20-60 min.
    - Consider magnesium sulfate for tocolysis 4-6 grams IV over 20-30 min, followed by maintenance infusion of 2 grams/hour titrated up to 3 grams per hour to cessation of contractions or evidence of toxicity (vomiting, hyporeflexia, respiratory depression.)
2. Maternal supportive care:
    - Universal precautions.
    - Transport in left lateral recumbent position.
    - Administer supplemental oxygen.
    - Consider placement of two large bore IV's if possible.
    - When possible, consider monitoring fetal heart tones with Doppler every 15 minutes.
    - Do not load the obstetric patient backward in the aircraft. This does not allow the patient to be properly secured, nor does it allow proper access to the patient's airway if necessary.
    - Avoid vaginal exams in third trimester bleeding.
3. Imminent vertex vaginal delivery:
    - Once crowning occurs, position mother supine with legs flexed if she is not already in this position.
    - Coach mother to breathe deeply between contractions and to push with contractions.
    - Episiotomy can be considered but need not be routinely performed.
    - Control delivery of head if possible; avoid explosive delivery of head.
    - Once head is delivered, instruct mother to stop pushing and suction infant mouth and nares. Mouth first.
    - Then, check for nuchal cord: if loose, slip over infant's head: if tight, place two clamps and cut between them.
    - While supporting head, deliver first the anterior shoulder and then the posterior shoulder. Generally, the remainder of the infant's body is easily delivered, though gentle traction after delivery of the shoulders

may be required. For shoulder dystocia, consider McRoberts maneuver: sharply flex the mother's legs up on her abdomen.
- Note time of delivery.
- Repeat suctioning of infant mouth and nose (mouth first), while holding infant with head slightly lower than body at or below level of vagina for about 30 seconds before clamping cord.
- Place clamps about 10cm and 15cm from infant, and cut between them.
- Warm and dry infant, score Apgars at 1 and 5 minutes and resuscitate as indicated per NRP/PALS.
- Await delivery of placenta, usually occurring spontaneously 5-30 minutes after infant. Avoid excessive traction on cord, which may cause uterine inversion. Deliver placenta with mother to hospital.
- If perineal tears or episiotomy are bleeding, apply direct pressure.
- Consider uterine massage for postpartum hemorrhage. Air Care does not carry oxytocin, though you may consider its use if available where delivery occurs (i.e. referring institution): 10 units in 1 liter NS, run first 500cc wide open, and then decrease to 125cc/hr. (Edit note (1)- needs to be on medication list?-)

4. Prolapsed cord
    - Strongly consider terbutaline tocolysis.
    - Administer high flow O2.
    - Position mother in Trendelenburg, tilted to left, with elevated hips or in knee-chest position.
    - Insert two fingers of gloved hand into the vagina to hold the presenting part of the umbilical cord, possibly throughout transport.
    - Do not attempt to push cord back in.
    - Transport to definitive treatment: C-section.
5. Breech presentations
    - At least in our setting, with a known breech presentation in labor without imminent delivery, consider tocolysis until controlled C-section available or delay or preclude maternal transport if delivery felt likely to occur during transport
    - The appearance of a foot or feet through the introitus does not in and of itself indicate that delivery is imminent; the cervix may be incompletely dilated.
    - In imminent breech vaginal delivery, morbidity and mortality are minimized if the breech is delivered spontaneously to the level of the umbilicus and then extracted.
    - Consider episiotomy.
    - The crewmember performing the delivery should consider positioning her thumbs over the infant's sacrum with her fingers placed over the infant's hips.

- Usually, a combination of downward and then upward traction is required to achieve delivery of the shoulders.
- Delivery of head: usually, the chin is directed posteriorly. Consider flexing the fetal neck by applying pressure to the fetal maxilla intravaginally, and then applying downward traction on the shoulders.
- If you are unable to deliver the head and infant begins to breathe spontaneously with its face pressed against the vaginal wall, consider the following: place a gloved hand into the vagina with the palm towards the infant's face, form a "V" with the index and middle fingers on either side of the infant's nose, and push the vaginal wall away from the infant's face to allow unrestricted respirations.

6. Treatment and resuscitation of the delivered neonate
    - Air Care generally follows the protocols and guidelines of the Neonatal Resuscitation Program and Pediatric Advanced Life Support, with consideration for individualization on a case-by-case basis based on the assessment of the medical crew.
    - Air Care does not intentionally transport neonates, however, we do occasionally transport the CCHMC neonatal team in our helicopter to a referring institution, where they will resuscitate the neonate and then transport them by ground, probably to CCHMC.
7. Postmortem C-section
    - Consider in any woman with a known or apparently viable (>24 weeks) pregnancy who suffers cardiopulmonary arrest, whose downtime is less than twenty (20) minutes. Outcomes are better if the time from death to delivery is minimized to five (5) minutes or less.
    - Continue CPR of the mother.
    - Make a midline vertical incision through the abdominal wall from symphysis pubis to the umbilicus through all layers to the peritoneal cavity.
    - Retract the bladder inferiorly.
    - While attempting to avoid injury to the fetus, make an approximately 5cm vertical incision through the lower uterine segment. Extend the incision with scissors vertically to the fundus.
    - Deliver the infant, suction the mouth and nares, and clamp and cut the cord. Resuscitate the infant.
    - Rarely, venal cava decompression by delivery will make maternal return of spontaneous circulation possible, so reassess the mother after infant delivery.
8. Potential Complications
    - Terbutaline toxicity
    - Magnesium toxicity including respiratory depression requiring intubation and mechanical ventilation
    - Cephalopelvic disproportion
    - Fetal distress, hypoxia, ischemia

- Cerebral palsy, or other neurologic disabilities
- Shoulder dystocia
- Fetal injury including fracture and intracranial hemorrhage
- Perinatal infection
- Peripartum or postpartum hemorrhage
- Amniotic fluid embolus
- Venous thrombeoembolic disease
- Preeclampsia and eclampsia

9. Special Considerations
    - After delivery of the infant and placenta, begin oxytocin 20 Units/Liter LR at 125 cc/hour to control postpartum bleeding. Avoid IV PUSH oxytocin. Toxicity otherwise not likely with the administration of oxytocin in this manner

V. RESPONSIBILITY

Flight Physicians, Flight Nurses

VI. KEY WORDS

VII. APPENDIX

VIII. REFERENCES / CITATIONS

University of Cincinnati Medical Center | UC Health

Pediatric Neonate Delivery at referring Facility (CLIN32)

I. POLICY

Neonatal delivery during transport

II. PURPOSE

This policy provides the guide when a high-risk OB transfer becomes a neonatal transfer, Air Care & Mobile Care will provide the safest and most effective care for both the mother and infant during transport.

III. DEFINITIONS

Neonate is defined as an infant under 28 days old and or has never been discharged from a neonatal intensive care unit.

IV. PROCEDURE

A. The Air Care & Mobile Care medical team will assist in the delivery of the newborn and assist in providing resuscitative care of the neonate at the referring institution if needed.

B. A call should be placed to the neonatal provider/faculty at the neonatal intensive care unit at the University of Cincinnati Medical Center for consultation.

C. Air Care and Mobile Care dispatch should be notified and Cincinnati Children's Transport Team or closest appropriate transport team with neonatal capabilities should be called to respond to the referring institution for continued resuscitation and transport of neonate.

D. The Air Care & Mobile Care medical team will stay with the infant at the referring institution until the arrival of the team.

E. If transport of the mother is needed; Air Care & Mobile Care will provide the transport.

F. Air Care & Mobile Care will follow current NRP guidelines, plan of care should be discussed with the UCMC neonatal provider /faculty and any needed orders obtained.

V. RESPONSIBILITY

Critical Care Nurse, Flight Physician, Mid-Level Practitioner, Faculty Physician,

VI. KEY WORDS

None

VII. APPENDIX

None

VIII. REFERENCES / CITATIONS

None

University of Cincinnati Medical Center | UC Health

Transfer of High-Risk Obstetric (OB) Patients (CLIN26)

I. POLICY

Transfer of High-Risk Obstetric (OB) Patients

II. PURPOSE

The High-Risk OB patient will be evaluated by specific criteria before transport. Patients deemed appropriate for transport will be monitored by standards of care for the antepartum, intrapartum and postpartum patient.

III. DEFINITIONS

High Risk OB Transport Nurse: An experience labor and deliver nurse deemed suitable by hospital leadership for the role of transport of the high risk obstetrics

IV. PROCEDURE

K. Considerations and guidelines prior to transport:

4. For patients laboring and/or contracting, the appropriate referring healthcare provider must be present to perform a vaginal exam prior to departure to ensure birth is not imminent. In addition, the referring and receiving physician (UC Maternal Fetal Medicine 513 504-6099) should be consulted on the following guidelines for transport appropriateness:
   - If the patient is multipara and dilated 5cm or more with contractions less than five (5) minutes apart
   - If the patient is primipara and dilated 6cm or more with contractions less than five (5) minutes apart
   - If the patient has bulging membranes or crowning
   - Consideration should be made for time and distance of transport. The transferring physician will need to affirm that the best option for the patient and her fetus is that she should be transferred instead of the delivery occurring at the transferring institution and Neonatal transport of the newborn is more ideal.
   - In preterm patients that tocolysis may be indicated, consideration should also be made if tocolytics can temporize the labor.

NOTE: Transport in these circumstances may be appropriate and in the best interest of the patient. Appropriateness of transport and transport decisions should be made in conjunction with the accepting and receiving facility.

5. OB patients should never be placed in reversed position on the cot for transport.

L. Antepartum Care Guidelines:

1. Every attempt should be made to transport OB patients on their left side or tilted towards the left.
2. Assess and document maternal blood pressure, pulse, respiration, contraction frequency, intensity and duration. Every attempt should be made to assess baseline fetal heart rate (normal 110-160) at a minimum of every fifteen (15) minutes. In the event that fetal heart rate cannot be obtained document fetal movement.
3. Fetal heart rates less than 110 should be reported to the receiving physician as soon as possible.
4. Consider high flow 02 as patient's condition warrants.
5. Maintain IV infusions.

M. Preterm Labor Guidelines:

1. For any patient who is in preterm labor, the appropriate referring healthcare provider should be asked to perform a vaginal exam prior to departure to ensure birth is not imminent.
2. Consider high flow oxygen as the patient's condition warrants.
3. Establish one (1) large bore IV lactated rings (LR), obtained from referring facility, if IV access is not already established.
4. Consider tocolysis (Expert consultation).

N. Pre-eclampsia:

1. If patient is undergoing magnesium sulfate anti-seizure prophylaxis, maintain and monitor BP, respiratory activity and level of consciousness closely.
2. If patient's BP is > SBP 160 or DBP 105. Consider labetalol 10mg IV. A second dose of 20mg over 10-15 minutes may be given to achieve goal BP of <160/105. Patients with contraindication to labetalol therapy (asthma; bradycardia) may be treated with hydralazine 5 mg IV as initial dose- an additional 10 mg may be given 20 minutes later to achieve target BP goal of < 160/105 mm Hg.

A. Eclampsia:

1. If patient has an eclamptic seizure give midazolam 2-4mg IV over one minute or magnesium sulfate 2 grams slow IV bolus in therapy naive patient.
   - Bolus: Magnesium 6g IV over 20 minutes in 100cc NS
   - Maintenance: 2g/hour (20g in 500cc – run at 50cc/hr)
2. Magnesium can cause hypotension, respiratory depression, flushing, headache, blurred vision, nausea, vomiting, dizziness. For subjective symptoms or hypotension, stop Magnesium infusion and give fluid bolus of 1L of NS. If respiratory depression or hemodynamic collapse occurs,

administer Calcium Chloride. Consider monitoring reflexes. Magnesium is contraindicated in a patient with Myasthenia Gravis.

NOTE: The combination of benzodiazepine and magnesium sulfate for eclamptic seizure increases the risk of respiratory depression as a complication. If readily available, magnesium sulfate is preferred agent, although rapid acting benzodiazepine agents are allowable for control of seizure if there is delay in initiating magnesium sulfate.

3. If BP >160/105 mm Hg treat hypertension as outlined in Preeclampsia section).

B. Intrapartum Care/Emergency Delivery Guidelines:

1. Increase the heat in the transport vehicle (minimum 75 degrees Fahrenheit).
2. Contact the communication specialist to notify the receiving facility to have the appropriate healthcare providers meet the transport team.

C. Postpartum Hemorrhage Guidelines:

1. Attempt to determine cause:
   - Hypotonic uterus
   - Retention of placental tissue
   - Trauma to genital tract
   - Coagulopathy
2. Maintain intravascular fluid volume with LR and blood products, obtained from referring facility, if needed by utilizing two (2) large bore IV's.
3. Firmly massage uterus.
4. Oxytocin therapy is available

D. Neonatal Care Guidelines:

1. Follow neonatal resuscitation guidelines as indicated.

V. RESPONSIBILITY

All Team Members

VI. KEY WORDS

None

VII. APPENDIX

None

VIII. REFERENCES / CITATIONS

None

University of Cincinnati Medical Center | UC Health

Vaginal Bleeding in Pregnancy (CLIN28)

I. POLICY

Vaginal bleeding in pregnancy

II. PURPOSE

This policy provides guidelines to rapidly transport the pregnant patient with vaginal bleeding to a source of definitive diagnosis and management, to treat her hemorrhagic shock if present, to avoid delivery in transport and to avoid iatrogenic harm to the patient.

III. DEFINITIONS

None

IV. PROCEDURE

A. INDICATIONS:

1. Vaginal bleeding, whether or not the etiology is known (the two most common will be placental abruption and placenta previa) and whether or not it is associated with pain or shock. Air Care & Mobile Care may also be called to transport a diagnosed placental abruption without any vaginal bleeding. See also "OB_Emergeny Delivery" and "Blood_Adminstration" clinical policies.

B. CONTRAINDICATIONS:

1. Delivery during transport is contraindicated if it can be avoided.
2. Vaginal examination is contraindicated in third trimester bleeding of unknown etiology, due to the possibility of worsening bleeding from placenta previa.

C. EQUIPMENT:

1. Obstetric tray/pack (Mobile Care).
2. Pediatric Bag.
3. Two (2) units O Negative PRBC or Type Specific Blood if available, Plasma
4. Suction
5. Extra blankets
6. For post-mortem C-section: scalpel and obstetric tray (Air Care).
7. IV pump for controlled infusion administration of tocolytics or oxytocin.

D. PROCEDURE and MANAGEMENT:

1. Avoid delivery in transport if possible.
   - If delivery is imminent, delay transport until delivery.

- Consider tocolysis.

2. Maternal supportive care:
   - Universal precautions.
   - Transport in left lateral recumbent position.
   - Administer supplemental oxygen.
   - Consider placement of two large-bore IVs if possible.
   - When possible, monitor fetal heart tones with Doppler every 15 minutes.
   - Closely monitor maternal vital signs and blood loss.
   - Do not load the obstetric patient in the vehicle backward. In this position she cannot be properly restrained to the stretcher, and the medical team will not have appropriate access to her airway if necessary.

3. Treat maternal shock with crystalloid and, if indicated, consider blood transfusion.

4. Transport rapidly and safely to accepting obstetrician.

E. POTENTIAL COMPLICATIONS:

1. Hemorrhagic shock.
2. Fetal distress, hypoxia, ischemia.
3. Cerebral palsy, or other neurologic disabilities.
4. Intrauterine fetal demise.
5. Pre-term labor.

V. RESPONSIBILITY

Flight Physicians, Mid-Level Practitioners, Critical Care Transport Nurses

VI. KEY WORDS

None

VII. APPENDIX

None

VIII. REFERENCES / CITATIONS

None

University of Cincinnati Medical Center | UC Health

Pediatric-Acute Asthma Exacerbation (CLIN31)

I. POLICY

Air Care and Mobile Care will be requested to transport a pediatric patient experiencing a severe asthma exacerbation.

II. PURPOSE

To provide guidelines in the care of a pediatric patient experiencing a severe asthma attack.

III. DEFINITIONS

Asthma Exacerbation - A prolonged and severe asthma attack that does not respond to standard treatment (bronchodilators and steroids).
WOB-Work of breathing

IV. PROCEDURE

A. Intubation and mechanical ventilation of the pediatric patient with asthma should only be considered if respiratory arrest is imminent and all the benefits verses risk have been evaluated. Endotracheal intubation is generally indicated in the case of failure to oxygenate, failure to ventilate, and inability to protect airway - intubation should be used as a last resort effort to maintain effective airway in asthmatic patients.

B. Consider trying Non-invasive ventilation prior to intubation – the advantage to NIV verses intubation and mechanical ventilation is that it allows for improved upper airway function and clearance. If using NIV consider sedation to make the patient more comfortable

1. Indications for intubation:
   - Hypoxia unresponsive to supplemental oxygen
   - Muscle fatigue (severe unremitting WOB) and absent breath sounds
   - Depressed/altered mental status, inability to protect airway
   - Progressing respiratory failure despite maximum therapy
   - Severe acidosis PH < 7.2, hemodynamic instability, arrest

Hypotension may occur with intubation because of the immediate reduction in intrathoracic pressure, improved venous return and generalized hypervolemia – anticipate the need for fluids and or vasopressor therapy. Consider using Ketamine for intubation

2. Post intubation Care:
   - Sedation: Ketamine, fentanyl or versed
   - Settings: TV: 5-8 mL/kg; I:E 1:2 – 1-4 or greater, decreased RR
   - Permissive hypercapnea, controlled hypoventilation
   - Avoid barotrauma
   - Lower levels of peep may be beneficial
   - IVF – to maximize preload

- May need to consider neuromuscular blockade if unable to achieve optimal oxygenation and prevent increased airway pressures – use as a last resort and not for an extended period of time so as not to worsen the potential for muscle weakness. Use vecuronium or rocuronium to decrease the possibility for bronchospasm

3. First line therapy is inhaled albuterol:
4. Combine ipratropium bromide 0.5 mg via nebulizer to each dose of albuterol every 20 minutes.
   - <30 kg – albuterol via nebulizer 2.5 mg
   - >30 kg – albuterol via nebulizer 5 mg

C. If patient continues to have increased WOB, poor breath sounds, marked wheezing, accessory muscle use and or fatigue:
1. Start methylprednisolone 1mg/kg/dose IV/IM or dexamethasone 0.6 mg/kg PO/IM/IV (max. dose 10 mg)
2. Consider Epinephrine IM (1:1,000) if patient not tolerating nebulizations, or respiratory arrest imminent - epinephrine 1:1000 0.01 mg/kg IM (max. 0.3 mg) Q15 minutes
3. Magnesium Sulfate bolus – 50 mg/kg/dose
   - Preparation: Mix to a standard concentration of 50 mg/mL
   - Mix 2 mL vial (1 gram) with 18 mL NS for a concentration of 50 mg/mL
4. Calculate dose and administer IV over 20 minutes.
   - ***Anticipate hypotension treatment with IVF bolus

D. If patient still continues with increased WOB, poor breath sounds, hypoxia and accessory muscle use and or fatigue:
1. For children <12 years old, consider terbutaline – there is no statistically significant data supporting the use of IV terbuteraline for pediatric patients who are unresponsive to continuous inhaled beta2 agonist, but it is still used
   - Loading dose 2-10 mcg/kg followed by 0.08 – 0.4 mcg/kg/min continuous infusion (Can get from OSH if needed.) titrate the dose in increments of 0.1 to 0.2 mcg/kg/min every 30 mins
   - Subcutaneous terbutaline 0.01 mg/kg every 20 min for 3 doses then every 2 – 6 hours as needed.

V. RESPONSIBILITY

Flight Physicians, Mid-Level Practitioners, Critical Care Transport Nurses, Paramedics

VI. KEY WORDS

None

VII. APPENDIX

None

VIII. REFERENCES / CITATIONS

None

University of Cincinnati Medical Center | UC Health

Cardiac Emergencies – Dysrhythmias in the Pediatric Population (CLIN16)

I. POLICY

In the event that a pediatric patient experiences a Cardiac Emergencies, ACMC health-care provider will perform the appropriate measures to resolve the emergent issue.

II. PURPOSE

To provide guidelines for the management of cardiac dysrhythmias in the pediatric population.

III. DEFINITIONS

None

IV. PROCEDURE

Air Care and Mobile Care follows PALS guidelines, which will not be reproduced here, and the Southwest Ohio protocols for the prehospital management of cardiac rhythm disorders in children. These are reproduced below.

A note specific to Air Care and Mobile Care, where our management will differ from that protocolized below:

A. Many of the protocols below mandate contacting medical control. While this remains an option in our setting, it is not mandatory.

Pediatric Pulseless Cardiac Arrest (V-Fib, V-Tach)

ALL

A. INCLUSION CRITERIA
   1. Age is younger than 16 years
   2. Patient is unconscious.
   3. Patient is apneic.
   4. Patient has no pulses.

MEDIC

B. EKG FINDINGS
   1. Ventricular fibrillation or ventricular tachycardia without pulse.

ALL

C. PROTOCOL
   1. Ensure airway and begin ventilation with bag-valve-mask with 100% oxygen.

2. Begin CPR and manage airway.
3. If using AED continue following AED instructions
4. EMT
   - If available, request ALS back-up or arrange to intercept an ALS unit as appropriate.
5. MEDIC
   - Apply quick look with paddles if not already monitored
   - If rhythm is ventricular fibrillation or ventricular tachycardia without pulses, defibrillate immediately at 2 joules/kg (max 200 J).
   - Immediately resume CPR for 2 minutes or 5 cycles
   - Check cardiac rhythm. If PEA or asystole, use appropriate protocol.
   - If ventricular fibrillation or ventricular tachycardia without pulses, resume CPR immediately while preparing to deliver shock.
   - Defibrillation at 4 J/kg (max 360 J) and resume CPR immediately.
6. ALL
   - Consider intubation.
7. MEDIC
   - Establish IV/IO access.
   - Administer Epinephrine 1:10,000 at 0.1 mL/kg IV/IO. If IV or IO is unattainable, give Epinephrine 1:1000 at 0.1 mL/kg via ET (maximum dose 5 mL). Repeat Epinephrine every 3 to 5 minutes, and follow each dose with 2 minutes of CPR or 5 cycles.
   - Check cardiac rhythm. If PEA or asystole, use appropriate protocol.
   - If ventricular fibrillation or ventricular tachycardia without pulses, resume CPR immediately while preparing to deliver shock.
   - Defibrillate at 4 J/kg (maximum 360 joules), then resume CPR immediately.
   - Administer Amiodarone 5 mg/kg (max 300 mg) IV/IO push then resume CPR immediately.
   - If Amiodarone is not available, give Lidocaine 1 mg/kg IV/IO push then resume CPR immediately, contact medical control, and continue CPR going back to step M above.

D. ALL NOTES:
1. As in all pediatric cardiac arrests, airway control is a key factor in improving the odds of successful resuscitation. Both cuffed and uncuffed endotracheal tubes are acceptable for intubating infants and children. Training in inflating cuffed tubes to minimal airway occlusion pressure is important. In certain circumstances (eg, poor lung compliance, high airway resistance, or a large glottic air leak) a cuffed endotracheal tube may be preferable to an uncuffed tube, provided that attention is paid to endotracheal tube size, position, and cuff inflation pressure (Class IIa, LOE B)
2. Limit the time a pulseless patient is not getting good CPR
3. AEDs may now be used on children of ALL ages. For infants, a manual defibrillator is preferred to an AED for defibrillation. If a manual defibrillator is

not available, an AED equipped with a pediatric does attenuator is preferred, an AED without a pediatric dose attenuator may be used.

4. MEDIC
   - Ventricular fibrillation is rare in children, unlike adults. It is usually due to hypoxia or cardiac disease.
   - Dilute Amiodarone by mixing 150 mg of Amiodarone in 100 mL of normal saline. This is 1.5 mg/mL
   - Consider the use of a stopcock for the administration of Amiodarone
   - When choosing joules for defibrillation in pediatric patients, round up.

Pediatric Cardiac Arrest (Asystole, PEA)

5. ALL
   - INCLUSION CRITERIA
     - ✓ Age is younger than 16 years.
     - ✓ Patient is unconscious.
     - ✓ Patient is apneic
     - ✓ Patient has no pulse.
6. MEDIC
   - EKG FINDINGS
     - ✓ There is an organized cardiac rhythm with QRS complexes indicating PEA
     - ✓ Patient shows asystole in the monitor in two or more leads.
7. ALL
   - PROTOCOL
     - ✓ Ensure airway and begin ventilation with bag-valve-mask with 100% oxygen.
     - ✓ Begin CPR and manage airway.
     - ✓ Reassess airway and breathing frequently, as hypoxia is a top cause of PEA.
     - ✓ If using AED continue to follow instructions.
8. EMT
   - If available, request ALS back-up or arrange to intercept an ALS unit as appropriate.
9. MEDIC
   - Check cardiac rhythm immediately resume CPR
   - Establish IV/IO access.
   - Epinephrine 1:10,000 at 0.1 mL/kg IO/IV. If vascular access is not available, then give epinephrine 1:1000 at 0.1 mL/kg via ET (maximum dose 5 mL)
   - Identify and treat causes (see Notes below).
   - Contact medical control.
   - Administer normal saline 20 ml/kg IV or IO.
   - If PEA persists after 3 to 5 minutes, repeat epinephrine 1:10,000 at 0.1 mL/kg (maximum dose 5mL) IV, IO, or 1:1000 at 0.1 mL/kg per ET.

- Medical control may consider the following:
  - ✓ Additional 20 mL/kg fluid boluses.
  - ✓ Needle decompression of the chest.

E. ALL NOTES:

1. Airway management with adequate bag-valve-mask (BVM) ventilation is a priority, and intubation should be considered if ventilation and oxygenation with BVM is difficult to maintain.
2. Both cuffed and uncuffed endotracheal tubes are acceptable for intubating infants and children. Training in inflating cuffed tubes to minimal airway occlusion pressure is important. In certain circumstances (e.g., poor lung compliance, high airway resistance, or a large glottic air leak) a cuffed endotracheal tube may be preferable to an uncuffed tube, provided that attention is paid to endotracheal tube size, position, and cuff inflation pressure (Class IIa, LOE B)
3. Since a main cause of PEA is hypoxia, the effectiveness of BVM ventilation and oxygenation should be reevaluated constantly.
4. The reversible causes of PEA include hypovolemia, tension pneumothorax, cardiac tamponade, acidosis and pulmonary embolism.

Pediatric Sinus Bradycardia

5. ALL
   - INCLUSION CRITERIA
     - ✓ Age is younger than 16 years.
     - ✓ Alteration of level of consciousness OR
     - ✓ Evidence of poor circulation (delayed capillary refill, or weak peripheral pulses) OR
     - ✓ Evidence of respiratory distress or failure.
6. MEDIC
   - EKG FINDINGS
     - ✓ Rhythm is sinus bradycardia for child's age.
7. ALL
   - PROTOCOL - THE PATIENT MUST BE SYMPTOMATIC BEFORE PROCEEDING WITH THIS PROTOCOL.
     - ✓ Ensure airway, apply 100% oxygen, bag-valve-mask (BVM) ventilate as needed, and recheck pulse rate.
     - ✓ If despite adequate oxygenation and ventilation, the heart rate is less than 60 in a newborn or child, perform chest compressions at a rate of 100 per minute.
8. EMT
   - If available, request ALS back-up or arrange to intercept an ALS unit as appropriate.
9. MEDIC
   - Establish IV/IO access.

- Epinephrine 1:10,000 at 0.1 ml/kg IV or IO. If vascular access is not available, then give epinephrine 1:1000 at 0.1 ml/kg via ET (maximum dose 5.0 ml).

10. ALL
    - Reassess airway and breathing frequently.
    - Contact medical control.
11. MEDIC
    - If symptomatic bradycardia persists, repeat epinephrine IV/IO every 3 to 5 minutes.
    - If symptomatic bradycardia persists, give atropine 0.02 mg/kg (min 0.1 mg, max 1 mg) IV, ET, or IO.
12. ALL
    - Reassess airway and breathing.
13. MEDIC
    - If hypotensive, normal saline 20 ml/kg IV push.

F. ALL NOTES:
1. The most common cause of bradycardia in the child is hypoxia. Therefore attention to airway is the most important intervention.
2. It is important to treat the patient and not the number. Remember that athletes may have heart rates of 40-60.

Pediatric Supraventricular Tachycardia (PSVT)

3. ALL
    - INCLUSION CRITERIA
        - ✓ Age is younger than 16 years
        - ✓ Older child may complain of chest pain or rapid heartbeat.
        - ✓ Heart rate in infants less than 2 years is usually greater than 220. Heart rate in older children is usually greater than 180.
        - ✓ The unstable patient displays signs of shock with weak or no distal pulse, delayed capillary refill, poor skin perfusion, and change in mental status.
4. MEDIC
    - EKG FINDINGS
        - ✓ QRS duration less than 0.08 (2 little boxes).
        - ✓ P waves may or may not be seen.
        - ✓ Little variability in heart rate noted with respiration and movement.

5. ALL
    - PROTOCOL
        - ✓ Maintain airway and administer Oxygen.
6. EMT
    - If available, request ALS back-up or arrange to intercept an ALS unit as appropriate.
7. MEDIC

- Obtain 12 lead EKG if available
- STABLE PATIENT WITH ADEQUATE PERFUSION
  - ✓ Consider one attempt at vagal maneuvers (crushed ice to the mid face for 15 seconds).
  - ✓ Attempt vascular access preferably in an antecubital vein.
  - ✓ Contact medical control.
  - ✓ Administer Adenosine 0.1 mg/kg IV rapid IV push. (Maximum first dose 6 mg) Adenosine should be administer as close to the heart as possible, preferably in the antecubital vein.
  - o Consider use of a double stopcock to administer 5 mL flush immediately.
  - ✓ May double and repeat Adenosine once IV rapid IV push. (maximum second dose 12 mg).
  - ✓ If the patient is conscious and only on the order of a medical control physician give Versed0.1 mg/kg (max 5 mg) IV/IM or other medications as directed by medical control.
  - ✓ Only on the order of a medical control physician: synchronized cardioversion 0.5 J/kg
  - ✓ If unsuccessful, repeat synchronized cardioversion at 1 J/kg
  - ✓ If unsuccessful, repeat synchronized cardioversion at 2 J/kg.

8. UNSTABLE PATIENT (POOR PERFUSION):
   - Contact medical control.
   - If IV access has been established, preferably in an antecubital vein, medical control may consider administration of adenosine 0.1 mg/kg rapid IV push (Maximum first dose 6 mg).
   - If IV has not been established, prepare for immediate cardioversion.
   - If the patient is conscious and only on the order of a medical control physician give Versed 0.1 mg/kg (max 5 mg) IV/IM or other medications as directed by medical control.
   - Only on the order of a medical control physician: synchronized cardioversion 0.5 J/kg.
   - If unsuccessful, repeat synchronized cardioversion at 1 J/kg.
   - If unsuccessful, repeat synchronized cardioversion at 2 J/kg.
9. ALL
   - Reassess ABCs, consider CPR, and transport.

G. NOTES:
1. Children without underlying heart disease or myocardial dysfunction will often tolerate SVT for up to 24 hours without compromise.
2. Round up when selecting joules on a defibrillator for cardioversion

.

V. RESPONSIBILITY

Flight Physician, Mid-Level Practitioners, Critical Care Transport Nurse, Paramedics, EMTs

VI. KEY WORDS
None

VII. APPENDIX
None

VIII. REFERENCES / CITATIONS
None

University of Cincinnati Medical Center | UC Health

Direct Transfer to Operating Room (CLIN29)

I. POLICY

On occasion Air Care & Mobile Care will be required to transfer a patient directly from the transport vehicle to the operating room.

II. PURPOSE

The purpose of this policy is to provide guidelines to facilitate rapid access to definitive surgical care in patients with recognized or impending hemorrhagic shock with a suspected ongoing source of bleeding.

III. DEFINITIONS

None

IV. PROCEDURE

A. INDICATIONS

1. Impending or recognized hemodynamic instability
2. High clinical suspicion for an ongoing source of hemorrhage (i.e. penetrating truncal trauma, ruptured or leaking abdominal aortic aneurysm, uterine rupture, known ruptured ectopic pregnancy.)

B. CONTRAINDICATIONS

1. Lack of an available OR
2. Refusal by accepting surgeon

C. MANAGEMENT

1. Contact on-line medical control (UCMC faculty) physician.
2. Declare desire for direct transfer to the OR and clearly state the reasons for the requested disposition.
3. Await permission from medical control physician to disposition patient to the OR at the receiving institution.

Note: Disposition of a patient directly to the OR requires a coordinated effort between Air Care & Mobile Care, the faculty physician serving as medical control and the receiving surgical service. Several phone calls will often be required to facilitate this disposition. Inform the medical control physician as soon as there is any indication that the patient would benefit from direct OR transfer to allow the necessary time. Early communication is essential.

V. RESPONSIBILITY

Flight Physician, Mid-Level Practitioners, Critical Care Transport Nurses

VI. KEY WORDS
None

VII. APPENDIX
None

VIII. REFERENCES / CITATIONS
None

University of Cincinnati Medical Center | UC Health

Blood Product Administration of Liquid Plasma (CLIN62)

I. POLICY

Administration and transport of liquid plasma

II. PURPOSE

A. To define when and how liquid plasma should be administered while transporting adult patients with evidence of or concern for severe hemorrhage or coagulopathy.

B. To assure that the liquid plasma that is carried by ACMC is properly stored and monitored.

III. DEFINITIONS

A. Plasma: the liquid, noncellular portion of whole blood, which contains coagulation factors, water, electrolytes, and fibrinogen.

B. Fresh Frozen Plasma (FFP): plasma that is separated and prepared from whole blood and then frozen within 8-24 hours of collection to allow long-term storage. Prior to administration, FFP must be thawed to a liquid state, which takes approximately 45 minutes. The delay created in thawing FFP limits its use in the emergency situations frequently encountered in the prehospital and transport environment.

C. Liquid Plasma (LP): plasma that is separated and prepared from whole blood in a liquid state and is never frozen. It is FDA approved and is stored at 1-6°C for up to 40 days. Because LP is stored in a liquid state, it is ready for immediate administration, and is thus ideal for use in the prehospital and transport environment.

D. BACKGROUND

1. Over three million people worldwide die of traumatic injuries every year making it a leading cause of death for people ages 5-45 years.[1] Extensive hemorrhage is a common cause of death in these severely injured patients, both in and out of the hospital setting. Multiple studies, many from military combat zones, strongly suggest that clinical outcomes are improved by administration of plasma alongside RBCs in a 1:1 ratio.[2] Furthermore, the concept of damage control resuscitation advocates for minimizing crystalloid infusion and maximizing early aggressive resuscitation with blood products in patients with life threatening

hemorrhage. Recent unpublished analysis suggests that expanding these resuscitation principles to the prehospital environment via helicopter EMS was associated with improved outcomes.[3]

2. Although this balanced transfusion strategy of plasma and RBCs was first implemented for bleeding trauma patients, it has since been adopted by other medical specialties, such as vascular surgery, gastroenterology, and ob-gyn in treatment of a variety of hemorrhaging patients.[4]
Thus given the high number of critically ill, bleeding, and coagulopathic, adult patients that are transported by Air Care and Mobile Care (ACMC) each year, our transport professionals will now begin administering liquid plasma when clinically indicated

IV. PROCEDURE

A. INDICATIONS:

Air Care and Mobile Care providers will consider transfusion of liquid plasma to **adult patients (age ≥ 16 years) who are ≥ 50kg** and who meet the following inclusion criteria:

1. TRAUMA

- **Evidence of or concern for severe internal or external hemorrhage** based on history of present illness, physical exam, or mechanism of injury. (ex: ejection from automobile, fall > 20 feet, pedestrian struck, bleeding requiring a tourniquet, penetrating injury to head, neck, torso, etc.)

AND

- **Presence of hemodynamic instability or acute coagulopathy of trauma** as evidenced by any of the following criteria
  - ✓ Systolic Blood pressure < 90mmHg or < 100mmHg if patient age is > 55 years)
  - ✓ Pulse rate > 110 beats per minute
  - ✓ Tachypnea > 24 breaths per minute
  - ✓ Clinical findings of peripheral vasoconstriction including cool, pale skin & capillary refill of > 2 seconds
  - ✓ INR > 1.5
  - ✓ Base deficit < -6mmol/L
  - ✓ Hemoglobin < 11 g/dL
  - ✓ Platelets < 200,000

****When blood product transfusion is indicated for the hemorrhaging trauma patient, it is the preference of ACMC that 2 sites of vascular access be obtained to allow infusion of both pRBC and liquid plasma simultaneously. However, if a second vascular access cannot be obtained during transport,* ***strongly consider transfusion of liquid plasma first*** *followed then by pRBC to maintain the desired 1:1 ratio.****

****If an ACMC crew is transporting a patient who has already received or will receive pRBC during transport as treatment for a traumatic injury with severe hemorrhage causing hemodynamic instability, infusion of liquid plasma in a 1:1 ratio, and administration of TXA should be strongly considered****

2. ACUTE MEDICAL HEMORRHAGE

- Liquid plasma administration is strongly encouraged along with PRBC in a 1:1 ratio for treatment of hemodynamically unstable (SBP < 90mmHg) medical hemorrhage such as
  - ✓ Massive gastrointestional bleeding
  - ✓ Ruptured abdominal aortic aneurysm
  - ✓ Postpartum hemorrhage
  - ✓ Spontaneous retroperitoneal hemorrhage
  - ✓ Life threatening bleeding from any source with an INR ≥ 1.5
  - ✓ Anticipated emergent or urgent invasive/surgical procedure with an INR ≥ 1.5
  - ✓ Acute disseminated intravascular coagulation (DIC) and active life threatening hemorrhage

3. TRAUMATIC BRAIN INJURY / INTRACEREBRAL HEMORRHAGE

- Liquid plasma administration is strongly encouraged for those patients with CT documented TBI (epidural/subdural hematoma, subarachnoid hemorrhage, or contusion) or spontaneous intracerebral hemorrhage with an INR ≥ 1.5

**** Elevation in INR can result from multiple causes including Coumadin therapy, liver disease, congenital factor deficiency, and acute coagulopathy of trauma.*

4. CONTRAINDICATIONS

- Patients ≤ 16 years old and or ≤ 50kg

- Documented intolerance to plasma or its components
- Congenital deficiency of IgA in the presence of anti-IgA antibodies. *(This information will rarely be known for patients transported by ACMC, thus it is imperative that crew members monitor for signs of anaphylaxis with initiation of plasma transfusion*)

5. ADMINISTRATION

- Refer to University of Cincinnati Medical Center Administration of Blood and Blood Products policy for administration protocol.

6. STORAGE

- All blood products will be checked at the beginning of each shift by the on duty nurse. Documentation of expiration dates and temperatures within the appropriate range will be recorded on the designated blood record.
- The UCMC Blood Bank will be monitoring the temperature management of the blood coolers annually and will inform the Clinical Manager if equipment needs to be replaced. All flight personnel are required to inform the Clinical Manager of damage to the cooler that could deem it inappropriate for use.
- Number and location of units:

  - ✓ Two (2) units of type A thawed plasma will be kept in the Center for Emergency Care (CEC) blood refrigerator at all times for emergency transfusion.
  - ✓ Two (2) units of type A liquid plasma will be kept in the remote base Air Care office refrigerators at all times for emergency transfusion.

- Upon notification of a patient flight the cooler with ice and two units of O-Negative PRBC and two units type A thawed plasma or liquid plasma are to be taken from the refrigerator and secured in the helicopter. It is the responsibility of the nurse to ensure that appropriate temperature of the blood products is maintained throughout the duration of time the products is not in the refrigerator. When blood products are out of the refrigerator and stored in the transport cooler, it will be monitored at a minimum of every 4 hours to ensure the appropriate temperature of 1-6°C is maintained. Bags of ice will

be changed as needed and inspection that bags are filled with ice, and not water, will be done.

7. REPLACEMENT

- The flight nurse is responsible for accurate and timely replacement of fresh frozen plasma or liquid plasma. When appropriate, the flight nurse will take the completed blood bank slip to the UCMC Blood Bank for replacement. If the nurse is replacing units that were taken from the CEC refrigerator, they will replace the units with FFP. Units that were used from the North or East base will be replaced with Liquid Plasma. In the event that the blood bank cannot acquire Liquid Plasma in a timely manner, they will replace the units with FFP. Once the blood bank receives Liquid Plasma they will notify the Air Care & Mobile Care Communication Center. When appropriate, the units of FFP will be returned to the blood bank in exchange for the Liquid Plasma.

****The flight nurse will log all blood products on the designated blood log and note the expiration dates of each unit****

8. MONITORING / CONTINUOUS QUALITY IMPROVEMENT

- Administration of liquid plasma will be tracked using our electronic charting program.
- All transport missions where liquid plasma is administered will be reviewed in the monthly ACMC CQI meeting by the appropriate transport medical director.

V. RESPONSIBILITY

Clinical care transport nurses, advanced practice nurses/midlevel providers, and physicians

VI. KEY WORDS

None

VII. APPENDIX

None

VIII. REFERENCES / CITATIONS

1. Roberts I, Shakur H, Ker K, Coats T, on behalf of the CRASH-2 Trial Collaborators. Antifibrinolytic drugs for acute traumatic injury. Cochran Database of Systematic Reviews 2011, Issue 1. Art. No.: CD004896.
2. Phan HH, Wisner DH. Should we increase the ratio of plasma/platelets to red blood cells in massive transfusion: what is the evidence? *Vox Sanguinis* 2010;98:395-402.
3. Holcomb J Pati S. Optimal trauma resuscitation with plasma as the primary resuscitative fluid: the surgeon's perspective. *Hematology* 2013: 656-659.
4. Burtelow M, Riley E, Druzin M, et al. How we treat: Management of life-threatening primary postpartum hemorrhage with a standardized massive transfusion protocol. *Transfusion Medicine Reviews*. 2009;23:255-65.

University of Cincinnati Medical Center | UC Health

Administration of O negative PRBC or type specific PRBC for Hemorrhagic Shock (CLIN13)

I. POLICY

Administration of O Negative Packed Red Blood Cells(PRBC) or type specific PRBC for Hemorrhagic Shock

II. PURPOSE

The purpose of this policy is to establish guidelines to enable resuscitation of known or suspected hemorrhagic shock with colloid with oxygen-carrying capacity. Note: the storage, documentation, expiration, and replacement procedures for our PRBC units are covered under separate operational policies.

III. DEFINITIONS

PRBC-Packed Red Blood Cells
FFP-Fresh Frozen Plasma

IV. PROCEDURE

.

A. INDICATIONS:

1. Known or suspected hemorrhagic shock.

B. CONTRAINDICATIONS:

1. Hemodynamic stability without evidence of hemorrhagic shock. Use with caution in patients with suspected pulmonary edema or volume overload.

C. EQUIPMENT:

1. Two units O negative PRBC in appropriately designated cooler or from referring facility.
2. Blood tubing
3. Peripheral IV and EZIO equipment for vascular access
4. Tourniquet for management of extremity arterial hemorrhage
5. Medications as indicated.
6. Fluid Warmer

D. PROCEDURE AND MANAGEMENT:

1. The blood cooler should be secured in the aircraft on every flight mission, even those without predictors of the likely need for transfusion.
2. Maintain universal precautions.
3. Air Care and Mobile Care follows the Southwest Ohio paramedic protocols as well as ACLS, PALS, and ATLS guidelines which will not be reproduced

here. However, in many cases we believe that the patient in obvious hemorrhagic shock may benefit from going to PRBC administration early, prior to the failure of administration of 2L of normal saline to stabilize the patient's hemodynamics.

4. For the patient with known or strongly suspected hemorrhagic shock of any etiology (eg. GIB, penetrating trauma, blunt trauma, ruptured AAA), even in the absence of frank hypotension, consider early administration of PRBC for symptoms and signs such as absolute or relative tachycardia, alteration of mental status, and poor perfusion.
5. For penetrating truncal trauma and hemorrhagic shock, consider a strategy of permissive hypotension, in which volume infusion is withheld as long as the patient maintains his mental status and a peripheral pulse. Once one or both of those are compromised, consider going straight to PRBC administration.
6. For interhospital transfers of patients with actual or impending hemorrhagic shock for whom the referring facility has readied cross-matched blood products, bring them with you for the transport even if transfusion has not yet been initiated. If transfusion becomes indicated, use the cross-matched blood preferentially over our O-negative units. If cross-matched FFP is available, bring it along as well. For hemorrhagic shock, ideally PRBCs and FFP would be transfused in approximately a 1:1 ratio.
7. Once transfusion is initiated, observe closely for signs / symptoms of transfusion reaction.
8. Hemolytic transfusion reactions (fever, chills, flushing, nausea, chest tightness, apprehension, joint and back pain, hypotension, dark urine, oozing from IV sites) and anaphylactic reactions (chills, vomiting, diarrhea, dyspnea, urticaria, hypotension, wheezing, angioedema) typically begin quickly, after only a small amount of blood has been transfused. Transfusion-related acute lung injury (TRALI; dyspnea, tachypnea, hypoxia, rales) can begin early or just after transfusion. In the case of any of these, stop the transfusion immediately and infuse normal saline in its place. Dopamine is indicated for hypotension or oliguria from hemolytic transfusion reaction. Treat anaphylaxis as you normally would with epinephrine, steroids, diphenhydramine, and crystalloid. For TRALI, administer supplemental oxygen and intubate if necessary. Notify the blood bank in the case of any known or suspected transfusion reaction.

E. POTENTIAL COMPLICATIONS:

1. Hemorrhage
2. The above listed transfusion reactions, among others
3. Transfusion-related infectious disease transmission

V. RESPONSIBILITY

Flight Physicians, Mid-Level Provider, Critical Care Transport Nurses

VI. KEY WORDS

None

VII. APPENDIX

None

VIII. REFERENCES / CITATIONS

UCMC-PCS-Administration of Blood and Blood products-029-01

University of Cincinnati Medical Center | UC Health

Management of Patients with Traumatic Injuries (CLIN55)

I. POLICY

Management of Patients with Traumatic Injuries

II. PURPOSE

To rapidly and safely transport the traumatized patient, whether from a referring hospital or scene, to a Level One Trauma Center and to systematically assess and resuscitate the patient.

III. DEFINITIONS

None

IV. PROCEDURE

A. INDICATIONS:

1. Adult or pediatric patients with traumatic injury.

B. CONTRAINDICATIONS:

2. There are no contraindications per se to the use of this policy in the traumatized patient.

C. EQUIPMENT:

1. Cardiac monitor and pulse oximetry.
2. Oxygen
3. Medications as indicated.
4. Two (2) units O Negative PRBC/Plasma.
5. IV pumps for controlled infusion.
6. Airway equipment
7. 10 or 14 gauge angiocaths for the purpose of needle thoracostomy.
8. Equipment for spine immobilization.

D. PROCEDURE AND MANAGEMENT:

1. Employ universal precautions.
2. Maintaining the safety of the medical crew and patient is paramount, which is particularly relevant at trauma scenes and

landing zones, and when managing violent, combative, intoxicated or head injured patients.

3. Air Care & Mobile Care generally follows guidelines from Advanced Trauma Life Support and Pediatric Advanced Life Support (which will not be reproduced here), with consideration for individualization on a case-by-case basis.
4. Recent evidence from the literature suggests consideration for a strategy of permissive hypotension in the patient in hemorrhagic shock from penetrating torso trauma. Consider resuscitating the penetrating torso trauma patient to maintain a palpable pulse and baseline mental status but avoiding aggressive attempts to normalize blood pressure.
5. Consider blood and/or plasma administration for the traumatized patient in hemorrhagic shock. Strongly consider the use of the tourniquet for extremity arterial hemorrhage unless the bleeding can be easily and quickly controlled by less invasive methods.
6. Consider administration of Tranexamic acid (TXA) for the hemodynamically unstable adult trauma patient. (See TXA Protocol Clin59)
7. Consider attempting to facilitate transfer directly to the operating room for the unstable penetrating trauma victim in obvious hemorrhagic shock.
8. Consider the administration of Ancef (cefazolin) 2g for open orthopedic fractures or chest tube insertion in patients 16 years of age or greater. Ancef may be administered over 15 to 30 minutes.
9. Generally, the traumatized patient without a predetermined accepting institution should be transferred to a pediatric level one trauma center if they are less than 16 years old (unless they are known to be pregnant) and to an adult level one trauma center if they are 16 years old or greater or if they are known to be pregnant, with consideration for individualization on a case-by-case basis. In some cases, the patient's age will be unknown in which case the patient should be taken to the institution which the medical crew feels is most appropriate.
10. The goal of any trauma patient assessment and transportation guideline is to facilitate "whatever gets the patient to the most appropriate level of care in the most expeditious manner." There is strong evidence that shows that reducing the time interval from the moment of injury to delivery/arrival at a definitive care site will reduce morbidity and mortality.
11. In the pre-hospital care environment, time, distance, patient condition, and level of care are important variables when making

decisions for transporting the trauma patient. These variables are frequently hard to assess in the field and are ever changing. These guidelines are meant to supplement, but not replace the judgment of the on-scene medical crew.

12. Use of on-line, active medical control for medical direction, particularly for difficult cases is encouraged.
13. Pre-arrival notification of the receiving facility is essential.
14. Transport Exceptions-Medical crews shall transport a trauma victim directly to an adult or pediatric center that is qualified to provide appropriate adult or pediatric care, unless one of more of the following exceptions apply:
    - It is medically necessary to transport the victim to another hospital for initial assessment and stabilization before transfer to an adult or pediatric trauma center.
    - It is unsafe or medically inappropriate to transport the victim directly to an adult or pediatric trauma center due to adverse weather or ground conditions or excessive transport time.
    - No appropriate adult or pediatric trauma center is able to receive and provide adult or pediatric trauma care to the trauma victim without undue delay.
    - Before transport of a patient begins, the fully informed patient who possesses the capacity to make medical decisions requests to be taken to a particular hospital that is not a trauma center or, if the patient is less than eighteen years of age or is not able to communicate, such a request is made by an adult member of the patient's family or a legal representative of the patient.

V. RESPONSIBILITY

Flight MD, Mid-Level Provider, Critical Care Transport Nurse, Paramedic, EMT-B

VI. KEY WORDS

None

VII. APPENDIX

None

VIII. REFERENCES / CITATIONS

Academy of Medicine Cincinnati Protocols for Southwest Ohio Pre-Hospital Care 2016

Spine and Spinal Cord Injury (CLIN53)

I. POLICY
Spine and Spinal Cord Injury

II. PURPOSE

To provide guidelines for the management of acute spine and spinal cord injury in order to prevent secondary injury.

III. DEFINITIONS
None

IV. PROCEDURE

A. INDICATIONS:

1. Radiographically proven spinal injury.
2. Spinal injury strongly suspected on the basis of clinical assessment:
   - Mechanism of injury consistent with spinal injury.
   - Presence of acute neck or back pain.
   - Neurologic signs and symptoms.
     - ✓ Sensory level
     - ✓ Motor level
       - Legs paralyzed, can move arms but cannot spread fingers – C7-8 injury.
       - Normal respirations, able to shrug shoulders and flex elbow – C5-6 injury.
       - Normal respirations, with quadriparesis – C4-5 injury.
       - Quadriplegia and breathing difficulty – C3 or above.
3. Specific cord syndromes
   - Central Cord: upper extremity weakness greater than lower extremity weakness.
   - Brown-Sequard: unilateral extremity weakness and contralateral loss of pain sensation.
   - Anterior Cord: motor intact below suspected level of injury with sensory level to pain.
   - Neurogenic shock (hypotension with normal pulse or bradycardia, skin warm and dry.)
4. Priapism (males.)
5. Consider for patients with altered mental status, potentially distracting injuries or those under the influence of alcohol or drugs.

B. CONTRAINDICATIONS:

None per se, but consider not immobilizing in the case of penetrating trauma to the head, neck or torso without neurological deficit due to difficulty managing the airway and providing hemorrhage control.

C. EQUIPMENT:

1. Appropriately-sized cervical collars.
2. Suction

D. MANAGEMENT:

1. Maintain spinal precautions: spine in neutral position with a cervical collar, adequate security to a stretcher, utilizing log roll precautions when moving to preserve inline stabilization.
2. Judicious use of a backboard. For interhospital transfer, backboard removal is encouraged, even in the case of known injury unless it is necessary for patient movement. If thoracic and lumbar spines are not cleared, maintain patient in supine position utilizing log roll precautions.
3. ABCs as standard.

    - ***Note: In any airway maneuvers, manual, in-line immobilization of the head must be employed. Unless contraindicated, RSI remains the method of choice for definitive airway management. Airway secretions and vomitus are to be cleared using suction devices. If necessary, the patient may be log-rolled for the purpose of airway maintenance.***

4. Neurogenic shock is a form of distributive shock that results in a loss of sympathetic tone. Neurogenic shock may be present in a patient with a known or suspected spinal cord injury that also presents with hypotension (SBP <90 mm Hg), bradycardia (HR <60) or absence of tachycardia (HR <100). Consider hemorrhagic shock as the primary reason for hypotension and treat first.

    For neurogenic shock:
    - Rule out hemorrhagic shock.
    - Start 500-1000 mL isotonic crystalloid fluid bolus.
    - Atropine 0.5 mg IVP q 5 minutes for bradycardia (HR<60) with hypotension.
    - Norepinephrine (Levophed) 2-50 mcg/min continuous IV infusion if hypotension persists to a goal MAP ≥65 mm Hg (if there is a concern for hemorrhagic shock) OR ≥80 mm Hg (if no concomitant concern for hemorrhagic shock).

V. RESPONSIBILITY

Flight Physicians, Mid-Level Practitioners, Critical Care Transport Nurse

VI. KEY WORDS

None

VII. APPENDIX

None

VIII. REFERENCES / CITATIONS

Early Acute Management in Adults with Spinal Cord Injury: A Clinical Practice Guideline for Health-Care Professionals. (2008). *The Journal of Spinal Cord Medicine*, *31*(4), 403–479. http://doi.org/10.1043/1079-0268-31.4.408

Nickson, Chris. "Trauma! Spinal Injury." *Life in the Fastlane,* n.d., https://lifeinthefastlane.com/trauma-tribulation-016/.

Orman, Rob (Producer). (2015, August 18). Neurogenic Shock [Audio podcast]. Retrieved from http://blog.ercast.org/spinal-shock/

White IV, C. C., Domeier, R. M., & Millin, M. G. (2014). EMS spinal precautions and the use of the long backboard–resource document to the position statement of the National Association of EMS Physicians and the American College of Surgeons Committee on Trauma. *Prehospital Emergency Care*, *18*(2), 306-314. DOI: 10.3109/10903127.2014.884197

University of Cincinnati Medical Center | UC Health

Management of Major Thermal Burns (CLIN14)

I. POLICY

Management of Major Thermal Burns

II. PURPOSE

The purpose of this policy is to provide guidelines for wound management, airway control and fluid resuscitation in the burned patient in the transport environment.

III. DEFINITIONS

A burn injury is defined as a traumatic injury to the skin or other organic tissue primarily caused by thermal or other acute exposures. Classification of major burn injuries are partial-thickness burns above 25% in adults or above 20% in children and full-thickness burns greater than 10% TBSA.

IV. PROCEDURE

A. INDICATIONS

1. Partial and/or full thickness thermal burns involving >20% TBSA.
2. Partial-thickness burns > 25% TBSA in Adults
3. Partial-thickness burns > 20% TBSA in children
4. Full-thickness burns > 10% TBSA

B. CONTRAINDIATIONS

1. None

C. EQUIPMENT

1. Burn sheets
2. Standard airway management equipment
3. Analgesics
4. IV crystalloid

D. MANAGEMENT

1. Consider spinal immobilization if the patient has suffered a fall or other significant mechanism of injury (e.g. explosion.)
2. Stop burn process by removing burned clothing. Cool burned areas with NS as needed. Avoid undue cooling of patient if burned surface area is large.
3. Supplemental O2 as indicated. Consider early intubation when there is evidence of impending airway obstruction, inhalational injury with

respiratory compromise or decreased mental status due to toxic inhalation or shock.

Note: The presences of carbonaceous sputum, facial burns or singed nasal hairs alone do not constitute indications for intubation. Evidence of respiratory compromise (increased work of breathing, hoarseness/muffled voice, oropharyngeal edema,) often indicates a need for definitive airway management. Inspiratory stridor in the setting of burns should virtually always be considered a strong indication for intubation.

4. If the burn patient with inhalational injury appears to be demonstrating bronchospasm evidenced by wheezing on exhalation with a prolonged expiratory phase, strongly consider administration of inhaled beta agonist therapy.

5. Establish one to two large-bore IV lines of 0.9% NS or LR. Attempt to start in burn free areas if possible, but IVs may be placed through burned tissue if necessary. Upper extremities are preferred sites. If transport time is brief (< 60 minutes,) administer fluids as follows:

   a. For children less than five (5) years of age, give 125 mL/hr.
   b. For patients from five (5) to fifteen (15) years of age, give 250ml/hour.
   c. For adult patients, give 500ml/hour.

   Immediate transport might be indicated if no IV site readily available and transport time is brief. If the time from the burn injury to completion of the transport will exceed one (1) hour, and IV access is available, administer fluids according to the Parkland Formula:

   4ml/kg/% BSA of 2nd and 3rd degree burn during first 24 hours. Give approximately one-half of this first eight (8) hours from time of injury. Overall rate is adjusted to produce > 1ml/kg/hr of urinary output.

6. Authorized personnel should consider chest escharotomy for circumferential burns of the chest with poor chest compliance and extremity escharotomies for circumferential burns or the extremities with evidence of circulatory compromise. Medical Control should be contacted if escharotomy is anticipated.

7. Take steps to prevent hypothermia.

8. Cover burned areas with dry sheets.

9. Strongly consider IV analgesia for pain control (see Policy – Pain Management CLIN 30.)

10. Evidence of inhalational injury + altered mental status or shock indicates hydroxocobalamin administration. See Cyanokit Policy (CLIN63) for details.

V. RESPONSIBILITY

Flight Physicians, Mid-Level Providers, Critical Care Transport Nurses, Paramedic

.

VI. APPENDIX

None

VII. REFERENCES / CITATIONS

None

University of Cincinnati Medical Center | UC Health

Management of Amputated Body Parts (CLIN52)

I. POLICY

Management of Amputated Body Parts

II. PURPOSE

To rapidly and safely transport the patient with amputated body parts to an appropriate institution, to resuscitate the patient and to maximize any chance for replantation.

III. DEFINITIONS

None

IV. PROCEDURE

F. INDICATIONS:

1. Rarely, Air Care and Mobile Care may transport a patient whose primary issue is partial or complete amputation of a digit or extremity. More often in our setting, this situation will be encountered in the context of multi-trauma. Often, there will be associated crush injury.

G. CONTRAINDICATIONS:

1. There are no contraindications per se to the use of this protocol in the patient with amputated body parts.

H. EQUIPMENT:

1. Cardiac monitor and pulse oximetry
2. Oxygen
3. Medications as indicated
4. Equipment for obtaining IV access
5. Two (2) units O Negative PRBC or Type Specific Blood (if available)
6. Plastic bag
7. Ice
8. Gauze and normal saline
9. CAT tourniquet

I. PROCEDURE AND MANAGEMENT:

1. Air Care and Mobile Care generally follows the Southwest Ohio Paramedic Protocols Services as well as the protocols and guidelines of Advanced Trauma Life Support and Pediatric Advanced Life Support

(which will not be reproduced here) with consideration for individualization on a case-by-case basis.

2. Maintain universal precautions.
3. Support ABCs. Resuscitate the patient in hemorrhagic shock and consider the transfusion of blood.
4. Collect and preserve all amputated parts at the scene/referring facility if possible, even if they appear crushed and not consistent with the possibility of replantation, since parts not suitable for replantation can still provide tendon or bone.
5. Control bleeding with direct pressure, elevation, a pressure dressing, compression of proximal arterial supply, or a tourniquet for arterial bleeding not otherwise readily controlled (CAT tourniquet or BP cuff). *CAT tourniquet is covered under a separate protocol.*
6. Elevate stump of amputated part and cover with normal saline-soaked dressing if possible.
7. Rinse amputated part (with sterile saline if possible,) wrap in saline-soaked gauze and place in dry plastic bag. Place entire bag on ice or into ice water bath. Do not place amputated part directly on ice.
8. With rare exception (the unstable, inextricable patient in whom completion of an amputation to allow extrication and transport may be life-saving) the medical crew should not attempt completion of a partial amputation. Cover with saline soaked gauze, apply a pressure dressing, splint and elevate.
9. Provide appropriate analgesia to the patient in the absence of contraindications.

J. POTENTIAL COMPLICATIONS:

1. Loss of limb, digit or function
2. Localized wound infection
3. Systemic sepsis
4. Tetanus
5. Hemorrhagic shock

V. RESPONSIBILITY

Flight Physicians, Mid-Level Practitioners, Critical Care Nurses, Paramedics, EMTs

VI. KEY WORDS

None

VII. APPENDIX

None

VIII. REFERENCES / CITATIONS

None

University of Cincinnati Medical Center | UC Health

Administration of Tranexamic Acid (TXA) in Trauma Patients (CLIN59)

I. POLICY

Administration of Tranexamic Acid in Trauma Patients

II. PURPOSE

To define when and how tranexamic acid (trade name cyklokapron) should be administered when caring for and transporting adult trauma patients with evidence of or concern for severe hemorrhage (internal or external).

III. DEFINITIONS

A. Tranexamic Acid: anti-fibrinolytic synthetic lysine analogue that inhibits both plasminogen activation and plasmin activity thus preventing clot breakdown and reducing hemorrhage. Other beneficial mechanisms of action including decreasing the systemic inflammatory response to trauma are currently being explored.

1. BACKGROUND

Over three million people worldwide die of traumatic injuries every year
making it the second leading cause of death for people ages 5-45 years.
Extensive hemorrhage is a common cause of death in these severely injured patients, both in and out of the hospital setting. Part of the physiologic response to surgery or trauma in any patient is the formation and subsequent breakdown (fibrinolysis) of intravascular clots. In some cases, clot break down can become pathologic (hyper-fibrinolysis) thus causing increased hemorrhage and blood loss. Administration of anti-fibrinolytic agents such tranexamic acid (TXA) has been shown to reduce blood loss in patients with both normal and exaggerated fibrinolytic responses to surgery. TXA has been used since 1966 to decrease bleeding from a variety of pathologies including hemophilia, prolonged uterine bleeding, and elective cardiothoracic surgery.

Since 2010, two large clinical trials (CRASH-2 and MATTERs) have examined the specific role for TXA in adult trauma patients with evidence of or concern for severe hemorrhage. These studies found significantly favorable reductions in all-cause mortality when victims of trauma received TXA. (See attachments for articles) As a result, TXA is now a Class I recommendation in the U.S. Military's Tactical Combat Casualty Care Guidelines and is included in the World Health Organization list of essential medicines.

Thus given the high number of critically ill trauma patients that are transported by Air Care and Mobile Care (ACMC) each year, our transport professionals will now administer TXA to hemodynamically unstable adult trauma patients as outlined in this protocol.

IV. PROCEDURE

B. INCLUSION CRITERIA:

Air Care and Mobile Care providers will identify patients who are eligible for TXA administration based upon meeting all of the following criteria:

1. **Evidence of significant blunt or penetrating trauma** based on the history present illness and or physical exam findings.
   AND
2. evidence of severe internal or external hemorrhage. (ex: +FAST, bleeding requiring a tourniquet, etc.)
   AND
3. **Presence of 3 or greater markers of hemodynamic instability or UCMC Massive Transfusion Protocol Triggers**
   a) Systolic Blood pressure < 90mmHg (or < 100mmHg if patient age is > 55 years, or SBP indicative of shock based on age appropriate parameters)
   b) Pulse rate > 110 beats per minute or pulse indicative of shock based on age appropriate parameters
   c) Tachypnea > 24 breaths per minute or RR concerning for shock based on age appropriate parameters
   d) Clinical findings of peripheral vasoconstriction including cool, pale skin & capillary refill of > 2 seconds
   e) INR> 1.5
   f) Base deficit < -6mmol/L
   g) Hemoglobin < 11 g/dL
   h) Platelets < 200,000

AND

4. **Time since the initial injury is less than 3 hours.** It is preferable that TXA be administered as soon as possible after the initial traumatic insult. **The greatest benefit to patients is seen when TXA is administered within 1 hour of injury.**

5. ACMC crews can consult with medical control for those patients who they feel demonstrate signs of impending hemodynamic instability and thus may benefit from early administration of TXA.

If an ACMC crew is transporting a patient who has already received or will receive blood products during transport as treatment for a traumatic injury with severe hemorrhage, administration of TXA should be strongly considered.

C. EXCLUSION CRITERIA

1. Time elapsed from initial injury is greater than 3 hours or is otherwise unknown.
2. Patients with clear contraindications for anti-fibrinolytic agents (evidence of active intravascular thrombotic disease or disseminated intravascular coagulation, etc).
3. TXA should NOT be given to a patient who has received or will receive activated prothrombin complex concentrate (PCCs) or factor IX complex concentrates as this may increase the risk of thrombotic events.
4. TXA should be used carefully in the setting of urinary tract bleeding as ureteral obstruction due to clotting has been reported.
5. Previous hypersensitivity reaction to TXA.
6. Acquired disturbance of color vision
7. Medical control discretion as to the appropriateness of anti-fibrinolytic therapy in any particular patient.

D. ADMINISTRATION

1. Assess and manage airway, breathing, and circulation including treating immediate life-threatening injuries per institutional and Advanced Trauma Life Support Guidelines.
2. If patient meets the above inclusion criteria administer TXA as described.
   a) **Initial Bolus 1g of TXA in 100ml of 0.9% Normal Saline or Lactated Ringers over 10 minutes IV or IO.** (If given as an IV push, may cause hypotension)

b) **Pediatric dosing:** <12 years of age-15 mg/kg (maximum dose 1g) over 10 minutes. ≥12 years of age-1g over 10 minutes.

c) Use dedicated IV/IO line if possible and ***Do NOT administer in the same IV line as blood products, rFVIIa, or Penicillin***

d) If patient condition and transport time allows, the maintenance dose of TXA may be initiated: 1g TXA in 500ml of 0.9% Normal Saline or Lactated Ringers IV/IO at a rate of 60ml per hour for a total infusion time of 8 hours. If patient less than 12 years of age call medical control for direction on starting a maintenance drip.

3. During radio report, notify the receiving trauma center that TXA was initiated during transport per this protocol.
4. When transferring care to hospital staff and completing transport documentation: note the time of injury, time of TXA bolus, and time of maintenance TXA infusion initiation as appropriate.

V. RESPONSIBILITY

Flight physician, Mid-Level Practitioners, Critical Care Transport Nurses

VI. KEY WORDS

None

VII. APPENDIX

None

V. MONITORING/CONTINUOUS QUALITY IMPROVEMENT

All transport missions where TXA is administered will be thoroughly reviewed in the monthly ACMC CQI meeting by the appropriate transport medical director. Patient outcomes will be tracked as available.

University of Cincinnati Medical Center | UC Health

Use of Topical Hemostatic Gauze: Kaolin-Impregnated Gauze (Combat Gauze) (CLIN54)

I. POLICY

Use of Topical Hemostatic Gauze: Kaolin-Impregnated Gauze (Combat Gauze)

II. PURPOSE

To provide guidelines for the use of Combat Guaze to rapidly control life threatening external hemorrhage.

III. DEFINITIONS

None

IV. PROCEDURE

A. INDICATIONS:

1. Life threatening venous and/or arterial extremity hemorrhage not amendable to the placement of tourniquets
2. Life threatening venous and/or arterial hemorrhage from a junctional injury (axilla or groin) or neck
3. Uncontrolled external hemorrhage from the scalp, mouth, thorax, or abdomen despite having applied adequate and continued pressure with non-hemostatic bandaging.

B. CONTRAINDICATIONS:

1. None

C. EQUIPMENT:

1. Combat Gauze: Roll or Z folded, vacuum packed gauze.
2. Personal Protective Equipment

D. MANAGEMENT:

1. Examine the wound and identify the point of bleeding, specifically, the bleeding vessel.
2. Sweep the wound clear of any accumulated blood or clots prior to packing.
3. Pack Combat Gauze directly over the point of bleeding, starting with good initial contact and maintaining it throughout the packing.
4. Pack the entire Gauze without losing or releasing contact with the point of
5. bleeding
6. Once the entire Gauze is packed, maintain pressure for 2-3 minutes.
7. Avoid lifting the Gauze to re-assess during the 2-3 minute period.

8. If the Gauze soaks through and active bleeding continues, remove the entire Gauze and repeat steps 1-6 with a new Combat Gauze.
9. If bleeding is relatively well controlled or hemostasis is established, cover the wound with a bandage to secure the Gauze in place for transport.

H. COMPLICATIONS:

1. Hemorrhagic Shock
2. Uncontrolled Hemorrhage

V. RESPONSIBILITY

Flight Physicians, Mid-Level Practitioners, Critical Care Transport Nurses, Critical Care Transport Medics

VI. KEY WORDS

None

VII. APPENDIX

VIII. REFERENCES / CITATIONS

None

University of Cincinnati Medical Center | UC Health

Management of Intraosseous Access and Infusion with EZ IO Device (CLIN35)

I. POLICY

Initiation of intraosseous access is within scope of the health care providers on Air Care & Mobile Care. Trained and authorized personnel can initiate, access, administer medication and blood through an intraosseous site.

II. PURPOSE

To provide guidelines for the establishment and use of intraosseus access in patients when less invasive modes of vascular access fail.

III. DEFINITIONS

None

IV. PROCEDURE

A. INDICATIONS:

1. Need for emergent vascular access in patients where peripheral intravenous access is unavailable.
   - Emergent need for the administration of resuscitative medication or fluids.
   - Administration of fluids and/or blood products in patients with uncompensated shock (absent peripheral pulses or systolic blood pressure less than 70mmHg) when a peripheral IV cannot be immediately established.
   - Cardiopulmonary arrest (Non-breathing and absent central pulses) when a peripheral IV cannot be immediately established.

B. CONTRAINDICATIONS:

1. Fracture at or proximal to intended placement site
2. Evidence of soft tissue infection at insertion site
3. Previous, significant orthopedic procedure at the site (IO in past 24 hours, prosthetic limb or joint).
4. Excessive tissue and /or absence of adequate anatomical landmarks.

C. MATERIALS:

1. Povidone-iodine solution
2. Sterile gauze
3. 10ml syringes
4. Tape
5. EZIO kit (driver, appropriate needle, primed EZ-Connect extension set)
6. Saline flush
7. Intravenous fluids and tubing

8. Lidocaine

D. MANAGEMENT:

1. Observe Universal Precautions at all times.
2. Locate landmarks at chosen site as per EZIO training (proximal humerus, proximal tibia, distal tibia). See www.vidacare.com for an excellent review of the device and technique.
3. Prepare the skin using betadine, chlorhexidine, or alcohol.
4. Prepare infusion system.
5. Choose the appropriate needle: pink (PD) for <40kg, blue (AD) for >40kg.
6. Ensure that the driver and needle set are securely seated. Remove and discard the needle set safety cap.
7. Insert. Control the patient's movement. Position driver at insertion site with needle set at a 90-degree angle to the bone. Gently press needle set until needle set tip touches bone. Ensure 5 mm mark on the catheter is visible. Penetrate bone cortex by squeezing the trigger and applying gentle, steady downward pressure. Avoid using excessive force. Release trigger and stop applying pressure when a sudden "give" or "pop" is felt, and/or desired depth is obtained.
8. Remove driver and stylet, and confirm catheter stability.
9. Attach primed EZ-Connect extension set to catheter luer lock. Do not attach a syringe directly to the catheter.
10. Consider aspiration to confirm placement.
11. Consider administration of lidocaine (adults 40 mg, peds 0.5 mg/kg IO) prior to flushing for conscious patients.
    - ADULT PATIENT
        - ✓ Slowly infuse lidocaine 40mg IO over 120 seconds, allow lidocaine to dwell in IO space 60 seconds
        - ✓ Flush with 5 to 10mL of normal saline
        - ✓ Slowly administer an additional 20mg of lidocaine IO over 60 seconds
    - PEDIATRIC PATIENT
        - ✓ Usual initial dose is 0.5mg/kg, not to exceed 40mg
        - ✓ Prime EZ-Connect extension set with lidocaine
        - ✓ Note that the priming volume of the EZ-Connect is approximately 1.0mL
        - ✓ For small doses of lidocaine, consider administering by carefully attaching syringe directly to needle hub (prime EZ-Connect with normal saline)
        - ✓ Slowly infuse lidocaine over 120 seconds
        - ✓ Allow lidocaine to dwell in IO space 60 seconds
        - ✓ Flush with 2-5 mL of normal saline
        - ✓ Slowly administer subsequent lidocaine (half the initial dose) IO over 60 seconds
12. Flush catheter with saline (10 mL for AD / blue, 5 mL for PD / pink).

13. Administer fluids or meds as indicated. Monitor site for extravasation. Note and document time of insertion.
14. When possible, consider applying dressing. If it cannot be done in the out-of-hospital setting, it should be done upon arrival at definitive care.
15. Do not leave catheter in place longer than 24 hours. To remove, attach syringe directly to catheter luer lock, twist clockwise while slowly applying traction. Do not rock or bend catheter.

Note: All resuscitation medications have been reported to be amenable to IO infusion.

Medications and fluids should be pushed, or a pressure bag should be used, since resistance to gravity flow is often high.

E. COMPLICATIONS:

1. Extravasation of fluid or medications into the subcutaneous, subperiosteal or mediastinal spaces due to improper placement.
2. Soft tissue or bone infection.
3. Fracture
4. Fat embolism
5. Injury to great vessel

V. RESPONSIBILITY

Flight Physicians, Mid-Level Practitioners, Critical Care Transport Nurses, Paramedics

VI. KEY WORDS

None

VII. APPENDIX

None

VIII. REFERENCES / CITATIONS

None

University of Cincinnati Medical Center | UC Health

Management of Needle Cricothyrotomy (CLIN36)

I. POLICY

Trained and authorized personnel in Air Care & Mobile Care are permitted to perform Needle Cricothyrotomy to provide a temporizing airway when all other methods fail.

II. PURPOSE

To provide the guidelines to provide a temporizing airway of last resort in pediatric patients that cannot be managed by less invasive methods.

III. DEFINITIONS

None

IV. PROCEDURE

A. INDICATIONS:

Need for a temporizing airway in the setting of:

1. Massive oral, nasal or pharyngeal hemorrhage.
2. Massive emesis.
3. Clenched jaw with ineffective RSI.
4. Upper airway obstruction, deformity, edema or stenosis.
5. Laryngospasm that prevents supraglottic intubation.
6. Age < 10.

B. CONTRAINDICATIONS:

1. Ability to obtain a rapid airway by less invasive methods.
2. Ability to oxygenate and ventilate via BVM
3. Laryngeal or cricoid trauma.
4. Age > 10 (consider surgical cricothyrotomy or Size 3 I-LMA as options.)
5. Anterior neck hematoma, or other anatomical barrier that prevents identification of necessary landmarks.

C. EQUIPMENT:

1. Standard airway equipment (see Policy – Orotracheal Intubation.)
2. Needle Cricothyrotomy Kit

D. MANAGEMENT:

1. Universal Precautions in use at all times.
2. Basic airway/ventilation therapy already initiated. Assign roles to care team.
3. Maintain manual in-line spinal immobilization in all victims with potential C-spine injury.

4. Pre-oxygenate with 100% O2 by BVM or non-rebreather mask.
5. Consider sedation, where appropriate.
6. Appropriately position patient and care team.
7. Prep anterior neck with povidone-iodine solution if time and patient condition permit.
8. Locate landmarks (midline [or "keel" of thyroid cartilage,] thyroid notch, anterior button of cricoid cartilage, depression of cricothyroid membrane [CTM] between thyroid and cricoid cartilages.)
9. Infiltrate local anesthesia at planned surgical site if time and patient condition permit.
10. Stabilize the thyroid cartilage with the non-dominant hand and localize the CTM with the index finger.
11. Attach the catheter-over-needle to the saline-filled syringe and insert the needle into the inferior portion of the CTM in a caudally inclined direction. Maintain negative pressure on the syringe plunger. Entry into the airway is indicated by aspiration of air into the syringe.
12. Slide the catheter-over-needle into the trachea until hubbed and maintain catheter position with the non-dominant hand. Note: NEVER LET GO of the catheter
13. Insufflate 100% O2 through catheter hub
    - <5 years old use BMV with Needle Cric Kit
    - >5 years old use O2 tube with stop cock set at 1 L/min/year of lifeby or 14. Assess ventilation by breath sounds, oximetry.

E. POTENTIAL COMPLICATIONS:

1. Acute airway obstruction:
   - Mucus plug
   - Blood clot
   - False lumen
2. Subcutaneous/mediastinal emphysema/barotraumas.
3. Infection.
4. Bleeding.
5. Late airway stenosis.
6. Tracheoesophageal fistula.
7. Dysphonia.

V. RESPONSIBILITY

Flight Physician, Mid-level Practitioner, Critical Care Transport Nurse

VI. KEY WORDS

None

VII. APPENDIX

None

VIII. REFERENCES / CITATIONS

None

University of Cincinnati Medical Center | UC Health

Management of Surgical Cricothyrotomy (CLIN34)

I. POLICY

Surgical Cricothyrotomy is within the scope of practice for health care providers on Air Care & Mobile Care. Trained and authorized personnel are permitted to initiate this procedure to obtain a definitive airway.

II. PURPOSE

To provide guidelines for a definitive airway in patients that cannot be managed by orotracheal intubation (standard or Airtraq), nasotracheal intubation, or I-Gel.

III. DEFINITIONS

None

IV. PROCEDURE

A. INDICATIONS:
1. Massive oral, nasal or pharyngeal hemorrhage.
2. Massive emesis.
3. Clenched jaw with ineffective RSI.
4. Upper airway obstruction, deformity, edema or stenosis.
5. Laryngospasm that prevents supraglottic intubation.
6. Unable to oxygenate or ventilate the patient via Orotracheal, Nasotracheal, rescue, or extraglottic device.

B. ABSOLUTE CONTRAINDICATIONS:
1. Ability to obtain a rapid airway by less invasive methods.
2. Age < 10 (consider needle cricothyrotomy as option.)

C. RELATIVE CONTRAINDICATIONS:
1. Laryngeal or cricoid trauma.
2. Anterior neck hematoma or other anatomical barrier that prevents identification of necessary landmarks.

D. EQUIPMENT:
1. Standard airway equipment (see Policy – Orotracheal Intubation.)
2. Cricothyrotomy kit

E. MANAGEMENT:
1. Universal Precautions in use at all times.
2. Basic airway/ventilation therapy already initiated. Assign roles to care team.
3. Maintain manual in-line spinal immobilization in all victims with potential C-spine injury.
4. Pre-oxygenate with 100% O2 by mask.
5. Consider analgesia and/or sedation where appropriate.
6. Appropriately position patient and care team.

7. Prep anterior neck with povidone-iodine solution if time and patient condition permit.
8. Locate landmarks (midline [or "keel" of thyroid cartilage,] thyroid notch, anterior button of cricoid cartilage, depression of cricothyroid membrane [CTM] between thyroid and cricoid cartilages.)
9. Infiltrate local anesthesia at planned surgical site if time and patient condition permit.
10. Stabilize the thyroid cartilage with the non-dominant hand and localize the CTM with the index finger.
11. Standard technique:
    - Make 2cm – 3cm vertical, midline, skin incision.
    - Make horizontal stab incision in midline, inferior portion of cricothyroid membrane, directed caudally.
    - Insert tracheal hook under inferior edge of thyroid cartilage, apply outward traction.
    - Insert Kelly clamp or dilator into surgical opening, and widen incision horizontally.
    - Insert ETT or Shiley trach tube in caudal direction, inflate balloon, and anchor tube (note: ETT should be inserted only until balloon is no longer visible to prevent mainstem intubation.)
    - Confirm airway placement with capnography/ capnometry, symmetric breath sounds, and symmetric chest rise.

12. Rapid Four-Step Technique (RFST)
    Note: RFST requires unequivocal identification of surface landmarks and absolute confidence that the initial stab incision will enter airway through the CTM.

    - Identify CTM, stabilize thyroid cartilage (Step I)
    - Make horizontal skin incision through skin and CTM (Step II)
    - Insert trach hook and apply upward traction on the superior margin of cricoid cartilage (Step III.)
    - Insert tube in caudal direction, inflate balloon and anchor tube (Step IV.)
    - Confirm airway placement with capnography/ capnometry, symmetric breath sounds, and symmetric chest rise.

13. Bougie-Aided Cricothyrotomy
    - Make 2cm – 3cm vertical, midline, skin incision.
    - Make horizontal stab incision in midline, inferior portion of cricothyroid membrane, directed caudally.
    - Insert tracheal hook under inferior edge of thyroid cartilage, apply outward traction.
    - Insert bougie with Coudé Tip pointed towards the feet (caudally). Feel for tracheal clicks and eventually the inability to continue advancing the bougie. This "hold up" tells you that you have reached the carina.

- If needed, insert Kelly clamp or dilator into surgical opening, and widen incision horizontally.
- Insert ETT or Shiley trach tube in caudal direction, inflate balloon, and anchor **tube over the bougie. (Note: ETT should be inserted only until balloon is no longer visible to** prevent mainstem intubation.)
- Remove bougie and confirm airway placement with capnography/ capnometry, symmetric breath sounds, and symmetric chest rise.

F. POTENTIAL COMPLICATIONS:

1. Acute airway obstruction:
   - Mucus plug
   - Blood clot
   - False lumen
2. Infection
3. Bleeding
4. Late airway stenosis
5. Tracheoesophageal fistula
6. Dysphonia

V. RESPONSIBILITY

Flight Physicians, Mid-Level Practitioners, Flight Nurses

VI. KEY WORDS

None

VII. APPENDIX

None

VIII. REFERENCES / CITATIONS

None

University of Cincinnati Medical Center | UC Health

Use of the Combat Application Tourniquet (CLIN33)

I. POLICY

In the even of extremity arterial hemorrhage, qualified and trained personnel are permitted to use the Combat Application Tourniquet

II. PURPOSE

The purpose of this policy to provide guidelines for the use the Combat Application Tourniquet to rapidly control extremity arterial hemorrhage, preventing or allowing stabilization of hemorrhagic shock.

III. DEFINITIONS

None

IV. PROCEDURE

A. INDICATIONS:

1. Uncontrolled hemorrhage in an upper or lower extremity.

B. CONTRAINDICATIONS:

1. There are no contraindications per se to the use of this protocol.

C. EQUIPMENT:

1. Cardiac monitor and pulse oximetry
2. Oxygen
3. Medications as indicated
4. Equipment for obtaining IV access
5. Two (2) units O Negative PRBC or Type Specific Blood/Plasma
6. Combat Application Tourniquet

D. PROCEDURE AND MANAGEMENT:

1. Air Care & Mobile Care generally follows the Southwest Ohio Protocols for Paramedic Services as well as the protocols and guidelines of Advanced Trauma Life Support and Pediatric Advanced Life Support (which will not be reproduced here,) with consideration for individualization on a case-by-case basis.
2. Maintain universal precautions.
3. Support ABCs. Resuscitate the patient in hemorrhagic shock and consider the transfusion of blood.

4. In patients without evidence of shock and ongoing extremity hemorrhage, attempts may be made to control the bleeding with the use of direct pressure, elevation, a pressure dressing, or compression of proximal arterial supply.
5. In patients without evidence of shock, ongoing extremity hemorrhage, and the providers are unable to dedicate themselves to continued pressure application to the wound, a CAT should be placed (e.g. multiple victims, busy during transport, other medical needs to attend for the patient.)
6. In patients with shock and ongoing extremity hemorrhage, a CAT should be placed.
7. In general, providers should have a low threshold for CAT placement in patients with ongoing extremity hemorrhage.
8. If possible, attempt to remove clothing from affecting limb prior to CAT placement.
9. Avoid placing the CAT over a joint.
10. To place the CAT, route the Self-Adhering Band around the limb and pass the free-running end of the band through the inside slit of the friction adaptor buckle
11. Pass the Band through the outside slit of the buckle utilizing the Friction Adaptor Buckle, which will lock the band in place.
12. Pull the Self-Adhering Band tight and securely fasten the band back on itself.
13. Twist the rod until bleeding has stopped.
14. Lock the rod in place with the Windlass ClipTM
15. Prior to transport secure the rod with the strap by grasping the Windlass StrapTM, pulling it tight, and adhering it to the opposite hook on the Windlass ClipTM
16. If your first CAT does not produce hemostasis despite maximal twisting of the rod, place a second CAT proximal to the first. Do not remove the first CAT.
17. If bleeding increases after CAT placement, consider a venous bleed with inadequate arterial occlusion.
18. Document the time of CAT placement.
19. Make every attempt to keep the CAT exposed so that it is easily recognized at the receiving facility (so that it does not become inadvertently removed or cut).
20. Once in place, do not remove the CAT.
21. If multiple extremities require tourniquet placement and there are no further CATs available, consider placing a blood pressure cuff proximal to the injury and inflate to 100 mmHg greater than the patient's systolic BP, then place a hemostat over the cuff tubing to minimize occult pressure leak.
22. Provide appropriate analgesia to the patient in the absence of contraindications.

For a video showing CAT's proper application, visit:
http://www.combattourniquet.com/two-handed-tourniquet-video.php

E. POTENTIAL COMPLICATIONS:

1. Amputation of the affected limb due to ischemia
2. Neuropraxia
3. Local Skin Damage
4. Wound infection
5. Compartment Syndrome and the need for Fasciotomy
6. Rhabomyolysis and its complications, including renal failure and acidosis
7. Venous Thromboembolism

V. RESPONSIBILITY

Flight Physicians, Mid-Level Practitioners, Critical Care Transport Nurses, Paramedics, EMT's

VI. KEY WORDS

None

VII. APPENDIX

None

VIII. REFERENCES / CITATIONS

None

University of Cincinnati Medical Center | UC Health

Hydroxocobalamin (Cyanokit) Administration (CLIN63)

I. POLICY

Hydroxocobalamin (Cyanokit□) Administration

II. PURPOSE

To define when and how hydroxocobalamin (Cyanokit®) should be administered when caring for and transporting patients with evidence of or concern for hydrogen cyanide poisoning.

III. DEFINITIONS

A. Hydroxocobalamin: A natural form of vitamin B12 and a member of the Cobalamin compound family, in this case with a hydroxyl group bound to the cobalt ion of Cobalamin. It is naturally produced by a number of bacteria species, including lactobacillus. Hydroxocobalamin reverses intracellular hypoxia caused by cyanide poisoning through scavenging cyanide off of cytochrome oxidase a3 and forming cyanocobalamin that is then renally excreted 1,2.

B. Background

Cyanide has been traditionally recognized as a poison and a weapon of war, but cyanide toxicity has become increasingly common in the modern era due to its many industrial and even household sources. Smoke inhalation from structural fires is the most common cause of cyanide poisoning in Western countries 1. Many household materials such as wool, silk, certain types of wood, plastics, nylon, acrylics, polyurethane foams, synthetic insulation, rubbers, resins used as adhesives in constructions, and even some cotton blends may produce cyanide gas in their smoke when exposed to high temperatures during breakdown from thermal energy 1,2.

Cyanide toxicity causes intracellular hypoxia by reversibly binding to mitochondrial cytochrome oxidase a3. Symptoms typically occur rapidly and can result in death within minutes due to the inhibition of cytochrome oxidase resulting in the arrest of aerobic cellular respiration and lactic acidosis. Early signs and symptoms include headache, anxiety, visual changes, lightheadedness, palpitations, diaphoresis, and transient rapid or deep respirations. As intracellular hypoxia progresses, patient may develop altered mental status, seizures, refractory hypotension, life-threatening arrhythmias, coma, respiratory depression, and complete cardiovascular collapse 1,2,3.

IV. PROCEDURE

E. INCLUSION CRITERIA:

1. Air Care and Mobile Care providers will identify patients who are eligible for hydroxocobalamin administration based upon meeting the following criteria:

   - Evidence of exposure to smoke from a fire in an enclosed space or other clear evidence and/or high level of suspicion for smoke inhalation

   OR

   - Evidence of exposure to industrial source of Cyanide such as HCN or KCN, etc. This can be from a fixed industrial exposure at an industrial facility or a mobile exposure such as a MVC involving a placarded vehicle transporting cyanide containing materials

   AND

   - Altered mental status

   AND/*OR*

   - Presence of hemodynamic instability, hypotension, cardiovascular collapse, or other evidence of systemic shock state

F. EXCLUSION CRITERIA:

8. Patients with known anaphylactic reactions to hydroxocobalamin or cyanocobalamin

G. ADMINISTRATION:

1. Assess and manage airway, breathing, and circulation per institutional and Advanced Cardiac Life Support Guidelines.

2. If the patient meets the above inclusion criteria for hydroxocobalamin as described.
   - Reconstitute hydroxocobalamin (Cyanokit®) with 200cc's of sterile 0.9% saline utilizing the sterile transfer spike and the 250cc NS bag stored with the kit.
   - Vigorously agitate solution for 60 seconds.

- Administer 5 g dose by IV bolus through provided dedicated IV tubing over 15 minutes.

3. There is limited data in pediatric patients, but suggested dose is 70mg/kg.

4. Administer to the patient on the scene or at the facility as soon as possible prior to transport. The efficacy of hydroxocobalamin (Cyanokit®) is related to the speed of administration in relation to time since exposure of the patient to the cyanide containing compounds. Do not delay hydroxocobalamin (Cyanokit®) administration for transport in a patient that meets the above criteria.

H. POTENTIAL COMPLICATIONS/ADVERSE EFFECTS:

1. Allergic reactions may occur, including chest tightness, shortness of breath, rash, hives, and in rare cases angioedema.

2. Transient hypertension may result from hydroxocobalamin administration

3. The patient's skin, conjunctiva, mucous membranes, and urine may temporarily turn orange (may last up to 2 weeks). This may interfere with some colorimetric laboratory tests and pulse oximetry/co-oximetry. Patients may experience photosensitivity with skin coloration changes as well.

4. GI symptoms such as nausea, vomiting, diarrhea, bloody stools, and abdominal pain may develop.

5. Some patients develop and acne-like rash that may appear 7-28 days after treatment that is usually self-resolving.

I. MONITORING / CONTINUOUS QUALITY IMPROVEMENT

1. All transport missions where Hydroxocobalamin (Cyanokit®) is administered will be thoroughly reviewed in the monthly ACMC CQI meeting by the appropriate transport medical director.

V. RESPONSIBILITY

Critical care transport medics, nurses, advanced practice nurses, and physicians

VI. KEY WORDS

None

VII. APPENDIX

None

VIII. REFERENCES / CITATIONS

A. Borron SW. "Recognition and treatment of acute cyanide poisoning." J Emerg Nurs. 2006; 32(4 suppl):S11-S18.

B. Hall AH, Dart R, Bogdan G. "Sodium thiosulfate or hydroxocobalamin for the empiric treatment of cyanide poisoning." Ann Emerg Med. 2007;49(6):806-813.

C. Hamel, J. "A Review of Acute Cyanide Poisoning With a Treatment Update." Critical Care Nurse 31.1 (2011): 72-82. Web.

University of Cincinnati Medical Center | UC Health

Field Limb Amputation (CLIN61)

I. POLICY

Trained and authorized personnel in Air Care & Mobile Care are permitted to perform a field amputation as a final effort to save life or limb.

II. PURPOSE

To provide guidelines for a field amputation when all other attempts to save a limb has been made.

III. DEFINITIONS

None

IV. PROCEDURE

A. INDICATIONS:

1. Need for rapid/emergent removal of the patient from their environment due to life-threatening factors that are either situational or patient-centered/medical in nature AND entrapment of a limb that would be amenable to field amputation otherwise preventing the emergent removal of the patient from their environment.

B. CONTRAINDICATIONS: (RELATIVE)

1. Entrapment of a limb at a proximal location so as to not allow proper placement of a tourniquet to control bleeding.
2. Environmental or situational consideration as to make the procedure unsafe for the provider.

C. EQUIPMENT:

1. Chlorhexidine preparation swabs
2. Sterile gauze
3. Gigli Saw
4. 10 blade scalpel
5. Sterile surgical towels
6. Hazardous materials specimen bag
7. Tourniquet
8. Bone Wax

D. PROCEDURE:

1. Observe Universal Precautions at all times.
2. Obtain appropriate IV or IO access.

3. If possible, obtain verbal consent from the patient undergoing the limb amputation and document in the medical record. Contact medical control (4-2636 phone) and discuss amputation indications and plan if time allows.
4. Provide appropriate analgesia and/or sedation for the patient.
5. Place a tourniquet (CAT) as far distal as possible on the affected limb but proximal to the site of the proposed amputation, avoiding placement over any joints (see tourniquet protocol).
6. Record the tourniquet time.
7. Prepare the skin using betadine, chlorhexidine, or alcohol, allowing appropriate time to dry
8. Utilizing scalpel, make a circumferential skin incision at the lowest point on the entrapped limb at the desired site.
9. Incise through all of the soft tissue, down to the bone.
10. Place Gigli saw around exposed bone and while holding a handle in each hand, perform slow back and forth motion while pulling tension on both ends of the saw in a "V" shape of roughly 90 degrees.
11. Cut completely through the bone.
12. Assess for continued bleeding and control with direct pressure, application of a second tourniquet just above or below the original tourniquet, or, if necessary, selective clamping of vessels.
13. Utilize bone wax if necessary to control bleeding from freshly cut bone.
14. Place sterile gauze over the end of the limb and cover with an ace bandage.
15. If able to retrieve limb after amputation, place limb in hazardous materials bag for transport with the patient to the hospital. DO NOT place limb on ice as in some circumstances the limb may be amenable for re-implantation.

E. COMPLICATIONS:

1. Hemorrhage
2. Infection/Osteomyelitis

V. RESPONSIBILITY

Flight Physician, Flight Nurse Practitioner

VI. KEY WORDS

None

VII. APPENDIX

None

VIII. REFERENCES / CITATIONS

In-Field Extremity Amputation: Prevalence and Protocols in Emergency Medical Services. *Prehospital and Disaster Medicine 11(1):63-66, 1996.*

Porter, K. M. "Prehospital Amputation." *Emergency Medicine Journal* 27.12 (2010): 940-42. Web.

Zils, Steven W., Panna A. Codner, and Ronald G. Pirrallo. "Field Extremity Amputation: A Brief Curriculum and Protocol." *Academic Emergency Medicine* 18.9 (2011): E84. Web.

University of Cincinnati Medical Center | UC Health

Lateral Canthotomy and Cantholysis (CLIN64)

I. POLICY

Trained and authorized personnel in Air Care & Mobile Care are permitted to perform a Lateral Canthotomy and Cantholysis in and effort to preserve the eye in a traumatic event**.**

II. PURPOSE

This policy provides the guidelines to decompress orbital compartment syndrome with the goal of saving a patient's vision in the setting of blunt trauma to the eye or head.

III. DEFINITIONS

Orbital Compartment Syndrome: Precipitous rise in intra-ocular pressure and compromise of the ophthalmic artery and optic nerve that occurs when a retro-bulbar hematoma forces the globe against the eyelids which are firmly attached to the orbital rim by the medial and lateral canthal ligaments. This can result in ischemia and visual loss. This can be caused by acute facial trauma or retrobulbar anesthesia that result in retrobulbar hemorrhage.

IV. PROCEDURE

A. INDICATIONS:

1. Acute proptosis AND acute decreased visual acuity OR acute loss of vision. May be associated with an afferent pupillary defect.
2. Acute proptosis AND intraocular pressure greater than 40 mmHg.

B. CONTRAINDICATIONS:

1. Globe rupture

C. EQUIPMENT:

1. 1% Lidocaine with epinephrine.
2. 10cc synringe with 25 gauge needle.
3. Chloroprep sticks.
4. Blunt fill needle.
5. Straight hemostat
6. Iris scissors
7. Forceps
8. Sterile gloves
9. 4X4 sterile gauze

D. PROCEDURE:

1. Clear debris away from the lateral canthus of the affected eye. Clean area with chloroprep. Maintain C-spine stabilization if necessary, especially if patient is awake.
2. Inject 1-2 ml of 1% lidocaine with epinephrine into the lateral canthus. Direct the needle tip towards the lateral orbital rim to avoid injuring or injecting the globe. This provides analgesia and hemostasis.
3. Apply straight hemostat to the lateral canthus angled towards the lateral margin of the bony orbit. Apply clamp pressure for 30-90 seconds to devascularize the canthus. Ensure to crimp all the way down to the orbital rim.
4. Remove the hemostat. Lift up the skin around the lateral orbit with forceps and cut the lateral canthus 1-2 cm laterally along the region demarcated by the hemostat.
5. Utilizing forceps, lift the inferior lid in an anterior-inferior direction to visualize the inferior crux of the lateral canthal ligament. This may require blunt dissection with the hemostats.
6. Cut the inferior crux of the lateral canthal ligament to perform an orbital compartment release.

E. COMPLICATIONS:

1. Iatrogenic globe rupture
2. Lacrimal duct injury
3. Scleral laceration or injury
4. Infection
5. Vision loss
6. Fibrosis

V. RESPONSIBILITY

Flight Physician, Advance Nurse Practitioner

VI. KEY WORDS

None

VII. APPENDIX

None

VIII. REFERENCES / CITATIONS

Roberts, James R., Catherine B. Custalow, Todd W. Thomsen, and Jerris R. Hedges. Roberts and Hedges' Clinical Procedures in Emergency Medicine. 6th ed. 2013. Print

University of Cincinnati Medical Center | UC Health

Management of Pericardiocentesis (CLIN37)

I. POLICY

Trained and authorized personnel in Air Care & Mobile Care are permitted to perform a Pericardiocentesis.

II. PURPOSE

To provide guidelines for the management of hemodynamic instability due to suspected or confirmed pericardial tamponade by pericardiocentesis.

III. DEFINITIONS

None

IV. PROCEDURE

A. INDICATIONS:

1. Hemodynamic instability or PEA / asystole due to suspected or confirmed pericardial tamponade. In our setting, the procedure has its greatest chance of efficacy in patients with known effusions (usually cardiac transfers). Next would be unstable or arrested penetrating truncal trauma patients. The procedure is unlikely to be efficacious in blunt trauma. In blunt trauma arrest, prior to calling the code, crews may consider performing pericardiocentesis, but it is not mandatory.

B. CONTRAINDICATIONS:

1. In our setting, hemodynamic stability would be a relative contraindication.

C. EQUIPMENT:

1. Pericardiocentesis
2. Cardiac monitor.

D. MANAGEMENT:

1. Universal Precautions at all times.
2. Continue standard ALS resuscitative efforts.
3. Attach spinal needle to three-way stop-cock and 20ml syringe.
4. Position patient, if condition permits, seated at 45 degrees.
5. Prep skin and infiltrate local anesthetic into planned puncture site.
6. Identify landmarks for puncture site:
   - Xiphosternal approach: The needle enters at the junction between the xiphoid process and left costal margin, directed toward the point of

the left shoulder, and advanced at 30 – 45 degrees off of the horizontal plane. In adults, the pericardial space usually lies at a depth of 5 – 8cm in this approach. In children, the space is usually encountered within 5cm.

- Parasternal approach: The needle enters in the left 5th intercostal space (ICS) perpendicular to the chest wall either immediately parasternally (preferred) or 3 – 4cm lateral to the sternal margin, to avoid Left Internal Mammary Artery (LIMA.)

7. When the needle penetrates the pericardium, there should be a release of resistance to advance of the needle. Stop advance on free return of blood, or if an injury current (ST-segment change) is noted on the monitor. If an EKG change is encountered, withdraw needle several cm until it ceases. Aspirate blood or fluid. Non-clotting blood usually indicates pericardial blood, while ventricular blood will generally clot. If pericardial blood or fluid is confirmed, fill the syringe as many times as is necessary to alleviate tamponade. Use of the three-way stop-cock, if available, will facilitate repeated filling and emptying of syringe.
8. Consider the use of Ultrasound for this procedure when available.
9. Specifically for Mobile Care crews, in the setting of a known significant pericardial effusion who then suffers a cardiac arrest during transport a pericardiocentsis can be considered.

E. POTENTIAL COMPLICATIONS:

1. Ventricular (usually right) penetration.
2. Arrhythmias/sudden cardiac death/AMI.
3. Infection
4. Laceration of coronary artery/vein.
5. New hemopericardium secondary to #1 or #4.
6. Pericarditis
7. Pneumothorax
8. Puncture of the aorta, inferior vena cava, LIMA.
9. Puncture of esophagus/mediastinitis.
10. Puncture of peritoneum/peritonitis.

V. RESPONSIBILITY

Flight Physicians, Mid-Level Practitioners, Critical Care Nurses, Critical Care Paramedic

VI. KEY WORDS

None

VII. APPENDIX

None

VIII. REFERENCES / CITATIONS

None

University of Cincinnati Medical Center | UC Health

Pleural Decompression (needle and finger thoracostomy) (CLIN38)

I. POLICY

Trained and authorized personnel are permitted to perform a needle or finger thoracostomy or in effort to save or preserve a life.

II. PURPOSE

To provide guidelines to facilitate rapid decompression of confirmed or suspected tension pneumothorax by needle thoracostomy.

III. DEFINITIONS

None

IV. PROCEDURE

A. INDICATIONS:

1. Suspected or confirmed tension pneumothorax with hemodynamic instability.
2. ACLS PEA protocol.

B. CONTRAINDICATIONS:

1. None

C. EQUIPMENT:

1. Needle Thoracostomy:

- Large bore IV catheter: 14 gauge or 10 gauge, minimum length 2 ½ inches (adult,) 14-20 gauge, minimum length 1 ¼ inches (child.)
- Aseptic Cleanser solution and gauze sponges or
- Lidocaine, syringes and needles.

2. Finger Thoracostomy:

- Sterile Gloves
- Aseptic Cleanser
- Kelly Clamp
- #11 Blade Scalpel
- Gauze, Tegaderm, Tape

D. PROCEDURE:

1. Needle Thoracostomy:

- Pre-oxygenate patient.
- Position patient with HOB elevated 30 – 45 degrees, if patient condition permits.

- Identify second intercostal space (ICS) by locating angle of Louis at the junction between sternal manubrium and body. The rib palpated at that level is the 2nd rib. The 2nd ICS lies just below the rib. Trace the 2nd ICS out to the mid-clavicular line.
- Prep the area with aseptic cleanser solution. Infiltrate local anesthesia into area of insertion point if time and patient condition permit.
- Insert needle-catheter immediately over the superior margin of the 3rd rib until pleural resistance is encountered and overcome as pleura is penetrated, or until rush of air is encountered. Needle insertion should be perpendicular to chest wall. Once pleural space is entered, remove the needle, leaving catheter in place.
- Re-assess breath sounds and hemodynamics frequently.
- Repeat procedure with 2nd catheter if signs of symptoms of tension pneumothorax recur. In this case, consider performing the needle compression at the anterior to mid axillary line, 4th inter-costal space

2. Finger Thoracostomy Intubated and Pulseless Patients Only (Air Care crews only):
   - Identify the fourth or fifth intercostal space (ICS) by locating the 2nd ICS and counting down, or by finding the 4th ICS at the nipple line (male) or inframammary fold (female.) Trace the selected ICS lateral to the anterior or mid-axillary line.
   - Prep the surgical site with aseptic cleanser solution
   - Prepare equipment and gloves in the usual sterile fashion
   - Make a horizontal incision with a scalpel along the upper border of the fifth rib about 4 to 5 cm in length
   - Using Kelly Clamps, perform a blunt dissection through subcutaneous fat and intercostal muscle.
   - Pierce the parietal pleura with your Kelly Clamps
   - Insert a sterile gloved finger and sweep around the pleura to free any adhesions.
   - If you regain a pulse, cover the incision with an occlusive chest seal (i.e. Bolin Chest Seal) for transport.
   - If your patient regains tension pneumothorax physiology, remove the chest seal and if necessary, sterile re-dilate the tract and replace chest seal as above.

E. COMPLICATIONS:
   - Open pneumothorax
   - Lung laceration
   - Hemothorax
   - Loss of catheter tip into pleural space
   - Injury to great vessels
   - Empyema
   - Failure to decompress pleural space

V. RESPONSIBILITY

Flight Physicians, Mid-Level Practitioners, Critical Care Transport Nurses, Transport Paramedics

VI. KEY WORDS

None

VII. APPENDIX

None

VIII. REFERENCES / CITATIONS

None

University of Cincinnati Medical Center | UC Health

Tube Thoracostomy (CLIN40)

I. POLICY

Trained and authorized personnel are permitted to perform a tube Thoracostomy to stabilize a patient and preserve or save a life.

II. PURPOSE

To provide guidelines to facilitate treatment of pneumothorax and hemothorax**.**

III. DEFINITIONS

None

IV. PROCEDURE

A. INDICATIONS:

Note: Tube thoracostomy will rarely be required prior to transport of interhospital transfer patients, and should not be performed in the field. Occasionally, tube thoracostomy will be appropriate to perform at a referring hospital prior to transport (e.g. intubated patient with known pneumothorax. Hypoxia refractory to supplemental O2). Undue delays due to the performance of this procedure should be scrupulously avoided, especially when transport times are relatively brief.

1. Simple pneumothorax.
2. Open pneumothorax.
3. Hemothorax

B. CONTRAINDICATIONS: (RELATIVE)

1. Pleural adhesions or lung bullae/blebs.
2. Coagulopathy

C. EQUIPMENT:

1. Aseptic cleanser.
2. 1% Lidocaine with epinephrine, syringes and needles
3. Kelly Clamp
4. Sterile drapes and/or towels
5. #11 Blade Scalpel
6. Chest Tube (size depends on indication and patient age)
7. Chest tube drainage device with water seal
8. Suction tubing and device
9. Needle driver.
10. 1-0 or 0 Silk sutures, tape and dressing supplies.

D. PROCEDURE:

1. Pre-oxygenate patient.
2. Consider IV sedation as the patient condition permits. Refer to "Pain Management and Sedation Policy.
3. If IV Cefazolin is immediately available at referring institution, consider administering a dose to decrease risk of subsequent empyema if not otherwise contraindicated.
4. Position patient with HOB elevated 30 – 45 degrees, if patient condition permits. Restrain ipsilateral arm over the patient's head.
5. Identify the fourth or fifth intercostal space (ICS) by locating the 2nd ICS (see Policy – Pleural Decompression) and counting down, or by finding the 4th ICS at the nipple line (male) or inframammary fold (female.) Trace the selected ICS lateral to the anterior or mid-axillary line.
6. Prep surgical site with aseptic cleanser and drape chest wall in sterile fashion.
7. Infiltrate local anesthetic into skin, periosteum of adjacent rib, intercostals musculature and pleural membrane.
8. Transverse skin incision, 2 – 4cm long, down to bone and over immediately inferior rib or rib below level of tube entry.
9. Tunnel through subcutaneous tissue and intercostals with Kelly clamp.
10. Perforate pleura with tip of Kelly clamp and spread clamp to widen pleural opening.
11. Remove clamp, insert finger to confirm pleural entry and leave finger in place.
12. With 20 – 36 F tube (depending on site, age, indication) held in tip of another Kelly, insert tube into pleural space by following internal finger.
13. Release clamp from tube and advance with twisting motion posteriorly, medially and apically.
14. Attach tube to water seal or ThoraKlex/Pneumovac.
15. Place single stitch to tighten skin incision around base of tube, leave leads long.
16. Tie tube with long leads.
17. Place single horizontal-mattress suture through skin incision and surrounding tube, tighten and secure with single-throw surgeons knot.
18. Apply occlusive dressing to base of tube and dress appropriately.
19. Reassess breath sounds, hemodynamics and tube output frequently.

E. COMPLICATIONS:

1. Open pneumothorax.
2. Lung laceration.
3. Hemothorax
4. Air leak.
5. Empyema
6. Splenic/liver/diaphragmatic laceration.
7. Re-expansion
8. Hemorrhage (from coagulopathy or injury to sub-costal vessels)

V. RESPONSIBILITY
Flight Physicians, Mid-Level Practitioners, Flight Nurses

VI. KEY WORDS
None

VII. APPENDIX
None

VIII. REFERENCES / CITATIONS
None

University of Cincinnati Medical Center | UC Health

Use of the TPod Pelvic Stabilizer (CLIN43)

I. POLICY

Trained and authorized persinnal are permitted to use the TPod Pelvic Stabilizer on traumatized patients.

II. PURPOSE

To provide guidelines to rapidly stabilize the unstable pelvic fracture, especially when accompanied by unstable hemodynamics.

III. DEFINITIONS

None

IV. PROCEDURE

A. INDICATIONS:

1. Unstable pelvic fracture, or known or suspected pelvic fracture accompanied by unstable hemodynamics.

B. CONTRAINDICATIONS:

2. There are no contraindications per se to the use of this device in the patient with a pelvic fracture. However, children under 23kg may be too small to achieve proper closure of the device.

C. EQUIPMENT:

1. Cardiac monitor and pulse oximetry
2. Oxygen
3. Medications as indicated
4. Equipment for obtaining IV access
5. Two (2) units O Neg PRBC or Type Specific Blood/ Plasma if available
6. TPod

D. PROCEDURE AND MANAGEMENT:

1. University Air Care & Mobile Care generally follows the Southwest Ohio Protocols for Paramedic Services as well as the protocols and guidelines of Advanced Trauma Life Support and Pediatric Advanced Life Support (which will not be reproduced here,) with consideration for individualization on a case-by-case basis.
2. Maintain universal precautions.
3. Support ABCs. Resuscitate the patient in hemorrhagic shock and consider the transfusion of blood.

4. If the crew decides that pelvic stabilization is indicated, the TPod should be considered first-line therapy and used preferentially over a bed sheet or other method.
5. Slide belt under patient and into position under the pelvis, maintaining spine precautions. Making sure that the device is properly placed over the Greater Trochanters. Improper placement can cause harm.
6. Cut the belt with trauma shears, leaving a 6-8 inch gap over the center of the pelvis/ abdomen.
7. Apply Velcro-backed pulley system on each side of the gap.
8. Draw the pull tab, creating simultaneous circumferential compression. You should be able to put two fingers underneath the belt to ensure it does not over tighten.
9. Wrap pull tab around notches provided to secure, and then place the Velcro-backed pull tab on the belt.
10. Note and document the time of application in the electronic medical record.
11. Provide appropriate analgesia to the patient in the absence of contraindications. See Pain Management Policy

E. POTENTIAL COMPLICATIONS:

1. Loss of limb or function
2. Hemorrhagic shock
3. Injury to the urogenital tract or gastrointestinal tract

V. RESPONSIBILITY

Flight Physicians, Mid-Level Practitioners, Critical Care Transport Nurses, Paramedics

VI. KEY WORDS

None

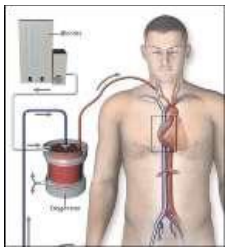
VII. APPENDIX

None

VIII. REFERENCES / CITATIONS

None

University of Cincinnati Medical Center | UC Health



ACMC ECMO Guide

Indications: Refractory hypoxemia/hypercapnia with failure of ventilatory support, refractory septic/cardiogenic shock that fails to respond to aggressive inotropic and pressor support or as a bridge to insertion of a left ventricular assist device (LVAD).
Contraindications: Clinical factors that would render the patient not a suitable candidate for ECMO transport mirror those factors which would make initiation or continuation of ECMO support in general inappropriate
Insertion: VV-ECMO: insertion of at least two cannulae in large veins (jugular, femoral, or both). VA-ECMO, the drainage cannula is commonly placed in the inferior vena cava (IVC) or right atrium (RA). Blood is returned to the patient through a cannula inserted in either the ascending aorta or the femoral
Complications: Hemorrhage, Intracranial bleeding, thromboembolism (stroke or leg ischemia) and infection. Thrombus in the circuit can affect the function of the pump or the oxygenator. ECMO management includes close coagulation monitoring, ensuring the best possible balance in coagulation homeostasis.

Truck (No truck 23): Generator, oxygen supply full, portables (ECMO team will need a portable 02 bottle).

Team (do you require an additional RN or Medic)?

EMT is Safety Officer (see Safety Officer Checklist)

Adequate pumps and tubing (minimum two triple channel)

Ventilator: tubing, green hose, HME, filter

Do you need the IABP?

Do you need portable suction?

Obtain sending facility RN contact phone number._____.

Obtain perfusionist name and contact phone_____.

Special resources? (bariatric equipment, extra IV poles)

Call Sending facility: request new med bags for all drips. You can prime the lines and build a manifold upon arrival. **(We do not take other hospital pumps)**

Is our transducer cable compatible with their transducer

Place Zoll pads on patient prior to packaging patient

Time Outs:

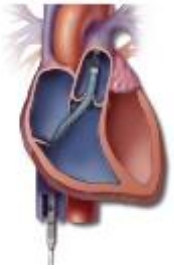
- On initial contact with sending team (MICU Team, ECMO Team and Sending Staff)
- Prior to any patient movement: i.e.Bed to stretcher

Move patient last to cot to minimize time on ECMO portable 02

Remind sending RN to contact receiving facility with update when departing

Identify IV access and make sure its accessible during transport

University of Cincinnati Medical Center | UC Health



ACMC Impella Guide

Indications: acute heart failure, cardiogenic shock, acute and post myocardial infarctions, acute on chronic ischemic cardiomyopathy, myocarditis, cardiac transplant-related acute graft failure, support during PCI, etc.
Contraindications: aortic regurgitation, severe aortic valve calcification, prosthetic aortic valves, aortic dissection, left ventricular thrombi, ventricular septal defects, severe sepsis, severe PAD, and bleeding diathesis.
Insertion: Impella 2.5 and CP are inserted via the femoral artery, Impella 5.0 is inserted axillary or via femoral artery cut-down. Impella RP is inserted via the femoral vein.
Complications: anemia, hemolysis, aortic injury and aortic valve insufficiency, arrhythmias, bleeding, cardiac tamponade, CVA, functional mitral stenosis, limb ischemia, mitral regurgitation secondary to chordal rupture. Device malfunction is predominantly due to device thrombosis (heparin should be in place).

Power Sources: AC or internal battery. BATTERY HAS **ONE HOUR** OF LIFE! Keep plugged in!!!

SUPPLIES NEEDED:
*You will likely be taking the device from the sending facility and it will need to be returned. Take the device off of the wheeled stand and secure to rack-pack (do not block cooling vents).
*If possible, take the manual for the device with you. It has a wealth of information regarding alarms/issues. Return it to sending facility when you return their device.
*If possible, take an extra purge cassette with you (in case of leak/failure). If you don't use it, you can return it to the sending facility when you return their device. Manual or rep can walk you through setting up a new purge cassette if needed.

***PATIENT ASSESSMENT:**
*All pulses as normal – but check distal pulses from insertion site with each set of vitals. May need Doppler.
*Assess insertion site with each set of vitals.
*The arterial pressure (placement signal) on the Impella console is a reflected pressure of the aorta (used for catheter positioning only) and not a 'true' arterial pressure. Legally, clinical decision making for interventions must be based on blood pressures recorded by the non-invasive blood pressure or an arterial line ONLY. There will be times where pulsatility is minimal and NIBPs will be inaccurate/unobtainable; using the MAPs from the placement signal in this situation is acceptable (document appropriately!).

TROUBLESHOOTING:
Reference manual for specific alarms. Impella display will tell you what you can do to remedy alarms.
Device Position Wrong: *If at sending facility*, request 2D echo and cardiologist repositioning. The pump offers no support if it is in the wrong place, and can actually cause harm.
If during transport, assess waveform to ascertain whether it is too far in or too far out. We are not qualified to reposition this device. Alert receiving facility to have echo tech and cardiologist present upon arrival for repositioning. Keep pump running. May need pressors/inotropes to support cardiac fxn.

If pump fails DO NOT ATTEMPT REPOSITIONING. Closely monitor patient and anticipate need for inotropic/pressor agents. Keep device/purge system running to prevent thrombus formation.

AA 1.2016 edit 7.2016

Alarms:

Suction: decrease P level by 1 or 2 to reduce effects of suction. Assess patient for volume needs. Gradually return P level to previous after treating.

Air in Purge System: Follow instructions on screen for de-airing purge system. Keep purge bag/syringe above level of purge cassette at all times!

Purge Pressure Low: Check tubing for leaks, ensure all connections are tight.

Purge System Blocked: Check tubing for kinks.

Impella Position Unknown: Confirm positioning with imaging, assess motor current/placement signals and hemodynamics.

RESUSCITATION:

*VF/VT ∅ Pulse/Asystole/PEA: Reduce flow to 1.5 L/min (P2), CPR and defib OK

*With ROSC, return P level to previous, and ensure receiving is aware they will need an echo to re-confirm placement. Monitor the device very closely.

*Arrhythmias, hypotension, respiratory distress, altered LOC, etc: **Treat patient**!

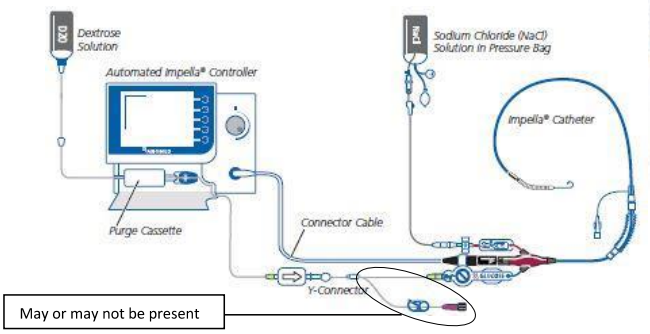
Documentation:

P level, Impella flows (max/min and mean), placement signal and motor current (max/mins and means). These will have to go in the comment section of your vital signs. If placement signal MAPs are being used to guide treatment, document reason. Insertion date/time and last placement confirmation via echo. Last ACT.

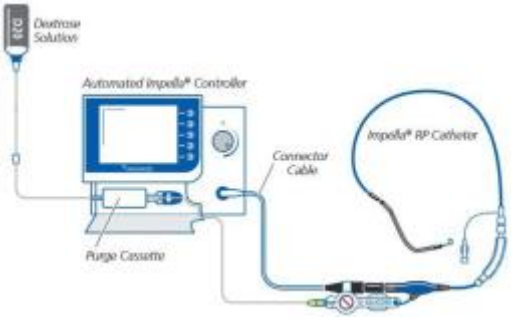
In GH make sure "ventricular assist device" is checked under cardiac portion of physical assessment.

Abiomed reps are a phone call away (ask referring RN which rep they have been in contact with).

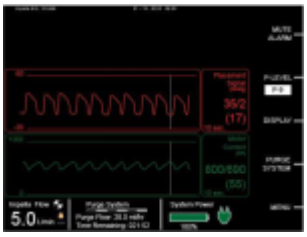
24hr Support Line: 1-800-422-8666 Myles Murphy (regional rep): 513-227-6099



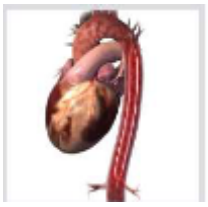
Correct configuration of the Impella system (2.5, 5.0, CP)



Correct configuration of the Impella RP system



University of Cincinnati Medical Center | UC Health



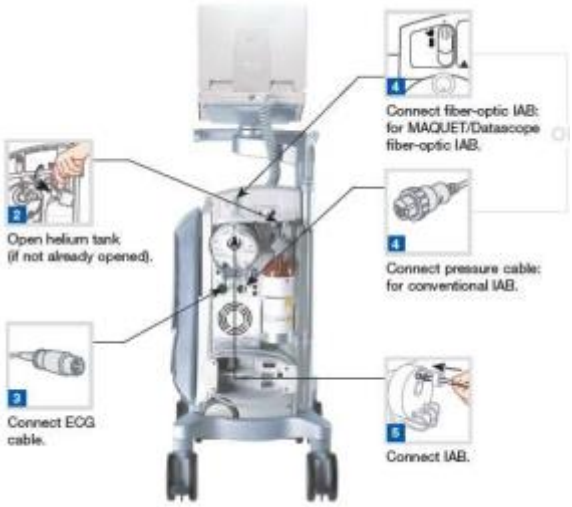
ACMC IABP Guide

Indications: Refractory angina, Acute MI, Vent failure, Cardiogenic shock, wean from bypass.
Contraindications: Aortic insuff, AAA, severe PVD, Obese w ⇑ groin scars (use with a sheath).
Insertion: (Freq) Lt Fem. artery→descend thoracic aorta (CXR tip @ 2nd → 3rd ICS, base ⇑ renals).
Complications: Limb ischemia, bleeding, balloon leak, infection, aortic dissection.

Inflation occurs at the onset of diastole (dicrotic notch), when aortic valve closes. Appears as a sharp "V." Inflation displaces blood in the aorta & ⇑ aortic pressure & MAP, ⇑ supply of 02 to the myocardium and ⇑ **coronary artery perfusion**.

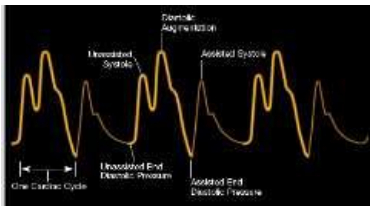
Deflation occurs just prior to systole (before aortic valve opens). Results in a ⇓ in (assisted) end diastolic & systolic pressures. ⇓ **afterload**, cardiac workload & left ventricular 02 demand. ⇑C.O.

CS300 IABP START UP:



(Top of left side / near back)

Arterial Pressure Waveform



*__Timing__ = inflation /deflation of balloon in cardiac cycle
*__Trigger =__ *Primarily ECG (R wave) vs Pressure (upstroke of AP waveform)
*__End Points:__ ⇑ **MAP**
- Diastolic Augmentation >Systole
- Assist Diastole < Unassist Diastole
- Assist Systole < Unassist Systole

*__SUPPLIES NEEDED:__ 60cc syringe, stopcock, scissors & Kelly, 500ml bag NS, pressure bag, ECG & Arterial pressure cable, Pressure tubing & transducer (max 8ft), IABP flowsheet, ? x-tra helium tank if <25%.

University of Cincinnati Medical Center | UC Health

***PT ASSESS:** √ radial pulses to assure balloon has not migrated up to Lt SC artery & pedal pulses (limb ischemia), Insertion site (√ for bleeding), IAB cath tubing (√ for bld), flush line, U.O.

TRANSFERRING IABP→IABP: Turn on IABP, match settings, attach ECG leads next to current leads, transfer IAP line (level/ 0**off-pt/open-air),Press Stand By on active pump, transfer helium line & start transfer IABP.*Plug IABP in, turn invertor ON. *Augmentation alarm set 10mmHg ⇓ pt's augmented diastolic pressure.

*Keep pressure bag w NS (remove air from IV) @ 300mmHg > 3ft above transducer. Level transducer @ phlebostatic axis – mid Axillary. **If fiberoptic (orange cable) ∅ need to zero/level. Internally calibrates.

MISC INFO:

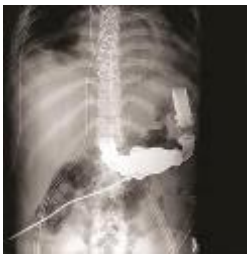
***Auto mode** = auto lead & trigger select, timing, auto management of irreg rhythms.
*If IABP alarms: push silence, push **help** button. ? Call 800# on pump.
*Main concern in transport: ∅ disruption of ECG signal, arterial pressure or helium flow.
*Must always have ≥ ½ IAB pressure / IAB status (keeps membrane from getting a clot).
*IABP Wt = 125#. *Always put IABP in standby prior to flushing IAP line.

TROUBLESHOOTING:  = Normal balloon pressure waveform (**)
*If not sensing "R" wave: ⇑ gain or change ECG lead.
*If IAB kinks: See rounded waveform. ?D/T HOB>30°. Lower HOB until get chair (**) waveform.
*If see IAB leak: Turn pump off. Rec. MD to remove within 30mins. Turn pump on q5 mins to prevent clot.
*If machine dies: Disconnect at helium extender tubing, attach 3-way stopcock & 60ml syringe, (asp 1st to√ for blood), manually inflate & deflate IAB (quickly) w 40-50cc air q5 mins.

TIMING ISSUES: √Timing in 1:2 "Fiddle to the Middle" ⇑inflate/⇓deflate time(Semiauto mode)
-Early inflation = inflation of IAB prior to aortic valve closure (prior to dicrotic notch).
Effect = ⇑ MV02 demand, aortic regurg, ⇑ afterload.
-Late inflation = inflation of IAB after closure of aortic valve (after dicrotic notch), absence of sharp V, sub-optimal augmentation. Effect = sub-optimal coronary artery perfusion.
-Early deflation = premature deflation of the IAB during the diastolic phase. Effect = sub-optimal coronary perfusion & afterload reduction, angina, ⇑ MV02 demand.
-Late deflation = Assisted = unassisted end-diastolic pressure, diastolic augment may be widened.
Effect = no afterload reduction, ⇑ MV02 consumption.

RESUSCITATION:
***VF/VT ∅ Pulse**: Auto mode goes to pressure trigger, CPR…, OK to defib (IABP is grounded).
***Asystole**: Auto mode → pressure, CPR…etc. Will return to ECG trigger if ROSC. ?mute alarm.
***PEA**: If keep in Auto mode, will have ECG rhythm interference. Go to semi-auto mode, change to pressure trigger & restart. CPR…etc.
*A Fib: After 16 irreg beats, goes into "Auto R wave" deflate.
*If HR too fast: (Pump can keep up to a HR of 200). Treat patient (+) ? change timing to 1:2.
*Pacer (V/AV, Atrial): Go to semi-auto mode/select approp. pacer when ECG triggering unsuccessful.
*Arrhythmias, Hypotension, Resp distress, Altered LOC…etc : Treat patient!

University of Cincinnati Medical Center | UC Health



ACMC LVAD Guide

Current types: HeartMateII (old&new controllers), HMIII, HeartWare, Jarvik2000, DuraHeart

Refer to specific device information

Indications: AHA/ACC stage D and NYHA class IV heart failure. Implanted LVADs are typically either Destination Therapy (not eligible for heart transplant) or Bridge to Therapy (awaiting heart transplant). Very rarely will implanted LVADs be used as Bridge to Recovery therapy (heart may recover when given the opportunity to "rest").
Contraindications: RV failure (may receive bivad instead); multi-organ failure; lack of caregiver support, others per physician specification. Patients and their families go through extensive screening before LVAD placement – this is not an emergently placed device.
Insertion: Typically via sternotomy, rarely via thoracotomy. Apex of heart is inflow site, aorta is outflow site.
Complications: Bleeding, return to OR, neurologic events, right heart failure → bivad, driveline infection, hepatic/renal dysfunction, hemolysis, pump thrombosis, respiratory failure, arrhythmias, A/V malformations (GIB and nose bleeds very common).

Need to Know:
*Devices are preload dependent, afterload sensitive – right heart failure is complication of increased LV flow
*Arrythmias will affect output and need to be treated aggressively
*The driveline is the patients' life line – avoid tension, kinks, catching on anything
*Programmed flows are only changed by VAD coordinators, MDs, CVICU RNs with orders to do so.
*TRENDS are most important – ensure sending RN provides a few hours of trends and goals.

Main concerns in transport: consider *reason* we are transporting them. Are they requiring heart transplant/pump replacement? Or are we just bringing them to their implant center for battery/controller issues or driveline infection? Do they have other health care needs and just happen to have an LVAD?
***Recent implant**
May still have invasive monitoring in place (art line, PA catheter) and may still be very critically ill (intubated, nitric oxide, chest tubes, etc). HF/CTS physicians will have tight parameters for drip rates&hemodynamic goals.
***Distant implant**
Patient/caregiver will likely be your resident expert on the device. If possible, always allow primary caregiver to accompany on transport.

Power Sources: Either AC power or batteries. Battery life and sequence of depletion are device specific.

***PATIENT SUPPLIES NEEDED: patient should always have in their possession the following:**

- **Extra controller – ensure this is programmed for same flow as primary controller**
- **Extra batteries**
- **Battery module**

***ASSESSMENT:**

*√ blood pressure by arterial line or manual cuff w/doppler @ brachial artery (first sound you hear is the MAP).
*Radial is secondary doppler BP site.
*Patient may be pulsatile, however usually not. Pulses are dopplered and often sound like constant flowing.
*Continuous flow devices will present with a "whirling" sound when heart sounds are auscultated.
*Acceptable MAP parameters: typically 70-90 or per heart failure physician direction. Note trends.

TROUBLESHOOTING:

***IF PUMP STOPS: ensure no loose connections → change batteries → change controller → call VAD coordinator.**
***ALARMS: alarms are device specific – refer to accompanying reference material or contact VAD coordinator.**

RESUSCITATION:

***VF/VT ∅ Pulse**: Typically NO CPR. Defibrillation and ACLS drugs OK. Keep pads away from pump pocket
***Asystole/PEA**: Typically NO CPR. Defibrillation and ACLS drugs OK. Keep pads away from pump pocket
*Arrhythmias, hypotension, respiratory distress, altered LOC, etc: **Treat patient**!

Things to consider:

Low flow+high CVP: consider RV failure, pHTN, volume overload.
Low flow+low CVP: consider VOLUME
High flow+high PI+high pump power: consider pump thrombus