

AIR EVAC
LIFETEAM
PROTOCOLS
and
STANDING ORDERS

Effective Date: September 2004

Scope of Practice

Scope of Practice Protocol Intent for Procedures and Techniques

It is the intent of Air Evac and the Medical Director that all procedures

referred to herein or normally practiced by clinical partners at Air Evac, be practiced

by:

- a) **Emergency Medical Technicians, Advanced Emergency Medical Technicians, and Emergency Medical Technician Paramedics perform skills and techniques only as defined by the State Board/Bureau/Agency/Unit of Emergency Medical Services, as within their individual scopes of practice.**
- b) **All skills and techniques, not within the E.M.T.s', A-E.M.T.s' or E.M.T.-P.s' scope of practice are performed with and under the supervision of a Registered Nurse and the medical director.**

All clinical partners function as a team in their approach to the patient's care and in their performance of critical care procedures and techniques.

STANDARDS OF PRACTICE

In keeping with the Air Evac Lifeteam mission of providing quality standards of care, the following statements are Air Evac Lifeteam's standards of practice.

- ❖ All patients will receive a documented primary survey upon initial contact including a complete set of manual vital signs followed by a comprehensive documented secondary survey outlining treatment as it relates to physical findings
- ❖ Vital signs are to be documented a minimum of every 15 minutes for patients within normal limit parameters and every 5 minutes for patients with parameters outside the normal limits.
- ❖ Vital signs must be taken before and after the administration of medication that could alter vital signs or neurologic status.
- ❖ Vital signs are inclusive of temperature (Oral or Axillary). Documentation of temperature will be reflected upon initial contact and upon arrival at destination.
- ❖ All intubated patients will be placed on a ventilator for transports ≥ 20 minutes.
- ❖ All intubated patients will receive continuous O₂ sat and End Tidal CO₂ monitoring.
- ❖ All patients will receive continuous cardiac monitoring from initial time of contact through arrival at destination.
- ❖ All medicated drips are to be administered through an IV Pump.

ACKNOWLEDGEMENTS

Approved by Medical Director September 2004

(Medical Director)

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**ADMINISTRATIVE
PROTOCOLS**

INITIATING A CALL TO MEDICAL COMMAND OR RECEIVING FACILITY

Initiating Medical Command Call:

1. Calls for Medical Command may only be initiated to a recognized medical command base station. In this case, a physician should be requested. Medical Command is defined as and should be utilized in the following:
 - a. Destination Emergency Department Physician
 - b. Originating Emergency Department Physician
 - c. Medical Director.
2. Medical orders can only be obtained from a physician. The physician may give verbal orders through an RN.
3. Medical command calls MAY be initiated:
 - a. when it will speed or improve patient care or,
 - b. whenever it is thought necessary by the flight crew,
 - c. for multiple casualty incidents (greater than 5 victims), or
 - d. when radiation or other hazardous materials incidents are encountered.
4. All Medical Command Orders must be documented.
5. All calls for medical command should be placed through a recorded system if possible.

Initiating Call to provide patient report to a receiving facility.

1. Calls made directly to the receiving facility prevent the loss of information from third party relaying the information.
2. Initial contact with receiving hospital should occur 20 minutes prior to arrival at designated destination.
3. Information should be given preferably to personnel at the level of RN or greater.
4. Update of patient information needs to occur 10 minutes prior to arrival with final patient update 2 minutes prior to arrival at designated destination.

Notes:

These protocols act as standing orders for procedures that may be performed by licensed flight crews and flight crew trainees under the direct supervision of a licensed flight crew. These protocols do not limit the activity of a flight crew who is in direct contact with the medical command physician. Certain procedures and medications require physician consultation prior to performance of the procedure or administration of the medication. These procedures are noted in the individual protocols.

CONTROL OF EMERGENCY MEDICAL SERVICES AT THE SCENE OF AN EMERGENCY

One of the most difficult situations for the flight crew is that created by the arrival of a physician at the scene. A different set of responsibilities exists when that physician knows and has established a previous doctor-patient relationship with the patient as opposed to when no such relationship exists. Physicians who are part of the EMS system such as the service's medical advisor or on-line medical command physician are generally responsible for patient care.

Physician Without Previous Doctor-Patient Relationship:

1. For a fully licensed physician who is not a part of the EMS system to assume control at the scene of an emergency, all of the following must take place:
 - a. Proof of the physician's identity and current licensure must be provided to the senior flight crewmember.
 - b. The on-line medical command physician must be notified and agree to relinquish control to the on-scene physician. This can usually best be accomplished by having the medical command physician speak directly with the physician at the scene.
 - c. The physician at the scene must agree to sign his or her orders.
2. If control of the emergency is given to the on-scene physician, then the physician can only issue orders within the scope of training and practice of the flight crew.
3. Any orders or procedures outside of the flight crew's scope of practice will have to be carried out personally by the on-scene physician.

Physician with Previous Doctor-Patient Relationship:

1. As a general rule, it is desirable that the flight crew called to the scene of an emergency, even within a physician's office, perform an assessment and manage the patient just as would be done in any other location.
2. If the physician wishes to take control of the patient's management, he or she may do so if communication is established between on-line medical command and the physician at the scene.
3. If control of the emergency is assumed by the on-scene physician then:
 - a. The physicians' license number will be recorded on the run report.
 - b. Orders within the scope of training and practice of the flight crew will be carried out.
 - c. Orders outside the scope of training and practice of the flight crew will be personally carried out by the on-scene physician.
 - d. The on-scene physician will sign his or her orders.
 - e. The on-scene physician must accompany the patient in the ambulance to the hospital unless released by the on-line medical command physician.

Notes:

1. In a disaster or multi-casualty situation, then the on-scene physician should use his best judgment about whether or not to accompany the patient to the hospital. It may be appropriate to stay at the scene and tend to the patients remaining. Generally these decisions should be made in consultation with the medical command physician.

PRE-HOSPITAL TRAUMA TRIAGE CONSIDERATIONS

In cases of significant trauma, transport to a trauma center should be considered. Individual circumstances may demand flexibility and judgment on the part of the responsible flight crew. These guidelines are not to be construed as mandatory or all-inclusive.

Time, distance, and patient condition are extremely important variables to consider when triaging injured patients to hospitals. In the rural environment, an injured patient may be at a substantial distance from a trauma center. Such patients may be treated initially at the nearest appropriate facility.

DETERMINATION OF DEATH / TERMINATION OF ACLS**Protocol:**

1. Advanced cardiac life support must be started on all patients who are found apneic and pulseless, **UNLESS:**
 - a. The emergency care providers are presented with a valid Do Not Resuscitate order as defined in the Do Not Resuscitate protocol, OR
 - b. There is an injury that is obviously incompatible with life. Examples are decapitation or burned beyond recognition, OR
2. Once started, resuscitation efforts must be continued until the resuscitation is terminated by a physician.
3. When all of the following circumstances exist, advanced cardiac life support may be stopped prior to hospital arrival:
 - a. There must be good contact between the flight crew unit and the medical command physician.
 - b. There must have been early, successful endotracheal intubation and medication administration.
 - c. There has NOT been any restoration of spontaneous circulation with a spontaneous palpable pulse for at least one five-minute period at any time during the resuscitation.
 - d. The patient does NOT have spontaneous respiration, eye opening, motor response, or other continued neurologic activity at the time stopping resuscitation is contemplated.
 - e. The cardiac rhythm is NOT persistent or recurrent ventricular fibrillation or ventricular tachycardia. If persistent or recurrent ventricular fibrillation or ventricular tachycardia is present, then resuscitative efforts should be continued until hospital arrival.
 - f. All flight crews and the medical command physician must be in agreement concerning termination of ACLS.
 - g. The cause of the cardiac arrest must be something other than drowning, hypothermia, acute airway obstruction, overdose, electrocution, or lightning strike.
 - h. The medical command physician has determined that the patient is suffering from a terminal condition and should not be resuscitated and he orders that the resuscitation be terminated.

Notes:

1. The purpose behind the termination of ACLS in the field is to keep flight crew units in-service for emergencies instead of transporting non-salvageable patients under ACLS. This protocol provides a method for terminating ACLS in hopeless cases.
2. Rigor mortis takes a variable amount of time to begin depending upon the physical condition of the deceased prior to death as well as the temperature of the environment. The face and neck begin to stiffen between two and five hours after death. After seven to nine hours, rigor mortis will affect the arms and chest. By twelve hours after death rigor mortis is usually firmly established. Post-mortem lividity (the pooling of blood at the dependent portions of the body) will occur unless the victim has suffered a large blood loss. About one to two hours after death, lividity will begin and peak at about six hours.

DO NOT RESUSCITATE ORDERS IN THE FIELD**Protocol:****In the event any DNR order is presented to a Flight crew, first determine if:**

1. **A valid E.M.S. D.N.R. Form EXISTS and is in effect.**
 - a. If the flight crew believes the **E.M.S. DNR order** is valid, there is no need to commence CPR. Medical command contact is not mandatory in this setting, however contact may be initiated at the Flight crew's discretion.
 - b. If the flight crew has any question of validity, **medical command MUST be contacted**. The flight crew need not comply with the DNR (and may commence CPR), while contacting medical command, unless and until a physician has verbally authorized compliance. Such authorization shall be documented by the flight crews in the run report.
2. **A valid E.M.S. D.N.R. Form DOES NOT EXIST.**
 - a. Start CPR, if indicated per the "Determination of death / Termination of ACLS" protocol.
 - b. All home care Do Not Resuscitate (DNR) orders must be dated and signed by the patient and at least two witnesses.
 - i) Home care DNRs shall not expire unless the document specifies a time for expiration. If the patient lacks capacity to make informed health care decisions on the date the DNR would expire, then the DNR shall continue in effect until the patient regains the capacity to make informed health care decisions for himself.
 - c. DNRs set forth in long-term care facility medical records shall be signed by the attending physician and dated.
 - i) DNRs set forth in long-term care facility medical records shall not expire unless the document specifies a time for expiration. If the patient lacks capacity to make informed health care decisions on the date the DNR would expire, then the DNR shall continue in effect until the patient regains the capacity to make informed health care decisions for himself.
 - d. A DNR may be honored in accordance with the provisions of this protocol where it is determined that the patient is in a terminal condition and the patient is no longer capable of making informed decisions.
 - e. A DNR may not be honored where the patient is pregnant, where withholding CPR would terminate the pregnancy, and where it is probable that the fetus will develop to the point of live birth if treatment is provided.
 - f. A DNR signed by both parents of a minor child or by the spouse of a patient in a terminal condition who is no longer able to make informed decisions, and signed by two witnesses, may be honored.
 - g. If the flight crew believes a DNR is valid, there is no need to commence CPR while waiting for physician orders. If the flight crew has any doubt, the flight crew need not comply with the DNR (and may commence CPR) unless and until a physician has verbally authorized compliance. Such authorization shall be documented by the flight crews in the run report.
3. In the case of any doubt or reservation as to the validity or authenticity of any DNR, and absent authorization by a base hospital physician, EMS medical director, family physician or physician on the scene to withhold CPR, the flight crew shall provide CPR to the patient and shall document the reasons for not complying with the DNR.
4. In the event resuscitation is initiated on a patient and then a DNR order of any type is subsequently identified, resuscitation may be terminated in compliance with that DNR upon specific verbal

authorization from a base hospital physician, EMS medical director, family physician, or physician on the scene. Documentation shall be made on the run sheet indicating the events that happened set forth in chronological order, including the authorization to stop CPR in the field. In the event a DNR is identified after a patient has been intubated, the tube shall not be removed in the prehospital setting. If the initial resuscitation has restored cardiac rhythm, the patient should be transported to the nearest appropriate medical facility with no further procedures or pharmacological measures undertaken, except by authorization from the base hospital physician, medical advisor, or attending physician. Communication with a physician should be established.

5. A DNR document shall be obtained from the family or facility and attached if at all possible to the medical record.
6. In the state of TN, articles 2c, 2d and 2g are to be ignored according to TCA-68-140-602. The following must be met to be a valid DNR.
 - a. ID of patient is clearly established
 - b. DNR is legally valid if
 - Signature of attending physician
 - Physician's name is printed or typed on form
 - Signature of patient or legal designee
 - Name of patient printed or typed on form
 - Signature of a witness
 - Full name of witness printed or typed on form
 - Date form was executed
7. In the state of KY, adhere to 202 KAR 7:493, 202 KAR 7:495 and 202 KAR 7:497.

The following algorithm is based on the standard "Emergency Medical Services Do Not Resuscitate (DNR) Order" form approved by the Kentucky Board of Medical Licensure under the authority of KRS 311.623 (3) passed by the 1994 Kentucky General Assembly will be utilized. Any questions about the EMS DNR Order and its application should be referred to medical control.

- a. Perform primary assessment: Airway, Breathing, Carotid Pulse
- b. Locate EMS DNR Order, Verify Patient Identification:
 - If a standard EMS DNR order or bracelet found, proceed to "c".
 - If no standard EMS DNR order or bracelet found, follow regular resuscitation protocols and contact medical control if available.
- c. If patient with EMS DNR order in cardiac or respiratory arrest, withhold:
external cardiac compressions, artificial ventilation, intubation, or advanced airway adjuncts, defibrillation, cardiac medications.
- d. If patient with EMS DNR order NOT in cardiac or respiratory arrest, EMS may provide the following:
oxygen, suction, basic airway management, administration of analgesics (if authorized in approved protocols), bleeding control, comfort patient and family.
- e. It is important that in cases where family does not wish resuscitation due to terminal illness and no EMS DNR form exists that contact be made with medical control or the patient's physician for orders to terminate resuscitation.

HAZARDOUS MATERIAL

In the event that the aircraft responds to a situation where hazardous material is involved,

1. Remain upwind of the situation.
2. Do not enter area until a HAZMAT Team gives clearance and all parties involved have been properly decontaminated.

RELEASE FROM MEDICAL RESPONSIBILITY

1. If, for any reason, a patient refuses service and/or transportation to a medical facility, a release from medical responsibility is to be obtained by the attendant. The release should be witnessed when possible.
2. Any time a patient refuses care and or transport that you are rendering, an obligation on your part is implied:
 - a. Insure that the patient has a clear understanding of your assessment and the need for further care.
 - b. Reaffirm that the patient is refusing to accept your services.
 - c. Have the patient read, date, and sign a refusal form.
 - d. Obtain the signature of two witnesses who observed the refusal.
 - e. Notify Dispatch that you have a refusal and give the nature.



PATIENT REFUSAL OF MEDICAL CARE

Patient Name
Home Address
City, State, Zip Code
Home Phone

Base #
Base Name
Flight #
Date

INITIALS	PATIENT ADVISORY
	I have been advised that further medical care is recommended
	I understand that failure to consent to medical care may result in harm to my person
	I understand that refusal of care may lead to detrimental medical conditions or even death
	I am freely refusing any further treatment or transportation by Air Evac Lifeteam
	<u>Other:</u>

I hereby voluntarily acknowledge and state that I have been advised regarding the state of my present physical condition and I hereby voluntarily refuse to receive or accept such medical care and/or transportation as recommended by representatives of the ambulance service listed above; and I do hereby for myself, my heirs, executors, administrators, and assigns forever release and fully discharge said ambulance service, it's officers, employees, medical consultants, hospitals, borrowed servants, or agents from any and all conceivable liability that might arise from my voluntary refusal of care and/or transportation, and I therefore agree to hold them completely harmless.

Patient / Legal Guardian Signature

Date

Witness Signature

Date

RN / EMT-P Signature

Date

Revised: 12/15/03

**MEDICAL TREATMENT PROTOCOLS
CARDIAC ARRHYTHMIAS**

VENTRICULAR FIBRILLATION AND VENTRICULAR TACHYCARDIA WITHOUT PULSE

Historical Findings:

1. Age > 14.
2. Patient is unconscious.

Physical Findings:

1. Patient is unresponsive.
2. Patient is without a pulse.

EKG Findings:

1. Ventricular fibrillation OR
2. Ventricular tachycardia.

Protocol:

1. If collapse is witnessed and monitored, administer a precordial thump.
2. Apply quick look paddles if not already monitored.
3. If rhythm is ventricular fibrillation or ventricular tachycardia, **DEFIBRILLATE IMMEDIATELY AT 200 JOULES.**
4. If no change, defibrillate at 200-300 joules.
5. If no change, defibrillate at 360 joules.
6. If no change, begin CPR and ventilate using a bag-valve mask and 100% oxygen. CPR should not be interrupted for more than 30 seconds.
7. Intubate the patient.
8. Initiate IV with normal saline and maxi-drip tubing at keep open rate.
9. Administer Epinephrine 1 mg (10 ml of 1:10,000) IVP or 2 mg (20 ml of 1:10,000) ET. Repeat every 3 to 5 minutes as long as cardiac arrest continues.
10. If rhythm is still VF or VT, defibrillate again at 360 joules.
11. Administer Lidocaine 1.5 mg/kg IVP or 3.0 mg/kg ET.

12. If no change, defibrillate at 360 joules.
13. A one time repeat dose of Lidocaine at 1.5 mg/kg IVP or 3.0 mg/kg ET may be given in 3 to 5 minutes for a total loading dose of 3.0 mg/kg IVP or 6.0 mg/kg ET.
14. If no change, defibrillate at 360 joules.
15. Contact medical command and begin transport as soon as possible.
16. If patient converts to a perfusing rhythm and has received Lidocaine, a Lidocaine drip may be started at a rate of 2 mg/minute with titration to a maximum dose of 4.0 mg/minute for effect.

Notes:

1. Defibrillation is the definitive way to treat VF and pulseless VT. It is the MOST important intervention in ACLS. The patient should be defibrillated as soon as possible. If other interventions can be accomplished simultaneously with defibrillation, they may be carried out. However, **DO NOT DELAY DEFIBRILLATION**. There should not be a pause for a pulse check between the first, second, and third shocks in the initial sequence as long as the properly connected monitor continues to show persistent VF/VT. The use of adhesive pads may facilitate rapid shock delivery.
2. A national performance goal of an EMS system for this condition is that 90% or more of patients with ventricular fibrillation will have been defibrillated at least once within 8 minutes of the receipt of the call for help in the 911 center.
3. If VF or pulseless VT reoccurs after transiently converting, defibrillate at whatever energy level has previously been successful for defibrillation.
4. Intubation is the preferable method of airway control. If it can be accomplished simultaneously with other techniques, then the earlier the better. In addition, intubation provides a route of administration of medication in the absence of an IV. All IV dosages should be doubled when given ET.
5. IV medications given through a peripheral vein should be followed by a 20-ml bolus of IV fluid and elevation of the extremity while CPR is continued. A second IV line may be established as needed.

PULSELESS ELECTRICAL ACTIVITY (PEA)

Historical Findings:

1. Age > 14.
2. Patient is unconscious.

Physical Findings:

1. Patient is unresponsive.
2. Patient has no pulses.

EKG Findings:

1. There is some type of electrical activity other than ventricular fibrillation or ventricular tachycardia.

Protocol:

Consider Possible Causes and Attempt Correction

Possible Cause Field

Therapies and Treatments

- | | |
|--|--|
| <ul style="list-style-type: none"> • Hypoxia • Respiratory Acidosis • Metabolic Acidosis | <ul style="list-style-type: none"> Ventilation and Oxygen |
| <ul style="list-style-type: none"> • Hypovolemia • Tension Pneumothorax • Massive Myocardial Infarction • Hyperkalemia • Cardiac Tamponade • Drug Overdose • Massive Pulmonary Embolism | <ul style="list-style-type: none"> Ventilation Ventilation Oxygen/Possible Sodium Bicarbonate Volume Infusion Needle Decompression |
2. Apply quick look paddles if not already monitored.
 3. Maintain adequate airway and initiate CPR using bag-valve-mask and 100% O₂.
 4. Attach monitor leads.
 5. Intubate.
 6. Initiate large bore IV of normal saline and begin to administer 1 liter wide open.
 7. Administer epinephrine 1 mg (10 ml of 1:10,000 solution) IV or 2 mg (20 ml of 1:10,000) via endotracheal tube. Repeat every 3 to 5 minutes for duration of cardiac arrest.

8. If EKG rate < 60, administer Atropine 1 mg IVP or 2 mg via ET tube. Repeat atropine 1mg IVP every 3-5 minutes if patient remains bradycardic to a total dose of 0.04mg/kg. Atropine may be given via ET, in which case all doses are doubled.
9. Search for possible causes of PEA as listed above.
10. Give additional fluid challenge.
11. If no improvement, consider chest decompression.
12. Begin transport by ground or air as determined by incident command.
13. Consider Sodium Bicarbonate 1 mEq/kg IVP. May be repeated at half the original dose every 10 minutes.

Notes:

1. Intubation is the preferable method of airway control. If it can be accomplished simultaneously with other techniques, then the earlier the better. A main cause of PEA is hypoxia, and the effectiveness of ventilation should be evaluated constantly.
2. IV medications given through a peripheral vein should be followed by a 20-ml bolus of IV fluid and elevation of the extremity while CPR is continued.

ASYSTOLE (CARDIAC STAND STILL)**Historical Findings:**

1. Age > 14.
2. Patient is unconscious.

Physical Findings:

1. Patient is unresponsive.
2. Patient has no pulses.

EKG Findings:

1. Rhythm is asystole (flat line). Confirm asystole in two leads.

Protocol:

1. Apply conductive media and then quick look paddles if not already monitored.
2. Maintain airway and initiate CPR using bag valve mask and 100% O₂.
3. Attach monitor leads and confirm asystole in two leads.
4. Intubate.
5. Initiate IV of normal saline with maxi-drip tubing at keep open rate.
6. Begin transcutaneous pacing.
7. Administer Epinephrine 1 mg (10 ml of 1:10,000) IVP or 2 mg (20 ml of 1:10,000) via endotracheal tube. This should be repeated every 3 to 5 minutes.
8. Administer Atropine 1.0 mg IVP or 2.0 mg ET. This should be repeated every 3 to 5 minutes to a total dose of 0.04 mg/kg IV, or 0.08 mg ET.
9. Once the protocol has been exhausted, consider termination of resuscitative efforts as detailed in the Determination of Death / Termination of ACLS protocol.

Notes:

1. Intubation is the preferable method of airway control.
2. IV medications given through a peripheral vein should be followed by a 20-ml bolus of IV fluid and elevation of the extremity.

UNSTABLE BRADYCARDIA**Historical Findings:**

1. Age > 14.
2. Chest pain, shortness of breath or inability to give history due to alteration in level of consciousness which are thought to be related to the slow heart rate.

Physical Findings:

1. Pulse rate < 60.
2. Systolic blood pressure < 90 torr, cardiogenic shock, or pulmonary edema.

EKG Findings:

1. Ventricular rate < 60.

All of the above criteria should be present before proceeding with this protocol.

Protocol:

1. Apply quick look paddles if not already monitored.
2. Assure airway patency and administer O₂ at high flow and high concentration, preferably by non-rebreather facemask.
3. Place on monitor.
4. Check vital signs frequently.
5. Initiate IV of normal saline with maxi-drip tubing at keep open rate. See note 2.
6. Administer Atropine 0.5 - 1.0 mg IVP. See notes 1 & 2.
7. Start transcutaneous pacing per TCP protocol. See notes 1 & 2.
8. If no response to initial measures, repeat Atropine 0.5 - 1.0 mg IVP every 3-5 minutes up to a total of 0.04mg/kg. Atropine may be given ET, in which case all doses are doubled.
9. May consider a Dopamine drip (1600µg /cc concentration) to run at 5-20 µg/kg/min IV.
10. Medical command may consider an epinephrine drip to run at 2-10 µg/min IV.
11. Medical command may consider Isoproterenol 2-10 µg/min IV.
12. Refer to Pain Management Protocol for pain control.

Notes:

1. If a transcutaneous pacemaker is available, its use may be preferable to the administration of Atropine for the patient with chest pain and a Mobitz II second-degree heart block or third-degree heart block or third-degree heart block with wide QRS complexes.
2. Do not delay initiation of transcutaneous pacing while awaiting IV access or for Atropine to take effect in the patient with serious signs or symptoms.
3. **Never treat ventricular escape beats during bradycardia!**

VENTRICULAR TACHYCARDIA WITH PULSE (UNSTABLE)**Historical Findings:**

1. Age > 14
2. Patient complains of chest pain, or shortness of breath.

Physical Findings:

1. Palpable pulse with a rate > 150.
2. Systolic blood pressure less than 90 mm Hg, or
3. Signs of inadequate perfusion such as acute heart failure, delayed capillary refill, diaphoresis, or altered mental status.

EKG Findings:

1. Rate above 150.
2. Wide QRS (≥ 0.12 sec or 3 little blocks).
3. Absent P waves.

NOTE: When doubt exists about whether the rhythm is ventricular tachycardia (VT) or supraventricular tachycardia, then treat for ventricular tachycardia.

Differential Diagnosis:

1. Stable ventricular tachycardia.
2. Supraventricular tachycardia.

Protocol:

1. Assure airway patency and administer O₂ at high flow and high concentration, preferably by non-rebreather facemask.
2. If ventricular rate is ≥ 150 beats/minute, and patient is symptomatic, prepare for immediate synchronized cardioversion.
3. Initiate large bore IV with normal saline with maxi-drip tubing to run at keep open rate.
4. If the patient is to be cardioverted and **does not have an altered level of consciousness**, administer Versed 2 mg IVP q 2 minutes titrated to effect or SBP >90.
5. While preparing for synchronized cardioversion, in antiarrhythmic drugs are easily accessible, administer 1.5 mg/kg of Lidocaine IV push. If VT persists and pulse is present, perform synchronized cardioversion at 100 joules or biphasic equivalent. If VT persists and pulse is present, repeat synchronized cardioversion at 200 joules or biphasic equivalent.

6. If VT persists and pulse is present, repeat cardioversion at 300 joules or biphasic equivalent.
7. If VT persists and pulse is present, repeat cardioversion at 360 joules or biphasic equivalent.
8. If VT has not converted, if antiarrhythmics have not been administered, give Lidocaine 1.5 mg/kg IVP or via ET tube and repeat synchronized cardioversion at 360 joules. If antiarrhythmics have been administered, give Lidocaine .75 mg/kg IVP or via ET tube and repeat synchronized cardioversion at 360 joules or biphasic equivalent.
9. If VT recurs, repeat synchronized cardioversion at previously successful energy level. If synchronized cardioversion is not successful, repeat at next higher energy level and continue with the protocol.
10. Begin transport
11. If VT has still not converted, repeat Lidocaine 0.75 mg/kg IVP every 5 to 10 minutes up to a total dose of 3 mg/kg.
12. If the ventricular tachycardia resolves, begin maintenance IV infusion of Lidocaine at 2 mg/minute with a titration to a maximum dose of 4.0 mg/minute for effect.
13. If the ventricular tachycardia persists give Magnesium Sulfate 2 gms IV infuse over 10-20 minutes.
14. If the patients clinical condition deteriorates, (i.e. they become Pulseless or ventricular fibrillation is detected), precede with immediate defibrillation (unsynchronized cardioversion) and follow the Ventricular Fibrillation – Pulseless Ventricular Tachycardia Protocol.

Notes:

1. If the patient is unconscious or severely obtunded, then proceed directly to synchronized cardioversion before establishing an IV.

VENTRICULAR TACHYCARDIA WITH PULSE (STABLE)**Historical Findings:**

1. Age > 14.
2. No associated symptoms such as chest pain, shortness of breath, depressed or altered level of consciousness.

Physical Findings:

1. Patient is conscious.
2. Blood pressure greater than 90 systolic.
3. Patient is without signs of inadequate perfusion (heart failure, delayed capillary refill, and diaphoresis).

EKG Findings:

1. Rate above 150.
2. Wide QRS (≥ 0.12 sec or 3 little blocks).
3. Absent P waves.

NOTE: When doubt exists about whether the rhythm is ventricular tachycardia or supraventricular tachycardia, then treat for ventricular tachycardia.

Differential Diagnosis:

1. Unstable ventricular tachycardia.
2. Supraventricular tachycardia.

Protocol:

1. Assure airway patency and administer O₂ at high flow and high concentration, preferably by non-rebreather face mask.
2. Maintain cardiac monitoring at all times.
3. Initiate large bore IV with normal saline with maxi-drip tubing to run at keep open rate.
4. Administer Lidocaine 1.5 mg/kg IVP. May repeat 0.75 mg/kg q 5 minutes to maximum dose of 3 mg/kg.

Notes:

If the patient becomes unstable, then proceed to the Ventricular Tachycardia with Pulse (Unstable) protocol.

PAROXYSMAL SUPRAVENTRICULAR TACHYCARDIA (PSVT)**Historical Findings:**

1. Age > 14.

EKG Characteristics:

1. Rapid (140-250), regular ventricular rate.
2. Normal QRS duration of less than 0.12 seconds (three little blocks).
3. P waves are usually absent.

Differential Diagnosis:

1. Ventricular tachycardia.
2. Sinus tachycardia

Note: Distinguishing PSVT from ventricular tachycardia is frequently difficult. If the duration of the QRS is 0.12 seconds or greater, assume the rhythm is ventricular tachycardia and treat accordingly. If there is any doubt about the origin of the rhythm, it is safer for the patient to assume the rhythm is ventricular tachycardia not PSVT.

STABLE**Historical Findings:**

1. Patient does not have chest pain or shortness of breath.

Physical Findings:

1. Patient is alert.
2. Patient is hemodynamically stable.

Protocol:

1. Oxygen by non-rebreather face mask or nasal cannula.
2. Place patient on monitor.
3. Establish proximal, large bore IV with normal saline with maxi-drip tubing to run at keep open rate.
4. Consider possible underlying cause for tachycardia.
5. Have patient perform Valsalva.
6. If equipment available, perform a 12 lead ECG, per *12 lead Electrocardiogram* protocol.

7. Administer Adenosine 6 mg. per the following method: A syringe of Adenosine and a second syringe of 20 ml of normal saline should be prepared. The Adenosine is given rapid IVP followed *immediately* by the flush of normal saline. If the tachycardia persists and the rhythm is still thought to be PSVT, administer adenosine 12 mg, rapid IVP by the method outlined above. If tachycardia persists and the rhythm is still thought to be PSVT, administer a final dose of adenosine 12mg, rapid IV by the method outlined above.
8. Monitor patient frequently.

UNSTABLE

The presence of **ANY** of the following criteria means this rhythm is unstable:

Historical Findings:

1. The patient MAY have chest pain, or

Physical Findings:

1. Patient is hemodynamically unstable.
2. Signs of acute heart failure or pulmonary edema.
3. Altered mental status.

Protocol:

1. Assure airway patency and administer O₂ at high flow and high concentration, preferably by non-rebreather facemask.
2. Place patient on monitor. If HR >150bpm go directly to DC cardioversion
3. Establish IV with normal saline at keep open rate using maxi-drip tubing.
4. Have patient perform Valsalva if alert enough.
5. If the patient is to be cardioverted and **does not have an altered level of consciousness**, administer Versed 2 mg IVP q 2 minutes titrated to effect or SBP >90.
6. Cardiovert using synchronization at 100 joules. See Note 1.
7. If no change, repeat with synchronization at 200 joules.
8. If no change, repeat with synchronization at 300 joules.
9. If no change, repeat with synchronization at 360 joules.
10. Transport the patient.

Notes:

1. Cardioversion is contraindicated in the presence of digitalis intoxication.
2. Adenosine has a short half-life of about ten seconds. For the drug to be effective, it must be able to reach the heart prior to being metabolized in the bloodstream. To achieve a high concentration of drug at the heart, a large IV, preferably in the antecubital fossa, should be established. Then when the adenosine is given, it should be followed by a bolus of saline that will swiftly empty the intravenous catheter of the drug and push it on its way to the cardiac circulation.
3. Unsynchronized cardioversion is indicated only for the most dire of clinical circumstances, e.g. severe and very marked hypotension or severe ischemia.

ATRIAL FIBRILLATION/FLUTTER**Historical Findings:**

1. Age > 14.

STABLE**Physical Findings:**

1. No signs of instability.
2. Borderline unstable vital signs or physical condition.

EKG Findings:

1. ATRIAL FIBRILLATION
 - a. Ventricular rate between 160-180 bpm
 - b. Irregularly irregular rhythm
 - c. Absent P waves with chaotic electrical activity
2. ATRIAL FLUTTER
 - a. Atrial rate usually 300 beats per minute
 - b. Regular atrial rhythm with a sawtooth appearance.

Protocol:

1. Assess airway patency and administer O2.
2. Place on monitor.
3. Initiate IV of normal saline with maxi-drip tubing at a keep open rate.
4. Administer Cardizem 0.25 mg/kg **SLOW** IVP over 2 minutes. After 10 minutes, may repeat at 0.35 mg/kg **SLOW** IVP.
5. Contact Medical Control if necessary.

UNSTABLE

Physical Findings:

Signs and symptoms of instability: chest pain, hypotension, congestive heart failure, dyspnea, decreased level of consciousness, pulmonary congestion, or acute myocardial infarction.

EKG Findings:

Same as stable

Protocol:

1. Follow steps 1-3 of stable protocol.
2. If ventricular rate > 150 bpm, prepare for immediate cardioversion.
3. If the patient is to be cardioverted and does not have an altered level of consciousness, administer Versed 2 mg IVP q 2 minutes titrated to effect or SBP >90.
4. Perform synchronized cardioversion at 100 J.
5. If no change, repeat with synchronization at 200 J.
6. If no change, repeat with synchronization at 300 J.
7. If no change, repeat with synchronization at 360 J.

Notes:

1. There may be a possible need to resynchronize after each cardioversion.
2. If delays in synchronization occur and clinical condition worsens, immediately go to unsynchronized shocks.

MEDICAL PROBLEMS

CHEST PAIN

Historical Findings:

1. Age over 25 years
2. Chest pain description suggests cardiac origin (heaviness, pressure, tightness, dull) and *may* be accompanied by shortness of breath, diaphoresis, nausea, vomiting or weakness.
3. Pain is not clearly pleuritic or musculoskeletal. If any doubt exists, treat as cardiac.

Physical Findings:

1. Pulse between 60 and 140 beats per minute.
2. Systolic blood pressure greater than 100.

Differential Diagnosis:

1. Non-cardiac chest pain
2. COPD
3. Cardiogenic shock
4. Arrhythmia

Protocol:

1. Initial contact - reassure, explain procedures.
2. Assure airway patency and administer O₂ at high flow and high concentration, preferably by non-rebreather facemask.
3. Place patient on cardiac monitor and run rhythm strip. Use a standard limb lead (4) placement if a 12-lead is anticipated. If not sinus rhythm between 60-150, go to arrhythmia protocols.
4. Monitor vital signs frequently.
5. Establish IV access with normal saline and maxi-drip tubing at keep open rate.
6. Nitroglycerin 0.4 mg sublingual if BP >100 systolic. If no relief of chest pain after 5 minutes and systolic BP >100, administer a second nitroglycerin. If no relief after another 5 minutes and systolic BP >100, administer a third nitroglycerin.
7. Begin transport.
8. If chest pain persists after three nitroglycerin doses, initiate NTG drip (see protocol pages 36/37).

9. If the patient is not allergic to aspirin or non-steroidal anti-inflammatory drugs, then administer (4) chewable (81 mg) aspirins equaling a total of 324 mg orally. Have patient chew and swallow.

Aspirin should be withheld if, within the past two weeks the patient has had:

gastrointestinal bleeding,
active ulcer disease,
hemorrhagic stroke,
major trauma

OR has already taken a dose of aspirin within the previous 24 hours.

10. Administer Morphine Sulfate 0.1 mg/kg IVP over 2 minutes. May repeat 0.05 mg/kg q 10 minutes as systolic BP > 100 and pain persists.
11. For complaints of nausea or vomiting, refer to Nausea/Vomiting Protocol.

Notes:

1. Since time is important in order to facilitate possible thrombolytic therapy, transport should not be delayed for medical command or additional Nitroglycerin. 12-lead ECG acquisition should not delay initiation of transport.
2. Since early administration of thrombolytic therapy saves lives, early notification of the receiving hospital about the patient with an ongoing acute chest pain syndrome is helpful in decreasing the time to treatment.
3. **TRIDIL (Nitroglycerin):**
The following information is included for reference:

ACTION:

Relaxes vascular smooth muscle. Dilation of the post-capillary vessels, including large veins, promotes peripheral pooling of blood and decreases venous return systemic vascular resistance and arterial pressure (afterload); myocardial oxygen demand is decreased; drug will decrease CVP, decrease PCWP, increase HR slightly.

DOSAGE:

Initial order may be 5-10 mcg/min. with increases in 5 mcg/min increments every 3-5 minutes until some response is seen at 20 mcg/min. Then increase by 10 mcg/.min. up to 200 mcg/min. for therapeutic response.

NAUSEA & VOMITING

Purpose:

To ensure the patient remains comfortable and the airway remains patent.

Protocol:

If the patient has a complaint of nausea or vomiting (see note #1):

1. Administer:

- a. **Adults:** Compazine 5 mg slow IVP followed by a 50 cc bolus of NS. Repeat dose x (1) if necessary.
- b. **Pediatrics:** Compazine 0.1 mg/kg slow IVP followed by a 20 cc bolus of NS, **No Repeat Dosage.**

Or

- c. **Adults:** Phenergan 6.25 mg (diluted in 10cc NS) slow IVP. Repeat dose x (1) if necessary.
- d. **Pediatrics:** Phenergan 0.25 mg/kg (diluted in 10cc NS) slow IVP.
No Repeat Dosage.

2. Insert NG tube if emesis continues.

Notes:

1. If a concern regarding a sedative effect exists, utilize Compazine. For concerns regarding hypotension, utilize Phenergan.
2. Akathisia (inability to remain still or increased urge to move around) or dystonia (muscle spasms, rigidity, or rolling of eyes) may occur. If noted, administer Benadryl 25 mg IVP.

CEREBRAL VASCULAR ACCIDENT (STROKE)

Historical Findings:

1. History of previous stroke or TIA?
2. History of hypertension, atrial fibrillation, diabetes, seizure disorder, or heart or vascular disease?
3. No evidence or history of trauma.

Physical Findings:

1. Alteration in consciousness
2. Headache
3. Aphasia
4. Facial weakness or asymmetry
5. Incoordination, weakness, paralysis, or sensory loss in one or more limbs
6. Ataxia
7. Visual loss
8. Intense vertigo, double vision, unilateral hearing loss, nausea, vomiting, photophobia or phonophobia

Differential Diagnosis:

Hypoxia	Drugs and alcohol
Hypertension	Infection, especially meningitis
Psychiatric	Hypoglycemia
Seizure	Hyperglycemia
Head trauma	Tumor

Protocol:

1. Maintain airway and administer high flow oxygen. Intubate if necessary.
2. Initiate IV of NS at TKO. Do not use IV fluids containing glucose.
3. Perform glucose check. If hypoglycemic less than 60 give D50W 25gms. If hyperglycemic, over 400, contact medical control for orders.
4. Monitor cardiac rhythm. If arrhythmia is present, proceed to the appropriate protocol.
5. If hypertensive, contact medical control for orders for treatment.

6. If patient is febrile, treat fever with 325 mg Tylenol PO or rectally if no documented allergy. Also use active cooling methods, such as removing clothing, cool packs, etc.
7. Transport with HOB slightly elevated. Monitor VS closely.
8. See protocol for *Altered Level of Consciousness* if applies.
9. See protocol for *Seizures* if applies.
10. Initial contact - reassure, explain procedures.
11. Perform exam, noting initial neurological exam for baseline documentation.
12. Assure airway patency and administer O₂ at high flow and high concentration, preferably by non-rebreather face mask.
13. Intubate if required. Ventilate with 100% oxygen. Hyperventilate only if signs of brain stem herniation.
14. Transport as soon as possible.
15. Place patient on monitor and obtain rhythm strip. If arrhythmia is present, proceed to the appropriate protocol.
16. Monitor vital signs frequently.
17. Medical command will advise on further drug therapy.

Notes:

1. Since time is important in order to facilitate possible thrombolytic therapy, transport should not be delayed. Early notification of the receiving hospital will expedite the administration of thrombolytics and possibly help reduce residual affects of the ischemic stroke.

TRIDIL ADMINISTRATION TABLE

EACH 10 ML TRIDIL AMP = 50MG I.V. NITROGLYCERIN

CONCENTRATION

FLOW RATE	1 AMP IN 500 ML	1 AMP IN 250 ML OR 2 AMPS IN 500 ML	2 AMPS IN 250 ML OR 4 AMPS IN 500 ML
	↓	↓	↓
MICRO DROPS/MIN	100 MCG/ML	200 MCG/ML	400 MCG/ML
3 ML/HOUR	5 MCG/MIN	10 MCG/MIN	20 MCG/MIN
6	10	20	40
12	20	40	80
24	40	80	160
48	80	160	320
72	120	240	480
96	160	320	640

Caution: 40% to 80% of amount of Nitroglycerin is absorbed into IV tubing. If non-absorbing tubing is used, reduced doses will be needed.

SUGGESTED PREPARATION:

One ampule (50 mg) in a glass bottle of either D5W or N/S (250 cc or 500 cc). May use up to two amps in 250 cc. Invert bottle several times to assure uniform dilution.

ROUTE:

1. Must be diluted in IV bottle. Not for direct IV injection.
2. The drug must be administered through an infusion pump.
3. The patient's blood pressure shall be checked and documented every 5 minutes during transport.

PRECAUTIONS:

Use with caution in patients with severe liver or renal disease. Paradoxical bradycardia and increases angina may accompany Nitroglycerin-induced hypotension.

SIDE EFFECTS:

2% of patients will experience headache. Less than 1% will experience: tachycardia, nausea and vomiting, apprehension, restlessness, muscle twitching, retrosternal discomfort, palpitations, dizziness and abdominal pain.

OVERDOSAGE:

May result in severe hypotension and reflex tachycardia which can be treated by elevating the legs and decreasing or temporarily terminating the infusion until patient's condition stabilizes.

HYPERTENSIVE EMERGENCY**Historical Findings:**

1. Age > 14.
2. Patient is NOT a victim of trauma or pregnant.
3. Patient has headache, confusion, vomiting, blurred vision, chest pain, or shortness of breath.

Physical Findings:

1. Diastolic blood pressure of 130 or above, AND
2. Systolic blood pressure of 180 or above.

Protocol:

1. Apply oxygen at high flow and high concentration preferably by non-rebreather facemask. Oxygen should be administered as needed to raise oxygen saturation to at least 95%.
 2. See protocol for *Stroke* if applies.
 3. Place patient at rest and reassure with head elevated.
 4. Repeat blood pressure. Continue protocol only if the blood pressure remains elevated according to the above criteria.
 5. Establish IV using normal saline at keep open rate.
 6. Monitor cardiac rhythm and treat arrhythmias per protocol.
 7. Treat chest pain, respiratory distress, seizures, or coma per protocol.
 8. Administer Nitroglycerin 0.4 mg SL or Nitropaste 1 inch.
 9. Begin transport to hospital if not already enroute. If after 10 minutes there is not an adequate response to the first dose of Nitroglycerin, a second dose may be repeated.
 10. If no relief from nitroglycerin SL, a Nitroglycerin drip may be considered.
 11. If blood pressure remains elevated, contact medical control and consider treating hypertension with Labetalol 10 mg IVP slowly. May repeat 5mg X 2 if target reduction not attained.
-

Notes:

1. Hypertension associated with severe head trauma may be protective and field treatment should be aimed at the head injury not BP control.
2. Hypertension associated with cocaine abuse may be difficult to treat. For patients with cocaine intoxication, medical command may consider the use of Ativan.
3. It may be undesirable to rapidly lower the blood pressure of hypertensive patients with transient ischemic attacks or cerebrovascular accidents. Field treatment of blood pressure in these cases should generally avoid rapid changes in BP.
4. Completely asymptomatic patients do not require treatment of their hypertension. Remember to treat the patient, not the number.

CARDIOGENIC SHOCK

Historical Findings:

1. Age > 14.
2. History of chest pain suggestive of cardiac origin and/or dyspnea.
3. No evidence or history of trauma or bleeding.

Physical Findings:

1. Systolic blood pressure \leq 80 mm Hg supine, OR
2. Systolic blood pressure 80-100 mm Hg and one of the following:
 - a. Pulse greater than 120,
 - b. Skin changes suggestive of shock, OR
 - c. Altered level of consciousness, agitation, or restlessness.

Protocol:

1. Maintain airway and administer oxygen at high flow and high concentration preferably by non-rebreather face mask.
2. Place patient on monitor and obtain rhythm strip. If arrhythmia is present, proceed to the appropriate protocol.
3. Monitor vital signs Q 3-5 minutes.
4. Transport as soon as possible.
5. Initiate large bore IV of LR or NS and maxi-drip tubing. Administer 250 ml fluid challenge if lungs are clear. If lungs are not clear, run IV at keep open rate or at rate specified by medical command.
6. May consider Dopamine with a starting dose of 5.0 mcg/kg/minute.
7. If the patient has documented Left Ventricular failure, consider Dobutrex 5.0 mcg/kg/minute to increase myocardial strength and to decrease pre-load.
8. Update medical command on patient's condition.

RESPIRATORY DISTRESS (Obstruction or Stridor)**Historical Findings:**

1. Patient complains of shortness of breath or cannot speak because of airway obstruction.
2. MAY have history suggestive of foreign body aspiration such as sudden onset of shortness of breath while eating.

Physical Findings:

1. Airway exam has little or no air movement, stridor, or decreased breath sounds.
2. MAY have use of accessory muscles of respiration.
3. MAY have fever or drooling.
4. MAY have retractions or rapid respiratory rate.

EKG Findings:

1. Normal sinus rhythm, sinus tachycardia, or atrial fibrillation with controlled ventricular response. If other rhythm is present, then proceed to appropriate arrhythmia protocol.

Differential Diagnosis:

1. Congestive heart failure
2. Epiglottitis
3. Croup (in a child)
4. Asthma

Protocol:

1. Maintain airway and administer oxygen at high flow and high concentration preferably by non-rebreather face mask. If patient is a young child, have the parent help administer the oxygen.
2. If complete airway obstruction by foreign body is suspected:
 - a. If the patient is conscious:
 - i) reassure and encourage the patient to cough forcefully if possible.
 - ii) perform basic life support measures until successful or victim becomes unconscious, then:
 - iii) visualize the larynx using the laryngoscope and remove any foreign body with suction device or Magill forceps.
 - iv) If spontaneous breathing does not begin, intubate the trachea.

- v) Consider cricothyroidotomy if unable to secure airway by standard means.
 - b. If the patient is unconscious when found:
 - i) initially perform basic life support measures until foreign body obstruction becomes apparent.
 - ii) visualize the larynx using the laryngoscope and remove any foreign body with suction device or Magill forceps.
 - iii) If spontaneous breathing does not begin, intubate the trachea.
 - c. If above methods fail, perform -cricothyrotomy (see cricothyrotomy protocol).
3. Allow patient to sit up in a position of comfort. If the patient is a young child, keep the patient with the parent and avoid unduly upsetting the child. Unless foreign body aspiration is suspected, do not perform a throat exam.
 4. Obtain vital signs and apply cardiac monitor.
 5. Perform patient assessment.
 6. An IV of normal saline at keep open rate with maxi-drip tubing may be initiated as situation warrants.
 7. Begin transport with patient as comfortable as possible.
 8. Contact medical command.
 9. Consider nebulized Albuterol (Proventil) as needed.

Notes:

1. Pediatric patients with fever, drooling, and stridor should be suspected as having epiglottitis. Epiglottitis is a bacterial infection of the epiglottis causing it to swell and possibly obstruct the glottic opening with catastrophic results for the patient. This obstruction can be precipitated by sticking objects such as fingers or tongue blades in the patient's throat as well as by having the patient lie down. These patients are best treated by quiet reassurance and transportation to the hospital. Have the patient breathe humidified oxygen as long as the oxygen does not cause the patient to become upset.
-

RESPIRATORY DISTRESS (Asthma/COPD)**Historical Findings:**

1. Patient complains of worsening shortness of breath, AND
2. Patient has a past medical history of asthma, emphysema, or COPD.

Physical Findings:

1. Lung exam has wheezing, decreased breath sounds, or poor air exchange.
2. Use of accessory muscles of respiration.
3. MAY have retractions, rapid respiratory rate, or pursed lip breathing.

EKG Findings:

1. Normal sinus rhythm, sinus tachycardia, or atrial fibrillation with controlled ventricular response. If other rhythm is present, then proceed to appropriate arrhythmia protocol.

Differential Diagnosis:

2. Congestive heart failure
3. Foreign body aspiration

Protocol:

1. Maintain airway and administer oxygen at high flow and high concentration preferably by non-rebreather facemask. Oxygen should be administered as needed to raise oxygen saturation to at least 90%.
2. If the patient is in impending respiratory failure, consider intubation.
3. Allow patient to sit up in a position of comfort.
4. Obtain vital signs and apply cardiac monitor.
5. Perform patient assessment.
6. Administer Albuterol (Proventil) aerosol 0.5 ml in 2.5-ml normal saline via hand held nebulizer. The same dose should be given to all patients including children.
7. Begin transport.
8. Establish an IV with normal saline and maxi-drip tubing at keep open rate. IV *may* be established prior to HHN therapy as needed.
9. You may consider epinephrine 1:1000 solution or Brethine 0.25 mg subcutaneously in patients < 40 years of age and no known coronary artery disease.

Adults: 0.3 ml SQ (0.3 mg)

Children: 0.01 ml/kg SQ up to 0.3 ml (0.01 mg/kg)

10. May consider repetitive bronchodilator treatments if needed.
11. Medical command may order Epinephrine from 1:10,000 solution IVP in patients in severe distress. This should generally only be given if the patient is unconscious.

Notes:

1. When attempting to differentiate between COPD and congestive heart failure, the medication history will usually give more valuable information than the physical exam.
2. Do not withhold high concentrations of oxygen from the COPD patient if oxygen is needed. The risks of oxygen therapy in these patients are usually overemphasized. Any rise in PCO₂, which may occur, is frequently more than offset by the beneficial effects of increased oxygen delivery to the tissue.

RESPIRATORY DISTRESS (Congestive Heart Failure)

Historical Findings:

1. Age > 14.
2. Patient complains of severe shortness of breath.
3. Patient has a past medical history of heart disease.

Physical Findings:

1. Respiratory rate > 20.
2. Systolic blood pressure > 100 mm Hg.
3. If systolic blood pressure < 100 mm Hg, treat per cardiogenic shock protocol.
4. Rales on lung exam.
5. Patient has evidence of respiratory insufficiency such as air hunger, accessory muscle use, or altered mental status.
6. Patient MAY have jugular venous distention or peripheral edema.

EKG Findings:

1. Normal sinus rhythm or sinus tachycardia. If an arrhythmia is present, proceed to appropriate arrhythmia protocol.

Protocol:

1. Maintain airway and administer oxygen at high flow and high concentration preferably by non-rebreather facemask.
2. Intubate if necessary.
3. Allow patient to sit up in position of comfort – Keep HOB elevated.
4. Obtain vital signs and apply cardiac monitor.
5. Initiate IV of normal saline and maxi-drip tubing at **keep open rate**.
6. Nitroglycerin 0.4 mg sublingually if systolic blood pressure > 120 mm Hg. This dose may be repeated (x3).

7. Administer Lasix slow IVP. If patient is already taking Lasix or a similar drug, then twice the patient's normal oral dose is recommended. Otherwise a starting dose of approximately 40 mg is frequently appropriate. The maximum single dose and/or total dose of Lasix should not exceed 200mg.
8. Consider Morphine sulfate 2mg IVP every 5 minutes up to a total of 10 mg if systolic blood pressure > 100 mm Hg.

Notes:

1. Transport to the hospital should be initiated immediately if the patient's airway is compromised or the patient needed endotracheal intubation. Otherwise transport should be initiated as soon as possible taking into account the time required to begin pharmacologic therapy.

ALTERED LEVEL OF CONSCIOUSNESS**Historical Findings:**

1. Patient has decreased level of consciousness without suspected trauma.

Physical Findings:

1. Patient has a decreased level of consciousness.
2. Systolic blood pressure \geq 90 mm Hg or child with normal perfusion.

EKG Findings:

1. Heart rate $>$ 60
2. NOT ventricular tachycardia
3. NOT supraventricular tachycardia

Differential Diagnosis:

1. Shock
2. Stroke, intracranial bleeding, head trauma
3. Electrolyte imbalance
4. Anemia
5. Toxic ingestion
6. Hypoxia
7. Hypertension
8. Seizure
9. Drugs and alcohol
10. Infection, especially meningitis
11. Myocardial ischemia/infarction
12. Arrhythmias
13. Pulmonary embolism
14. Psychiatric

Protocol:

1. Spinal immobilization when indicated. If trauma, treat per specific protocol.
2. See protocol for *Stroke* if indicated.
3. Maintain airway and administer oxygen at high flow and high concentration preferably by non-rebreather face mask. Oxygen should be administered as needed to raise oxygen saturation to at least 95%.
4. Place patient on monitor and obtain rhythm strip. If dysrhythmia is present, proceed to the appropriate protocol.
5. Monitor vital signs frequently.

6. Initiate IV of normal saline or lactated ringers with maxi-drip tubing at keep open rate.
7. May Consider Thiamine 100 mg IVP to prevent Wernicke's Syndrome. This should especially be considered if the patient is alcoholic.
8. Test glucose with rapid glucose assay.
9. If rapid glucose test result is less than 60, then administer D50W 25 gms (children \leq 10 years of age D25 2 cc/kg) IVP, (See Note 2).
10. Administer Narcan 2.0 mg IVP or IM (children 0.1 mg/kg up to 2.0 mg) (See Note 1).
11. Note patient response to medication.
12. Begin transport to the hospital.
13. Additional dose of Dextrose or Narcan may be considered.

Notes:

Although alcohol is a common cause of altered level of consciousness, it is rarely the cause of complete unresponsiveness. Do not let the patient's alcohol intoxication cloud your judgment. It is safer to assume that the intoxicated patient has a serious medical problem and treat accordingly than it is to conclude that the patient is "just drunk."

1. If there is a strong suspicion of drug overdose, then administer Narcan as soon as possible. If the patient has inadequate spontaneous ventilation, then control the airway with bag-valve-mask ventilation until Narcan has been administered and the patient's response assessed.
2. D25 is made by diluting 1 cc/kg of D50 with 1 cc/kg of sterile water for injection or normal saline. The resulting solution will be D25 with a volume of 2 cc/kg.

ANAPHYLAXIS/ALLERGIC REACTION**Historical Findings:**

1. Exposure to an allergen (insect sting, medications, foods, or chemicals).
2. Patient complains of itching, shortness of breath, tightness in chest or throat, weakness, or nausea.

Physical Findings (One or more)

1. Flushing, hives, or swelling.
2. Wheezing or stridor.
3. Anxiety or restlessness.
3. Pulse > 100 (adult).
4. Blood pressure < 90 in an adult, < 75 in a child < 5 years old, or < 85 in a child age 5-10 years old.

Protocol:

1. Maintain airway and administer oxygen at high flow and high concentration preferably by non-rebreather facemask. Oxygen should be administered as needed to raise oxygen saturation to at least 95%.
2. Remove allergen (stinger from skin, etc.)
3. Monitor cardiac rhythm and check vital signs frequently.
4. Administer Epinephrine 0.3 ml (child 0.01 ml/kg) 1:1000 solution subcutaneously if either hypotension or severe respiratory distress is present, and begin transport. Consider risk of MI in patients > 40 years of age or has cardiac history prior to administering Epinephrine.
5. If bronchospasm or wheezing is present, administer Albuterol (Proventil) aerosol treatment 0.5 ml in 2.5 ml NS via hand held nebulizer.
6. Initiate IV of normal saline and maxi-drip tubing at 250cc/hr. If the patient is hypotensive, begin 1 L (child: 20 ml/kg) IV wide open.
7. Administer Benadryl 50 mg (child over age 9 months: 1 mg/kg) IVP. Benadryl may be given IM if IV access is not available.

8. Administer Epinephrine 0.1 mg (1 ml of 1:10,000 solution, child: 0.1 ml/kg of 1:10,000 up to 1 ml) IVP. This should generally only be given if the patient is unconscious.
9. Begin transport.
10. Consider Solumedrol 125mg IVP
11. If, after five minutes, hypotension persists despite fluid challenge and epinephrine administration, medical command may order repeat epinephrine administration.
12. If hypotension still persists, medical command may order dopamine infusion.

Notes:

1. Be aware of patients on β -blockers. They may not manifest the usual tachycardia or sympathetic adrenergic response to allergic stimuli.
2. Anaphylaxis in infants is rare.
3. Administration of epinephrine to the patient with known cardiovascular disease should be avoided unless the patient is extremely ill.

SEIZURE**Historical Findings:**

1. Patient suspected to have had grand-mal seizure based upon description of eyewitnesses, incontinence of urine or stool, or history of previous seizures.

Physical Findings:

1. MAY have current seizure activity.
2. Level of consciousness is decreased.

Protocol:

1. Maintain airway and administer oxygen at high flow and high concentration preferably by non-rebreather face mask. Oxygen should be administered as needed to raise oxygen saturation to at least 95%.
2. Immobilize C-spine if evidence for significant trauma is present, otherwise position the patient in the lateral recumbent position.
3. Suction as needed.
4. Obtain vital signs and place on cardiac monitor.
5. Initiate IV with normal saline and maxi-drip tubing at keep open rate.
6. If hypoglycemia is suspected or if seizure lasts longer than 15 minutes, then check glucose; and if glucose is less than 60, administer 25 gm D50 (child \leq 10 years of age D25 2 cc/kg) IVP with 100 mg Thiamine IVP.
7. If there is a suspicion of narcotic overdose, then administer Narcan 2 mg IVP (children 0.1 mg/kg up to 2.0 mg).
8. Begin transport.
9. If actively seizing, give Ativan 0.1 mg/kg IVP repeat if necessary q 5 minutes. Be prepared to support the patient's respirations.
10. If seizures continue, contact medical control

Notes:

1. Trauma to the tongue is unlikely to cause serious problems, but trauma to teeth may. Attempts to force an airway into the patient's mouth can completely obstruct the airway. Use of a nasopharyngeal airway may be helpful.
2. New seizures in patients over the age of 50 are often caused by cardiac arrhythmias.
3. Most patients with seizures need only oxygen and attention to airway management.
4. If unable to establish IV then administer Glucagon 1.0 mg **IM**.

TOXICOLOGIC EMERGENCIES

Historical Findings:

1. History of actual or possible poisoning either through ingestion, inhalation, or skin exposure.

Physical Findings:

1. Patient's level of consciousness is not altered. If there is alteration in level of consciousness, see the Altered Level of Consciousness protocol.
2. Systolic blood pressure \geq 90 mm Hg in an adult OR
3. Child age $<$ 5: systolic BP $>$ 75 mm Hg or child age 5-10: systolic BP $>$ 85 mm Hg.

Protocol:

1. Evaluate scene for provider safety.
2. Maintain airway and administer high flow oxygen preferably by non-rebreather face mask. Oxygen should be administered as needed to raise oxygen saturation to at least 95%. If carbon monoxide exposure is suspected or the patient is cyanotic, then administer high flow oxygen via non-rebreather face mask regardless of saturation reading.
3. Obtain vital signs, evaluate breath sounds and level of consciousness.
4. If toxin remains on patient, wash or brush off as appropriate. If in doubt, contact medical control for clarification.
5. If there is eye exposure, flush the eyes with normal saline.
6. If patient has ingested medication or other substance, obtain container(s), if available, and bring them with the patient.
7. Begin transport as soon as possible.
8. Start IV of normal saline and maxi-drip tubing as required and run at keep open rate.
9. Contact medical command if indicated. Direct contact from the flight crew unit to the poison control center is discouraged. If necessary, medical command will contact the poison control center. The medical command physician will order IV fluid or other medications as indicated by the toxic exposure.
10. Reassess vital signs, perfusion status, and level of consciousness frequently. If there is any change in these findings, notify the medical command physician.

Notes:

1. Because of the wide variety of possible adverse effects of assorted toxins, it is not practical to detail the management of various toxic exposures. Consultation with the medical command physician can enhance the prehospital care of patients with potentially dangerous exposures and is encouraged.
2. Since some toxic exposures have a high risk for causing rapid deterioration in the patient's mental status, the flight crew should not administer ipecac unless specifically ordered by the medical command physician.

HYPOTHERMIA

Historical Findings:

1. High risk groups: elderly, infants, outdoor workers, alcoholics.
2. Predisposing factors:
 - a. Increased loss of body heat due to:
 - i) Prolonged exposure to cold
 - ii) Inadequate clothing
 - iii) Intoxication
 - iv) Illness or injury
 - b. Decreased heat production due to:
 - i) Malnutrition
 - ii) Endocrine disorders
 - c. Impaired thermoregulation due to:
 - i) Hypoglycemia
 - ii) Drugs (alcohol, barbiturates, phenothiazines)
 - iii) Sepsis
 - iv) Central nervous system disorders.
3. Hypothermia can occur under relatively mild weather conditions.

Physical Findings:

1. Variable presentation with a range of presenting symptoms from mild nonspecific complaints to unresponsiveness.
2. Mild symptoms include decreases in coordination, reflexes, and alertness.
3. If unresponsive, may appear pulseless, with pupils fixed and dilated.
4. Pulse rate may be severely bradycardic. A radial pulse may be very difficult to palpate. The pulse rate should be obtained with palpation of a central pulse (carotid or femoral) for at least one minute.
5. Extremities may be stiff resembling rigor mortis, or may be cyanotic or edematous.

EKG Findings:

1. Bradycardia.
2. May see "J" or "Osborne" waves on rhythm strip.

Differential Diagnosis:

1. Cardiac arrest
2. Coma

3. Severe shock
4. Narcotic abuse

Protocol:

1. *Gentle* handling of the patient is important to avoid inducing ventricular fibrillation.
2. Do **NOT** massage extremities (causes increased cutaneous vasodilatation and decreases shivering).
3. Do **NOT** use hot packs (can cause serious burns, as well as possibly increased mortality).

PULSE/BREATHING ABSENT

1. Apply cardiac monitor. If the rhythm is ventricular fibrillation or ventricular tachycardia then defibrillate up to a total of three shocks at 200 joules (2 j/kg for child), 300 j, 360 j.
2. Intubate the patient and ventilate with 100% O₂.
3. Begin CPR and ALS.
4. Initiate transport by ground or air as determined by incident command.

SPONTANEOUS RESPIRATIONS

1. Monitor cardiac rhythm.
2. Maintain airway and administer oxygen at high flow and high concentration by non-rebreather facemask (heated to 42 C [108 F] max. if possible). If the patient is unconscious and not able to protect the airway, then perform endotracheal intubation.
3. Initiate large bore IV of normal saline with maxi-drip tubing and begin to administer 1 liter (child 20 ml/kg) fluid bolus.
4. Test glucose with rapid glucose assay.
5. If rapid glucose test is less than 60, then administer D50W 25gms (children < 6 years of age D25 2 cc/kg) IVP.
6. Administer Narcan 2.0 mg (children 0.1 mg/kg up to 2.0 mg) IVP.
7. *Gentle* evacuation is needed. Remove wet clothing, insulate with dry, warm blankets, and immobilize to avoid exertion by the patient.
8. Initiate transport.
9. Notify receiving hospital so that preparations can be made to warm the patient.

Notes:

1. If the patient fails to respond to initial defibrillation attempts or initial drug therapy, subsequent defibrillation or additional boluses of medication should be avoided until core temperature rises above 30 C (86 F).

SURGICAL PROBLEMS

HEMORRHAGIC SHOCK

Historical Findings:

1. History of or suspected hemorrhage

Physical Findings (One or More):

1. Active severe bleeding with signs of shock OR
2. Signs of poor tissue perfusion such as abnormal mental status, cool clammy skin, delayed capillary refill, weak or absent radial pulse OR
3. Systolic blood pressure < 90 mm Hg in an adult OR
4. Child age < 5 systolic BP < 75 mm Hg or child age 5-10 systolic BP < 85 mm Hg.

Protocol:

1. Maintain airway and administer high flow oxygen by non-rebreather face mask.
2. Aggressively manage the airway. If spontaneous respirations are inadequate, intubate with C-spine control if the patient will tolerate the attempt.
3. Identify and treat life-threatening breathing problems such as open chest wounds. For treatment of tension pneumothorax see Tension Pneumothorax protocol.
4. If situation indicates, immobilize patient with rigid cervical collar, long back board, and immobilize head such that the patient's head is secured to back board.
5. Control external bleeding with direct pressure.
6. Begin transport as soon as possible to appropriate facility as directed in Trauma Triage Protocol.
7. Monitor heart, obtain vital signs, evaluate breath sounds and level of consciousness.
8. Without stopping transport, initiate 2 large bore IV's of normal saline and Lactated Ringers with maxi-drip tubing. Give 1-2 liter wide open for adults **or** 20 ml/kg for children. In cases of penetrating trauma or a single visible bleeding wound minimize fluids unless bleeding is uncontrolled.
9. Reassess vital signs, perfusion status, and lung sounds at least every 5 minutes. Watch for signs of fluid overload.
10. Consider additional fluid boluses as indicated by reassessment in blunt trauma patients.
11. Continue secondary assessment as time permits.

Notes:

1. The key to good prehospital care of the hemorrhagic shock patient is rapid transport to definitive care. Scene time should be kept to a minimum. The philosophy is to make the most efficient use of time before arrival at an appropriate facility.
2. A reasonable performance goal for an EMS system is that 90% of patients who have traumatic shock and are not entrapped should be delivered to a definitive trauma care facility within 30 minutes from the time of injury.
3. Patients with penetrating chest trauma and abnormal vital signs are especially in need of immediate transport to definitive care. Early intubation of these patients improves outcome.

HYPOTENSION/SHOCK

Historical Findings:

1. History of recent trauma
2. History of recent large volume loss (diarrhea, vomiting blood, GI bleeding)
3. Spinal cord injury or alteration in vascular tone
4. Severe allergic reaction to foreign substance
5. Heart failure or AMI
6. Infection that is severe enough to cause sepsis

Physical Findings:

1. Anxiety
2. Confusion
3. Marked Tachycardia
4. Hypotension
5. Tachypnea
6. Narrowing Pulse Pressure
7. Diaphoresis
8. Decreased Urine Output
9. Decreased Capillary Refill

EKG Findings:

1. Tachycardia
2. Cardiac Arrhythmias
3. Bradycardia (as shock worsens)

Protocol:

1. Assess airway. Administer high flow Oxygen preferably by non-rebreather mask. Intubate if patient is obtunded or has a GCS less than 8 and BVM.
2. Stop hemorrhage and inspect for wounds.
3. Obtain a full set of vital signs. Apply cardiac monitor.
4. Assess mental status.
5. Assess for JVD.
6. Initiate 2 large bore IVs, either lactated ringers or normal saline. Deliver fluids judiciously based on vital signs.
7. Determine type of shock and treat appropriately:

HEMORRHAGIC

- a) Tamponade bleeding and support and splint fractures
- b) Titrate crystalloids and volume expanders to improve vital signs. Do not over resuscitate penetrating trauma victims.

HYPOVOLEMIA

- a) Administer crystalloids and volume expanders to vital signs
- b) Burns should be treated per burn protocol

SEPTIC

- a) Administer crystalloids to vital signs

NEUROGENIC

- a) Administer crystalloids to vital signs
- b) Properly immobilize patient
- c) Consider vasoactive drugs to maintain peripheral vasoconstriction (Dopamine)
- d) Follow spinal cord injury protocol

8. Do only life saving interventions before loading. Transport immediately, giving report en route.

HEAD OR SPINAL TRAUMA

Historical Findings:

1. History of loss of consciousness following head injury, OR
2. History of motor vehicle accident, diving accident, fall, or other trauma.

Physical Findings:

1. Head contusions, abrasions, or lacerations, OR
2. Fluid or blood from nose, ears, or mouth, OR
3. Altered mental status.
4. May have loss of sensation or movement.
5. May have pain in back or neck.
6. No signs of shock. If shock is present, refer to Hemorrhagic Shock protocol.

Protocol:

1. Control airway and administer oxygen at high flow and high concentration, preferably by non-rebreather face mask. Oxygen should be administered as needed to raise oxygen saturation to at least 95%.
2. If altered mental status, aggressively assure good oxygenation of patient. If GCS is 8 or less then intubate using in line c-spine immobilization. Oxygenate to maintain O₂ Sat above 95%. Do not hyperventilate. ETCO₂ 35-45 for intubated patients.
3. Immobilize patient with rigid cervical collar, long backboard, and immobilize head such that the patient's head is secured to backboard.
4. Begin transport as soon as possible to appropriate hospital as directed in Trauma Triage Protocol.
5. Obtain vital signs and monitor cardiac rhythm.
6. Obtain Glasgow Coma Scale, if the patient is older than four years of age.
7. Start large bore IV of normal saline at keep open rate.
8. If hypoglycemia is suspected, then check glucose. If glucose is < 60, then administer D50W 25 gms (child ≤ 10 years D25 2 cc/kg).
9. If narcotic overdose is suspected, administer 2 mg Narcan IVP.

10. If spinal trauma suspected:

- a. Assess distal circulation for vasodilation. If signs of neurogenic shock present as evidenced by hypotension with normal pulse pressure, bradycardia and warm, dry skin, start dopamine infusion @ 5mcg/kg/min. Titrate if needed to max of 20 mcg/kg/min. If severely bradycardic (<40 bpm), atropine should be considered for maintenance of normal hemodynamic function.
- b. Assess motor and sensory function.

11. If the patient is less than or equal to four years of age, then obtain either the pediatric Glasgow Coma Scale or assess level of consciousness using the AVPU Scale.

		> 1 Year	< 1 Year	
EYE OPENING				
	4	Spontaneous	Spontaneous	
	3	To Verbal Command	To Shout	
	2	To Pain	To Pain	
	1	None	None	
MOTOR RESPONSE				
	6	Obeys commands	Obeys commands	
	5	Localizes pain	Localizes pain	
	4	Withdrawal pain	Withdrawal pain	
	3	Flexion pain – decorticate	Flexion pain – decorticate	
	2	Extension pain – decerebrate	Extension pain – decerebrate	
	1	None	None	
VERBAL RESPONSE		> 5 Years	<2-5 Years	0-23 Months
	5	Oriented & Converses	Appropriate words and phrases	Smiles, coos, cries appropriately
	4	Disoriented	Inappropriate words and phrases	Cries
	3	Inappropriate words – Screams	Cries and/or Screams	Inappropriate cries and/or screaming
	2	Incomprehensible sounds	Grunts	Grunts
	1	None	None	None

Notes:

1. Shock is not usually due to head injuries. If patient is in shock, consider another cause for the hypotension.
2. Remember that restlessness can be due to hypoxia and shock not just head injury.
3. In any multiple trauma patient, spinal trauma should be assumed until proven otherwise in a hospital emergency department.

MAJOR BURNS (Thermal or Electrical)

Historical Findings:

1. Patient complains of shortness of breath, cough, or hoarseness.
2. Any patient with electrical injury.

Physical Findings:

1. Second degree burns (partial thickness) greater than 20% of body surface area, OR
2. Third degree burns (full thickness) greater than 15% of body surface area, OR
3. Singed nasal or facial hair, soot or erythema of mouth, or respiratory distress.

Protocol:

1. Evaluate scene for safety.
2. Remove patient from source of burn including clothing.
3. Maintain airway and administer oxygen at high flow and high concentration by non-rebreather facemask. If conscious, but with suspicion of inhalation injury consider PAI per protocol.
4. If patient is unconscious or has any respiratory distress, intubate immediately.
5. Obtain vital signs and place on cardiac monitor.
6. Initiate IV of normal saline with maxi-drip tubing and assess the percent of burn. Calculate rate using Parkland formula. (4cc/kg/percent). Half of the total to be given in the first 8 hours.
7. Remove all prostheses, rings, and constricting bands from all extremities.
8. Partial thickness (2nd degree) burns with less than 10% BSA, cover with moist dressing; greater than 10% BSA, cover with dry dressing. Full thickness (3rd degree); cover with dry dressing.
9. Transport patient to an appropriate facility capable of treating major burns.
10. Notify the receiving facility.
11. Refer to pain management protocol for pain control.

Notes:

1. Consider carbon monoxide poisoning if the patient has headache, dizziness, nausea, vomiting, decreased mental status, syncope, or chest pain or was trapped in a closed space.
2. Burn victims have often suffered other trauma. These patients should primarily be managed as multiple trauma patients.
3. Important historical information includes any inhalation problem or closed space exposure, duration of exposure and time elapsed since burn, chemical exposure, and significant past medical problems.
4. Keep the burned patient warm. It is important to avoid hypothermia since the skin injury disables much of the body's heat conservation methods. Only burns of less than 10% of body surface area should be treated with local cooling such as wet dressings.
5. Monitor urine output to a volume of 30-50 cc per hour in Adults. For Children <30 kg, Urinary output should be maintained @ 1 ml/kg.

IMMINENT DELIVERY ON SCENE FLIGHTS**Historical Findings:**

1. Pregnant woman who is in active labor as defined by regular, frequent uterine contractions and who feels the urge to push.

Physical Findings:

1. Crowning of fetal part at vaginal opening with imminent delivery.

Differential Diagnosis:

1. Delivery not imminent.

Protocol:

1. Assure airway patency and administer O₂ at high flow and high concentration, preferably by non-rebreather face mask.
2. Obtain vital signs and FHT's.
3. Establish IV of normal saline and maxi-drip tubing with one large bore catheter (16 gauge preferred) at keep open rate. If potential premature delivery during transport, consider Brethine 0.25 mg SQ for smooth muscle relaxation.
4. Should delivery occur during transport, request the pilot to land the helicopter, assist with normal delivery—then continue transport.
5. If baby is delivering in malpresentation (e.g. foot or arm), elevate hips of mother and continue transport immediately.
6. If cord is prolapsed:
 - a. Relieve pressure on the cord with hand in vagina to maintain head of baby off cord.
 - b. Place patient in knee/chest or steep trendelenburg position.
 - c. Keep cord moist
 - d. Transport
7. If cord is wrapped about neck:
 - a. Attempt manual removal
 - b. If unsuccessful, then cut cord after clamping prior to completing delivery.
8. After the infant's head is delivered, suction the mouth, oropharynx, then nose.
9. After complete delivery, provide routine newborn care with special attention to maintenance of infant body temperature. Place infant on oxygen and suction if needed. Document APGAR scoring at 1 minute and 5 minutes after birth. Refer to newborn resuscitation protocol if needed.
10. Apply local pressure to any visible bleeding sites.

11. Contact medical command.
12. Resume transport to hospital with labor and delivery service.
13. If a complication such as massive bleeding or neonatal distress occurs, proceed to nearest appropriate hospital.
14. If mother has excessive bleeding post delivery:
 - a. Treat per hemorrhagic shock protocol.
15. Assist with delivery of placenta and begin fundic massage.

Notes:

1. Only deliver the placenta when it has detached. Do not pull on the umbilical cord to force out the placenta as this can lead to retained placenta or uterine eversion.
2. **DO NOT DO AN EPISIOTOMY!**
3. If this is a scene call and delivery is determined to be imminent, assist with normal delivery prior to transport.
4. If this is a transfer, assess the situation in regard to patient safety and imminent delivery. The decision to decline transport may be determined based on findings.
5. In general patients in with imminent delivery should have two ALS providers for transport as you may have two critically ill patients present at any time.

APGAR SCORING FOR NEWBORNS			
SIGN	0 pts	1 pt	2 pts
Appearance	All Blue/pale	Pink body Blue extremities	All pink
Pulse	Absent	Less than 100	More than 100
Grimace (reflex)	Absent	Grimaces	Cough or Sneezes
Activity (muscle tone)	Limp	Some flexion of Extremities	Good flexion Active motion
Respirations	Absent	Less than 30, Irregular	30-50, good Strong crying

EYE INJURY

Historical Findings:

1. History of actual or suspected eye injury.
2. MAY have foreign body sensation or pain in eye.

Physical Findings:

1. MAY have visible foreign body or visible globe laceration.
2. MAY have light sensitivity.
3. MAY have poorly reactive or non-reactive pupil.

Protocol:

1. If there is an impaled object, then stabilize it in place.
2. If there is evidence of a penetrating eye injury such as visible globe laceration or fluid draining from the globe, then cover the affected eye with a *metal* eye patch. Do not press on the globe.
3. If the patient has a chemical exposure to the eye or a non-penetrating foreign body in the eye, then proceed in the following manner:
 - a. Begin eye irrigation by instilling copious amounts of normal saline solution.

Notes:

1. Remember that eye injuries can cause a great deal of patient anxiety. Provide reassurance.
2. When not contraindicated by other injuries or need for spinal immobilization, then transport the patient with the head of the bed elevated at least 30°.

PEDIATRIC PROTOCOLS

NEWBORN RESUSCITATION

Historical Findings:

1. Newborn Infant

Physical Findings:

1. Central Cyanosis, poor or no respiratory effort, or limp muscle tone.

Protocol:

Ensure adequate airway. Suction mouth, oropharynx, then nose, prior delivery of head if possible. Assess for thick meconium in amniotic fluid.

a) For newborns whose amniotic fluid does contain thick meconium:

- i) Perform endotracheal Intubation and directly suction with the endotracheal tube while slowly withdrawing the tube. Using a new tube, repeat this procedure until meconium no longer exists.

b) For newborns whose amniotic fluid does not contain thick meconium:

- i) Dry infant to provide stimulation and prevent chilling. Keep the infant warm.
- ii) Check heart rate. If less than 100, ventilate with 100% oxygen at a rate of 40 to 60/minute.
- iii) Check color. If there is central cyanosis, provide 100% oxygen and assist ventilation if needed.
- iv) Assess response to oxygen and ventilation. If heart remains less than 100 after 15 to 30 seconds of assisted ventilation, reassess airway and consider intubation.
- v) Assess response to intubation. Check the position of the endotracheal tube frequently and document the centimeter mark at the gum line. If heart rate <60 or is 60-80 bpm and not rapidly increasing despite effective positive-pressure ventilation with 100% oxygen for approximately 30 seconds, initiate cardiac compression of ½ to ¾ inches at 120 per minute. In the newborn, a chest compression/ventilation ratio of 3:1 is used.
- vi) If heart rate is still <80 after 30 seconds of chest compression, give Epinephrine via ET per chart below.
- vii) Transport as soon as possible.
- viii) Establish IV of normal saline. If unable to initiate IV, start IO infusion per IO protocol.

- ix) Contact medical command.
- x) If vascular access is available, then repeat Epinephrine IV or IO every 3 to 5 minutes until heart rate is above 80. If vascular access is not available, then repeat Epinephrine via ET. **See chart below.**
- xi) If hypovolemia is suspected due to blood loss at delivery, then give normal saline 30 ml (10 ml/kg) IV or IO.
- xii) Provide medical command with patient update.
- xiii) If Glucose result is ≤ 40 mg/dl, administer D10 at 2 ml/kg IV. D10 is made by wasting 40 ml of D50 and drawing up 40 ml of NS in a 50cc syringe.

EPINEPHRINE		
	Endotracheal Tube*	IV or IO
First Dose	1:1,000 at 0.1 mg/kg or 0.1 ml/kg	1:10,000 at 0.01 mg/kg or 0.1 ml/kg
Repeat Doses	1:1,000 at 0.1 mg/kg or 0.1 ml/kg	1:1,000 at 0.1 mg/kg or 0.1 ml/kg

*When 1:1000 Epinephrine is to be given per ET tube, draw up the drug dosage, and enough normal saline to make a total of 3-5 ml of total volume, into a syringe.

Notes:

1. Newborn Infants lose heat rapidly and need to be kept warm to decrease oxygen demands and prevent metabolic acidosis.
2. Doses based on a 3 kg. weight
3. When dealing with such a short trachea, remember that slippage of even a centimeter in endotracheal tube position can result in inadvertent extubation.

Endotracheal tube sizes:

FULL TERM: 3.0 -- 3.5 ET tube

PREMATURE: 2.5 -- 3.0 ET tube

PEDIATRIC ASYSTOLE

Historical Findings:

1. Unconscious patient.
2. Age \leq 14.

Physical Findings:

1. Patient is not breathing.
2. Patient has no pulse.

Protocol:

1. Ensure adequate airway and begin hyperventilation using bag-valve-mask with 100% oxygen.
2. Begin CPR and intubate as soon as possible.
3. Check cardiac rhythm.
4. Establish vascular access per IV or IO with normal saline at keep open rate. If age $<$ 6, place intraosseous line if needed as detailed on the intraosseous infusion protocol.
5. Give Epinephrine IVP or IO. If vascular access is not available, then give Epinephrine via ET tube (max. dose 5.0 ml). **See chart below.**
6. Begin transport
7. Reassess airway and breathing.
8. If the patient remains in asystole after 3 to 5 minutes, repeat Epinephrine every 3 to 5 minutes IV, IO, or ET (max. dose 5.0 ml). **See chart below.**
9. Contact medical command.

EPINEPHRINE		
	Endotracheal Tube*	IV or IO
First Dose	1:1,000 at 0.1 mg/kg or 0.1 ml/kg	1:10,000 at 0.01 mg/kg or 0.1 ml/kg
Repeat Doses	1:1,000 at 0.1 mg/kg or 0.1 ml/kg	1:1,000 at 0.1 mg/kg or 0.1 ml/kg

*When 1:1000 Epinephrine is to be given per ET tube, draw up the drug dosage, and enough normal saline to make a total of 3-5 ml of total volume, into a syringe.

Notes:

- 1 The most common cause of pediatric cardiac arrest is hypoxia with ischemic insult. Therefore airway and breathing are extremely important.
- 2 Epinephrine given through the pediatric tube should be diluted with 1 to 2 ml of saline prior to administration.

PEDIATRIC BRADYCARDIA

Historical Findings:

1. Age \leq 14.

Physical Findings:

1. Patient may have alteration in level of consciousness, OR
2. Patient has weak peripheral pulses, OR
3. Patient has other signs of uncompensated shock such as poor skin perfusion or delayed capillary refill.

EKG Findings:

1. Rhythm is sinus bradycardia for child's age.

The patient must be symptomatic before proceeding with this protocol.

Protocol:

1. Ensure airway, apply 100% oxygen, assist ventilation as needed, and recheck pulse rate.
2. Perform chest compressions, if despite oxygen and ventilation, heart rate is < 60 in infant or child associated with poor systemic perfusion.
3. Establish vascular access per IV or IO with normal saline at keep open rate. If age < 6 , place intraosseous line if needed as detailed on the intraosseous infusion protocol.
4. Give Epinephrine IVP or IO. If vascular access is not available, then give Epinephrine via ET tube (max. dose 5.0 ml). **See chart below.**
5. Begin transport
6. Reassess airway and breathing.
7. Contact medical command.
8. If symptomatic bradycardia persists, repeat Epinephrine every 3 to 5 minutes. **See chart below.**

EPINEPHRINE		
	Endotracheal Tube*	IV or IO
First Dose	1:1,000 at 0.1 mg/kg or 0.1 ml/kg	1:10,000 at 0.01 mg/kg or 0.1 ml/kg
Repeat Doses	1:1,000 at 0.1 mg/kg or 0.1 ml/kg	1:1,000 at 0.1 mg/kg or 0.1 ml/kg

*When 1:1000 Epinephrine is to be given per ET Tube, draw up the drug dosage, and enough normal saline to make a total of 3-5 ml of total volume, into a syringe.

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9. If symptomatic bradycardia persists, give Atropine 0.02 mg/kg (0.1 mg minimum, 0.5 mg maximum single dose for a child, 1.0 mg maximum single dose for an adolescent) IV, IO, or ET.
 10. If symptomatic bradycardia persists after 5 minutes, repeat Atropine 0.02 mg/kg (to a maximum total dose of 1.0 mg for a child, 2.0 mg for an adolescent) IV, IO, or ET.
 11. Reassess airway and breathing.
 12. If hypotensive, normal saline 20 cc/kg IVP.

Notes:

1. The most common cause of bradycardia in a 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 slower heart rates

PEDIATRIC PULSELESS ELECTRICAL ACTIVITY (PEA)

Historical Findings:

1. Age \leq 14.
2. Patient is unconscious.

Physical Findings:

1. Patient has no pulse or blood pressure.

EKG Findings:

2. There is an organized cardiac rhythm with QRS complexes.

Protocol:

Consider Possible Causes and Attempt Correction.

Possible Cause Field Therapies and Treatments:

Hypoxia	Ventilation and Oxygen
Respiratory Acidosis	Ventilation and Oxygen
Metabolic Acidosis	Ventilation and Oxygen/Possible Sodium Bicarbonate
Hypovolemia	Volume Infusion
Tension Pneumothorax	Needle Decompression
Cardiac Tamponade	
Poisoning	

1. Ensure adequate airway and begin hyperventilation using bag-valve-mask with 100% oxygen.
2. Begin CPR and intubate as soon as possible.
3. Check cardiac rhythm.
4. Establish vascular access per IV or IO with normal saline. If age $<$ 6, place intraosseous line if needed as detailed on the intraosseous infusion protocol. Administer Normal Saline 20ml/kg IV or IO, as appropriate for possible cause of arrest.
5. Give Epinephrine IV or IO. If vascular access is not available, then give Epinephrine via ET tube (maximum dose 5.0 ml). **See chart below.**

EPINEPHRINE		
	Endotracheal Tube*	IV or IO
First Dose	1:1,000 at 0.1 mg/kg or 0.1 ml/kg	1:10,000 at 0.01 mg/kg or 0.1 ml/kg
Repeat Doses	1:1,000 at 0.1 mg/kg or 0.1 ml/kg	1:1,000 at 0.1 mg/kg or 0.1 ml/kg

*When 1:1000 Epinephrine is to be given per ET tube, draw up the drug dosage, and enough normal saline to make a total of 3-5 ml of total volume, into a syringe.

6. Begin transport.
7. Reassess airway and breathing.
8. If PEA persists after 3 to 5 minutes, repeat Epinephrine every 3 - 5 minutes IV, IO, or ET (max. dose 5.0 ml).

Medical command may consider the following:

1. Additional fluid challenge.
2. Needle thoracentesis.

Notes:

1. Intubation is the preferable method of airway control. A main cause of PEA is hypoxia, and the effectiveness of ventilation should be evaluated constantly.

PEDIATRIC SUPRAVENTRICULAR TACHYCARDIA

Historical Findings:

1. Age \leq 14.
2. Older child may complain of chest pain or rapid heart rate.

Physical Findings:

1. Heart rate in infants under age 2 is $>$ 220. Heart rate in children age 2 - 14 is 150 - 250.
2. The unstable patient has poor skin perfusion, hypotension or change in mental status.

EKG Findings:

1. QRS duration \leq 0.12 (3 little boxes).
2. P waves may or may not be seen.

Protocol:

1. Ensure airway and apply 100% oxygen.
2. If patient is stable, then transport and contact medical command.

Only if patient is unstable:

1. Contact medical command.
2. Attempt vascular access preferably in an antecubital vein. Use normal saline at keep open rate.
3. Medical command may consider administration of Adenosine 0.1 mg/kg up to 6 mg rapid IVP.
4. If the patient is conscious, give Versed 0.05 mg/kg IVP titrated to effect.
5. Perform synchronized cardioversion at 0.5 j/kg.
6. If unsuccessful, repeat synchronized cardioversion at 1 j/kg.
7. If unsuccessful, repeat synchronized cardioversion at 2 j/kg.
8. Reassess ABCs, consider CPR and transport.

Notes:

Children without underlying heart disease or myocardial dysfunction will tolerate the rhythm for up to 24 hours without compromise.

1. **WARNING:** Vagal maneuvers (e.g. ice bag) in young infants may cause asystole.

PEDIATRIC VENTRICULAR FIBRILLATION

Historical Findings:

1. Age \leq 14.
2. Patient is unconscious.

Physical Findings:

1. Patient is not breathing.
2. Patient has no pulse.

EKG Findings:

1. Ventricular Fibrillation or Ventricular Tachycardia without a pulse.

Protocol:

1. Apply Quick Look paddles if not already monitored.
2. If rhythm is ventricular fibrillation or ventricular tachycardia without a pulse, defibrillate immediately at 2 joules/kg (max. 200 joules).
3. If no change, repeat defibrillation at 4 joules/kg (max. 300 joules).
4. If no change, repeat defibrillation at 4 joules/kg (max. 360 joules).
5. If no change, begin CPR and ventilate using a bag-valve mask and 100% oxygen.
6. Intubate the trachea.
7. Establish vascular access per IV or IO with normal saline at keep open rate. If age $<$ 6, place intraosseous line if needed as detailed on the intraosseous infusion protocol.
8. Give Epinephrine IV or IO. If vascular access is not available, then give Epinephrine via ET tube. Repeat every 3 to 5 minutes using Epinephrine IV, IO, or ET (maximum dose 5.0 ml).
See chart below.

EPINEPHRINE		
	Endotracheal Tube*	IV or IO
First Dose	1:1,000 at 0.1 mg/kg or 0.1 ml/kg	1:10,000 at 0.01 mg/kg or 0.1 ml/kg
Repeat Doses	1:1,000 at 0.1 mg/kg or 0.1 ml/kg	1:1,000 at 0.1 mg/kg or 0.1 ml/kg

*When 1:1000 Epinephrine is to be given per ET tube, draw up the drug dosage, and enough normal saline to make a total of 3-5 ml of total volume, into a syringe.

9. Repeat defibrillation at 4 joules/kg (max. 360 joules).
10. If no change, Lidocaine 1 mg/kg IVP or IO push.
11. Repeat defibrillation at 4 joules/kg (max. 360 joules).
12. Repeat Lidocaine 1 mg/kg IVP or IO push.
13. Repeat defibrillation at 4 joules/kg (max. 360 joules).
14. Contact Medical Control.
15. Repeat defibrillation at 4 joules/kg (max. 360 joules).
16. Repeat defibrillation at 4 joules/kg (max. 360 joules).
17. Continue CPR, monitor, transport.
18. If patient converts to a perfusing rhythm, and has received a Lidocaine bolus, administer Lidocaine 0.5 mg/kg IVP every 8 minutes to a maximum of 3 mg/kg of Lidocaine.

Notes:

1. Ventricular fibrillation is rare in children, unlike adults. If it present, consider some underlying pathology such as myocarditis, cardiomyopathy, prolonged QT syndrome, intoxication, or hypoxia.
 2. As in all pediatric cardiac arrests, airway control is a key factor in improving the odds of successful resuscitation.
-

PEDIATRIC VENTRICULAR TACHYCARDIA**Historical Findings:**

1. Age \leq 14.
2. Older child may complain of chest pain or palpitations.

Physical Findings:

1. Pulse rate usually $>$ 150.
2. May have hypotension or altered level of consciousness.

EKG Findings:

1. Wide QRS (\geq 0.12 seconds or 3 little boxes).
2. Rate $>$ 150.
3. Absent P waves.

Ventricular tachycardia is unstable when the patient has hypotension or mental status changes.

Protocol:

1. If patient has no pulse, treat as for ventricular fibrillation.
2. Ensure airway and apply 100% oxygen.
3. Establish vascular access. If age $<$ 6 and is unstable as defined above, then use intraosseous access, if needed as detailed on the intraosseous infusion protocol. Use normal saline at keep open rate.

UNSTABLE

4. If the patient is conscious, give Versed 0.05 mg/kg IVP titrated to effect.
5. Perform synchronized cardioversion at 0.5 j/kg.
6. If rhythm has converted to a stable sinus rhythm, administer Lidocaine 1 mg/kg IVP and transport.
7. If rhythm remains ventricular tachycardia, cardiovert again 1 j/kg.
8. Lidocaine 1.0 mg/kg IVP.
9. If rhythm remains ventricular tachycardia, cardiovert again at 2 j/kg.

10. Begin transport and contact medical control.

STABLE

1. Lidocaine 1 mg/kg IVP.
2. Begin transport and contact medical control.
3. Repeat Lidocaine 0.5 mg/kg IVP every 5 minutes until either the ventricular tachycardia resolves or to a total of 3 mg/kg.
4. Medical command may order synchronized cardioversion starting at 0.5 j/kg.

Notes:

1. This dysrhythmia is rare in the pediatric population. It is sometimes seen after cardiac surgery or with Digitalis intoxication, cardiomyopathy, electrolyte imbalance, prolonged QT syndrome, or tricyclic antidepressant overdose.

INFORMATION SHEET FOR PEDIATRICS

A. Minimum Blood Pressures

AGE	NORMAL
Neonate	Less than 60mm Hg systolic
1-12 months	Less than 70mm Hg systolic
1-10 years	70 + (2X age in years) mm Hg systolic
Over 10 years	90 mm Hg systolic

NOTE: Diastolic pressure should be 2/3 of systolic pressure. If systolic falls to level of diastolic, hypotension is present.

Proper BP Cuff Size: Cuff cover 2/3's of arm from axilla to the elbow.

Endotracheal Tubes and Defibrillation doses for Pediatric Patients

A general rule is that the approximate tube size will be the width of the nailbed of the little finger

$$\text{ET tube size} = \frac{\text{patient's age in years}}{4} + 4$$

$$\text{Tube depth of insertion} = \frac{\text{age in years}}{2} + 12$$

Age	Tube size	Depth of insertion
Newborn	3.0mm	10-10.5
6 months	3.5mm	10-10.5
18 months	4.0mm	11-12
3 years	4.5mm	13
5 years	5.0mm	14
6 years	5.5mm	15
8 years	6.0mm	16
12 years	6.5mm	18
16years	7.0mmm	20
Adults (F)	8.0 – 8.5mm	21-22
Adults (M)	8.5 – 9.0mm	22-23

B. Defibrillation Doses (In watt seconds – joules)

Placement instructions for pads/ paddles include both Sternum/Apex or Anterior/Posterior positions.

2 joules / kg first attempt. If unsuccessful, double the initial energy dose. If unsuccessful, be attentive to oxygenation and acid-base balance, as well as administration of Epinephrine.

50th percentile Weights in Kilograms by Sex and Age

AGE	MALE	FEMALE
Newborn	3.2kg	3.2 kg
3 months	6.0 kg	5.4 kg
6 months	8.0 kg	7.2 kg
12 months	10.0 kg	9.8 kg
2 years	12.6 kg	12.0 kg
3 years*	15.0 kg	14.0 kg
4 years	17.0 kg	16.0 kg
5 years	19.0 kg	18.0 kg
6 years*	21.0 kg	20.0 kg
7 years	23.0 kg	22.0 kg
8 years	25.0 kg	25.0 kg
9 years	28.0 kg	29.0 kg
10 years*	32.0 kg	33.0 kg
11 years	35.0 kg	37.0 kg
12 years	40.0 kg	42.0 kg
13 years*	45.0 kg	46.0 kg
14 years	51.0 kg	50.0 kg
15 years	57.0 kg	54.0 kg
16 years	62.0 kg	56.0 kg
17 years	66.0 kg	57.0 kg
18 years*	69.0 kg	57.0 kg

WEIGHT:

Weight is a difficult evaluation in the field. Ask parent if they know a recent weight of the child. There are 2.2 pounds in a kilogram. Divide the weight in pounds by 2.2 to give you the weight in Kilograms.

Note: Concentrate on key ages in relation to average kg weights so you can estimate ages with some normal kg weights. The ages marked “*” would be good indices.

PEDIATRIC CARDIOPULMONARY RESUSCITATION

Cardiopulmonary resuscitation – Per ACLS Guidelines:

Cardiac Compression Rate:

1. Infants (<1 yr):	at least 100 per minute
2. Children 1 – 10 yrs:	100 per minute
3. Children > 10 yrs:	80 per minute

Ventilation Rate:

1. Infants (<1 yr):	at least 20 per minute
2. Children 1 – 10 yrs	20 per minute
3. Children > 10 yrs:	16 per minute

DRUGS	DOSE	HOW SUPPLIED
1. Sodium Bicarbonate	1 meq/kg	1 meq/ml
2. Epinephrine	0.1 mg/kg	1:10,000
3. Atropine	0.02 mg/kg	0.1 mg/ml
*Minimum dose 0.1 mg to avoid rebound effect		
4. Lidocaine	1mg/kg	10 mg/ml
5. Narcan	0.01mg/kg	0.4 mg/ml
6. Calcium Chloride	0.2 mg/kg	100 mg/ml
*questionable use good for documented hypocalcemia and/or calcium channel blocker overdose		

Note: Use of the Broselow Pediatric Emergency Tape is encouraged for the above and preceding information.

INFANT AND PEDIATRIC AIRWAY OBSTRUCTION

Airway Obstruction:

If patient can move air and cough, do not interfere with attempts to clear airway. If cough becomes ineffective and cyanosis develops, airway obstruction has become life threatening.

Foreign Body:

1. Follow current AHA Guidelines for obstructed airway.
2. If unsuccessful, and patient not moving air, attempt direct visualization and extrication of foreign object.
3. Apply high flow O₂.
4. Monitor cardiac status.

Soft Tissue: (EPIGLOTTITIS)

1. Assure airway (Prepare to intubate but be aware such an attempt may exacerbate condition and require a surgical airway)
2. High Flow O₂
3. Monitor Cardiac Status
4. Transport rapidly, keep patient calm, move patient as little as possible.

Lower Airway Obstruction: (ASTHMA)

1. Obtain Vitals and ABC's
2. 100% O₂
3. IV NS KVO, unless hypovolemia/dehydration if suspected
4. Epinephrine 1:1000 0.1 mg/kg SQ
5. Albuterol 1.25 mg via nebulizer. May repeat if necessary.
6. Intubate with caution and only if child is obtunded and you cannot get O₂ saturation above 90 percent with supplemental O₂ and BVM.

PEDIATRIC ADVANCED AIRWAY PROTOCOL

Purpose:

1. This protocol is for use by experienced and trained personnel in the management of pediatric patients with a compromised airway or with a high risk of developing a compromised airway and in situations of pediatric cardiopulmonary arrest.
2. This protocol applies to patients 8 years and younger. When in doubt assume that the patient is younger than you think.
3. The pediatric patient in general has a different airway from the adult airway. The angles from nasopharynx and oropharynx are more acute and prevent the use of nasotracheal intubation. In very young children, the airway is small, conically shaped and more collapsible and easily occluded. Children also have shorter times to oxygen desaturation than adults due to a higher oxygen consumption per kilo of body weight.
4. **This is not superior to BVM ventilation or spontaneous ventilation and should be used only if there is no other airway possible and the patient cannot be ventilated.**

Procedure:

This protocol assumes the use of basic airway management skills have been utilized to this point and a decision has been made to initiate advanced airway control, i.e. intubation. You must be certain early that the airway can be managed reasonably with a bag valve mask before initiating pharmacologic assisted protocol. If it is necessary to proceed with PAI in a patient who cannot be ventilated with bag valve mask you must be prepared to immediately proceed to an alternative airway in case endotracheal intubation fails.

Make certain all equipment is available and that appropriate medications are drawn up, labeled, and ready to hand.

1. Pre-oxygenate to 100% saturation using 100% Oxygen by mask or BVM.
2. Proceed with orotracheal intubation if the patient is obtunded or unconscious.
 - a. Use the **smallest** appropriate sized endotracheal tube. When in doubt, go down one half size. An airway that is smaller than required is still a viable airway. Selecting too large a tube can cause failed intubation or trauma to the larynx.
 - b. If your first attempt fails because you are unable to pass the tube into the vocal chords, Re-Oxygenate using BVM and attempt using one half size smaller ET Tube.
3. If patient is combative, seizing, or fully awake (burns), proceed to PAI using appropriate medications for pediatric patients. Use a Broeslow tape for appropriate weight base dosing.
 - a. Pre-oxygenate to 100% saturation using high flow 100% oxygen by bag valve mask.
 - b. Administer medications while maintaining cricoid pressure. (*Do not release cricoid pressure until the endotracheal tube is secured*).
 - c. Once the medications have taken effect, intubate using orotracheal technique.
4. Successful intubation:
 - a. Verify adequate intubation by auscultation, rising Oxygen saturation and end tidal CO2 verification.
 - b. **SECURE the endotracheal tube!**
5. Failed Intubation:
 - a. If you can see the chords and tube will not pass, go down one half size on the endotracheal tube. Re-oxygenate before each attempt at intubation.

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-
- b. If intubation fails and patient can be ventilated by BVM continue this method as long as airway is not compromised and patient was breathing on his own prior to intubation attempts or paralysis.
 - c. If an alternative airway must be established or BVM ventilation is inadequate, proceed to insertion of an **LMA**. If unable to insert LMA successfully, proceed to **Needle** Cricothyroidotomy. Surgical Cricothyroidotomy is not indicated in patients under age of 8.
6. Needle Cricothyroidotomy:
- a. Use the largest IV catheter available, preferably a 12 g or 10 g catheter.
 - b. Attach a 5 cc syringe (size not critical) to the catheter.
 - c. Prep the neck with alcohol or betadine identifying the cricothyroid membrane.
 - d. Advance the needle and catheter into and through the cricothyroid membrane aspirating until air is aspirated.
 - e. Advance the catheter in a caudal direction removing the needle.
 - f. Attach the catheter to a 3 or 3.5 F endotracheal tube adapter and ventilate using BVM and 100% O₂.
 - g. **SECURE the catheter!**
7. Notes:
- a. Needle catheter Cricothyroidotomy provides oxygenation but not very adequate ventilation. Over time the patient's paCO₂ will rise.
 - b. In smaller children, this may be an adequate airway. In older children, it will provide 30 to 40 minutes of appropriate oxygenation.
 - c. **This is not superior to BVM ventilation or spontaneous ventilation and should be used only if there is no other airway possible and the patient cannot be ventilated.**
-

PEDIATRIC AIRWAY PROBLEMS

1. Drowning And Near-Drowning:

- a. Use C-spine Protocol if a diving accident precipitated event or if the history is unclear.
- b. Ascertain ABC's initiate CPR as indicated.
- c. Use 100% oxygen.
- d. Intubate as needed, 5cm PEEP may be used, increase if necessary.
- e. May place NG tube to dependent drainage if abnormal distension is present.
- f. Obtain vital signs.
- g. Initiate IV with LR TKO.

2. Carbon Monoxide Poisoning and Smoke Inhalation:

- a. Remove from toxic environment.
- b. Ascertain ABC's/ initiate CPR as indicated.
- c. Obtain Vital signs.
- d. Administer oxygen 15 l / min per non-rebreather mask.
- e. Intubate as needed (i.e. smoke inhalation with evidence of pharyngeal scorching or burns)

3. Asthma:

- a. Check ABC's
- b. Obtain vitals.
- c. Oxygen at 2-4 liters per mask.
- d. Initiate IV NS 20 ml/kg bolus then,
- e. Albuterol 1.25 mg via nebulizer
- f. Epinephrine 1:1000 0.01 ml/kg SQ.
- g. Monitor cardiac status.

PEDIATRIC SHOCK

Shock:

Shock may occur from hemorrhage, burns, peritonitis, sepsis, or gastroenteritis. Pallor, hypotension, tachycardia and diaphoresis will be present. You may assume about 25% of the blood volume has been lost for shock to be present. Blood volume is approximately 88 cc/kg for infants and children.

1. ABC's, stabilize C-Spine as indicated
2. Give oxygen at high flow.
3. Place multiple IV's of LR or NS and infuse 20 cc /kg (10 cc / kg for neonate) as a bolus. Insert IOs (6 years or under) if unable to establish IVs.
4. Attend to other body system injuries as applicable
5. If shock persists, administer a second bolus of 20 cc/kg. Repeat as necessary, often requires at least 40-60 cc/kg. Maintain IV at 10 cc/kg/hr.
6. Apply cardiac monitor.
7. Nasogastric tube or orogastric may be used at discretion of Flight Crew.

Note: Cyanosis in a neonate (8 weeks or less) is an indication of sepsis until proven otherwise.

PEDIATRIC TRAUMA

1. Major Trauma:

- a. Protect C-spine/ascertain ABC's initiate CPR if indicated.
- b. Stop obvious external bleeding with pressure.
- c. Quick survey of patient, noting mechanism of injury, maintain awareness of suspected abuse or neglect.
- d. Oxygen through adequate airway with high flow O₂
- e. Obtain vital signs.
- f. If shock is present, initiate shock protocol.
- g. Stabilize C-spine (Protocol for Pediatric Spinal Injuries).
- h. Splint fractures (Protocol for Pediatric Fractures).
- i. Follow other protocol as necessary – head injury, penetrating wound, evisceration, etc.
- j. Initiate transport to trauma center at earliest opportunity.

2. Trauma Related Cardiopulmonary Arrest:

- a. Check ABC's
- b. Establish oral airway, using modified jaw thrust.
- c. Ventilate with BVM (or vent if patient size adequate)
- d. Initiate chest compressions.
- e. Stabilize C-Spine; place spine board.
- f. Transport
- g. May attempt IV enroute.

Note: Don't delay transport. Cardiopulmonary arrest secondary to trauma cannot be stabilized in the field and must reach definitive care immediately.

3. IV Lines:

In the field, intravenous lines are difficult to establish in children. Children's IVs are difficult any place.

- a. Access Selection:
 - i) Peripheral attempt X 3 attempts or 90 seconds
 - ii) Intraosseous

PEDIATRIC HEAD INJURY

1. Be alert for associated C-spine injury, especially in the unconscious patient.
 2. Clear airway using modified jaw thrust. Establish patient airway and hyperventilate patient.
 3. Apply C-collar, long spine board, as outlined in Protocol for Pediatric Spinal Injuries.
 4. Obtain vital signs.
 5. Have suction immediately available
 6. If patient vomits, turn as a unit to lateral side and suction.
 7. Begin transport to hospital
 8. Document Glasgow Coma Score/pediatric Trauma Score en route to hospital.
 9. Start IV LR TKO
 10. For seizures administer Ativan 0.1 mg/kg IVP repeat dose q 5 minutes if necessary. The patient should be intubated.
 11. Multi-trauma with head injury, follow Protocol for Pediatric Shock.
 12. Do not hyperventilate!
-

PEDIATRIC SPINAL INJURIES (C-SPINE, THORACIC, AND LUMBAR)

Spinal Injuries:

Never use a scoop stretcher for spinal injuries.

Suspected C-Spine Injury:

1. Protect C-Spine, check ABC's
2. Place C-collar.
3. Carefully place on spine board, maintaining head, neck, thoracic, and lumbar spine and legs as a single axis.
4. Have suction immediately available
5. Shock protocol as needed.
6. If patient will tolerate, tape head to spine board.
7. Be alert for associated injuries.
8. Check Neuro status frequently, watch for respiratory depression.

Thoracic and Lumbar Spinal Injuries:

1. Place patient on long spine board.
2. Avoid rotation, extension, and flexion of the spine.
3. Stabilize with securing straps
4. Have suction immediately available
5. Shock protocol as needed.
6. Check Neuro status frequently

PEDIATRIC PENETRATING WOUND

May occur in a variety of circumstances – GSW, stabbing, missiles from explosions, objects thrown from lawnmowers, etc. DO NOT remove embedded objects or foreign bodies.

1. Abdomen:

- a. Check ABC's / CPR as indicated.
- b. Obtain vital signs.
- c. Start IV LR or NS
- d. If hypotensive, follow shock protocol.
- e. Apply sterile dressing to wound.
- f. Transport to hospital

2. Chest:

- a. Check ABC's /CPR as indicated, with C-Spine precautions.
- b. Obtain vital signs.
- c. Start IV LR or NS
- d. If hypotensive, follow shock protocol.
- e. Apply nonocclusive sterile dressing or three sided occlusive dressing to wound (occlusive dressing may precipitate a tension pneumothorax).
- f. Observe for signs of tension pneumothorax and treat per adult protocol using 18g catheter.
- g. Begin transport to hospital as soon as possible

3. Head and Neck:

- a. Check ABC's / CPR as indicated, with C-Spine precautions.
- b. Obtain vital signs
- c. External pressure to external bleeding.
- d. Start IV LR or NS
- e. If hypotensive, follow shock protocol.

4. Extremity:

- a. Obtain vital signs and distal neurovascular status.
- b. Apply external pressure to external bleeding, if unsuccessful, use pressure points and elevation
- c. Apply sterile dressing.
- d. Splint and elevate extremity
- e. Start IV LR or NS in uninjured extremity.

5. Abdominal Evisceration:

- a. Place patient supine.
- b. Obtain vital signs.
- c. Cover abdominal viscera with moist sterile dressing; do not attempt to replace viscera.
- d. Start IV LR or NS
- e. If evidence of shock, initiate shock protocol.
- f. Keep patient warm.

PEDIATRIC FRACTURES

Orthopedic Injuries:

Fractures may be open or closed. Open fractures are usually obvious. Closed fractures may present as swelling or deformity. Do not palpate suspected fracture sites. Assess presence of pulses distal to the fracture site, sensory status distal to the fracture site, temperature of the skin, and skin color.

1. Most fractures can be splinted in the position in which they lie.
2. Straightening of severely angulated fractures may be attempted and then splinted if necessary to achieve stabilization, especially if neurovascular compromise.
3. Control external bleeding with external pressure.
4. Do not attempt to reduce protruding bone unless vascular compromise is present.
5. Immobilize fracture, as well as a joint above and a joint below.
6. Recheck distal pulses after splinting.
7. Dress open wounds with sterile, moist saline dressings before splinting.
8. Refer to Pain Management Protocol for pain control.

Specific Fracture Sites:

1. C-spine (see spinal Injury Protocol)
2. Dorsal – Lumbar spine (See Spinal Injury Protocol)
3. Hand Injuries – position of comfort on a pillow
4. Wrist Injuries – splint using appropriate disposable splint from metacarpal phalangeal joint to upper forearm; sling for comfort.
5. Forearm – splint using appropriate disposable splint with a sling.
6. Arm, shoulder, clavicle – place in sling and swathe to thorax.
7. Elbow – sling if comfortable, if not support with pillow in position of comfort.
8. Rib fracture – transport in position of comfort.
9. Hip and pelvis – spine board and may use PASG if greater than 40 pounds.
10. Femur – may apply appropriate disposable splint, traction splint, or PASG if greater than 40 pounds.
11. Knee – transport in position of comfort, supported with a pillow.
12. Lower leg and ankle – posterior splint and incorporate the foot to prevent motion.
13. If shock occurs, follow Pediatric Shock Protocol.

PEDIATRIC BURNS

1. Ascertain ABC's / initiate CPR as indicated.
2. Be alert to other possible injuries – head injury, drug ingestion, airway burn, etc.
3. Remove clothing (may retain heat and continue to burn). If stuck to tissue, do not remove.
4. Obtain vital signs
5. Provide supplemental oxygen using appropriate technique to provide highest concentration of delivery with consideration to patient tolerance.
6. Intubate as necessary for airway involvement.
7. Start IV of NS or LR with appropriate size needle. Use Parkland formula for drip rate.
 - a. $\% \text{ BSA burn} \times \text{pt wt in kg} \times 4\text{cc} = \text{Total fluid in 24 hours}$
 - b. One half of fluid amount to be given in first 8 hours.
 - c. IV rate should achieve 2.65 cc/kg/hr urine output up to 30kg.
8. Estimate percentage body surface; however do not waste time in the field. Only a gross estimate is needed for field purposes. Palm of patient's hand roughly equals 1% BSA.
9. Refer to Pain Management Protocol for pain control.

PEDIATRIC UNKNOWN COMA

1. Check ABC's
2. High flow oxygen, intubate if necessary.
3. Obtain vital signs
4. Obtain fingerstick glucose determination
5. Initiate IV of NS, if easily possible, obtain clot tube.
6. Apply Shock Protocol if necessary.
7. If blood sugar is less than 60, administer Glucose D25 2cc/kg IVP.
8. If no response, give Narcan 0.01 mg/kg IVP. May repeat every 5 minutes to a total of 2mg.

PEDIATRIC ALLERGIC REACTION – ANAPHYLACTIC SHOCK

An acute severe reaction to any substance which the patient is hypersensitive to. This may involve the skin, GI tract, and cardiovascular tract, as well as the eyes. Presenting symptoms may include hives, pruritis, vomiting, diarrhea, runny nose, cough, bronchospasm, hypotension, tachycardia, arrhythmias, and complete cardiovascular collapse.

Mild Symptoms:

May give Epinephrine 0.01 mg/ kg 1:1000 SQ (Maximum Dose 0.3c).

Anaphylactic Shock:

1. Check ABC's CPR as indicated.
2. Administer high flow oxygen, intubate as necessary.
3. IV of NS
4. Epinephrine 0.01 mg/ kg SQ followed by Benadryl 1.0 mg/kg (max 50 mg) slow IVP over 5 min or IM
5. Keep patient warm and calm.

PEDIATRIC POISONING**Assessment:**

1. Check ABC's
2. Check vital signs.
3. Obtain brief history. Bring any containers, package information, etc.
4. Assess level of consciousness as well as cardiac and pulmonary systems.

Ingested Poison: Conscious Patient:

1. Ascertain ABC's / CPR as indicated.
2. If respirations are inadequate or patient is cyanotic, administer high flow oxygen.
3. Obtain vital signs' obtain history.
4. If hypotensive, follow shock protocol.
5. save emesis sample
6. Cardiac monitor

Ingested or Injected Poisons: Patient unconscious:

1. Ascertain ABC's / Initiate CPR as indicated.
2. Administer high flow oxygen.
3. Obtain vital signs / obtain history.
4. Secure Airway. (Intubate and NG)
5. If normotensive, initiate IV NS TKO. If hypotensive, initiate NS IV and follow shock protocol as indicated.
6. Check glucose level. If less than 60, may give 1cc/kg D25W 0.05 mg/kg IVP (Draw 1cc whole blood, if easily obtainable).
7. If no response to #6 may give Narcan 0.01 mg/kg IVP, may repeat every 5 minutes up to a total of 2 mg. Note response.
8. Cardiac monitor.

PEDIATRIC DIABETIC EMERGENCY

1. Check ABC's
2. Obtain vital signs.
3. Apply high flow oxygen.
4. Obtain history of insulin, time and dose, diet.
5. Any diabetic with stupor, lethargy, coma, diaphoresis, or loss of consciousness is considered hypoglycemic and should be treated as such without delay.
6. If easily possible when starting IV, obtain clot tube. At a minimum, obtain one drop of blood for blood glucose determination, the push D25W 0.05 gm/kg IVP.
7. If dehydrated and glucose level is elevated greater than 180, start NS IV and give 20cc/kg and maintain IV at 10cc/kg/hr.
8. May give glucagon 0.1mg/kg up to 1mg IM, IO, IV or SC.

PEDIATRIC SEIZURES

Seizures:

1. If patient is actively seizing on arrival, protect airway, and place in a horizontal, lateral position (protect the neck if associated with trauma).
2. DO NOT ATTEMPT TO FORCE ANY OBJECT INTO THE MOUTH.
3. Suction as necessary.
4. Obtain body temperature.
5. Start IV. Administer Ativan 0.1 mg/kg IVP repeat dose q 5 minutes if necessary.
6. If seizures have stopped, place in a lateral, horizontal position and transport.
7. If patient is a diabetic by history, obtain 1cc whole blood to clot tube if possible. Initiate IV with NS. Follow protocol for Diabetic Emergency.
8. For recurrent or continuous seizures – contact medical control.

PEDIATRIC EYE AND ENT EMERGENCIES

1. Direct Trauma to Lid or Globe:

- a. Calm patient and place in semi-reclining position as tolerated.
- b. Obtain gross vision from each eye if possible using a finger count at 3-5 feet.
- c. Cool, moist dressing over eyes as tolerated.

2. Thermal Burn:

- a. Calm patient and place in semi-reclining position as tolerated.
- b. Obtain gross vision test for each eye as above if possible.
- c. Place moist dressing over eyes as tolerated.

3. Chemical Burn:

- a. Calm patient and place in reclining position.
- b. Gently irrigate affected eye or eyes with 500 – 1000 cc or normal saline – 15 minutes minimum.
- c. Obtain gross vision test, if possible.
- d. Moist, cool dressing to eyes.

PROCEDURE PROTOCOLS

PHARMACOLOGIC ASSISTED INTUBATION (PAI)**Indications:**

1. A need to gain definitive control of a patient's airway prior to or during transport.
Indications for (PAI) may include:
 - a. Any patient in whom airway closure during transport is a realistic possibility. Examples: inhalation burns, refractory anaphylaxis, laryngeal trauma.
 - b. Any patient who is not moving air well and who is likely to require intubation en route.
 - c. Any patient who is unable to maintain adequate oxygen saturation (<90%) while breathing independently with supportive respiratory interventions.
 - d. Patients with head injuries with lateralizing signs. Glasgow 8 or less.
 - e. Multi-system trauma affecting adequacy of ventilations.

Preparation:

1. Assure patient is in need of PAI.
2. Establish IV lines and assure patency.
3. Place patient on cardiac monitor, pulse oximeter, and BP if available.
4. Assure all necessary equipment is functioning properly and readily available.
 - a. Suction
 - b. Oxygen
 - c. Light Source
 - d. Tubes and stylets
 - e. Tube changer
 - f. End tidal CO2 monitor
5. Prepare all appropriate medications for administration and calculate dosages.
6. Preoxygenate the patient with 100% oxygen per NRB. Assist ventilation with BVM and 100% oxygen if insufficient ventilation exists.
7. Be certain that you can perform an alternative airway procedure if intubation is unsuccessful and patient deteriorates.

Technique:**Premedication:**

1. Lidocaine 1.5 mg/kg for potential or confirmed increased ICP.
2. (Opioid) Morphine 0.1 mg/kg IVP **or** Fentanyl 3.0 mcg/kg IVP.
3. Atropine 0.02 mg/kg as a drying agent and prophylactically for bradycardia in **children and infants**. Atropine minimum dose is 0.1 mg to avoid rebound effect.
4. Defasciculating dose of paralytic (10% of paralytic dose), if indicated.
 - a. Succinylcholine (anectine) 0.15 mg/kg IVP.

Paralysis:

1. Cricoid pressure should be applied before paralytic is injected and maintained until tube is placed and cuff is inflated and tube placement is confirmed.
2. Etomidate 0.3 mg/ kg IVP.
2. Succinylcholine (anectine) 1.5 mg/kg IVP. Pediatrics: 2.0 mg/kg IVP.
3. Confirm tube placement:
 - a. Breath sounds present
 - b. Abdominal sounds absent
 - c. Visualization
 - d. Stat Cap
 - e. ETCO₂

Intubation:

1. Position patient and maintain spine stabilization.
2. Cricoid pressure
3. ET placement
4. Inflate cuff, confirm placement, remove cricoid pressure, and secure tube. Check CO₂ monitor to confirm placement.

Post-Intubation:

1. Add agents now that were deferred because of urgency.
2. Administer:
 - a. Versed 2 mg IVP q 2 minutes titrated to effect or SBP >90 for sedation.
 - b. Norcuron 0.1 mg/kg IVP as the non-depolarizing agent for ongoing paralysis.
 - c. Morphine 0.1 mg/kg IVP for pain control.

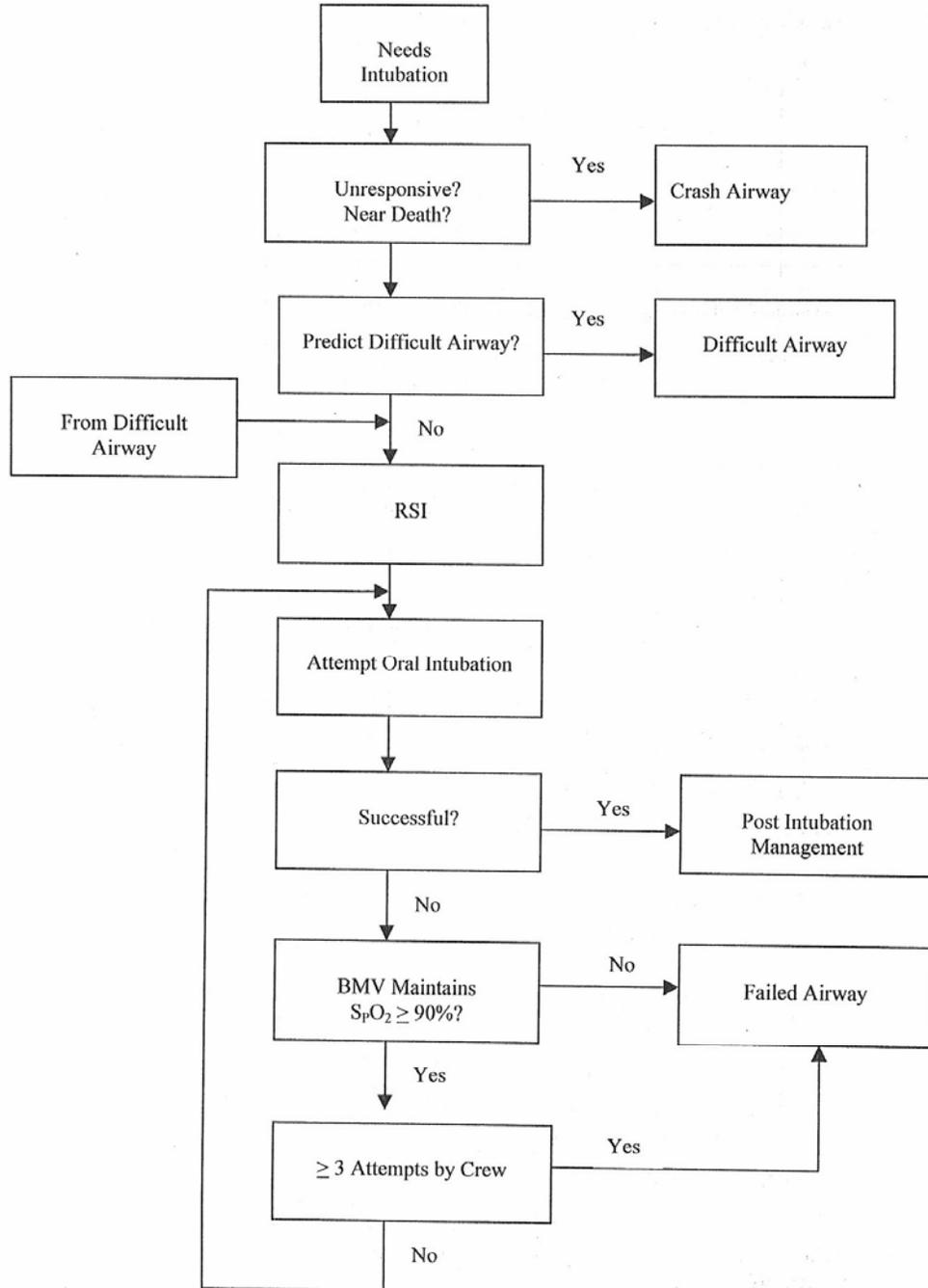
Notes:

1. If intubation attempts fail, continue BVM. If airway cannot be maintained or if inadequate ventilation exists, consider combitube or LMA followed by a Melker Cricothyrotomy if necessary.

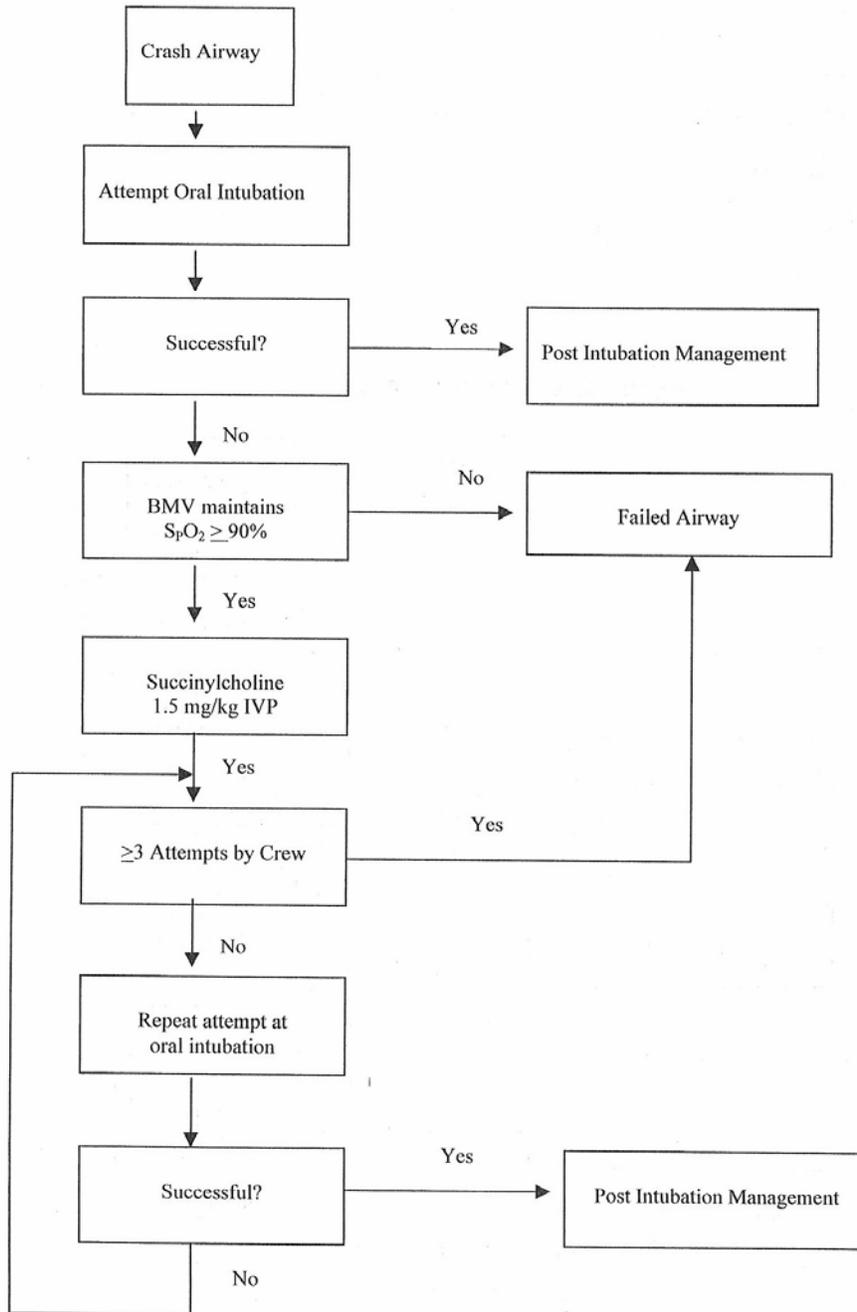
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2. Variations in the above sequence may be indicated and will be made by the flight crew and dictated by the patient's needs when immediate direct medical control cannot be established.

 3. If necessary, refer to the following algorithms from the National Emergency Airway Management Course to guide your decision based upon patient's condition and situation.

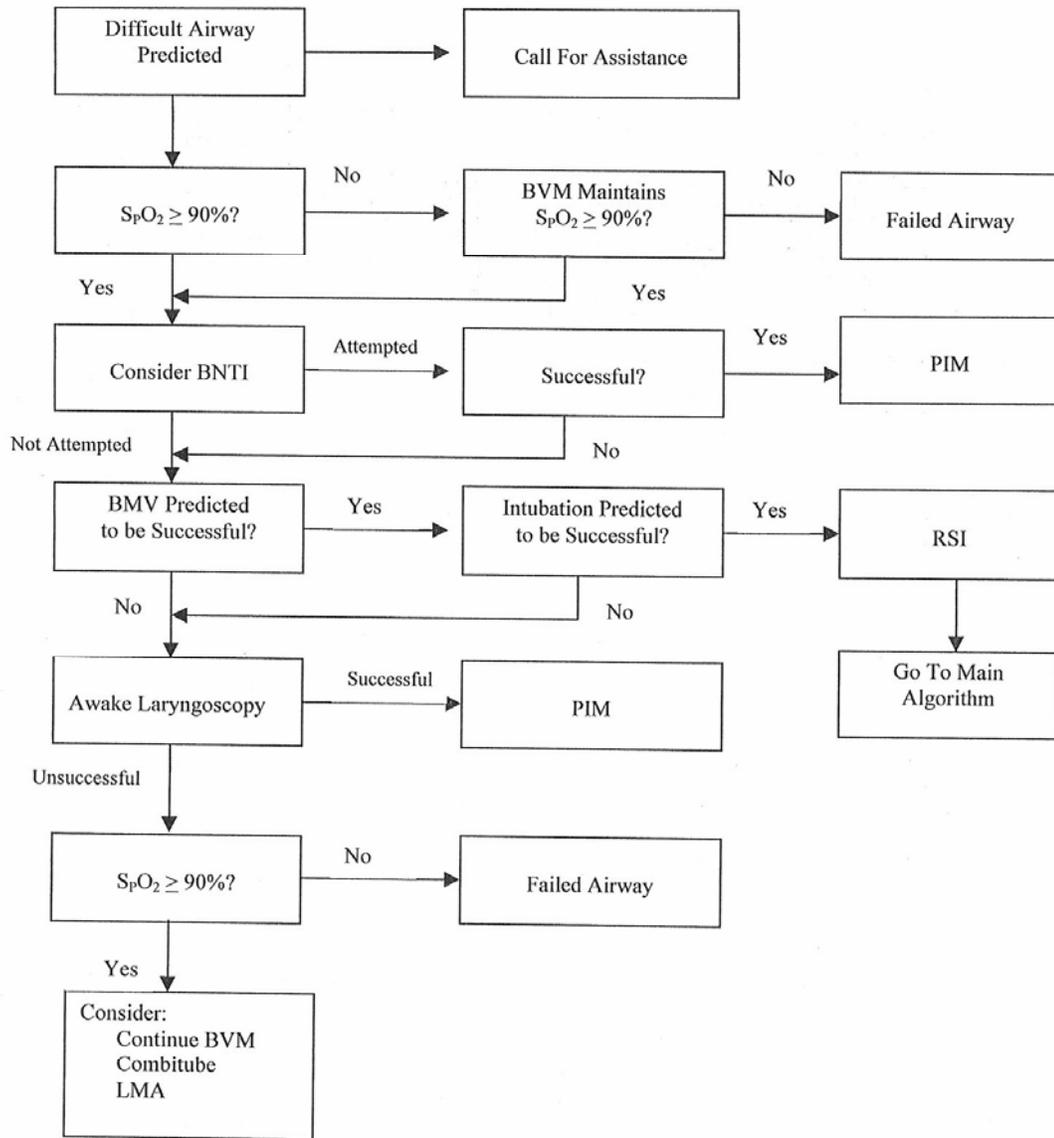
MAIN EMERGENCY AIRWAY MANAGEMENT ALGORITHM



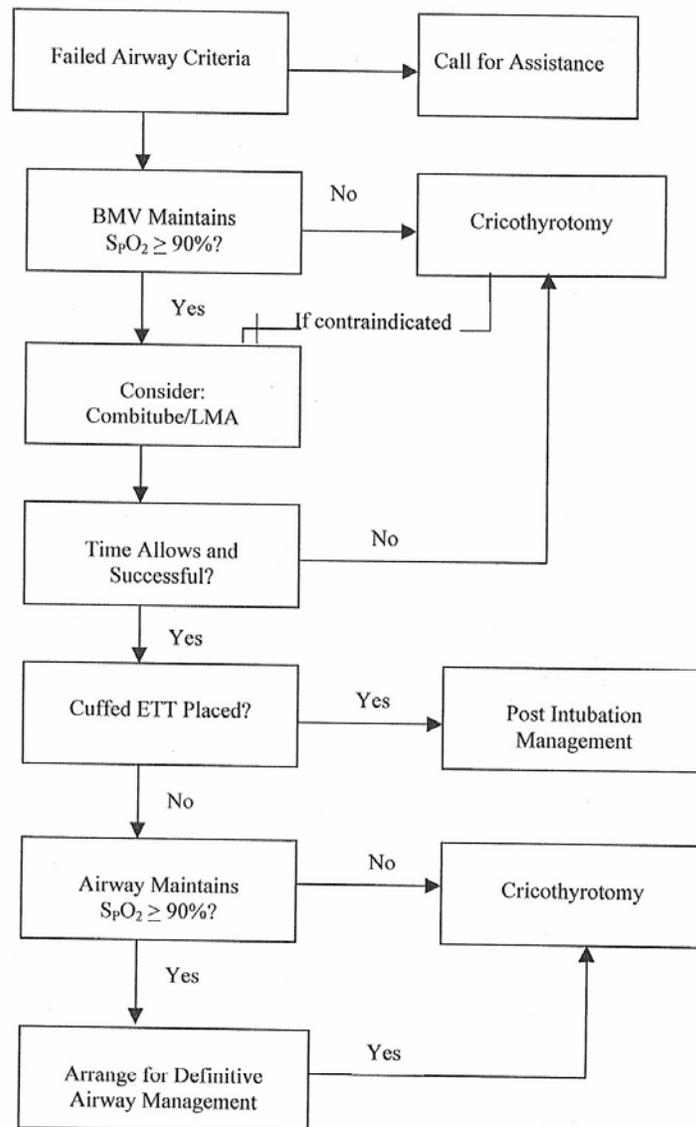
THE CRASH AIRWAY ALGORITHM



THE DIFFICULT AIRWAY



THE FAILED AIRWAY ALGORITHM



PAI WEIGHT BASED MEDICATION TABLE

Lbs.	Kg	LIDO	ETOMIDATE	SUX	SUX (Pediatric)	NORCURON
2.2	1	1.5MG	0.3MG	1.5MG	2.0 MG	0.1 MG
4.4	2	3.0MG	0.6MG	3.0MG	4.0 MG	0.2 MG
6.6	3	4.5MG	0.9MG	4.5MG	6.0 MG	0.3 MG
8.8	4	6.0MG	1.2MG	6.0MG	8.0 MG	0.4 MG
11.0	5	7.5MG	1.5MG	7.5MG	10.0 MG	0.5 MG
13.2	6	9MG	1.8MG	9MG	12.0 MG	0.6 MG
15.4	7	10.5MG	2.1MG	10.5MG	14.0 MG	0.7 MG
17.6	8	12MG	2.4MG	12MG	16.0 MG	0.8 MG
19.8	9	13.5MG	2.7MG	13.5MG	18.0 MG	0.9 MG
22.0	10	15MG	3MG	15MG	20.0 MG	1 MG
26.4	12	18MG	3.6MG	18MG	24.0 MG	1.2 MG
30.8	14	21MG	4.2MG	21MG	28.0 MG	1.4 MG
35.2	16	24MG	4.8MG	24MG	32.0 MG	1.6 MG
39.6	18	27MG	5.4MG	27MG	36.0 MG	1.8 MG
44.0	20	30MG	6.0MG	30MG	40.0 MG	2 MG
50.6	23	34.5	6.9MG	34.5	46.0 MG	2.3 MG
57.2	26	39MG	7.8MG	39MG	52.0 MG	2.6 MG
63.8	29	43.5MG	8.7MG	43.5MG	58.0 MG	2.9 MG
70.4	32	48MG	9.6MG	48MG	64.0 MG	3.2 MG
77.0	35	52.5MG	10.5MG	52.5MG	70.0 MG	3.5 MG
81.4	37	55.5MG	11.1MG	55.5MG	74.0 MG	3.7 MG
88.0	40	60MG	12MG	60MG	80.0 MG	4 MG
99.0	45	67.5MG	13.5MG	67.5MG	90.0 MG	4.5 MG
110.0	50	75MG	15MG	75MG	100.0 MG	5 MG
121.0	55	82.5MG	16.5MG	82.5MG	110.0 MG	5.5 MG
132.0	60	90MG	18MG	90MG	120.0 MG	6 MG
143.0	65	97.5MG	19.5MG	97.5MG	130.0 MG	6.5 MG
154.0	70	105MG	21MG	105MG	140.0 MG	7 MG
165.0	75	112.5MG	22.5MG	112.5MG	150.0 MG	7.5 MG
176.0	80	120MG	24MG	120MG	160.0 MG	8 MG
187.0	85	127.5MG	25.5MG	127.5MG	170.0 MG	8.5 MG
198.0	90	135MG	27MG	135MG	180.0 MG	9 MG
209.0	95	142.5MG	28.5MG	142.5MG	190.0 MG	9.5 MG
220.0	100	150MG	30MG	150MG	200.0 MG	10 MG
231.0	105	150 MG	31.5MG	150 MG	210.0 MG	10.5 MG
242.0	110	150MG	33MG	150MG	220.0 MG	11 MG
253.0	115	150MG	34.5MG	150MG	230.0 MG	11.5 MG
264.0	120	150MG	36MG	150MG	240.0 MG	12 MG
275.0	125	150MG	37.5MG	150MG	250.0 MG	12.5 MG
286.0	130	150MG	39MG	150MG	260.0 MG	13 MG
297.0	135	150MG	40.5MG	150MG	270.0 MG	13.5 MG
308.0	140	150MG	42MG	150MG	280.0 MG	14 MG

ENDOTRACHEAL INTUBATION

Purpose:

To ensure a patent airway, provide supplemental oxygen, and institute positive-pressure ventilation when spontaneous breathing is inadequate or absent.

Indications:

1. Presence of apnea
2. Inability to maintain an airway by other means
3. Need to protect the lower airway from aspiration of blood or emesis
4. Impending or potential compromise of the airway
5. Presence of a closed head injury requiring assisted ventilation (GCS \leq 8)
6. Inability to maintain adequate oxygenation by face mask
7. Burns to airway

Contraindications:

Massive facial trauma with unrecognizable landmarks (cricothyrotomy should be considered).

Potential Complications:

Cervical vertebral injury
Esophageal intubation
Right mainstem bronchus intubation
Induction of vomiting and aspiration
Trauma to the airway
Chipping or loosening of teeth; dislocation of mandible
Rupture/leak of the tube cuff
Laryngospasm
Hypertension
Tachycardia / bradycardia
Increase ICP

Equipment:

Adequate suction with rigid suction tip
Laryngoscope and blades
Stylette
Endotracheal tubes
10cc syringe
Oxygen and delivery device
Bag valve mask
Magill forceps

Water soluble lubricant
Adhesive tape
Restraints
Medications for sedation/ paralysis

Procedure:

1. **Administer sedatives / paralytics only if indicated.**
 2. Assure adequate ventilation and oxygenation are in progress. Assure suction is immediately available.
 3. Check all equipment: inflate/deflate tube cuff, check bulb on laryngoscope
 4. Select appropriate tube size and stylette
 5. Have assistant manually immobilize the head and neck to avoid hyperextension or hyperflexion.
 6. Hyperventilate with BVM and 100% oxygen
 7. Apply cricoid pressure to protect against stomach distention and aspiration
 8. Hold the laryngoscope in the left hand
 9. Insert the laryngoscope into the right side of the patient's mouth, displacing the tongue to the left
 10. Visually identify the epiglottis and the vocal cords
 11. Gently insert the endotracheal tube into the trachea without apply pressure on the teeth or oral tissues
 12. Inflate the cuff with enough air to provide an adequate seal. Do not over inflate the cuff.
 13. Check placement of the ET tube by bag-valve-to-tube ventilation.
 14. Visually observe chest excursions
 15. Auscultate the chest and abdomen with a stethoscope to ascertain tube position
 16. Secure tube with tape or some other ETT holder device.
 17. Confirm placement with portable chest xray if in hospital setting and patient is stable enough to wait on x-ray.
 18. Attach pulse oximeter and end-tidal CO₂ monitor device.
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NASAL INTUBATION

Indications:

1. Multiple trauma.
2. Unconscious spontaneously breathing patient.
3. Conscious patient in severe respiratory distress.

Contraindications:

1. Facial trauma (blunt or penetrating).
2. Penetrating neck wounds
3. Blood/CSF from nasal passages or other signs of a basilar skull fracture.
4. Obstructed airway, severe facial or neck injuries.
5. Patient under age of 8.

Complications:

- 1 Nasal Bleeding
- 2 Tube malposition in the:
 - a. Vallecula
 - b. Piriform fossa
 - c. Esophagus
- 3 Laryngospasm
- 4 Retropharyngeal laceration

Protocol:

1. Position the patient's head in the neutral position. If atraumatic, slightly extend the patient's head.
2. Select an endotracheal tube 1 mm smaller than the appropriate orotracheal tube, usually 7.0 mm or smaller.
3. Lubricate the distal end of the ETT with water soluble lubricant.
4. Pass the tube into the patient's largest nostril, placing the beveled edge against the nasal septum. Direct the tube perpendicular to the facial plane.
5. Advance the tube gently into the pharynx. **NEVER FORCE THE TUBE.**

6. Pause at the level of the pharynx so gag is minimal and breath sounds are audible through the tube.
7. Applying firm, gentle cricoid pressure, advance the tube rapidly but gently approximately 1” through the vocal cords during inspiration.
8. Inflate the ET cuff.
9. Verify proper tube placement.
10. Secure the tube in place.

Apply end tidal CO2 monitor.

MECHANICAL VENTILATION

Purpose:

To ensure intubated patients receive adequate ventilation and airway management as required by current standards of care and practice.

Indications:

1. Any intubated patient requiring transport \geq than twenty (20) minutes duration.
2. Ventilation dysfunction to include apnea, ventilatory failure, or patients requiring ET_{CO2} control.
3. Oxygenation dysfunction as determined by ET_{CO2} or O₂ Sat \leq 96%.

Procedure:

1. Establish the patient is in need of mechanical ventilation.
2. Place the patient on the cardiac monitor, pulse oximeter, blood pressure cuff, and end tidal CO₂ monitor.
3. Ensure Patency of IV lines.
4. Establish all appropriate equipment is readily available and functioning:
 - a. Oxygen
 - b. Ventilator
 - c. Suction
5. Set the ventilator to the appropriate settings for use with the patient.
 - a. Tidal Volume should be set at 6 to 10 cc kilogram of body weight.
 - b. Rate should be set at an average of 12, and titrated to SpO₂ and ET_{CO2} response
 - c. FiO₂ should be set at 100% for air transport.

Notes:

1. Any exception to protocol must be documented by the air crew with justification.

COMBITUBE-ESOPHAGEAL TRACHEAL DOUBLE LUMEN AIRWAY

The Combitube is used to facilitate rapid insertion of an airway when endotracheal intubation has been unsuccessful. The device is a double lumen tube with a central wall dividing the esophagus and tracheal lumens. The esophageal lumen has a blind end and a series of ventilating eyes; the tracheal lumen is open and functions like an endotracheal tube. The Combitube is blindly inserted and will provide ventilation following placement in either the trachea or the esophagus. The Combitube comes in two sizes, the Adult and Small Adult.

Combitube – Adult – Patients taller than 5 feet

Combitube – Small Adult – patients 4 feet – 5 feet, 5 inches tall.

Indications for usage:

1. When endotracheal intubation is unsuccessful or impractical.
2. When there is difficulty visualizing the vocal chords due to blood, emesis or trauma.
3. Patients should be unconscious with no gag reflex.

Contraindications:

1. Patients under 4 feet tall.
2. Ingestion of caustic substances
3. Known history of esophageal disease

Combitube Procedure Checklist:

1. Place the patient's head in a neutral position. Grasp the patient's jaw and tongue and advance the tube gently into the mouth until the teeth and alveolar ridges are aligned between the black rings printed on the tube body.
2. Inflate Line 1 through the blue pilot balloon leading to the large pharyngeal cuff with 100 ml of air using the large syringe provided. Use 85 ml of air for the Small Adult tube.
3. Inflate Line 2 through the white pilot balloon leading to the smaller distal cuff with 15 ml of air using the small syringe provided.
4. Since an esophageal placement is most likely, begin ventilation by attaching the ventilating device to the longer blue connecting tube marked No. 1. If auscultation of breath sounds is positive, indicating esophageal placement, continue ventilation. If esophageal placement is confirmed, the second clear connecting tube marked No. 2 can be used for gastric suction with the suction catheter provided.
5. If auscultation of breath sounds is negative, a tracheal placement has been accomplished. The ventilation device should then be connected to the shorter clear connecting tube marked No. 2. The Combitube is then able to function as a normal tracheal tube.

LARYNGEAL MASK AIRWAY

1. Indications:

- a. Inability to secure a patent airway with an endotracheal tube and/or a Combitube in an adult patient
 - i) Two unsuccessful attempts by each crew member
 - ii) Greater than five minutes taken for the procedure
- b. Patients with traumatic injury to the face where intubation is not practical
- c. Patients with known or suspected C-spine fractures where possible manipulation may result in a detrimental outcome.
- d. Patients trapped or positioned in such a way as to inhibit traditional intubation.

2. Contraindications (relative):

- a. Gross obesity
- b. Inability to open mouth >1.5 cm
- c. Pregnancy
- d. Hx. Of recent opiate ingestion
- e. Ability to control airway through intubation or with Combitube

3. Procedure:

- a. Identify indications and contraindications
- b. Assemble equipment:
 - i) LMA Size 4 (Normal adults) inflation volume: 30 cc
 - ii) LMA Size 5 (Large adults) inflation volume: 40 cc
 - iii) Lubrication
 - iv) Appropriate size syringe
 - v) Ambu bag with face mask
 - vi) Bite block
- c. Sedation and paralytics administered for intubation should be used to reduce possibility of aspiration. See appropriate protocol, if necessary.
- d. Check LMA cuff and pilot bulb for correct inflation.
- e. Deflate by placing in a flat surface and applying downward pressure while removing air from cuff.
- f. Generously lubricate the top and point of the LMA.
- g. Pre-oxygenate
- h. Hold the LMA like a pen, with the index finger placed at the junction of the cuff and the tube. The mask aperture must face forward and the black line on the airway tube should be oriented anteriorly toward the upper lip.
 - i) Under direct visualization, press the tip of the cuff upwards against the hard palate and flatten the cuff against it.
 - ii) Using the index finger, keep pressing upwards as you advance the mask into the pharynx to ensure the tip remains flattened and avoids the tongue.
 - iii) Keeping the neck flexed and the head extended (not applicable in the immobilized patient), press the mask into the posterior pharyngeal wall using the index finger.
 - iv) Continue pushing with the ball of the index finger guiding the mask downward into position. By withdrawing the other fingers and slight pronation of the

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- v) forearm, it is usually possible to push the mask fully into position in one fluid movement.
 - vi) Grasp the tube firmly with the other hand and withdraw the index finger from the pharynx. Press down gently to ensure that the mask is in the correct position.
 - vii) Inflate the mask with the recommended volume of air. **DO NOT OVER INFLATE.** Do not hold or touch the LMA while inflating unless the position is grossly unstable. Normally the mask should be allowed to rise up slightly out of the hypopharynx as it is inflated, to find its correct position.
- 4. NEVER USE FORCE!** If resistance is felt with the mask tip just behind the tongue, either the tip has folded over on itself, or has impacted an irregularity or swelling in the posterior pharynx.
- 5. Signs of correct placement:**
- a) Slight outward movement of the tube on inflation.
 - a) Presence of smooth oval swelling in the neck in the thyroid and cricoid area.
 - b) No cuff visible in the oral cavity.
 - c) Bilateral breath sounds present with ventilation.
 - d) Satisfactory O₂ SAT levels.
 - e) Absence of gross abdominal sounds with ventilation.
 - f) Positive EDD inflation.
 - g) Satisfactory ET CO₂ levels, or correct Capnograph color change.
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MELKER CRICOTHYROTOMY

Indications:

1. Acute upper airway obstruction which cannot be relieved using basic airway maneuvers, finger sweep, or endotracheal visualization and Magill forceps removal.
2. Respiratory arrest with facial or neck anatomy or injury which make endotracheal intubation impossible.

Complications:

1. Bleeding
2. Vocal cord injury
3. Failure to place the catheter in the trachea

Contraindications:

1. Direct laryngeal injury
2. Known laryngeal condition:
 - a) Stricture
 - b) Tumor
3. Subglottic stenosis
4. Coagulopathy
5. Child less than 12 years of age
6. Known tracheal transection
7. Expanding hematoma in the area of cricothyrotomy

Equipment Required:

1. Melker Cricothyrotomy Kit
2. 10cc syringe
3. Curved dilator
4. Airway catheter
5. #15 scalpel

Protocol:

1. Position the patient in the neutral recumbent position. Maintain C-spine precautions if suspected cervical injury.
2. Following exposure of the neck, identify the trachea, cricoid cartilage and cricothyroid membrane.
2. Prep the skin with alcohol/povidine iodine pad.
3. Carefully palpate the cricothyroid membrane and while stabilizing the cartilage, make a vertical incision in the midline using the #15 short handle scalpel blade.
4. An adequate incision eases introduction of the dilator and airway.
5. With the syringe attached to the 18 gauge TFE catheter introducer needle, advance it through the incision into the airway at a 45 degree angle to the frontal plane in the midline direction. **When advancing the needle forward, verification of entrance into the airway can be confirmed by aspiration on the syringe resulting in free air return.**
6. Remove the syringe and needle, leaving the TFE catheter in place. Advance the soft, flexible end of the wire guide through the TFE catheter and into the airway several centimeters.
7. Remove the TFE catheter, leaving wire guide in place.
8. Advance the handled dilator, tapered end first, into the connector end of the airway catheter until the handle stops against the connector. NOTE: This step may be performed prior to beginning procedure. Use of lubrication on the surface of the dilator may enhance fit and placement of the emergency airway catheter.
9. Advance the emergency airway access assembly over the wire guide until the proximal stiff end of the wire guide is completely through and visible at the handle end of the dilator. **It is important to always visualize the proximal end of the wire guide during the airway insertion procedure to prevent its inadvertent loss into the trachea.** Maintaining the wire guide position, advance the emergency airway access assembly over the wire guide with a reciprocating motion, and completely into the trachea. **Care should be taken not to advance the top of the dilator beyond the tip of the wire guide within the trachea.**
10. Remove the wire guide and dilator simultaneously.
11. Fix the emergency airway catheter in place with the cloth tracheostomy tape strip in a standard fashion.
12. Connect the emergency airway catheter, using its standard 15-22 adapter to an appropriate ventilatory device.

Note:

The Melker kit is **not** designed for pediatric patients.

TENSION PNEUMOTHORAX DECOMPRESSION

Indications:

1. Treatment of tension pneumothorax is simple, but the complications of the procedure can be lethal. Diagnosis must be accurate and is not always easy. Field treatment is indicated when the life of the patient is in danger and treatment cannot be delayed until arrival at the hospital.
2. Field relief of tension pneumothorax is indicated **ONLY** when the patient has progressive severe respiratory distress with cyanosis, decreased breath sounds on the affected side, and hypotension. In addition the patient may have distended neck veins and tracheal shift away from the affected side. If the patient is intubated, there should be increasing difficulty in ventilating. Hypotension can be detected by noting loss of radial pulse. Usually there will be loss of consciousness as well.

Differential Diagnosis:

1. Simple pneumothorax without tension
2. Hemothorax
3. Cardiac tamponade

Complications:

2. Hemorrhage from vessel laceration.
3. Creation of a pneumothorax if one was not already present.
4. Laceration of the lung.
5. Infection.

Procedure:

2. Maintain airway and administer oxygen by non-rebreather face mask.
3. Expose the entire chest.
4. Clean the affected side with Betadine.
5. Prepare for the procedure using the Cook Pneumothorax kit.
6. Insert the IV catheter and needle assembly, over the top of the rib in the second or third intercostal space in the *midclavicular* line.
7. Remove the needle from the catheter and leave the plastic catheter in place.
8. Secure catheter with molnor disc with pull tab. Tape disc securely.

Notes:

2. Tension pneumothorax is rare; but when present, it must be treated promptly.
3. Non-tension pneumothorax is relatively common, is not immediately life threatening and should not be treated in the field.
4. Positive pressure ventilation may lead to the development of a pneumothorax and to rapid progression to tension pneumothorax.

PATIENT RESTRAINT

Purpose:

To provide safety to the patient and crew members during transport utilizing physical restraints. Pharmacological restraints may be used if necessary.

Indications for Use:

1. Controlled and safe access for medical procedures.
2. Threat or behavior that create or imply a danger to the patient or others.
3. Change in behavior that is a result of improvements or deterioration of patients condition, (i.e. overdose, intubation, hypoglycemia).

Procedure:

1. Attempt first to control the patient with verbal counseling.
2. The least restrictive means of control should be employed.
3. Only “reasonable force” (use of force equal to or minimally greater than the amount of force being exerted by the resisting patient) may be used.
4. Restraints must not interfere with the assessment or treatment of the patient’s ABC’s.
5. The decision to use restraints should be made prior to transport.
6. Once applied, do not remove the restraints unless the patient experiences seizures.
7. Restraints should afford the patient as much dignity as the situation will allow.
8. Attempt to accommodate patient comfort or special needs whenever possible.

Protocol:

1. Use non-threatening verbal communication as the first attempt to calm the patient.
2. Apply soft extremity restraints if appropriate for the situation.
3. **If the above measures fail in providing a safe environment for transport administer Versed 2 mg IVP q 2 minutes titrated to effect or SBP >90. Monitor and document SaO₂, throughout transport and status of ABC’s.**

Documentation Requirements:

1. The need for treatment was explained to the patient.
2. Failure of less restrictive methods of control.
3. The restraints were used for the safety of the patient or others.
4. The reason for the restraints was explained to the patient.
5. The method of restraint used.
6. CMS checks q 15 minutes.
7. **SaO₂ q 15 minutes if pharmacological restraint used.**

TRANSCUTANEOUS PACEMAKER

Indications:

1. Symptomatic bradycardia unresponsive to Atropine OR
2. Early Asystole OR
3. Pulseless electrical activity with ventricular rate < 60.

Contraindications:

1. Hypothermia
2. Children age \leq 14.

Protocol:

CONSCIOUS OR SEMI-CONSCIOUS PATIENTS WITH A PULSE

1. Connect pacing electrodes and cables.
2. If the patient is to be externally paced and does not have altered level of consciousness, administer Versed 2 mg IVP q 2 minutes titrated to effect or SBP >90.
3. Begin pacing at a rate of 70 with current output at 20 mAmps.
4. Increase current output by 20 mAmps every 10 seconds until either cardiac capture occurs, the patient complains of significant pain from the pacemaker, or maximal output is reached. Usual capture is at 50-100 m Amps.
5. If capture occurs, reassess peripheral pulses and vital signs.
6. Continue pacing @ 10% mAmps above initial capture.
7. Refer to Pain Management Protocol for Pain Control.

PULSELESS OR UNCONSCIOUS PATIENTS

1. If pulseless, interrupt chest compressions briefly to apply pacing electrodes to chest and back.
2. Initiate pacing at a rate of 70 and maximum current output.

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3. Once pacing has begun (as indicated by chest wall twitching), interrupt chest compressions and assess peripheral pulses. If pulse is present, discontinue chest compressions and assess blood pressure. If pulse is absent, resume chest compressions.
 4. Contact medical command.
 5. If capture is achieved, decrease output by 10 mAmps every 15-20 seconds as capture allows. Again, pace @ 10% above total capture.

Note: Remove any nitroglycerin patches or pads before pacing or defibrillating.

INTRAOSSUEOUS INFUSION

Indications:

1. Emergency vascular access for the pediatric patient when peripheral intravenous access is unavailable.
2. Cardiopulmonary arrest (non-breathing and absent central pulses). In this setting, no prior medical command order required.
3. The patient must be unconscious with uncompensated shock (absent peripheral pulses or systolic blood pressure less than 70 mm Hg) when a peripheral IV cannot be established after two attempts (attempts can include actual venipunctures or looking at two different sites to find a vein).

Contraindications:

1. Awake or responsive patient. Consider sedation.
2. Use of a limb with a suspected fracture or prior puncture of the bone since fluid will leak out. Leave the previous IO in place with the stylet in the needle.
3. Placement through an infected area unless this is the only available site.

Complications:

1. Extravasation of fluids into the subcutaneous tissue
2. Infection of tissue or bone
3. Injury to the epiphysis (growth plate)

Procedure:

1. The preferred site is the proximal tibia, one finger breadth (1-3 cm) below the prominence (tibial tuberosity) on the flat anteromedial surface. A different bone should be chosen if the primary bone is fractured or the overlying skin is burned or infected. A secondary site is the distal femur in the midline approximately 3 cm above the patella.
2. Prep the skin.
3. Adjust the bone marrow needle for insertion by lowering the depth guard to cover about $\frac{1}{4}$ - $\frac{1}{2}$ of the needle.
4. Insert a 15-18 gauge bone marrow needle through the skin with the point directed at a slight angle away from the knee (away from the growth plate). Use a boring or screwing motion until a give is felt upon entering the marrow cavity. If a pop or give is not felt, then raise the depth guard on the needle and continue to apply pressure.

5. Remove the stylet and attempt to flush the needle with IV solution. If the solution can be flushed easily and there is no evidence of swelling around the site, then the needle can be safely assumed to be in the correct place. If resistance is met, then try to pull the needle back slightly and flush again. If still unsuccessful, the remove needle and try again in a different bone.
6. Attach IV tubing with stopcock to needle.
7. Screw the flange of the needle so it is flush to the skin and tape it in place.
8. Begin infusion of medications and fluids.

Notes:

1. Medications and fluids should be given push since gravity flow is often slow.
2. If unable to push fluid from the syringe, consider the following:
 - a. If “pop” was not felt, continue advancing needle until pop is felt.
 - b. A piece of bone may be blocking the end of the needle. Reinsert the stylet, remove it, and reattempt to push fluid.
 - c. The tip of the needle may have gone through the marrow cavity and is the other side of the bone. Slowly pull back the needle while pushing fluids from the syringe. When you are able to push fluid from the syringe easily without swelling around the site, secure the needle in place and continue giving fluids and medications.
3. If there is swelling around the site due to fluids in the soft tissues, consider the following:
 - a. The fluid may be leaking from a previous puncture site.
 - b. It may be leaking through the hole around the needle which was enlarged by bumping or jiggling the needle.
 - c. The needle may have gone all the way through the bone and the fluid is leaking from the end of the needle on the other side. You must remove the needle and attempt access in another bone.

F.A.S.T. 1 Sternal Intraosseous Infusion Device

The F.A.S.T. 1 Sternal Intraosseous Infusion Device (**F**irst **A**ccess for **S**hock and **T**rauma) is designed for rapid fluid administration in the adult patient in which peripheral intravenous access is limited by the patient’s medical condition.

Indications for usage:

1. Patients requiring fluid resuscitation in which substantial vascular access and/or no peripheral vascular access can be obtained expeditiously.

Contraindications for usage:

1. Patient less than 12 years of age
2. Adult Patients small in stature
3. Surgical sternotomy in the past year
4. Evidence of severe skin compromise such as trauma, burns or infection over the insertion site.
5. Fracture of the sternum or suspected injury to the underlying vessels.

Precautions:

Safety has not been proven in patients with severe osteoporosis or other bone pathology.

Procedure:

See attached protocol.

Quality Assurance/Validation of Skills:

1. Each crew member will undergo initial training to include a visual demonstration, hands on practice with return demonstration and written testing.
2. Validation of skills will be required on a yearly basis in accordance with departmental standards and testing procedures.
3. Each incidence of SIO use will be reviewed in the QA process for the following:
 - a) Number of attempts
 - b) Length of time required to obtain access
 - c) Amount of fluid infused
 - d) Any errors or equipment failures in the application of the device

F.A.S.T. 1 Procedure Protocol:

The F.A.S.T. Adult Sternal Intraosseous Infusion Device comes packaged with the three key devices required for insertion as well as Betadine and Alcohol preps for aseptic preparation of the insertion site.

The single recommended site of insertion is the adult manubrium, on the mid-line, 1.5cm below the sternal notch.

1. To begin, use the Betadine Prep followed by the Alcohol prep cleansing in a circular motion from the inside of the intended site of the outside of the site. The index finger is then used to align the Target patch with the patient's sternal notch.
2. With the patch securely attached to the patient's skin, place introducer in the Target Zone of the Target Patch perpendicular to the patient's skin. A firm push on the Introducer inserts the infusion tube into the correct site and penetration depth. The Introducer is pulled straight back exposing the Infusion Tube and a two part support sleeve which fails away.
3. Correct placement is verified by aspiration/observation of marrow in the Infusion Tube. The Infusion Tube is joined to tubing on the patch, which is connected to a purged source of fluid. Release roller clamp and fluid is ready to infuse.
4. The Protective Dome is then pressed down firmly over the Target Patch to engage the Velcro fastening. Now, the site is clearly visible and requires no further stabilization for transport.
5. **A pre-packaged removal kit must be kept with the patient for removal of the device. This kit should be taped to the patients chest. The infusion tube will break off if it is not removed using the pre-packaged removal kit.**

DOPPLER

Purpose:

1. To amplify blood pressure when auscultation by stethoscope is unreliable
2. To assess the character of blood flow through a vessel when circulatory impairment is suspected

Equipment:

1. Doppler ultrasound device
2. Ultrasound transmission gel
3. Damp washcloth or tissue

Procedure:

1. Gather the equipment
2. Wash your hands
3. Explain the procedure to the patient
4. Apply a generous amount of ultrasound transmission gel to the Doppler probe or to the anatomic location to be examined.
5. Set the volume control of the Doppler device at the midpoint
6. Press on “on” button.
7. Place the probe over the suspected location of the vessel or pulse
8. Tilt the probe at a 45° angle toward the axis of the blood flow of the vessel
9. Gently slide the probe over the site until blood flow is auscultated, adjusting the volume control as needed
10. Mark the point on the skin at which the blood flow is heard
11. To obtain systolic blood pressure:
 - a) Substitute the Doppler device for a stethoscope
 - b) Listen for blood flow with the Doppler device over the brachial artery
 - c) Inflate the blood pressure cuff until the arterial sound disappears; release the cuff pressure slowly while listening with the Doppler device; when blood flow is heard, note the systolic blood pressure. (No diastolic pressure is obtained with the Doppler device.)

12. If you are unable to hear blood flow over the site where the pulse is normally palpated:
Test the Doppler device by checking your own pulse site with it.

13. If the Doppler device is not working, assess the following:
 - Is sufficient gel being used?
 - Is the volume control adjusted?
 - Is the battery fresh?
 - Is the probe/transducer clean (without dried residue)?
 - Is the cord damaged?

14. If the Doppler device is working:
 - Be sure excessive pressure is not being exerted on the probe, which may occlude the vessel.
 - Ask another nurse to auscultate if you are still unable to hear blood flow.
 - Notify the physician if blood flow cannot be heard.
 - Clean the gel from the patient's skin using a damp tissue or washcloth

15. Clean the Doppler probe thoroughly with a damp tissue or washcloth after each use. Do not clean it with alcohol or organic solvents, as they may damage the transducer.

Documentation:

Reason for Doppler use

Detection/ non-detection of blood flow

Pearls:

If ultrasound transmission gel is not available, water-soluble lubricating jelly may be used. Water-soluble lubricating jelly may leave a residue on the probe. Clean the probe carefully.

12 - LEAD ELECTROCARDIOGRAM

Indications:

1. Patients who are complaining of chest pain, palpitations, irregular heart beat, shortness of breath, dizziness, syncope, or weakness believed to be of cardiac origin should be considered.
2. A patient that the flight crew thinks is suffering an acute cardiac event in the absence of a complaint of chest pain.
3. Any patient for whom a physician request a prehospital 12-lead ECG be acquired whether or not a cardiac event.

Procedure:

1. Treat patient per specific protocol.
2. Reassure, explain and, place in a position of rest.
3. Apply cardiac monitor using a standard limb lead (4) placement if a 12-lead is anticipated.
4. Complete a patient assessment:
5. Attach precordial leads
6. Acquire 12-lead ECG after medical intervention prior to arrival.
7. Transmit 12-lead ECG to receiving station while en route to the hospital.

Notes:

1. If either defibrillation or synchronized cardioversion is necessary, quickly remove precordial leads necessary to allow for the paddles and proceed with appropriate protocol.
2. ACLS protocol and physician orders will supersede the 12-lead ECG acquisition in cases where it is in the best interest of the patient.
3. If 12-lead ECG is acquired while patient assessment is taking place, scene time is not adversely affected.
4. Treatment of patient with Nitroglycerin, Lidocaine, Morphine, Aspirin, or other medication should not be delayed by the acquisition of the 12-lead ECG.

Appendix A: Medication Lists

The following medications are used in these protocols:

Adenosine	Lasix® (Furosemide)
Albuterol	Lidocaine
Anectine (Succinylcholine)	Magnesium Sulfate
Aspirin	Morphine Sulfate
Ativan	Narcan® (Naloxone)
Atropine	Nitroglycerin Tablets/Spray/Paste/Injectible
Benadryl® (Diphenhydramine)	Normal Saline for Injection
Brethine	Norcuron
Cardizem	Oxygen
Compazine	Phenergan
Dextrose	Sodium Bicarbonate
Dobutamine	Sodium Chloride
Dopamine	Solumedrol
Epinephrine	Sterile Water
Etomidate	Thiamine
Fentanyl	Tridil
Glucagon	Tylenol-oral and suppository
Isoproterenol	Versed
Labetalol	

The following medications are available for use under direction of Medical Command:

Calcium Gluconate

Levophed

Lopressor

Nipride

Romazicon

Appendix B: Pediatric Guidelines

	Age	0-3 mo	6 mo	9-24mo	3 yrs	6 yrs	8 yrs	10 yrs	12 yrs	14 yrs
	Weight Lbs. Kgs	$\frac{6-7}{3}$	$\frac{11}{5}$	$\frac{20}{10}$	$\frac{30}{15}$	$\frac{40}{20}$	$\frac{50}{25}$	$\frac{60}{30}$	$\frac{80}{40}$	$\frac{100}{50}$
Vital Signs	Systolic BP	60-70	70	70-75	75-80	80	80	85	85	90
	Pulse	100-180	100-180	90-160	80-140	70-130	70-130	60-120	60-120	60-120
Airway	Endotracheal tube size	3.0-3.5	3.5	4.0-4.5	5.0	5.5	6.0	6.5	7.0	7.0
	Atropine (0.1 mg/ml)	1.0 ml	1.0 ml	2.0 ml	3.0 ml	4.0 ml	5.0 ml	6.0 ml	8.0 ml	10 ml
	Benadryl (50 mg/ml)			0.2 ml	0.3 ml	0.4 ml	0.5 ml	0.6 ml	0.8 ml	1.0 ml
M	Bretylium (50 mg/ml)	0.3 ml	0.5 ml	1.0 ml	1.5 ml	2.0 ml	2.5 ml	3.0 ml	4.0 ml	5.0 ml
	Dextrose 25% (250 mg/ml)	D10W 6 ml	10 ml	20 ml	30 ml					
E	Dextrose 50% (500 mg/ml)					20 ml	25 ml	30 ml	40 ml	50 ml
D	Dopamine ml/hr 300 mg/ 250 ml ml/hr 300mg in 250ml	2-4	3-6	5-10	8-15	10-20	13-25	15-30	20-40	25-50
S	Epinephrine 1:10,000 IV/IO (0.1 mg/ml)	0.3 ml	0.5 ml	1.0 ml	1.5 ml	2.0 ml	2.5 ml	3.0 ml	4.0 ml	5.0 ml
	IV and IO dose; if no effect in cardiac arrest, use 1:1000 dilution.									
	Epinephrine 1:1000 IV/IO/ET (1 mg/ml)	0.3 ml	0.5 ml	1.0 ml	1.5 ml	2.0 ml	2.5 ml	3.0 ml	4.0 ml	5.0 ml
All ET doses and subsequent IV and IO doses if first epinephrine dose has no effect in arrest.										
	Epinephrine 1:1000 SQ (1 mg/ml)		0.05 ml	0.1 ml	0.15 ml	0.2 ml	0.25 ml	0.3 ml	0.3 ml	0.3 ml
	Ipecac			15 ml	30 ml					
	Lasix	0.3 ml	0.5 ml	1.0 ml	1.5 ml	2.0 ml	2.5 ml	3.0 ml	4.0 ml	5.0 ml
	Lidocaine 2% (20 mg/ml)	0.15 ml	0.25 ml	0.5 ml	0.75 ml	1.0 ml	1.25 ml	1.5 ml	2.0 ml	2.5 ml
	Narcan (0.4 mg/ml)	0.05 ml	0.15 ml	0.25 ml	0.4 ml	0.5 ml	0.6 ml	0.8 ml	1.0 ml	1.0 ml
	Sodium Bicarb. 8.4%	3 ml†	5 ml	10 ml	15 ml	20 ml	25 ml	30 ml	40 ml	50 ml
	Valium (5 mg/ml)		0.1 ml	0.2 ml	0.3 ml	0.4 ml	0.5 ml	0.6 ml	0.8 ml	1.0 ml
Fluid Bolus	Normal Saline (20 cc/kg)	60 ml	100 ml	200 ml	300 ml	400 ml	500 ml	600 ml	800 ml	1 liter
Defibrillation	Defibrillation 2 joules/kg	6	10	20	30	40	50	60	80	100
		Total joules on first shock								
Cardioversion	Synchronized Cardioversion 0.5 joules/kg (First Shock)	1.5	2.5	5	7.5	10	12.5	15	20	25

† Dilute 1:1 with sterile water.

**PROTOCOLS SPECIFIC TO
INTER-FACILITY TRANSFERS**

INTER-FACILITY TRANSFERS
MAINTENANCE OF INTRAVENOUS MEDICATIONS-HEPARIN

Indications:

1. Post acute myocardial infarction {AMI}.
2. Treatment of deep vein thrombosis {DVT}.
3. Treatment of pulmonary embolism {PE}.

Protocol:

1. Flight crews will be permitted to monitor patients on intravenous Heparin.
2. The drug must be administered through an infusion pump.
3. When receiving report from the transferring R.N., always verify the physician's orders for infusion rate, and check pump flow rate.
4. Notify medical command as needed for general medical direction.

Notes:

1. Patients achieve maximum benefit from intravenous Heparin therapy if the targeted therapeutic range is achieved within 12 to 24 hours and maintained for the duration of therapy. Careful dosing and monitoring also minimizes the risks of untoward events.

TRANSPORTATION OF THE PATIENT WITH CHEST TUBES

Purpose:

To assure that all patients transported with chest tubes are treated according to policy.

Procedure:

1. Assure all holes of the chest tube are within the pleural cavity
2. Assure the chest tube is securely anchored to the chest.
3. Assess bilateral breath sounds
4. Evaluate patency of tube
 - a. Look for fluctuation in the water seal chamber while not connected to suction if presently on a drainage system.
 - b. If Heimlich valve utilized, look for fluctuation of the one-way valve immediately upon tube insertion
5. Maintain current drainage system when possible. Heimlich valve will be utilized when necessary
6. Connect suction
7. Continue to assess and document patient's respiratory status and vital signs as indicated during flight

FLUID WARMING**Purpose:**

To assure that patients meeting certain criteria will be administered intravenous fluids warmed using approved warming measures.

Action:

1. Patients who meet the following criteria will be administered warmed fluids as noted above. This list is not exclusive of other circumstances and any patient that the crew feels is at risk of hypothermia should receive warmed fluids.
 - a. Hypothermic patients (whether due to environmental exposure or disease process)
 - b. Patients requiring blood products or large volumes (>40 cc/kg) of intravenous fluid resuscitation
 - c. Submersion injuries
 - d. Any other patient in which warm fluids would be of benefit, such as the very young, the very old, or those with other comorbid factors.

NEONATAL TRANSPORTS

1. Neonates will be defined as any infant delivered full term that is less than 28 days of age.
2. The flight crews will not perform interfacility transports of neonates for cardiac anomalies or any disease process that requires the use of an isolette, except under orders from sending physician.

The flight crews will respond to primary scene calls and transport the patient, weather permitting, no matter the age of the patient.

INTER-FACILITY TRANSFERS OF OB PATIENTS

Purpose:

To ensure safety of the patient in a high risk situation.

Procedure:

1. If the transfer request is in any manner related to the pregnancy, the flight will be declined.
2. Air Evac Lifeteam Communication Center will assist the requesting agency in locating the appropriate transport service qualified to providing the safety needs of the patient.

MASS CASUALTY / DISASTER RESPONSE

1. Prehospital Response with Incident Command in Place

- a) Pre-arrival
 - i. Dispatch should obtain appropriate frequency for contact, as this may be different in a large incident than in ordinary response.
 - ii. Radio call sign should be obtained for the Incident Commander or Transport Office that the crew is to report to.
 - iii. The crew should ensure that their landing zone is a designated landing zone, rather than simply a location nearest the patient.
- b) On Scene
 - i. Upon landing, the crew should immediately report to the Incident Commander or his designee (Transport Officer, Triage Office, etc.)
 - ii. Upon landing, the crew should assign one individual to guard the landing zone and block any unauthorized approach to the aircraft.
 - iii. Upon landing, the crew should immediately attempt to obtain an estimated number of casualties and number of air ambulances needed, as this number could have easily changed since the initial call was made to dispatch.
 - iv. Prior to departure, the crew should inform the Transport Officer of their ETA to the closest appropriate facility, and enquire as to whether they should immediately return to the scene for additional transports.
 - v. The Crew should assure that the receiving facility has been notified of:
 - The mass-casualty or disaster
 - The transport of their patient to that facility
- c) Post Departure
 - i. At the earliest possible time, the crew should contact the receiving facility with patient report and obtain instructions for landing and unloading, as this may greatly differ from the norm in a disaster.
 - ii. Contact should be made by the crew or by dispatch after arrival at the receiving facility to ensure that the casualty count has not changed, and that the return of the aircraft to the scene is/is not needed.
 - iii. If the aircraft is to return to the scene, an effort should be made to update the Incident Commander on the aircraft's return ETA.

2. Prehospital Response with no Incident Command in place

- a) Pre-Arrival
 - i. The crew should attempt by all means possible to gain communication with any ground units on scene.
 - ii. If units are on scene, but no specific command structure is evident, the crew should specifically request to speak to the incident commander to prompt the organization of a command structure.
 - iii. If no designated landing zone is established:
 - The crew should use their best judgment as to land or orbit the scene.
 - If landing is necessary, it should be sufficiently far enough from the scene to prevent unauthorized approach of the aircraft.

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- As quickly as possible, the landing zone should be secured, and someone assigned to prevent unauthorized approach to the aircraft.
- b) On Scene
 - i. The crew should divide, quickly covering as much of the area as possible to initiate triage and attempt to prompt the creation of a command structure.
 - ii. As soon as number and severity of injuries are evident, dispatch should be notified and instructed to relay information to the appropriate emergency response agencies, and to the necessary hospitals and respond further air ambulances as needed.
 - iii. As soon as anyone of authority (fire chief, EMS supervisor, etc.) arrives, as report on number and severity of injuries should be made and command turned over to this individual.
 - iv. As guided by incident command or crew triage, the most severely injured and readily accessible patients should be transported by air.
 - c) Post Departure
See Post Departure in Section 1.

3. Inter-facility transfer during mass casualty

- a) Pre-arrival
 - i. Obtain landing and loading instructions from the sending hospital as early as possible.
- b) On-scene
 - i. Ensure that no further air ambulance response is needed.
 - ii. Ensure that the receiving facility is aware of the transfer.
 - Ensure that no relevant COBRA laws will be violated
 - iii. Provide the sending facility with an ETA to the receiving facility and ensure that a return of the aircraft to the sending facility will/will not be needed.
- c) Post Departure

See Post Departure in Section 1

HAZARDOUS MATERIAL RESPONSE

1. Prehospital:

- a) Pre-Arrival
 - i. Dispatch should notify crew of possible hazardous material involvement.
 - ii. Attempts should be made to identify the substance.
 - iii. Dispatch should attempt to provide the crew with pre-arrival information through Poison Control or CHEMTREC.
 - iv. The crew should review information in the Emergency Response Guide if possible.
 - v. Contact should be made as early as possible with ground units to obtain landing instructions.
 - vi. Flight crew should ensure that the landing zone is upwind, uphill and a significant distance from the source of the hazardous materials.
 - vii. NO ONE on the ground should be permitted to approach the aircraft as all persons should be considered contaminated until proven otherwise.
- b) On scene
 - i. The crew should make immediate contact with the Incident Commander or his designee to determine the specific type of incident.
 - ii. Any person directly contaminated by hazardous materials **is not eligible** for air transport, regardless of decontamination status.
 - Keep in mind that even minor contaminations (gas, diesel, etc.) have serious implications when in a confined space such as an aircraft.
 - iii. An attempt should be made to obtain MSDS forms, bills of lading, etc. that provide information on the specific material involved.
 - iv. The crew will not at any time, enter an area designated anything other than “safe” by the Hazmat team on scene.
 - v. If the situation begins to change, affecting crew safety, the aircraft and crew should immediately depart and orbit away from the area until a safe area is reestablished.
 - vi. Ensure **prior to departure** that no crewmember, piece of equipment or aircraft is considered contaminated.

2. Inter-facility:

- a) Pre-arrival
 - i. The crew should be notified of possible Hazmat involvement
 - ii. The crew should contact the sending facility as soon as possible to obtain landing instructions as this may differ from the normal.
 - iii. The crew should attempt to gain as much information en route about the offending agent through Poison Control, CHEMTREC, etc.

2. On Scene:

- a) Prior to entry the crew should ensure that the sending facility and sending department are not considered contaminated.
- b) The crew should ensure that the patient has been decontaminated according to OSHA and CHEMTREC specifications prior to approaching the patient.
- c) The crew should ensure that there are **printed information sheets** on the known agent, specifying agent type, decontamination considerations, affect on the human body and

treatment guidelines. These forms are to be transported with the patient and crew and a copy left with the receiving facility. A copy of these should also accompany the patient's chart and be kept with the base paperwork.

- d) The crew should contact the receiving facility prior to departure to ensure that they are aware of the patient's condition and are prepared for possible isolation of the patient.
- e) The crew has the right to refuse transport if at any time their safety or well-being is in question.
- f) A patient who has been contaminated with an unknown substance is **not a candidate** for air transport.

4. Any special medication or treatment required should be obtained from the sending facility, if available, with written orders for use from the sending physician.

5. Post Departure

- a. If at any time the crew begins to feel effects of possible contamination, the aircraft is to be immediately landed.
- b. If the patient deteriorates en route, extreme caution should be used when a decision to divert to another facility is made. Any facility diverted to should be given an early warning of the patient's condition and mechanism of injury (hazmat) and be allowed to decide if they are able to accept and stabilize that patient.
- c. The receiving facility should be notified as early as possible of arrival
- d. Instructions as to patient isolation should be obtained prior to arrival.
- e. The aircraft should be placed out of service and thoroughly cleaned post-transport, regardless of patient decontamination status.

PAIN MANAGEMENT PROTOCOL

Purpose:

To outline procedures in the administration of analgesia in the critically ill or injured adult or pediatric patient.

Rational:

The primary goal of medical care is to relieve pain and suffering without causing further harm to the patient.

Procedures:

1. Perform a brief neurologic exam prior to administration of analgesia.
2. Place patient on a pulse oximeter and cardiac monitor.
3. Be prepared to support respirations and provide supplemental oxygen and, if necessary, to perform endotracheal intubation.
4. Objectively assess the patient's pain level using a standardized pain scale. Usually 1-10 for adults where 1 is essentially no pain and 10 is the worst pain imaginable. Ask the patient to rate their pain and accept their answer as fact. In children use a standardized face scale with 5 ratings. Document the patient's pain level.
5. Treat the patient with an appropriate narcotic analgesic by the IV route only.
Do not give IM pain medications.
6. Once medicated for pain, reassess the patient's response after 10 minutes using the pain scale. Retreat if rated 5 or greater. Repeat the reassessment and repeat treatment as indicated.

Analgesia:**MORPHINE**

Adult- 0.1 mg/kg IVP. Repeat 0.05 mg/kg q 10 minutes if needed.

Pediatric- 0.1mg/kg IVP. Repeat 0.05 mg/kg q 10 minutes if needed.

OR**FENTANYL**

Adult- 2 mcg/kg IVP. Repeat 1 mcg/kg IVP q 10 minutes if needed.

Pediatric- 2 mcg/kg IV. Repeat 1 mcg/kg IVP q 10 minutes if needed.

Make sure to document vital signs including a pain assessment and O2 Saturation.

Reassess and document vital signs q 10 minutes

Record before and after medication.

Notify receiving facility/physician of meds given.

