

# **EHS LifeFlight**

(Air Medical Transport)

**&**

# **EHS Trauma Program**

**Indications and Patient  
Preparation Guidelines for  
Air Medical Transport  
and / or Major Trauma  
Transport to Tertiary Care**

**1-800-743-1334**

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## History:

Since the first Canadian civilian air medical transport (AMT) in 1946, these services have grown independently in every part of Canada. It has evolved from primitive beginnings into sophisticated systems designed specifically for the movement of the ill and injured.

The IWK was the first civilian team to go airborne in the Maritimes in the 1980's using several different types of aircraft. However, there was no comprehensive system available to all patient populations or locations.

The planning stage to develop a comprehensive AMT program in Nova Scotia began in September 1995, after months of consultation with pilots, ground EMS, physicians, paramedics, nurses, as well as other members of the community.

Emergency Health Services (EHS) Nova Scotia developed the framework for this program and was responsible to oversee the delivery of a province wide AMT program. The EHS AMT program went "wheels up" with a dedicated helicopter air ambulance program in 1996. Critically ill or injured Adult, Paediatric, Neonatal and Obstetric patients now had access to a rapid, safe, and high quality AMT service 24 hours a day throughout all of Nova Scotia.



## Mission Statement:

- EHS LifeFlight provides critical care to ill and injured patients and immediate access to expert consultation and safe, timely air medical service.

## **What groups are involved in the EHS LifeFlight program?**

### **Nova Scotia Department of Health**

The Department of Health provides funding for the program's operating costs and is responsible for overseeing the service.

### **EHS Medical Communication Centre**

The EHS (EHS) Medical Communications Centre provides EHS LifeFlight with the emergency medical dispatch communications that are essential to the effective delivery of patient care.

### **Canadian Helicopters Inc. (CH)**

Canadian Helicopters provides the primary aviation component of the AMT program - helicopter, pilots and engineers.

### **Medical Control Physicians (MCP)**

When EHS LifeFlight is contacted by a health care professional with a request for AMT of a patient, the caller is put in contact with one of our MCPs. The MCP, one of a group of Obstetricians, Neonatologists, Paediatricians, Emergency Medicine physicians or Fellow(s) in appropriate disciplines from either the Queen Elizabeth Health Science Center or the IWK Health Center, makes the final decision as to whether the patient is suitable for air transport. The MCP advises the sending

facility on how to prepare the patient for flight and briefs the Air Medical Crew (AMC) on their mission.

### **Air Medical Crew (AMC)**

Our AMC functions as a multi-disciplinary team composed of highly qualified nurses, respiratory therapists and paramedics, all of whom have extensive experience in their respective fields.

The composition of the AMC for each mission depends upon whether the patient to be transported is an expectant mother, a newborn infant, a child, an adult, or a patient from a scene.

The children's component consists of specially trained critical care nurses and respiratory therapists, all of whom work at the IWK Paediatric and neonatal intensive care units when not on EHS LifeFlight duty shifts.

The obstetric service consists of an obstetrical nurse and the children's crew. All of the obstetrical nurses work at the IWK in labour and delivery (when not on EHS LifeFlight duty shifts) and are very competent in treating the complicated OBS patient.

The adult component consists of specially trained nurses and paramedics. The paramedics are all Critical Care registered and have many years experience working on advanced life support vehicles. The nurses are specially

trained ICU and/or emergency department tertiary care nurses with many years of experience as well.

Throughout the mission the MCP is available to provide advice to the transport team. If it is deemed necessary, the MCP may accompany the team on the mission.

The special close relationship which exists between EHS LifeFlight and Halifax's tertiary care hospitals (the Queen Elizabeth II Health Sciences Centre and the IWK Health Centre), ensures that our staff have access to state of the art equipment and continuing education programs.

The helicopter is specially equipped for each mission, depending on the individual patient's requirements.

The air crew utilizes special medical equipment for air transport. With sophisticated equipment, and the training and experience of the medical crew, we are able to offer the patient the same quality of care they would receive in most Nova Scotia Emergency Departments and Intensive Care Units. Clearly, the level of care provided during inter-facility transport must stay the same as that of the sending facility or ideally increase during transport. The aircraft and crew are equipped and capable of managing emergencies in the air, but the goal of the actual transport is to provide the highest standard of care without having to perform any unexpected interventions in flight.

## **Commonly Asked Questions**

### **Why do we need AMT in Nova Scotia?**

The medical community recognizes AMT as a vital component of delivering quality emergency medical care.

EHS LifeFlight supports communities with critical care for ill and injured patients, usually requiring treatment from specialists located at the QEII, IWK or regional hospitals.

AMT

### **Why don't these patients just get transported to hospital by ambulances?**

- AMT brings the specialty team directly to the patient, dramatically increasing the speed at which the patient begins receiving critical care.
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- Additionally, AMT supports both hospital and ground ambulance paramedic teams which helps to keep these valuable resources in Nova Scotia communities.
- EHS LifeFlightEHS LifeFlight

### **Why do you use a helicopter as the primary response vehicle?**

The EHS LifeFlight helicopter is not restricted to landing at airport runways, can land at hospital and community helipads and sometimes at the scene of an emergency.

This flexibility enables a fast response with close access to communities and reduces patient out-of-hospital time.  
AMC

## **What happens in bad weather?**

Severe and changing weather does affect flight safety. Therefore, EHS LifeFlight pilots always make the final decision to fly a mission based on safety.

Other options for transporting the AMC to patients include using the non-dedicated back-up fixed wing airplane or ground ambulance.

## **How long will it take for EHS LifeFlight to get here?**

From 07:00 – 23:00 hrs the EHS LifeFlight crew is stationed with the helicopter at Halifax International Airport and can be airborne within 10 minutes of the call (mission logistics depending). Please note that Obstetrics missions require the addition of an EHS LifeFlight OBS nurse (who is not stationed at the base) to our on-site crew. Therefore, OBS missions require a 60 minute airborne response. From 23:01 – 06:59 hrs our medical crews are at the base but our pilots and Obstetrics nurse

are on call off the base. Between these hours we cut back to a 60 minute wheels up response.

## What types of medications do the AMC carry?

Listed below are the classifications and types of medications that are carried. As new treatment modalities are developed, specific medications may be added, changed or deleted.

Resuscitation IV Fluids	Vasodilators
Chronotropic/Inotropic Agents	Antibiotics
Antiarrhythmics	Antiemetics
Bicarbonate	Benzodiazepines
Bronchodilators (Neb/IV)	Narcotics
Antipsychotics	Anticoagulants
Anticonvulsants	Glucose
Topical Anesthetics	Antacids
Sedatives / Hypnotics	Oxygen
High Dose Steroids	Antidotes
Antihypertensives	Antipyretics
Vasopressors	Betablockers
Calcium Channel Blockers	Diuretics
Anti-inflammatory agents	Insulin
Infiltrative anesthetics	Paralytics
Pulmonary Surfactant	Vitamin E & K
Prostaglandin	Oxytocics

## What medical equipment do the EHS LifeFlight AMC utilize?

Portable and onboard oxygen / medical air  
Portable and onboard suction  
Ventilators and ventilation devices (neo/paed/adult)  
Triple channel and syringe infusion pumps  
Defibrillation / Pacing  
Glucometers  
Spinal immobilization equipment for Adult and Ped pts.  
Advanced airway kits (all ages)  
Surgical airway kit  
Airway adjuncts (bugie, lightwand, LMA, Combitube)  
Chest tube kits  
IV, IO, UA and UV Kits  
Obstetrics emergency kit  
OG/NG Kits and catheterization trays  
Blood culture / specimen kits  
Doppler  
Traction splints and immobilization devices  
Neonatal incubators  
Thermoregulatory devices  
Wound dressing / care, burn sheets and suture kits  
Cardiac and invasive monitors: ECG, HR, NIBP, IBP, SpO2, ETCO2, Resp, and Temp  
Nitric Oxide delivery system

## **How are patients triaged during multiple AMT requests?**

EHS LifeFlight has only one helicopter to serve the entire province of Nova Scotia, PEI and New Brunswick. On occasion more than one request for AMT may occur simultaneously.

When this occurs, triage decisions or queuing decisions based on patient's acuity, resources and tertiary care needs coupled with time dependent elements must be made. Generally, scene responses for trauma will take precedence over other calls since these potentially unstable patients may have truly time dependent pathology. Other triage decisions are made on a case by case basis with communication between MCPs as needed to expedite care of the most unstable patients first. If your patient's transport is pre-empted due to triage decisions, arrangements can be made for possible fixed-wing transfer, ground transfer, or with further queuing for AMT when available. This is accomplished by the EHS Communications Centre in conjunction with the MCP.

If you have any questions about the way one of your patients was triaged or why a delay may have occurred you can request the medical directors of the program review the case.

## **Tell me about the helicopter...**

EHS LifeFlight utilizes a Sikorsky S-76A as its primary aircraft. This helicopter is a twin engine helicopter capable of covering all of the Maritimes. It is rated for flying in both VFR (visual flight rules) and IFR (instrument flight rules) conditions. Our cruising speed is 135 knots or 250 Km/hr. It has a maximum lift of 10,500 lbs. Depending on mission logistics and conditions, the EHS LifeFlight helicopter can carry up to 8 people; two pilots, 4 AMC and 2 patients.

## **Is there a fee for EHS LifeFlight?**

There is no service fee for Nova Scotia patients, sending hospitals or agencies using EHS LifeFlight as a critical care transport service. A service fee will be charged to non-Nova Scotian and non-Canadian residents.

**Other provinces that contract this service may charge a fee to their residents.**

## **Where are the AMC located?**

The EHS LifeFlight adult air medical team and aviation crews are stationed with the helicopter at the Halifax Stanfield International Airport. Obstetric, neonatal and Paediatric teams are on-call at the IWK.

When they are not flying, the crews are practicing their skills and keeping up-to-date on the latest medical treatments through continuing education.

All team members have additional responsibilities such as developing community outreach programs, safety training, conducting research, etc.

## **Where does the helicopter land during scene missions?**

Support and emergency personnel throughout Nova Scotia have been trained to assist in landing the EHS LifeFlight helicopter at or near the scene of an emergency.

Once on-scene emergency services have determined the need for AMT, EHS LifeFlight will respond directly to the scene or nearby helipad.

EHS LifeFlight

## **Who can I contact if I have any general questions about EHS LifeFlight?**

Please feel free to contact us at our base at Halifax International Airport with any of your questions or concerns.

### **EHS LifeFlight Contact Information:**

EHS LifeFlight  
637 Barnes Drive  
Halifax Stanfield International Airport  
Enfield, Nova Scotia, B2T 1K3

General Inquiries:  
(902) 873-3657

Fax: (902) 873-3987

Email: [ehslifeflight@emci.ca](mailto:ehslifeflight@emci.ca)

Web: [www.ehslifeflight.ca](http://www.ehslifeflight.ca)

EHS LifeFlight and Trauma Mission Requests:  
**1-800-743-1334**

# **Adult Patient(s) (16 yrs and up)**

## **Indications for Air Medical Transport Activation**

### **Part One: Non-Trauma**

#### **Preamble:**

Specific industry guidelines for the AMT of medically compromised patients are not available in an evidence-based format at this time. Such criteria are far better developed for trauma (see Trauma Activation Criteria). EHS LifeFlight does offer advanced critical care helicopter transport for severely ill medical patients based upon general criteria in conjunction with definitive MCP decision making.

Nova Scotia is a province that is ideally suited for AMT of the unstable, critically ill patient since 2/3 of the Province's hospitals are greater than 25 km from the nearest fixed-wing runway and the remaining 1/3 are over 100 km away from the nearest landing strip. As well, there are often significant distances to be covered (and changing weather and geographic conditions) by ground ambulances to the nearest regional centre and certain ambulance crews may not have advanced life support skills.

**The following general guidelines can be used to determine indications for AMT of the unstable, critically ill patient >15 years of age in non-trauma situations. The final decision on transfer by air will be ultimately made by the MCP on a case by case basis which will also be predicated upon other factors such as helicopter availability, weather, etc. The mission pilot will make the final flying decision based upon these and other aviation concerns.**

### **General Indications for AMT of the Non-Trauma Adult Patient:**

1. Any patient that is medically unstable/critically ill where time to definitive care by ground is in excess of AMT time.
2. In any patient in which a delay in timely, advanced medical investigation or intervention could be expected to result in an adverse outcome and ground transport is not available or would result in excessive time.
3. When personnel, equipment or expertise needs of the patient exceed those of the local, sending agency or institution. It is understood that this “resource” category will not apply to Nova Scotia’s regional centres but rather to smaller hospitals whose capabilities would be significantly compromised by a critically ill patient(s).

Please note that the final decision to transport a patient by air will be made by the AMT on-line MCP after discussion with the referring physician (for interhospital transports).

### **Specific Clinical Scenarios That May Warrant AMT:**

1. Dissecting/bleeding aortic aneurysm
2. Intracranial bleed (e.g. subarachnoid hemorrhage)
3. Severe hypothermia/hyperthermia
4. Patients in need of emergency cardiac surgery (e.g. ruptured mitral valve)
5. Patients needing mechanical ventilation and/or inotropic support for shock states (such as septic shock).
6. Unstable patient who may warrant investigations not available at referring institution such as angiography for an unstable GI bleed.
7. Severe poisonings.
8. Renal failure (acute) where dialysis is not available at sending institution.
9. Uncontrollable seizure activity (status).
10. Indications for hyperbaric oxygen therapy such as severe carbon monoxide poisoning or decompression illness.
11. Trauma: See specific Trauma Indications for AMT section.

12. Cardiac: See specific Cardiac Indications for AMT section.

**These are guidelines only and may not apply to several regional hospitals with more advanced capabilities. Final decision for transfer will occur with MCP input.**

### **Contraindications to AMT:**

1. Patient in full arrest
2. Terminally ill patient
3. Active untreated communicable disease that would put the crew at risk.
4. Uncontrollable, combative patient.
5. Patient of sound mind who refuses transfer.
6. Unstable patient, who requires a procedure (i.e. laparotomy) which could be performed at the sending centre.
7. Stable patient in whom another means of transport would be more appropriate.

### **Specific Considerations in AMT of Cardiac Patients**

Provincial triage of acute cardiac conditions is predicated upon utilization of the district health authorities and appropriate regional hospitals. Thus, for example, an uncomplicated, MI patient who has received appropriate initial treatment in a specific community hospital or health centre will be transported to the nearest regional hospital and not to the Queen Elizabeth Health Centre by AMT.

EHS LifeFlight can assist small hospitals and community health centres in transportation of unstable patients to the nearest regional centre if the patient's condition warrants AMT as per the original general criteria for transport. That is, the patient is critically ill and ground transport is unavailable or excessive time is involved, or the resources of the hospital are incapable of transporting the patient.

If a sending physician feels that the cardiac patient is so unstable that tertiary care is indicated (e.g. ruptured mitral valve post MI with cardiogenic shock), then these cases will be reviewed with the on-call Cardiologist at the QEII and AMT will be organized by the MCP. If there is any concern, in borderline cases, about the patient's condition, then this case will be reviewed by the MCP with the Cardiologist on call. Only then will a transport decision be made.

#### **Acute Cardiac Conditions That May Need Transfer to the QE II**

1. Cardiogenic shock
2. Patients with acute MI and contra-indications to thrombolysis who may require primary PTCA.
3. Acute ventricular septal defects or valve dysfunction post-MI.
4. Cardiac tamponade.
5. Acute mechanical valve dysfunction.

#### **Non acute, Urgent Cardiac Cases:**

Other cardiac cases may be transferred from Regional Hospitals after initial treatment and stabilization for further definitive tertiary care treatment and/or investigations. These cases may include the following:

1. High risk unstable angina, usually on IV heparin, and for priority angiography.
2. Post infarct angina or other complications such as CHF.
3. Medically refractory dysrhythmias.
4. Patients awaiting surgery (CABG) with acute complications such as unstable angina.

Many of these patients can and will be transported by ground ambulance with appropriate staff. At times, pending helicopter and team availability, EHS LifeFlight may be asked to transport some of these patients. Other critical care calls such as trauma must, however, take precedence and thus will involve final decisions by the AMT MCP.

## **Part Two: Trauma**

### **Preamble**

EHS LifeFlight is capable of both primary scene responses to serious trauma as well as interfacility transport of trauma patients. Decision to involve EHS LifeFlight is based upon the following listed criteria. If interfacility transport is being considered, the Provincial Trauma Team Leader can be contacted through the number 1-800-743-1334. AMT can also be arranged using the same number.

### **Physiologic Criteria:**

1. Systolic BP < 90 with hypoperfusion
2. Ventilatory Compromise (RR < 10 or > 29)
3. Glasgow Coma Scale  $\leq$  12 or other evidence or suspicion of, significant head injury.

### **Anatomic Criteria:**

1. Amputation proximal to elbow or knee.
2. 2 or more proximal long bone fractures.
3. Suspected spinal cord injury with neurological deficit.
4. Severe maxillofacial injury with potential airway compromise.
5. Burns (2<sup>nd</sup>, 3<sup>rd</sup>, chemical, inhalation) >15% TBSA.

### **Mechanism Criteria:**

1. Gunshot wound proximal to knee or elbow.
2. Significant penetrating wound to head, neck, chest, abdomen, or groin.

### **Logistical Criteria:**

1. Simultaneous arrival or presence of 3 or more multiple-trauma patients and / or local resources are overwhelmed.

**Please note that these are  
guidelines only and any trauma  
case may be reviewed with the  
Air MCP or Provincial Trauma  
Team Leader for advice or  
consideration for AMT.**

**Adult Patient(s)  
Preflight  
Preparation for  
AMT  
(16 years and up)  
Trauma and Non-  
Trauma**

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## AIRWAY

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- **Intubation** is essential if there is any concern about oxygenation, ventilation, obstruction or altered level of consciousness or concern about pending airway compromise (e.g. inhalation thermal injury)

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## BREATHING

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- **Oxygen** is essential, to keep O<sub>2</sub> saturation appropriate (>95%)

- **Chest Tubes** pre-flight are essential if there is evidence of pneumothorax, hemopneumothorax, significant post-traumatic SQ emphysema, or significant post-traumatic pulmonary contusion. Generally, in adult trauma patients with indications for chest tube insertion, a larger chest tube is most appropriate (28-32 Fr.). In a non-trauma patient where only air is to be drained, a smaller sized tube is acceptable.

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## CIRCULATION

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- **IV access:** Secure two large bore IV sites for transfer of the critically ill adult
- **Fluids:** Generally, normal saline is the fluid of choice for resuscitation and transport unless contraindicated
- **Blood Products:** If blood products are being given, the crew will take them with the patient on the transport
- **Monitoring:** Cardiac monitoring, oxygen saturation, temperature and blood pressure as indicated. A Foley catheter with urine output monitoring is very helpful
- **Pelvic Splinting:** In a hemodynamically unstable patient with a suspected pelvic fracture, external immobilization of the pelvis can be obtained with the use of a tightly wrapped sheet around the pelvis

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## OTHER

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- **Consider:** NPO and use of orogastric or nasogastric tube pre-transport
- **Lab Work:** Any recent lab work including CBC, lytes, BS, blood gases.
- **X-Rays:** Chest x-ray is of most importance. C-spine and pelvis if possible but not essential

### Note:

**All trauma patients will remain in or be placed in full c-spine immobilization and on spinal board for transport as per transport protocol.**

**The Transport Team Will  
Require the Following Prior to  
Leaving**

- Photocopy of the patient's prehospital record, hospital chart, a signed consent to transfer care, relevant X-rays/CTs, a brief transport note from the referring MD and name of accepting MD and place of patient destination.

A family member may request to accompany the patient during the transport.

Many factors influence this decision such as; weight restrictions, number of medical crew, weather conditions, and safety.

Please discuss this issue or any other concerns with the AMC.

# Paediatric Patient(s) (1 mos – 15 yrs)

## Indications for AMT Activation

### Consider AMT for children with:

- Asthma, croup, bronchiolitis, pneumonia or other respiratory conditions who:
  - ◆ are ventilated or in imminent need of ventilation
  - ◆ are intubated or in imminent need of intubation
  - ◆ require more than 40% oxygen to maintain Saturations 94%
  - ◆ require hourly or more frequent aerosols
  - ◆ have visible respiratory distress and increased work of breathing
  - ◆ have a respiratory or metabolic acidosis on blood gas analysis
  - ◆ have an upper airway obstruction, mediastinal mass or foreign body
- Sepsis and signs of manifest or impending shock, particularly those with immune suppression.
- Unstable cardiac conditions including arrhythmias, heart failure, unstable or unexplained cyanosis.
- Status epilepticus, coma, meningitis, or increased intracranial pressure.
- Unstable metabolic conditions including diabetic ketoacidosis, hepatic or renal failure, or inborn errors of metabolism.

- Significant head or spinal injuries, cardiothoracic injury, limb amputation, burns, smoke inhalation, near drowning or multi-system trauma.
- Drug ingestions that may require dialysis or life support.
- Rare life threatening systemic conditions such as Hemolytic Uremic Syndrome, Stevens-Johnson Syndrome, or Henoch Schoenlein Purpura.

**Consider the following when triaging children:**

- Children with life threatening injuries can look deceptively well on first inspection.
- Head injured children with poor initial exams (e.g. fixed and dilated pupils) are often postictal and have better prognosis than anticipated.
- Respiratory fatigue and failure can mask respiratory distress and other signs and symptoms.
- Blood pressure in septic children is often well maintained until shock is advanced.
- Hypothermia and cold water immersion may prolong ischemic survival time: no child should be declared dead until rewarming is accomplished.

**This list is not all-inclusive and provides only general guidelines. Feel free to consult with the EHS LifeFlight Paediatric MCP (Paediatric intensivist on call at IWK) about potential air transport patients by calling the AMT and Trauma Line at 1-800-743-1334.**

# Paediatric Patient(s) (1 mos – 15 yrs)

# Preflight Preparation for AMT

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## AIRWAY

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- If **intubation** is required – age/4 + 4 = ETT size (e.g. a four year old child would require a #5 ETT)  
    **Confirm ETT position with chest x-ray**

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## BREATHING

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- **Ventilate with oxygen** as required to maintain pulse O<sub>2</sub> saturation  $\geq$  95%
- Use **airway pressure** as needed to maintain **air entry** and **chest wall expansion**

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## CIRCULATION

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- **Monitor** - Heart rate and rhythm, oxygen saturation, temperature and blood pressure
- **Volume Depletion** - Treat with 10 – 20 mls/kg of normal saline IV fluid
- **Secure Two Large Bore IV sites** for the critically ill child. (An extension tubing between your IV cannula and infusion set will facilitate rapid change over to our team's infusions)

- **Fluid Management** - Normal Saline or Ringer's Lactate; for children under 1 year of age use D5NS or D5RL

### Guidelines for Determining IV Fluid Rate

<1 month of age = 5 cc/kg/hr

1 month – 2 years = 4 cc/kg/hr

2 years – 10 years = 3 cc/kg/hr

> 10 years or age = 2 cc/kg/hr

## Procedures to Discuss With the MCP

- **Pneumothoraces** – Place chest tube prior to flight for pneumos > 25%, tension, or increasing in size
- **Blood Work** – Recent blood gas, CBC, glucose and electrolytes (if possible)
- Recent **x-ray**
- **NPO** – Large bore orogastric or nasogastric tube

- **Foley Catheter** – In all seriously ill or injured patients unless urethral injury is suspected
- **For Trauma Patient** – Chest x-ray, c-spine and pelvic x-ray (if possible)

**All Trauma Patients**  
**Will Remain on a**  
**Backboard for**  
**Transport Regardless of**  
**X-Ray or Physical**  
**Findings**

**The Transport Team Will  
Require the Following Prior to  
Leaving**

- Photocopy of patient's chart including admission history, lab reports, etc...
- Relevant x-ray and CT films
- A brief transfer note from the attending MD (if possible)

A parent or family member may request to accompany the child during the transport.

Many factors influence this decision such as; weight restrictions, number of medical crew, weather conditions, and safety.

Please discuss this issue or any other concerns with the AMC.

# Neonatal Patient(s) (0 – 1 month or < 5 kgs)

## Indications for AMT Activation

### Consider AMT in:

- Respiratory distress requiring intervention (O<sub>2</sub>, N-CPAP, Intubation) regardless of cause (MAS, sepsis, RDS, CHD, etc.) Any infant with any

suggestion of airway compromise or respiratory failure should be considered a transport candidate.

- Any unstable airway (choanal atresia, mass, congenital anomaly▶ Pierre Robin, Treacher-Collins).
- Any infant with a distended abdomen with unknown etiology, or suspected surgical abdomen (Hirschsprungs, atresia, NEC, congenital abnormalities).
- Infant with known / suspected cyanotic heart disease.
- Infant with congenital heart disease resulting in decreased systemic output such as Hypoplastic Left Heart, Coarctation (suspect in poor perfusion, increasing metabolic acidosis, decreased or absent pulses +/- heart murmur).
- Infant with congenital heart disease resulting in symptomatic congestive heart failure (increased respiratory rate, enlarged liver, poor perfusion, “wet” chest x-ray, and large heart on chest x-ray).
- Birth weight < 2000 grams and/or gestational age < 32 weeks.
- Seizures not responsive to routine treatment (phenobarbital/phenytoin).

- **Any infant with unstable vital signs**  
(i.e.  $\uparrow$  or  $\downarrow$  HR,  $\uparrow$  RR,  $\uparrow$  or  $\downarrow$  T<sup>o</sup>,  $\downarrow$  BP)
- **Suspected unstable metabolic conditions, such as inborn errors of metabolism.**
- **Any infant on pressor agents, prostin or with symptomatic arrhythmias requiring treatment.**
- **Any infant requiring immediate and/or rapid transport in the referring physician's opinion.**

**Consider the following when assessing newborns:**

- Infants with significant asphyxia are at risk of seizures, and resultant apnea.
- Full term infants with significant asphyxia or compromise during or immediately after birth, may be at risk of developing persistent pulmonary hypertension of the newborn (PPHN).
- Infants with a PCO<sub>2</sub>>60 and requiring greater than 40% oxygen should be considered candidates for intubation.
- Sepsis should be strongly considered a factor in any compromised newborn.

**Neonatal  
Patient(s)  
(0 – 1 month or < 5 kgs)**

**Preflight  
Preparation for  
AMT**

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## AIRWAY

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- Maintain Clear Airway  
(may require oral suctioning,  
do not exceed 80-100 mmHg)

Provide **ventilation** and  
**oxygenation** if the baby:

- a) requires  $> 40\%$  oxygen and  
PaO<sub>2</sub> remains  $< 60$  mmHg
- b) PaCO<sub>2</sub>  $> 55 - 65$  mmHg with a  
pH  $< 7.20$
- c) Is apenic or has poor respiratory  
effort

## Guidelines for Determining ETT Size

$> 2000$  grams = 3.5 ETT

1000 – 2000 grams = 3.0 ETT

$< 1000$  grams = 2.5 ETT

6 + patient's weight in Kg = **lip to  
tip measurement** of ETT (i.e.  
1.5 kg baby would require a #3.0  
ETT secured 7.5 cm at the lip)

**Chest x-ray post intubation**

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## BREATHING

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- Provide supplemental oxygen to maintain oxygen saturation  $\geq$  85%

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## CIRCULATION

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- Monitor **heart rate** and **rhythm**
- Perform **upper** and **lower limb blood pressures** (to assess for congenital heart defects)

- Secure **two IV sites** either peripheral, scalp, or umbilical if time permits and qualified personnel available. (Place small extension tubing on peripheral IVs for easier access when changing over lines)
- Monitor **pre ductal** (right hand) and **post ductal** (any other limb) oxygen saturation if indicated. (i.e. query congenital heart, meconium aspiration, asphyxia or any infant with poor response to oxygen) **Important for assessing blood flow and determining pulmonary hypertension.**

- **Fluid management** – D10W @ 60 cc/kg/day (baby's weight x 60/24 = hourly rate, i.e. a 3 kg baby would receive 7.5 cc/hr)
- **Volume depletion-**  
10 – 20 mls/kg of normal saline
- **Maintain body temperature** between **36.5 – 37.5** degrees Celsius by placing baby in incubator, on an over bed warmer, or covering with warm blankets
- **Maintain blood glucose** or chemstrip  $\geq 2$  mmol/L. A bolus of 2-4 mls/kg of D10W is required for glucose < 2mmol/L followed by an IV infusion of D10W
- **Urine Output** – should be  $\geq 1$ cc/kg/hr after 24 hrs of age

**Procedures to Consider or  
Discuss With the MCP**

- **Pneumothoraces** – Place chest tube prior to flight with any evidence of intrathoracic air on chest x-ray
- **Blood cultures and antibiotics** – the usual dose for Ampicillin is 50 mg/kg and for Gentamycin is 2.5 mg/kg
- **Blood work** – recent blood gas (arterial or capillary), CBC and differential, glucose and electrolytes
- **Recent x-rays** – chest and/or abdomen
- **NPO** – the baby should be kept NPO for transport. A nasogastric or orogastric tube will be placed in all intubated infants
- **Foley catheter** – consider in all paralyzed and sedated infants

**The Transport Team Will  
Require the Following Prior to  
Leaving**

- Clotted sample of mother's blood
- Sample of cord blood
- A brief transfer note from the attending MD (if possible)
- Photocopy of patient's chart including the delivery record, maternal history, blood work, x-rays, etc...

A parent or family member may request to accompany the child during transport.

Many factors influence this decision such as; weight restrictions, number of medical crew, weather conditions, and safety.

Please discuss this issue or any other concerns with the AMC.

# **S.T.A.B.L.E.**

## **Program**

The IWK Health Centre is offering an education program focusing on the pre-transport stabilization of sick and premature infants. This program, titled “S.T.A.B.L.E.” was developed by a neonatal nurse practitioner at Primary Children’s Medical Centre in Salt Lake City, Utah, in 1985. It has been successfully implemented in Newfoundland/Labrador since 1997 and in the Maritimes since 1999.

S.T.A.B.L.E. is coordinated by the IWK Health Centre and is endorsed by EHS LifeFlight. The program is taught by neonatal

nurse practitioners, neonatal transport nurses and respiratory therapists.

This program is open to all staff involved in the care of newborns. It is designed to assist nurses, paramedics, and physicians with a concise, easy to remember tool to help organize the tasks required to stabilize a sick infant prior to transport.

The program can be taught at interested hospital/health centres by S.T.A.B.L.E. instructors.

For more information on the S.T.A.B.L.E. Program, contact:

Nancy O'Neil (RNC, MN, NNP)  
S.T.A.B.L.E. Coordinator  
IWK Health Centre  
(902) 428-8895  
[nancy.oneil@iwk.ns.health.ca](mailto:nancy.oneil@iwk.ns.health.ca)

# **Obstetrical Patient**

## **Indications for AMT Activation**

### **Consider AMT in cases when:**

- **Pre-term labour with a gestational age that cannot safely be managed in the referring hospital.**
- **Known fetal anomaly (ies) and active labour at any gestation; i.e. fetal cardiac anomaly, respirology or surgical emergency shortly after birth, intubation, need for prostin, balloon septostomy**
- **Severe PIH; HELLP Syndrome**
- **Antenatal bleeding**
- **Cervical incompetence requiring a “rescue cerclage”.**
- **Severe maternal illness due to pre-existing condition**
- **Any pregnant women requiring rapid transport and when out of hospital time must be minimized in the referring physicians’ opinion.**

**This list is not all-inclusive and provides only general guidelines. Feel free to consult with the EHS LifeFlight Obstetrical MCP about potential air transport patients by calling the EHS LifeFlight AMT and Trauma Line at 1-800 743-1334.**

# **Obstetrical Patient Preflight Preparation for AMT**

## **Criteria for Transport**

### **a) Preterm Labour:**

It may not be suitable to transport some women in pre-term labour who are at increased risk to deliver in flight. The decision depends on the reason for transport, the gestational age (viability), the parity, the labour pattern, and the cervical findings. The decision can only be made in consultation with the Obstetrical MCP.

- Indomethacin is the tocolytic of choice: 100 mg pr, prior to transport.
- If indicated; the initial dose of steroid prophylaxes for improving fetal lung maturity may be given prior to transport.

b) **Pre-Eclampsia:**

**Magnesium Sulfate** – should be started prior to transport and following consultation with the obstetrical MCP.

- 4 grams IV bolus (40 gms per litre of Ringers Lactate) 100 cc's over 20 minutes with a maintenance dose of 2 gms per hour.
- Foley catheter should be insitu during MgSO<sub>4</sub> therapy.

### c) Antepartum Hemorrhage :

Women who have antepartum bleeding, and are now stable, are suitable candidates for transport.

- A blood transfusion may be required prior to transport, therefore packed red blood cells may be requested for transport (if available).

### Transport Preparation

- #18 Gauge IV with Ringer's Lactate infusing.
- Recent set of V/S and tracing of the fetal heart rate (if available).
- Recent Lab work
- Medications:
  - **Gravol 25 mg IV approx. 1 hr prior to transport.**
  - **Steroids, MgSO<sub>4</sub>, Indomethacin, etc... as discussed with obstetrical MCP.**
- **Foley catheter; all patients on MgSO<sub>4</sub> or as discussed with obstetrical MCP.**

➤ **The Transport Team Will Require The Following:**

- A brief transfer note from the attending physician (if possible)
- Photocopy of patient's chart including pre-natal record, maternal history, lab work, ultrasounds, etc.

A family member may request to accompany the patient during transport.

Due to the limitations within the aircraft, this is not possible for obstetrical transport.

Please discuss this issue or any other concerns with the  
AMC.

# Scene Response Briefing

EHS Nova Scotia began its scene response program in 1998, responding directly to or near-by the scene. Scene response is a province wide initiative where by all prehospital emergency personnel have had the opportunity to take a 4 ½ hour certification course. Safety, teamwork and proper utilization of EHS LifeFlight are the focus points of this course. The goal of this program is to provide patients with a quicker time to definitive care, for major time-dependant injuries associated with trauma. In keeping with the “golden hour” philosophy, the definitive treatment for trauma is the operating room.

However, most medical, non-surgical scenarios, as previously described in this manual, can often be treated by the local hospitals and do not require AMT. If a patient does require air transport for a medical / cardiac / non trauma condition, we would prefer this decision be left to the hospital’s discretion, where the medical expertise is higher. The only time that EHS LifeFlight will respond to an out-of-hospital acute medical / cardiac condition is in the **remote** setting as described further on.

**Indications for EHSNS Paramedics to “Launch” EHS LifeFlight to the scene for “Trauma” patients:**

“EHSNS Paramedics should launch EHS LifeFlight if the patient is a victim of penetrating and/or blunt trauma, with one or more of the following indications present and if it will take longer than 30 minutes (from the time that they arrive on the scene, including extrication and drive time) to transport the patient to a District or Tertiary Trauma Center. If it will take less than 30 minutes, the ground Paramedics will notify the EHS LifeFlight MCP of the situation and patient condition. The EHS LifeFlight MCP will be call conferenced to the District Trauma Center Emergency Room Physician to see if they would like EHS LifeFlight launched to their facility.

◇ **Anatomic Criteria:**

- ◆ Amputation proximal to elbows or knees
- ◆ Two or more suspected long bone fractures
- ◆ Suspected spinal cord injury
- ◆ Severe facial injuries with possible airway compromise
- ◆ Burns greater than 15% Body Surface Area (2°, 3°, chemical or inhalation)
- ◆ Paediatric Trauma Score  $\leq 8$

◇ **Physiologic Criteria:**

- ◆ Glasgow Coma Scale  $\leq 12$
- ◆ Respiratory rate  $< 10$  or  $> 29$  breaths per minute
- ◆ Shock, or significant hypotension (BP  $< 90$  mmHg systolic)

◇ **Logistical Criteria:**

- ◆ Simultaneous occurrence of three or more trauma patients, and/or local resources are overwhelmed with victims

◇ **Mechanism Criteria:**

- ◆ Gunshot wound proximal to elbows or knees
- ◆ Any significant penetrating wound to the head, neck, chest, abdomen or groin

◇ **Other:**

- ◆ Paramedic Judgement

Once the need for EHS LifeFlight has been established via the criteria listed above, the EHSNS Paramedics at the scene must contact EHSNS Communications Center to “Launch” EHS LifeFlight. The Paramedics will then be call-conferenced with the EHS LifeFlight Medical Control Physician, providing them with the following information:

- Patient age, pertinent medical findings, mechanism of injury, and current vitals;
- Pertinent past medical history; and,
- Treatment given thus far and response.

**The EHS LifeFlight MCP has the final say whether the EHS LifeFlight crew shall continue with the mission or abort. The EHS LifeFlight MCP will advise the Paramedics at the scene on how to proceed with patient care and pre-flight patient preparation. They are also able to provide “Patch Orders” as per EHSNS provincial protocols if needed.**

For daylight hours scene response, the EHS LifeFlight MCP will direct the Paramedics on the scene to either: 1) Stay at the scene and await EHS LifeFlight’s arrival; 2) Proceed to the closest pre-designated landing zone (LZ) and meet EHS LifeFlight there; or, 3) Proceed to the closest hospital and EHS LifeFlight will meet you there. The EHS LifeFlight MCP will make this decision based upon the scene logistics, patient condition, the distance to the closest hospital, in conjunction with input from EHS Dispatch / Communications Centre. If the MCP chooses to have EHS LifeFlight meet the patient at the closest hospital, they will alert the hospital of the helicopter’s pending arrival and patient condition.

For night-time hours, the EHS LifeFlight MCP will direct the Paramedics on the scene to: 1) Proceed to the closest pre-designated LZ and meet EHS LifeFlight there; or, 2) Proceed to the closest hospital and EHS LifeFlight will meet you there. The EHS LifeFlight MCP will make this decision based upon the scene logistics, patient condition, the distance to the closest hospital, as before. If the MCP chooses to have EHS LifeFlight meet the patient at the closest hospital, they will alert the hospital of the helicopter’s pending arrival and patient condition.

**EHS LifeFlight will not land at the scene at nighttime, as the aviation risk factors of such a response are extremely high.**

In Nova Scotia the average time for emergency crews to respond to the scene is approx. 15 minutes. The average on-scene time for the Paramedics (if the patient is not trapped) is 15 minutes. Obviously, if the patient is trapped, this on-scene time will be lengthened proportionately. The average response to the closest hospital is another 15 minutes. If EHS LifeFlight is put on standby as the crews are responding to the scene and the Paramedic launches EHS LifeFlight immediately after their primary assessment, the response time by EHS LifeFlight can be minimized.

The further out that EHS LifeFlight travels from our base, the harder it is to justify the ground Paramedics to stay at the scene and await EHS LifeFlight arrival, unless the patient is trapped. But with this early launch for life threatening traumatic injuries, EHS LifeFlight can often arrive at the closest hospital at the same time or shortly after the arrival of the patient. This will help to ensure that if the patient requires treatment at a larger regional centre or at a tertiary care centre, the time from the incident to the OR can be drastically reduced. If, upon the patient’s arrival, the attending physician deems that the patient’s condition is such that they will not require treatment at a higher level of care, they can inform EHS LifeFlight that they will not be required.

## Remote Medical/Trauma Scene Response

In the **remote** setting, quick access to the patient by EHSNS ground Paramedics may not always be possible, such as at a hunting or fishing camp. In this case EHS LifeFlight can justify responding to the scene for serious trauma injuries as well as acute life-threatening medical illness. Ground personnel should consider EHS LifeFlight if the patient is in a remote/isolated area where access/extrication is difficult or impossible by ambulance. If the “Remote” patient presents with a significant traumatic injury or an acute medical condition, EMS should contact EHS LifeFlight via EHSNS Communication Center as soon as possible. The agency with the highest medical training at the scene may request EHS LifeFlight to launch, but they will be call-conferenced with the EHS LifeFlight MCP first. The on-scene personnel will provide the scene specifics and patient findings.

**The EHS LifeFlight MCP will decide if EHS LifeFlight will be launched.**

## **Tips For Preparing the Critically Ill or Injured Patient for Flight**

*The time you spend preparing the patient will expedite AMT.*

### **Airway Tips**

**It is better to intubate a patient who might lose their ability to protect their own airway in a controlled setting than to have to intervene in transport in a less controlled environment.**

- ◆ Have backup plans for difficult intubations (Bougie, LMA, Combitube, Lightwand, etc).
- ◆ Confirm tube placement and positioning via ETCO<sub>2</sub>, Sats, and X-Ray.
- ◆ Document cm at the lip
- ◆ Double secure ETT
- ◆ Place air in the ETT cuff vs water
- ◆ Do not cut ETT especially with burns

## Breathing / Ventilation Tips

- ◆ Ventilate with constant ETCO<sub>2</sub>, ECG & Sat monitoring
- ◆ Adequate paralysis / sedation can improve ventilation
- ◆ Monitor for changes in patient condition such as pneumothorax
- ◆ Full circumferential burns of the chest may require an escharotomy in consultation with the AMT MCP

## Circulation Tips

- ◆ Aim to restore adequate BP, HR and Sats
- ◆ Use blood products if no response to aggressive crystalloid resuscitation
- ◆ Be aware of hypothermia: warm blood, fluids, blankets, etc.
- ◆ Use “Parkland Formula” (2-4cc x kg x % BSA) as a guide for fluid resuscitation of burns
  - 50% given over first 8 hrs\***
  - 50% given over next 16 hrs\***
  - \*from the time of burn injury**
- ◆ Consider inotropic support after adequate fluid and blood product resuscitation
- ◆ Document fluid intake and output

## Spinal Immobilization Tips

- ◆ All trauma patients should be fully immobilized
- ◆ Fully restrain patients so you can easily log roll them in case of vomiting
- ◆ Fully restrain obstetric trauma patients to allow the patient to be transported in the left lateral recumbent position

## Splinting & Dressing Tips

- ◆ For femur fractures: use short style traction splints – no weights
- ◆ New casts must be bivalved for AMT
- ◆ Burn dressings must be sterile and dry
- ◆ Outline hematomas with a pen if clotting factors are abnormal

## **Tube Tips**

- ◆ Double secure all tubes
- ◆ Securely tape all connections between hoses
- ◆ Place a Foley drainage bag on most tubes collecting fluids
- ◆ Place a Heimlich valve on all chest tubes relieving air
- ◆ Do not cut ET tubes
- ◆ Secure tubes to prevent them from being kinked

## **Line Tips**

- ◆ Double secure all lines
- ◆ Use extension sets if possible
- ◆ Label and number IV lines with solution/drug type
- ◆ Move roller clamp up towards bag
- ◆ Do not cover the IV site or injection port
- ◆ Use arm boards (when necessary) to keep IV site patent

## **Sedation / Analgesia Tips**

- ◆ Provide basic pain control measures to trauma patients
- ◆ Treat pain syndromes in all patients
- ◆ If patient is combative, suspect hypoxemia and / or head injury vs. ETOH alone

## **Early activation is crucial – Call immediately**

**Remember that these are only guidelines**

**Refer to the appropriate section of this manual for specifics regarding patient ages, illness or injuries.**

**Contact the AMT MCP for specific patient treatment inquiries and suggestions on how best to prepare the patient for transport: 1-800 743-1334**

## EHS Nova Scotia Trauma Program



### Background – Why a Trauma Program?

Injury is the leading cause of death for Canadians between 1 and 44 years of age. The human toll of trauma is incalculable, changing the lives of Nova Scotians each and every day. In addition, the economic consequences of trauma also place an enormous burden on society. Some injury facts:

- It costs over 15 billion dollars per year to care for Canada's injured (400 million dollars in Nova Scotia).
- Across Canada, injury results in the consumption of over 2.2 million acute care hospital days each year (55,000 inpatient hospital days in Nova Scotia)
- 6000 Nova Scotians are admitted to hospital each year as a result of injury, and thousands more are treated in emergency departments.

- Injuries result in more potential life years lost than any other disease.
- Injuries **ARE NOT ACCIDENTS!** 95% of injuries are predictable and preventable.

### Trauma Systems

Research has clearly demonstrated that a well designed trauma system will significantly reduce the occurrence of injury, and decrease morbidity and mortality. A trauma system, broadly defined, enhances community health through an organized system of injury prevention, research, acute care, and rehabilitation. This type of trauma system is known as an inclusive trauma care system. Inclusive trauma systems are comprehensive -- all aspects of trauma care and injury control exist within the system. A true inclusive trauma system recognizes the full spectrum of injury as a disease epidemic and does not focus solely on the most seriously injured patient.

Having said the above, the Trauma Section of this Manual specifically relates to the acutely injured patient, stressing the need for Nova Scotia's health care team to follow an organized approach to the identification, treatment, and rapid transport of major trauma patients. In Nova Scotia where trauma is most likely to occur in a rural setting, the non-tertiary hospitals play a vital role in the trauma system. In recognition of this, the Nova Scotia Trauma Program

has developed the Trauma Indications and Procedures located in this Manual.

## **What is the Nova Scotia Trauma Program?**

Officially launched by EHS in 1997, the Nova Scotia Trauma Program facilitates optimal trauma care and injury control through leadership in prevention, education, research and system development. Some examples of what we do include:

- The designation and accreditation of trauma centres (Tertiary & District Trauma Centres)
- Coordination of the Advanced Trauma Life Support Program; Telemedicine Education Sessions; trauma simulation courses, in conjunction with the Atlantic Health Training & Simulation Centre; custom designed lectures and self-study modules.
- Injury Prevention Programming and Trauma Research.
- Management of the Nova Scotia Trauma Registry – a system for trauma data collection and analysis. This information is used for quality improvement, research, and injury surveillance.
- Establishment of the Nova Scotia Trauma Advisory Council – a multidisciplinary group whose role is to provide input and advice to the ongoing development and improvement of Nova Scotia's trauma system. Included in the

membership of the Advisory Council are representatives from each of the District Health Authorities.

## **How to Reach Us:**

**Medical Director:** (902) 473-3710  
**Trauma Program Manager:** (902) 473-1423  
**Secretary:** (902) 473-7157  
**Educator/ATLS Coordinator:** (902) 473-3778  
**Trauma Registrar:** (902) 473-5949 or toll free  
1-877-900-7132  
**Facsimile:** (902) 473-5835  
**E-mail:** emsem@qe2-hsc.ns.ca  
**Web site:** [www.gov.ns.ca/health/ehs](http://www.gov.ns.ca/health/ehs)

### **Mailing Address:**

**Nova Scotia Trauma Program**  
Room 1-026B  
Centennial Building  
QEII Health Sciences Centre  
1276 South Park Street  
Halifax NS B3H 2Y9

# **NOVA SCOTIA TRAUMA PROGRAM – INDICATIONS**

## **INDICATIONS FOR MAJOR TRAUMA TRANSPORT TO TERTIARY CARE**

*For universal access to ground  
and AMT: 1-800-743-1334*

### **GENERAL PRINCIPLES:**

1. Appropriate emergency interventions and expeditious transport to a trauma centre is associated with a better outcome for major trauma patients.
2. Perform only those diagnostic studies and therapies that influence immediate patient management before transport.
3. Early communication with the tertiary care trauma team leader and preparation for transport leads to decreased time to definitive care, which is associated with improved outcome.
4. Each hospital in Nova Scotia has different capabilities, resources, and personnel available for the resuscitation and treatment of major trauma. The following indications for tertiary trauma transport are guidelines only and should be individualized to specific institutions.
5. The above noted 1-800 number will give the sending institution universal access to **ground & AMT**; MCPs for AMT (AMT) and trauma team leader advice and consultation for Nova Scotia's two tertiary care hospitals is also via this number: **1-800-743-1334**.

# **GENERAL CATEGORIES of MAJOR TRAUMA PATIENTS WHO MAY be CANDIDATES for TERTIARY CARE TRANSPORT:**

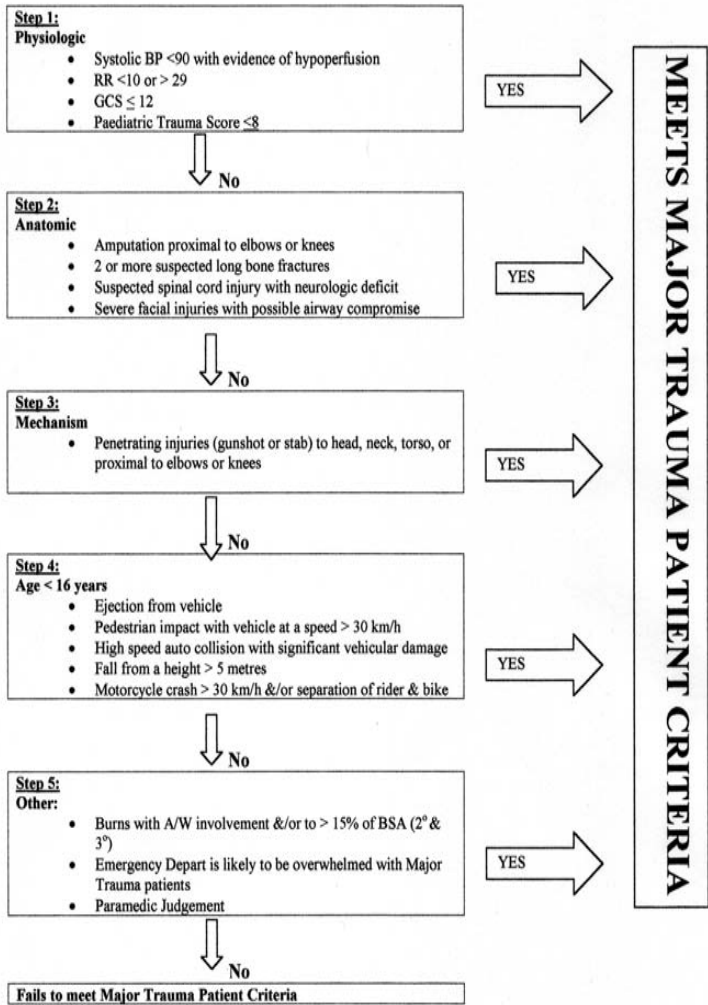
1. Major/moderate head injury (see Trauma - Procedure for specific head injury guidelines).
2. Major pelvic injury.
3. Major burns (>15% BSA).
4. Spinal cord injuries or complex cervical thoracic or lumbar spine injuries.
5. Major traumatic vascular injuries.
6. Complicated facial fractures and injuries.
7. Local resources overwhelmed by three or more trauma patients at one time.
8. Trauma in pregnancy.

These guidelines represent general criteria and not specific clinical syndromes. Again, the resources of your hospital must be individually evaluated for each trauma case before transport decisions are made.

The guidelines were developed to facilitate the rapid assessment, resuscitation, stabilization and transfer of the major trauma patient to tertiary care within Nova Scotia and may not apply to all situations.

Remember that critical care transport and trauma advice is available 24 hours per day/7 days per week at **1-800-743-1334** through the provincial communications and dispatch centre.

**Criteria for the Determination of a Major Trauma Patient**



**CRITICAL CARE TRANSPORT &  
TRAUMA ADVICE is  
AVAILABLE**

**24 HOURS / DAY / 7 DAYS / WEEK**

**AT**

**1-800-743-1334**

**THROUGH the PROVINCIAL  
COMMUNICATIONS and  
DISPATCH CENTRE**

# NOVA SCOTIA TRAUMA PROGRAM – PROCEDURE

## TRAUMA RESUSCITATION and PREPARATION for TRANSPORT:

### **Guidelines for Trauma Resuscitation:**

The basic principles of trauma resuscitation including airway, breathing and circulation (A, B, Cs) apply to every trauma case.

- a.) **Airway/Breathing:** Early endotracheal intubation is indicated in all trauma patients if there are concerns about (a) airway compromise (facial trauma, inhalation injury); (b) inadequate oxygenation or ventilation; (c) severe brain injury with a Glasgow coma Scale of  $<$  or  $=$  8, or if there are concerns with the patient's ability to protect their airway in transport.
- b.) **Circulation/Resuscitation:** Maintaining adequate organ perfusion is a basic component of trauma resuscitation. In the adult patient, use warmed normal saline with up to two litres in the initial resuscitative phase of the hypotensive patient. If the patient remains hypotensive, transfuse packed red blood cells. In the Paediatric patient use warmed normal saline at 20cc/kg & a second bolus may be given. If the patient remains hypotensive, transfuse 10 cc/kg of PR packed red blood cells and repeat, as needed including repeated boluses of saline at 20 cc/kg. Avoid hypothermia. If less than 6 years of age consider intraosseous access if venous access impossible.
- c.) Do only necessary **imaging/laboratory** studies before transport. If the decision has been made to transport a major trauma patient early in resuscitation, the only essential imaging modality recommended is a chest x-

ray. Optional x-rays include a cervical spine lateral x-ray and AP of the pelvis & a laboratory hemoglobin value. In a critically ill trauma patient CT scanning should only be performed if the therapeutic interventions needed to treat that patient as a result of the CT scan are available locally. Extremity radiographs play no immediate role in the resuscitation of the unstable major trauma patient prior to transport.

### **General Interventions in the Major Trauma patient Prior to Transport:**

1. Early endotracheal intubation and maintenance of adequate oxygenation/ventilation.
2. Inserting chest tubes in patients with pneumothorax /or hemothorax.
3. Secure 2 large bore IV lines and use warmed normal saline whenever possible.
4. Application of direct pressure to all sites of external bleeding.
5. Immobilize spine with rigid cervical collar and spinal board.
6. Immobilize suspected extremity fractures and check pulses.
7. Stabilize suspected unstable pelvic fractures with a bed sheet tightly wrapped around the pelvis (Pelvic MAST component can be used).
8. Apply dry dressings to burns and not wet dressings.
9. Insert a Foley catheter and gastric tube (especially in children) in all severely injured patients without contraindications.
10. Rapidly suture and control bleeding from scalp lacerations.

### **Common Pitfalls in Major Trauma Patients:**

1. Delaying patient transfer to obtain diagnostic studies that will not alter immediate patient management.
2. Failure to perform early and controlled endotracheal intubation.
3. Failure to recognize, and aggressively treat, hemorrhagic shock.
4. Failure to insert chest tube in patients with significant pneumothorax and/or hemothorax prior to transport.
5. Failure to control active bleeding sites, especially in the scalp.
6. Failure to recognize, stabilize and rapidly transport patients with unstable pelvic fractures.
7. Failure to anticipate, recognize and treat hypothermia in the trauma patient.
8. Failure to sedate patients receiving paralytic agents and failure to give analgesia (fentanyl - 0.5 – 1.0 mg/kg) in the trauma patient.

### **Specific Head Injury Guidelines:**

Within the province of Nova Scotia, advanced, tertiary-based neurosurgical care is available only in Halifax and thus the early transfer of seriously head-injured patients is of paramount importance after initial resuscitation. The following guidelines and criteria are meant to assist in this process.

1. Hypoxemia and hypotension independently double mortality in head injury.
2. Always protect/immobilize c-spine in trauma patients.
3. Use Glasgow Coma Scale to classify head injury and to assist in clinical decisions.
4. Mild head injury: GCS: 13-15.
5. Moderate head injury: GCS: 9-12.
6. Major head injury: GCS: 3-8
7. Use pupillary response, gross sensory/motor function and reflexes to assess neuro-status after GCS.
8. Moderate and Major head injuries are best treated in a tertiary care neurosurgical setting.
9. Never ascribe an altered level of consciousness solely to ethanol in a traumatized patient with a head injury.
10. Mannitol, hyperventilation and steroids (for spinal cord injury) should be used only after consultation with the provincial trauma team leader and/or receiving neurosurgeon.
11. The decision to CT a trauma patient's head at a facility without neurosurgical interventions should be rare; the CT scanner is a poor place for an unstable trauma patient and information gained will often delay transfer to tertiary care. Stable patients with mild head injury (GCS 13 to 15) may be imaged (CT) to assist in clinical decision making.

*EHS LifeFlight*



**AMT Indications  
& Preflight Patient Preparation Guidelines**

*EHS Trauma Program*

**Major Trauma Transport Indications &  
Trauma Resuscitations Guidelines**

**1-800-743-1334**



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**AMT Indications  
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*EHS Trauma Program*

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