



Air Ambulance Program



Medical Control Protocols & Procedures for Primary Care Paramedics

Effective October 2020



Advanced Medical Solutions Inc.

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STANDARD OPERATING PROCEDURE

TITLE:	Consulting with Most Responsible Physician		
OWNER:	AMS Medical Director	CREATION DATE:	March 06 2015
APPROVER:	VP Medical Operations	REVISION NO.:	
DOCUMENT NO.:	SOP-OPS-2015/02-r01	REVISION DATE:	March 06 2015

PURPOSE:

To describe when consultation between the air medical crew and the Most Responsible Physician (MRP) should occur to facilitate collaborative client centered care.

SCOPE:

This SOP applies to all Air Medical Crew (AMC), Operations Managers and the AMS Medical Director.

PROCEDURES:

ACCESS Air Ambulance encourages collaborative patient management between AMC and MRP to plan and coordinate a plan of care. The Most Responsible Practitioner (MRP) is considered the healthcare provider who is most responsible for treatment at a given time. During a transport this is a shared model with the receiving physician, the medevac medical director, the sending physician and the sending physician or nurse. As a general rule the physician from the facility with the higher level of care or specialization will assume this role.

1. Prior to departure from base AMC will consult with the MRP to coordinate a plan of care in the following situations:
 - a) Pre-Arrival Orders for the sending nursing station are required.
 - b) Any time the air medical crew feels consultation pre-flight would benefit the patient.



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STANDARD OPERATING PROCEDURE

2. Before Departing the Sending Facility, the AMC will consult with the MRP before initiation of treatment other than routine care (AMS Protocol: AMS Protocols: Analgesia, Anxiolysis, Allergic Reaction and Nausea & Vomiting)
3. Inflight treatment that is required other than routine care and not covered by previously issued orders or mutual plan of care shall require consultation with an MRP via satellite phone.
4. If consensus related to appropriate plan of care cannot be obtained between the MRP and AMC, discussion with AMS Medical Director (or designate) should be initiated.
5. AMC may perform immediate lifesaving interventions within the AMS medical control guidelines before consulting the MRP in emergency situations only. The MRP will be consulted as soon as possible.
6. The MRP will be consulted as soon as possible if emergency procedures are performed and an incident report completed.

The following four protocols may be utilized **without any consultation with a Physician**. It is expected that the PCP will make every effort to request sending facility staff administer any required symptom relief medications to the patient as prescribed prior to departure from the sending facility. The following protocols are intended to treat unexpected or sudden onset of signs and symptoms during the out of hospital patient transfer.

1. Analgesia
2. Anxiolysis
3. Allergic Reaction
4. Nausea & Vomiting

REQUIRED DOCUMENTS:

REFERENCES:

- M1500--- Medical travel--- Most responsible Physician in a Medevac Situation

AMS / ACCESS ANALGESIA PROTOCOL

This protocol may be utilized by the Air Medical Crew without consultation with a Physician

PCP Standard Approach and Ongoing Assessment

Oxygen therapy - only indicated to maintain SpO2 greater than 94%

Ensure proper patient positioning and consider repositioning to ensure comfort
Search for and treat possible causes
Provide support / Splinting prn / Rest / Cold pack / Elevation prn
Monitor SpO2, ECG, EtCO2 (Respiratory Rate), NIBP

Request that the sending facility staff administer analgesia to the patient as prescribed at the time of departure from the sending facility

PCP For minor pain consider:
acetaminophen 500-1000mg PO q 4 hours prn
(patient must be able to safely swallow)

Has the patient received Analgesics prior to transfer

No

PCP **ketamine** 0.5 mg/kg (IBW) IN q30 minutes prn** to a maximum of 1mL in each nostril / dose

Yes

PCP **fentaNYL* 1 mcg/kg (IBW) IN q 30 minutes prn** to a maximum of 1mL in each nostril / dose

Consider initiating peripheral vascular access

PCP If systolic blood pressure <90 and / or heart rate is >110 consider:
Crystalloid Solution 10mL/kg IV bolus to a single maximum dose of 500mL q30 minutes prn to a total maximum of 20mL/kg

Transport with early pre-notification
Continue treatment until transfer of care completed

AMS PROTOCOL Analgesia

Patient Safety Considerations

- For geriatrics (65 years or older)
- Maximum dosages for fentaNYL and ketamine remain the same; however consider reducing individual doses by half. Consider biological versus chronological age
- Dosing of all analgesics is based on Ideal Body Weight (IBW)

*fentaNYL administration:

- Patient must be rousable to be able to administer and / or continue administration of fentaNYL
- Patient must have a GCS of >13
- Patient must have a respiratory rate >10
- Patient must have a systolic blood pressure of >90mmHg

**Ketamine administration:

- avoid the use of ketamine in a patient who has a heart rate >130 and SBP >170 due to catecholamine release

Patient complains of Nausea or Vomiting

Refer to Nausea and Vomiting Protocol

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Analgesia Protocol Notes

Etiology

Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage. Nociception, the physiologic process of pain perception, is composed of four stages:

1. Transduction – process by which noxious stimuli are transmitted into electrical signals at the sensory nerve endings and transmitted to the spinal cord
2. Transmission – propagation of the impulse through the sensory nervous system to the spinal cord
3. Modulation – alteration of the information by endogenous mechanisms
 - a. Prostaglandins – enhance the sensitivity of free nerve endings (increase pain)
 - b. Gating – stimulation of neurons can inhibit other neuronal sensation (e.g., TENS, acupuncture, rubbing an area – decrease pain)
 - c. Endorphins, enkephalins, and dynorphin – 3 subtypes of endogenous opioids that reduce the nociceptive response (decrease pain)
 - d. Windup – the longer a painful stimulus persists, the more nerve fibres are recruited (increase pain)
4. Perception – reflects the sensory stimulation on the existing psychological framework
 - a. Emotional and physical experience of pain
 - b. Often influenced by prior pain experiences, race, gender, age, culture, and cognitive state

Two different types of nerve fibres transmit two different types of pain:

1. A-delta fibres
 - a. Sensation of well localized, sharp, stabbing pain
 - b. Covered with myelin and transmit impulses at a rapid rate
 - c. Higher threshold for firing, but once activated, dramatically increase their firing rate as the stimulus intensity increases
 - d. Activated by thermal and mechanical stimuli
 - e. Localization is much more accurate because of the simultaneous activation of both tactile and pain receptors
2. C fibres
 - a. Sensation of dull, aching, burning, and poorly localized pain
 - b. Slower onset of activation, but the pain sensation is often more intense
 - c. Activated by the release of chemicals that occurs with tissue damage
 - d. Often associated with visceral pain
 - e. Localization is poor as the fibres have multiple areas of synapse in the brain

Pain management in specific situations can contribute significantly to the patient's perception of the quality of care and treatment delivered by practitioners

Insufficient pain management is a problem common in both prehospital and in-hospital settings; frequent reassessment and repeat administration of medications is an essential component of pain management

Interventions

1. This protocol is not intended to be used to treat cardiac origin chest pain
2. Document the patient's baseline perception of pain using the pain scale, as well as on an ongoing basis following each administration of medication
3. Monitor SpO₂ and EtCO₂ with the administration of analgesics to record the patient's ventilatory status remember that the EtCO₂ value and waveform will alert you to respiratory changes before the SpO₂ changes

Pharmacology

1. Geriatric patients (age 65 years or older) are more sensitive to medications; consider adjusting dosing as follows:
 - a. Reduce single dosage by half
 - b. Repeat times and maximum totals remain the same as for other ages
 - c. Consider biological versus chronological age
2. If narcotic induced nausea/vomiting occurs treat concurrently with Adult Nausea and Vomiting protocol
3. Side effects of Ketamine include: Hallucinations, mood changes, Dizziness, Nausea and a Feeling of Unreality. These are normal side effects and the patient should be calmed and re-assured. Discontinue use of Ketamine if the patient is experiencing serious side effects.

Patient Experience Considerations

Not all patients will react, manage pain, ask for or accept analgesia in the same way. Fear of addiction, concerns about side effects, lack of knowledge, culture and beliefs that 'good patients' do not complain about pain are often barriers to successfully managing your patient's pain. The practitioner's primary role is to offer and provide strategies for pain management.

AMS / ACCESS ANXIOLYSIS PROTOCOL

This protocol may be utilized by the Air Medical Crew without consultation with a Physician

EMR
PCP
ACP

Standard Approach and Ongoing Assessment

AMS PROTOCOL ANXIETY

Patient is aggressive
or is suffering from a
behavioural emergency*

Yes

Refer to Adult
Combative
Behaviour
Protocol

Contact your
Operations
Manager

Patient Safety Considerations

Consider and treat other causes of anxiety such as:

- hypoxia
- hypoglycemia
- hypotension
- pain

*Behavioural Emergency

- Any patient who is showing signs of aggression or has voiced a plan to harm themselves or others
- A patient who is voicing suicidal ideation
- A patient who is refusing to be transferred and/or has been placed under a Form 1 under that mental health act for transfer

No

Are there any absolute contraindications to the administration of Anxiolytics?**

No

If patient is complaining of chest discomfort and / or shortness of breath, obtain 12 lead ECG and oxygen saturation

12 Lead is positive for STEMI or pain is suspicious for ACS?

Yes

Refer to Acute
Coronary
Syndrome
Protocol

**Absolute Contraindications

- Do not administer an anxiolytic if:
- patient has received an intravenous or intranasal dose of an opioid within 1 hour
 - patient has received dimenhydrinate within the last 4 hours
 - patient has an altered level of consciousness or is unable to swallow or manage their own airway secretions

No

Request that the sending facility staff administer anxiolytics to the patient as prescribed at the time of departure from the sending facility

PCP
ACP

LORazepam 1mg SL q30 minutes prn to a total maximum of 2mg

PCP
ACP

Consider establishing vascular access
Consider monitoring 4-lead ECG

Transport with early pre-notification
Continue treatment until transfer of care completed

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Anxiety Protocol Notes

Etiology

Acute anxiety and other disorders can be caused by other medical conditions (e.g. acute coronary syndrome, hypoxia, trauma). Obtain a thorough history, search for and treat possible causes.

Patient Safety Considerations

- **Prior to administration of sedation, access to airway equipment must be prepared and available for immediate use**
- **Consider dose reduction of all sedative medications in compensated shock states and patients over 75 years old**

Interventions

Assessment

- Anxiety is a diagnosis of exclusion only
- An unremarkable 12-lead ECG does not rule out cardiac causes of anxiety

Supportive Care

1. Provide a calm, quiet, and well-lit environment if possible
2. Reassure the patient
3. Continually reassess for changes in condition
4. Monitor blood glucose levels
5. Monitor 4-lead ECG due to development of prolonged QT and cardiac arrhythmias

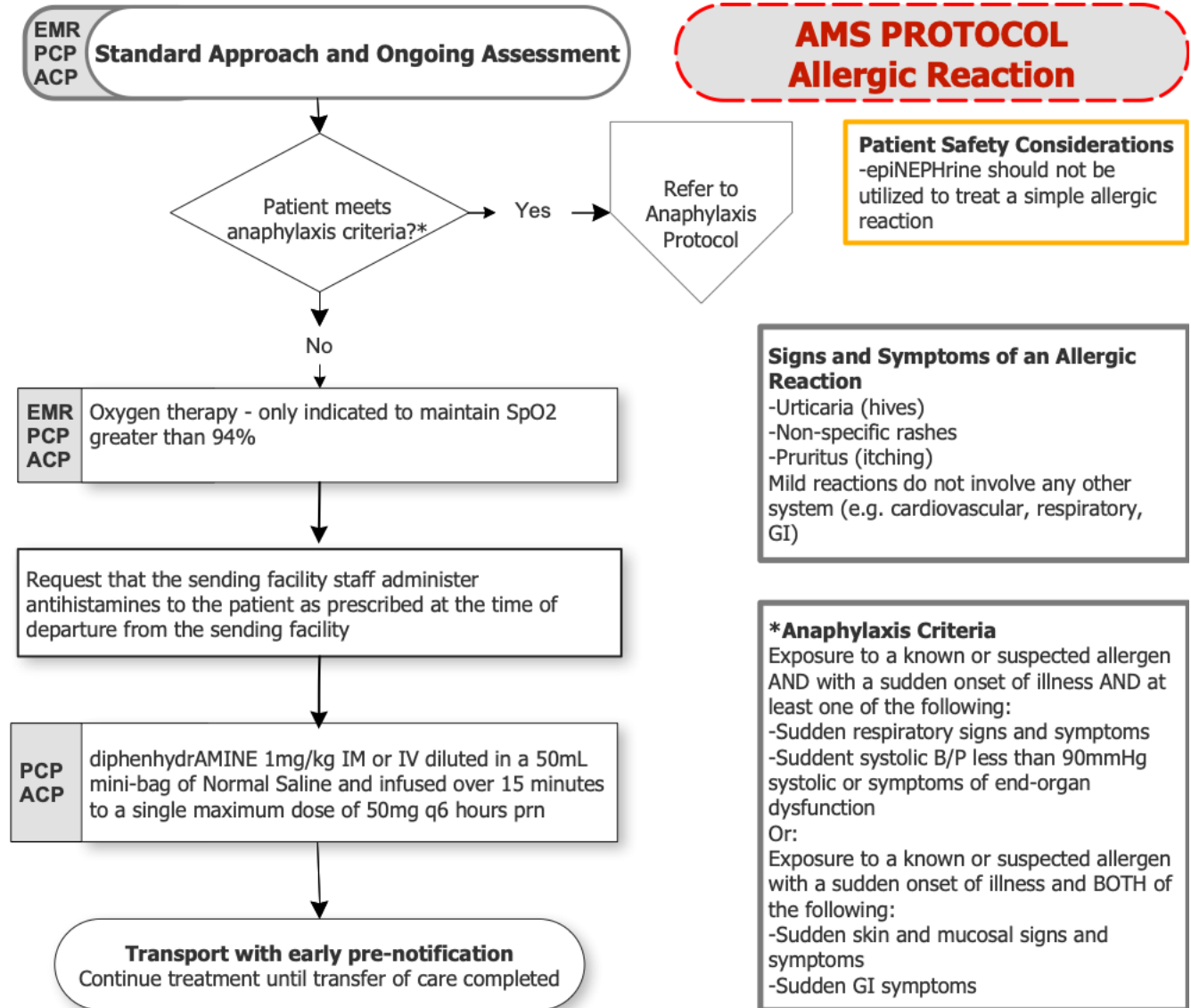
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AMS / ACCESS ALLERGIC REACTION PROTOCOL

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Allergic Reaction Protocol Notes

Etiology

Allergic reactions are an exaggerated response by the immune system to a foreign substance (allergen). The reaction may vary from mild to severe with variable rates of onset. Regardless of severity, these patients require vigilant observation and reassessment. Signs of an allergic reaction include:

1. Urticaria (hives, rash)
2. Pruritus (itchiness)
3. Mild discomfort

Mild reactions do not involve any other system (e.g. cardiovascular, respiratory, GI).

Anaphylaxis criteria include the following:

Exposure to a known or suspected allergen with a sudden onset of illness AND at least 1 of the following:

- Sudden respiratory signs and symptoms
- Sudden systolic BP less than 90 mmHg systolic or symptoms of end-organ dysfunction

Or

Exposure to a known or suspected allergen with a sudden onset of illness and both of the following:

- Sudden skin or mucosal signs and symptoms
- Sudden gastrointestinal symptoms

Interventions

1. Mild dermatologic manifestations usually only require removal of the allergen, if possible and antihistamine administration
2. Stingers should be removed by gently scraping the skin with the dull side of trauma shears to avoid squeezing more venom into the site
3. If the patient meets the anaphylaxis criteria, more aggressive therapy is required; immediately refer to the Adult Anaphylaxis Protocol

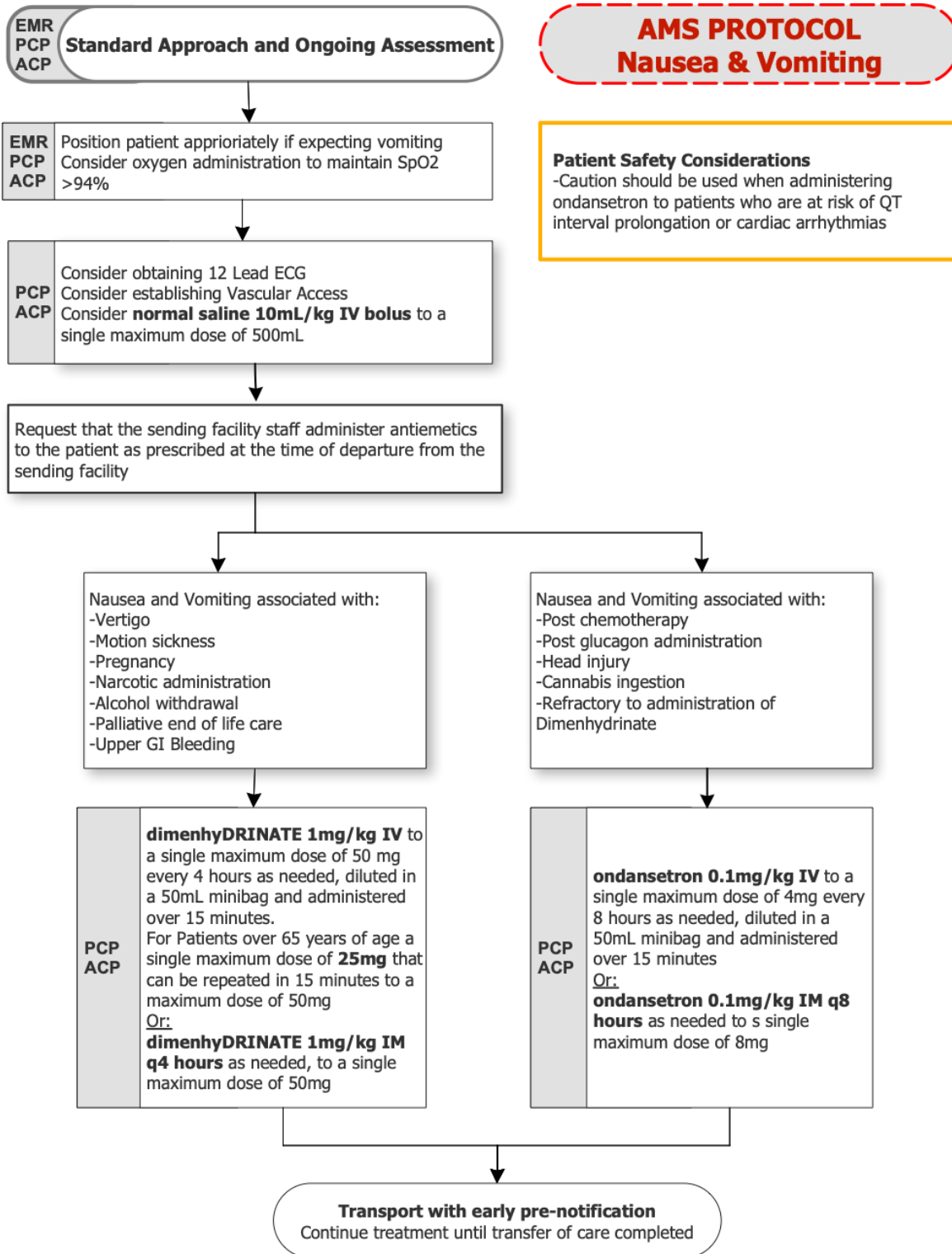
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AMS / ACCESS NAUSEA & VOMITING PROTOCOL

This protocol may be utilized by the Air Medical Crew without consultation with a Physician



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Nausea & Vomiting Protocol Notes

Etiology

Nausea and vomiting are not considered diseases but rather are symptoms of other illnesses. The causes of nausea and vomiting are diverse which makes identifying the probable cause essential in order to determine the most appropriate medication.

Vertigo

Vertigo is a perceived sensation of motion that is often described as spinning or whirling. It is often accompanied by sweating, pallor, nausea, vomiting, and imbalance issues. Vertigo is caused by many different factors including:

1. Impaired visual input, inner-ear function, or peripheral sensory input
2. Central nervous system impairments
3. Alcohol
4. Prescription drugs
5. Disease (e.g. Meniere's disease)

Pregnancy

Nausea can be a common issue during pregnancy, especially in the first trimester. Dimenhydrinate is considered to be the first-line medication of choice for these patients. Metoclopramide is an acceptable second-line option. These medications are considered to be safe and effective during pregnancy.

Some patients may have fear or anxiety regarding taking medications during pregnancy. It is important to discuss this with your patient, if possible, prior to administering any treatments, especially medications.

Opioid Induced Nausea and Vomiting

Due to the low incidence of opioid induced nausea, the lack of efficacy of prophylactic therapy and the possibility of additional side effects, opioids should not be accompanied by an antiemetic agent. Antiemetic therapy is only indicated if the patient develops nausea or vomiting after opioid use.

Alcohol Withdrawal

Patients experiencing alcohol withdrawal are at a higher risk of developing electrolyte abnormalities which can affect QT intervals. Dimenhydrinate is the first line antiemetic in this patient subset as it does not affect the QT interval and provides some sedation.

Head Injury

Patients suffering from head injuries can experience significant nausea and vomiting. Dimenhydrinate should be avoided in these patients due to the sedative effects. Use of ondansetron is preferred as it does not mask neurologic abnormalities while providing some symptom relief. Treatment of vomiting is important in these patients as vomiting can significantly increase intracranial pressures.

Post Chemotherapy

Patients receiving chemotherapy can experience a delayed onset of nausea and vomiting up to several hours after treatment.

Cannabinoid Hyperemesis Syndrome (CHS)

CHS is a condition associated with the use of marijuana, typically when used chronically, however, it has been observed with acute use as well. Typical symptoms include severe nausea, persistent vomiting that occurs in cyclical patterns and severe abdominal pain. Patients with CHS may report that hot showers or baths help to relieve their symptoms.

CHS can be difficult to diagnose in the field as patients may not admit to marijuana and the condition can mimic other pathologies such as Cyclical Vomiting Syndrome. Ondansetron is the first line treatment for CHS along with IV fluid administration if vomiting has been prolonged and/or the patient shows signs of dehydration and electrolyte imbalance. Practitioners can attempt other anti-emetic options if vomiting is refractory to ondansetron. Some case studies have demonstrated the use of benzodiazepines, such as lorazepam, or haloperidol to treat refractory CHS, however, there is a lack of empirical evidence to support this. In longer transports where vomiting is refractory to ondansetron, metoclopramide, and dimenhydrinate practitioners are encouraged to contact OLMC for further treatment options.

and

Interventions

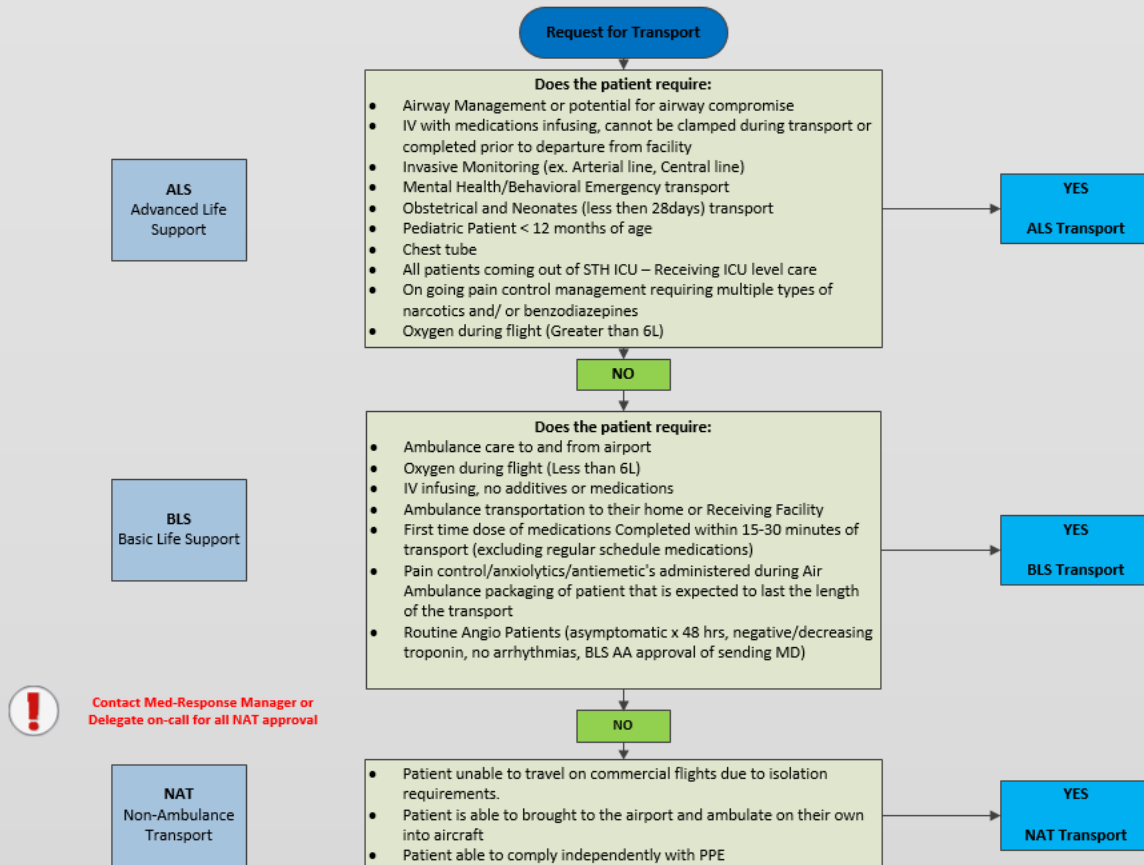
Use care when assisting the patient; make their movements slow and controlled as sudden movements of the head can increase vertigo and the associated nausea, vomiting, or imbalance.

Fluid Resuscitation

1. Administer fluid with caution in the following patient subsets:
 - a. Elderly
 - b. Patients with Congestive Heart Failure (CHF)
 - c. Head injuries

Utilization Policy and Procedure for Primary Care Medevac Team

MED RESPONSE FLOW CHART – BLS Medic Requirements/Non-Ambulance Transport



AMS / ACCESS AMENDMENT TO THE SPINAL INJURY PROTOCOL NOTES

AMS/ACCESS AMENDED SPINAL INJURY NOTES - ADENDUM

Spinal Motion Restriction Interventions

Vacuum Mattress

Approach to the treatment and transport of a patient requiring spinal motion restrictions:

1. Apply the C-Spine clearance protocol to the patient. If the c-spine cannot be cleared, provide Spinal Motion Restriction.
2. No patient shall ever be transported on a rigid immobilization device (spine board, backboard, scoop stretcher, KED, half backboard)
3. A rigid cervical should be placed on all patients requiring spinal motion restriction. If a cervical collar cannot be placed due to the patient's anatomy or an injury, then attempt to place a soft cervical collar on the patient.
4. Utilize the Vacuum Mattress for the transport of patients requiring Spinal Motion Restriction.
5. Slowly and safely move the patient onto the Vacuum Mattress (place a sheet or flannel beneath the patient). Consider placing an Edmonton AHS transfer sheet underneath the patient, between the Vacuum Mattress and the sheet or flannel, if planning to hand off the patient to a Ground Ambulance crew.
6. Before moving the patient from their hospital or EMS bed onto the #9 stretcher, deflate the Vacuum Mattress, making it rigid, and provide lateral head support.
7. Once the patient has been placed onto the #9 stretcher for transport, inflate the mattress, making it soft for transport, continue to provide lateral head support.
8. Upon arrival at your destination, deflate the Vacuum Mattress, making it rigid for movement of the patient onto the receiving facility stretcher.
9. Inflate the Vacuum Mattress and complete the transfer of the patient.

Death in the Field

If air ambulance personnel receive an expired client in the field, obtain as much history as possible and perform a primary survey. It would be inappropriate to initiate resuscitative attempts in patients who exhibit signs of obvious death. These signs include:

- Decapitation
- Decomposition
- Transection of the torso
- Incineration
- Rigor mortis
- Lividity

Notify the Most Responsible Physician or AMS Medical Director as soon as possible and do not disturb the body. Document the patient condition and your assessment on the patient report. Stay with the deceased until the coroner or designate relieves you or gives you instructions as to how to proceed. AMC will advise Med-Response and the pilots as soon as possible of the situation.

AMS
ADVANCED MEDICAL SOLUTIONS

Death on an Aircraft:

If the patient does not have a DNR order:

- Attempt resuscitation as per Medical Control Protocols
- If appropriate, go to the closest facility that can assist with ALS resuscitation or return to the sending facility to obtain assistance
- If no physician is on board the aircraft, have the pilots establish contact with the Most Responsible Physician or AMS Medical Director via satellite phone or radio
- Resuscitation will continue until the physician orders the resuscitation to stop as only a physician can pronounce death.
- All orders received from the physician will be repeated back to the physician for verification and documented on the physician order form.
- Document resuscitation on the patient report and time that resuscitation was stopped and who ordered resuscitation to cease.
- Record latitude and longitude at time of death.
- Do not remove any lines or tubes on patient.
- Have physician responsible for the patient notify coroner or designate of the death.
- Coroner or designate will meet the aircraft on arrival.
- Stay with body until relieved by coroner or designate.

If the patient has a DNR order:

- Obtain a copy of original DNR order before departing with the patient.
- Notify the physician responsible for the patient of the patient's death en-route.
- Document time of death and circumstances on the patient report form.
- Do not disturb the body.
- Stay with the body until relieved by the coroner or designate.

Air Ambulance Guidance and Procedures: MEDICAL EFFECTS OF ALTITUDE

Preflight assessments of all patients should include consideration for any potential problems arising from the effects of altitude on human physiology. Anticipate problems before they arise. A few extra minutes spent on the ground ensuring proper and safe preparation of a patient for air transport will enhance the safety of the flight and in return prevent the untoward development of additional problems.

The effects of altitude on the body's systems should always be considered during air transport. Remember that these effects can affect the flight team as well as the patient.

General symptoms include fatigue, insomnia, anorexia, thirst, drowsiness, altered mental status, and dehydration.

Cardiac/respiratory symptoms include chest pain, breathlessness or Cheyne-Stokes respirations, cyanosis, dysrhythmias, pulmonary edema, blood pressure alterations, and increases in heart and respiratory rates.

Musculoskeletal symptoms include weakness, stiffness and poor coordination.

Gastrointestinal symptoms include nausea, vomiting, diarrhea, abdominal cramps, indigestion and gas. Nausea and vomiting are particularly common during flight in cardiac patients.

Neurological symptoms include headache, visual changes, confusion, psychosis, hallucinations, dizziness and memory loss.

ENT symptoms include sinus pain or bleeding and tooth pain during decompression, as well as the more common "ear squeeze".

THE TEN STRESSORS OF FLIGHT

Decrease in partial pressure of the gases:

Barometric pressure (total pressure of all gases in the air) decreases as altitude increases.

Altitude	Barometric Pressures	pO ₂	pCO ₂
Sea level	760	100	40
5,000 ft	632	81	37
11,000 ft	523	61	35

Decreases in the barometric pressure can lead to hypoxia. Factors include altitude, rate of ascent, duration of exposure, and individual tolerance, i.e., illness, fatigue, hypoglycemia, alcohol, drugs and smoking.

Flight Considerations:

A thorough respiratory assessment prior to lift-off is essential. Assess breath sounds, color, tidal volume, capillary refill rate, use of accessory muscles, level of consciousness and any presence of cyanosis.

All patients in shock require 100% oxygen. Because hemoglobin carries oxygen to the tissues, a low hemoglobin level may be potentially dangerous when flying at high altitudes; consider transfusing the patient prior to the flight.

All patients transported at altitudes over 5,000 feet should be administered oxygen.

All cardiac patients, including cardiac disease and post myocardial infarctions, may have a compromised cardiac output and will, therefore, be susceptible to hypoxia from high altitudes.

Patients with eye injuries require 100% oxygen. The retina has the highest oxygen need of any organ in the body. An increase in altitude will produce dilation of the retinal vessels and will lead to an increase in vascular volume with a resultant increase in intraocular pressure.

Severe head injuries require 100% oxygen. A decrease in oxygen and an increase in pCO₂ cause dilation of the vessels and increase the vascular flow to the brain, thereby increasing intracranial pressure.

OBS patients in labour or potential premature labour should be given oxygen. Hypoxia

causes the uterus to become for irritable and supplemental oxygen is needed for patients with fetal distress and premature labor.

Decrease in Barometric Pressure:

Boyle's Law: The pressure and volume of an enclosed gas are inversely proportional. Therefore, with an increase in altitude, which causes a decrease in ambient pressure, a mass of gas will expand (as shown below).

Atmospheric Pressure and Gas Volume

Altitude	Atmospheric Pressure – PSI	Gas Volume
Sea level	14.7	1.0
8,000 ft	10.9	1.4

Flight Considerations

Pneumothorax: In multiple trauma patients, consider chest x-ray prior to flight to evaluate for pneumothorax; the amounts of air in the pleural cavity will increase with altitude and should therefore be evacuated before air transport with chest tube insertion. Chest tubes inserted prior to flight must be attached to one-way flutter valves, Pleurevac water seal or suction prior to flight.

Bowel obstruction: Gas within the stomach and in the intestinal tract will expand; patients will require a nasogastric tube, which should be left open to air. If gas is trapped within the intestine between points of obstruction, altitude must be maintained at a low level.

Skull fracture: Be alert to the possibility of free air inside the skull and keep altitude to a minimum.

Congested sinuses: Maintain low altitudes with slow ascents and descents. Flight crew members should not fly with a cold or any type of ear problems.

Plugged Eustachian tube: Attempt to relieve the valsalva maneuver or by swallowing, yawning or tensing muscles in the throat.

Bends: Described as the release of excess nitrogen from the blood. Gases are distributed throughout the body in proportions that depend on partial pressure of the inert gas and its solubility in water, body solutions and fat. These bubbles of nitrogen will enlarge with altitude. Altitude must be kept at or below 500 feet; 100% oxygen is required.

Air splints and PASG: The gas volume within the splint or pants will increase with ascending altitude and decrease with descending altitude. The increased pressure can result in a tourniquet effect, while the decreased pressure may cause dysfunction of the device. Slow release or addition of air may be needed to maintain the desired therapeutic effect of the splint or pants; but remember to coordinate this with the appropriate clinical signs: monitor blood pressure, proximal and distal pulses, sensation, movement, pain and capillary refill as appropriate.

Colostomy: Air expansion stimulates GI motility. Remember to put a pin-hole in the bag or deflate it frequently.

IV bottles: With glass bottles, air expansion will significantly affect the drip rate and may cause the bottle to break. It is therefore advisable to use plastic bottles and bags. Always keep the drip chamber half full. Utilization of pressure bags is helpful when decreased gravity prevents a steady flow.

Chest tubes: Observe for clogging, transport with a Heimlich valve between the drainage system and the patient.

Dental work: Due to the possibility of trapped air (e.g., following a root-canal procedure), crew members should not fly for 24 hours post-dental procedure.

Endotracheal tube / Foley catheter: When the balloons or cuffs on any of these devices are filled with air, they will undergo changes similar to those outlined for air splints as described above. Monitor their pressure to ensure a physiologic seal, but not over-inflation or under-inflation as the aircraft ascends and descends. **DO NOT INFLATE ETT CUFFS WITH WATER.** This creates a very hard cuff and can cause tracheal stenosis. Check cuff frequently for gas expansion or contraction and keep cuff at appropriate tension.

Vibration in the Airplane:

Overall, the airplane offers a smooth ride but there is a consistent low vibration level. Vibration may interfere with non-invasive blood pressure monitor function. Rotor wing aircraft have a much stronger vibration.

Traction devices cannot have dangling weights.

Equipment settings should be rechecked on a routine basis.

Screws and bolts loosen over long periods of time and need routine maintenance.

Vibration of the aircraft compromises the ability to palpate pulses.

Decrease in Humidity:

When the atmospheric pressure decreases (as altitude increases), the air becomes dryer; furthermore, in colder temperatures the amount of moisture is less.

As the relative humidity decreases:

ET tubes will plug more easily, especially in pediatric patients with small diameter tubes. Keep these moist with saline as required.

Corneas will dry out easily; contact lenses should be removed. On long flights the use of Natural Tears may be helpful.

Drug Potentiation:

CNS depressants and narcotics are potentiated at higher altitudes because of hypoxia.



In other words, the side effects are potentially more significant. Morphine and Valium may lead to respiratory depression; therefore, very small doses at more frequent intervals are advised.

Antihistamines make the patient more susceptible to hypoxia.

Alcohol will make a patient more susceptible to disorientation and hypoxia. Remember that it takes an additional supply of oxygen to metabolize alcohol; additionally, alcohol can act as a depressant on the respiratory center.

Noise:

Ear protection is needed for the patient and crew due to the aircraft's interior and exterior noise levels. Hearing loss is irreversible; it is imperative to protect your hearing.

Breath sounds cannot be auscultated while in the airplane; therefore, they should be assessed immediately prior to takeoff and immediately after landing.

Blood pressure often cannot be heard by auscultation; the NIBP, palpation method or Doppler devices can be useful as alternatives.

Emphasize the use of your senses of vision and touch to assist in patient assessments.

Nausea:

Flying may cause the patient to develop air sickness with symptoms of headache, stomach awareness, pallor, perspiration, nausea and vomiting. Treatment suggestions include:

Low-flow oxygen of 2-4L/minute may be helpful.

A preflight discussion with the patient may alleviate their fear or anxiety.

A visual reference of a fixed object in combination with a cool cabin will be

helpful. Anti-emetics may be helpful: consider Gravol or Ondansetron –

see protocol.

Suction should always be available and ready to use. Plan how you will turn the patient, if possible, before take-off.



Thermal Effects:

Temperature decreases with altitude (as illustrated below).

Altitude	Temperature
Sea level	20 C
10,000 ft	Zero C

Consider the added chill factor during the winter months.

Keep the patient warm by always using the sleeping bag and keeping it closed until the cabin warms up. Children will cool faster due to their larger body surface area in proportion to weight.

G-Forces:

In airplane transports, the G forces are minimal. Patients should be securely fastened with safety belts for takeoff, landing, and during turbulence.

Fatigue:

Fatigue can be described as the sum total of all “stressors of flight”.

Fatigue increases in illness, with too little rest and with poor nutrition. It is imperative for the flight crew to keep in good physical health based on these factors

GENERAL CONSIDERATIONS FOR AIR AMBULANCE TRANSPORT

Response Times

Under normal operating conditions, Air Medical Crew will obtain telephone report from the referring facility, gather appropriate equipment and be at the hospital or aircraft within 30 minutes of receiving the medevac call.

Equipment will be kept ready to go at all times to reduce response times.

All times will be documented on the pre-flight patient report form and patient transport record.

If a delay is encountered, the reason for the delay will be documented in an incident report.

Dispatching Flights

Med-Response will receive all requests for air ambulance transport and will contact the appropriate Air Medical Crew according to the on-call schedule provided by AMS. The on-call schedule will be given to Med-Response on a weekly basis and updated as required. Air Medical Crew (AMC) will carry their assigned cell phone at all times when on call and during flights. If Med-Response is unable to contact the AMC on their cell phone they will call the Medical Operations Manager on call for further direction.

Med-Response is responsible for dispatching ACCESS AMC and coordinating communication between the AMC and other health care providers. Med-Response will call the AMC on-call and will provide the following information:

- Name of client
- Health care number
- Date of birth
- Referring and receiving facilities
- Referring and receiving physicians
- Client's symptoms or diagnosis
- Dispatched aircraft
- CTAS

Med-Response will coordinate all ground transport requirements.



Once en-route, messages from Med Response can be relayed to the Air Medical Crew via cell phones, satellite phone or air carrier company.

The Operations Manager will be notified if Air Medical Crew are detained anywhere due to weather or mechanical problems as soon as possible.

Equipment for Each Flight

The Standard kit configuration will be brought on every flight including:

- ☐ The MEDICATION kit
- ☐ The INTUBATION/TRAUMA kit
- ☐ The OXYGENATION kit
- ☐ The CRITICAL CARE/OXYGEN kit
- ☐ The OBS/PEDS kit
- ☐ The HAMILTON T1

The following items are uploaded:

- ☐ Narcotic Kit (two for two AMC calls)
- ☐ Fridge Medications
- ☐ Cardiac Monitor – load with fresh battery
- ☐ Panasonic Toughbook ePCR
- ☐ Pack Rack
- ☐ Number nine stretcher (a second one is permanently in winglocker)

Specialty Items for Upload:

- ☐ Isolette with neo-puff for OB flights > 24 weeks Gest or patients <4.7kg
- ☐ Inflatable car seat for infants' transports
- ☐ Vacuum mattress and scoop stretcher for patients requiring spinal motion restriction
- ☐ Bariatric stretchers
- ☐ Spare Monitors for two patient transports
- ☐ TnKase Kit for high risk ACS patients (if in scope)
- ☐ Blood products – from hospital on MRP order (If in scope)

Equipment used during each flight must be replaced in the bags immediately after the medevac is completed. Used Sealed pouches are exchanged with fresh sealed pouches at the base. All medications or unsealed items are replaced. All equipment will be cleaned with Bleach Wipes and prepared for use for the next flight.



Patient Assessment and Preparation for Flight

The goal of every air ambulance transport is to provide patient care that will ensure the patient arrives at the receiving facility in as good or better condition than prior to transport.

It must be stressed that the patient must be assessed and properly prepared prior to transfer, but care must also be taken not to spend too much time in the field. Air Medical Crew must be aware that the sooner the patient arrives at a hospital, the sooner the patient is exposed to the abundant resources available for continued diagnosis and treatment.

Upon arrival, perform a complete head to toe assessment of the patient (refer to guidelines for (Patient Documentation Standards). Discuss patient condition and assessment findings with local physician or nurse. Review chart, labs, x-rays and treatments provided prior to arrival. Initiate any treatment required prior to transport as appropriate.

Ensure adequate airway with supplemental oxygen and adequate ventilation with attention to cervical spine immobilization as appropriate. All patients who cannot protect their airway (i.e. GCS < 8) should be intubated for transport. All intubated patients will have continuous ETCO₂ monitoring on Zoll monitor.

Ensure there will be enough oxygen for the patient during the entire transport process plus a 45-minute reserve. This calculation must be completed prior to each flight:
Use the O₂ Duration application available on your iPhone

$$\frac{\text{PSI in tank} - 200 \text{ residual}}{\text{Litres/min}} \times \text{Tank factor} = \text{Minutes of oxygen}$$

$$\begin{aligned} \text{Tank factor} - E &= 0.28 \\ M &= 1.37 \end{aligned}$$

Apply monitoring equipment to patient. All patients will be placed on a pulse oximeter for transport.

Patients should have at least one IV for transport. Saline lock unessential IV sites whenever possible. All children under the age of 16 years old and adult patients requiring fluid restriction (i.e. CHF) must have their IV fluid placed on an infusion pump



for transport. Pressure infusers will be required on all IV lines not on an infusion pump. Care must be taken to carefully monitor the flow rate while in the infusers. All patients at risk for hemodynamic instability during transport will have two large bore IVs prior to transport (i.e. 16 or 18 gauge). No glass containers will be used on the aircraft.

All bolus medications should be piggy backed into the main IV infusion for transport. Use three-way stopcocks or needle-less systems at all times.

Patients with a hemoglobin less than 7.5 g/dL should receive a blood transfusion prior to transport in consultation with the Most Responsible Physician

Glasgow Coma Scale will be done for every transport. Artificial tears and patches will be applied to the eyes of all unconscious patients to prevent corneal abrasions during transport. Remove contact lenses when possible.

Any patient complaining of pain should be pre-medicated prior to transport and re-evaluated en-route.

Any patients with abdominal complaints or absent bowel sounds will have an NG inserted prior to transport unless contraindicated. Patients complaining of nausea or vomiting should be pre-medicated prior to transport and re-evaluated en-route.

Patients who are able should void prior to transport. Consider an indwelling Foley catheter in acutely ill or injured patients. All drainage bags should be measured and emptied prior to and after the transport.

Non-critically ill patients should be awakened prior to descent to allow them to clear their ears on descent.

Neonates or infants less than 1 month old will be transferred in a pre-warmed isolette. These patients will have their heads covered to prevent heat loss. Isolette restraints will be applied at all times.

In-Flight Patient Transport

Prior to leaving the referring facility, the AMC will have Med-Response connect them with the receiving facility. An updated patient report will be provided to the physician and the management plan for flight will be discussed.

Place the patient in the middle of the sheet inside the sleeping bag for transport. Use the sleeping bag all year round. Lay the patient with their head at the adjustable end of the stretcher. Secure the patient to the stretcher and ensure the patient remains secure throughout the entire transport.



For all transports to Edmonton International Airport, the patient must be placed on a slider inside the sleeping bag. This facilitates transfer to Alberta Health Services (AHS) stretchers. For selected CTAS 1 & 2 patients the transfer sheet will not be used, as the patient remains on the number nine and clip deck. The clip deck and number nine stretcher are secured to the AHS stretcher for transport into the hospital.

All equipment will be secured and stowed for take off and landing and all equipment will be accessible during the flight.

In cold weather IV lines should be protected from the cold. IVs should be saline locked or place the IV on an infusion pump or pressure infuser and place it into the sleeping bag to keep warm. Cover the patient's head to prevent heat loss and avoid opening the sleeping bag until the ambient temperature in the aircraft is acceptable.

Altitude restriction will be considered for each flight. Any critical or seriously ill or injured patient should be transported with a cabin altitude of 2,000 to 4,000 feet AGL. Air Medical Crew must assess each clinical situation and discuss with the pilots what altitude can be safely achieved. See attached table for suggested altitude restrictions.

During the flight, make frequent verbal contact with the patient to reassure and check for complaints and these re-assessments shall be documented in the Ongoing Assessments section in the ePCR. Pay close attention on take-off, ascent, descent and landing. Monitor vital signs every 15 minutes for patients with potential for hemodynamic instability and every 30 minutes for more stable patients. Reassess previous complaints or treatments and continue the treatment plan en-route.

Air Medical Crew will inform receiving facility of clients that have deteriorated en-route through Med-Response via the satellite phone. Patients who deteriorate shortly after take-off from Yellowknife will be re-routed back to Yellowknife.

ALTITUDE RESTRICTIONS

CNS		
1.	Head injuries where pneumoencephalus is possible (i.e. basal skull fracture, open skull fracture)	2000 ft
2.	Closed Head Injuries where a pneumoencephalus is not suspected.	2000 ft
3.	Intracranial problems (i.e. bleed)	2000 ft
4.	Spinal Injuries	4000 ft
CVS		
1.	Acute MI or unstable angina with chest pain	2000 ft
2.	Cardiac Arrest	2000 ft
3.	Cardiogenic Shock/Pulmonary Edema	2000 ft
4.	MI (uncomplicated by chest pain)	2000 ft
5.	Stable angina	2000 ft
6.	Aneurysm	2000 ft
7.	Anemia - Sickle Cell, Hgb less than 90 - Others	2000 ft 4000 ft
8.	Shock – any type	2000 ft
ENT		
1.	Hyphema	2000 ft
2.	Penetrating eye injury	2000 ft
3.	Glaucoma	2000 ft
4.	Middle Ear Infection	4000 ft
Respiratory		
1.	Hypoxemia (pO ₂ less than 60) on the ground with O ₂ administration	2000 ft
2.	Pneumothorax	2000 ft
3.	Airway burns (not intubated)	2000 ft
4.	Croup, epiglottitis	2000 ft
5.	Asthma	2000 ft
Trauma		
1.	Trauma with potential for entrapped gas or shock, including burns	2000 ft
GI		
1.	Acute Bowel obstruction	2000 ft
2.	GI surgery within previous 72 hours	3000 ft
Others		
1.	Gas Gangrene	2000 ft
2.	Anaphylactic Shock/Drowning	2000 ft

All diving accident victims with a potential for decompression illness MUST be transported by pressurized aircraft with a SEA LEVEL cabin altitude pressure. If unable to provide such an aircraft, air transport be reevaluated by an MRP.

No patient transport should occur with cabin altitude pressures exceeding 7000 ft. AGL. (8000 ft. ASL).

The use of cabin altitude restriction does NOT exclude the use of O₂ in patient management during flight, especially for the seriously ill and injured. Oxygen should be administered liberally during air transport unless the patient's medical condition warrants careful control of oxygen delivery. (i.e. COPD with chronic CO₂ retention).



Multiple Patients

When transporting multiple patients, the flight nurse/paramedic will ensure that every patient has a seat/stretchers and all necessary equipment and personnel are available to safely transport each patient.

The pilot will be consulted prior to agreeing to transport multiple patients.

Med-Response must be notified of the request to transport multiple patients. If unable to safely transport the additional patient, inform the health care provider so that other arrangements can be made for the additional patient. Triage accordingly and discuss alternate flight options with the health care provider.

No patient will be left alone on the aircraft while assessing another patient. If a patient is already on-board the aircraft and you are picking up another patient in a second community, have the health care provider in the referring community transport the second patient to the aircraft when possible.

Family Escort

One family member may accompany the patient on transport after being approved by Med-Response but will depend on the condition of the patient, age of the patient, and availability of seating in the aircraft.

Children under the age of sixteen should be transported with a parent or guardian.

Any family escort that is under the influence of alcohol or any other substance will not be permitted to escort a patient out of or back to their community.

Passenger luggage will be restricted to one carry on bag due to lack of cabin space and limited room in the back of the aircraft after the appropriate medical equipment as been properly stored.

It is the aircraft captain's discretion who will be permitted to board the aircraft and how much luggage may accompany.

Holding for Patients

Air Medical Crew will wait for patients transferred to Edmonton at the EIA when directed by Med-Response.



Patient Repatriation

Every attempt will be made to return patients to the NWT from southern facilities and to their home communities when possible.

Med Response will notify AMC when a patient in a southern facility is ready for return back to the NWT.

Prior to repatriation, Air Medical Crew will ensure that there is adequate seating or stretcher room to accommodate the patient, the patient can be safely cared for en- route, and the pilots are aware of the repatriation.

The amount of luggage will be restricted to one carry on bag each.

AMS Infection Control Quick Reference

Prior to every patient interaction, aeromedical personnel have a responsibility to assess the infectious risk posed to themselves and other patients, pilots and health care workers by a patient, situation or procedure. A Point of Care Risk Assessment is required to be completed during the Pre-Flight assessment and before any patient interaction to:

1. Evaluate the likelihood of exposure to blood and body fluids:
 - ☐ Consider type and amount of fluids being produced by patient
 - ☐ Consider type of interaction (e.g. performing/assisting with aerosol-generating medical procedures)
 - ☐ Consider specific patient (e.g. infants/young children, patients not capable of self care/hand hygiene, have poor compliance with respiratory hygiene, copious respiratory secretions, frequent cough/sneeze, early stage of influenza-like illness, etc.
 - ☐ Consider environmental conditions
- AND**
2. Choose the appropriate actions/PPE needed to minimize the risk of patient, HCW/other staff, pilots, contractor, etc. exposure to infectious agents

Before Every Flight Ask About Any Of The Following Conditions:

If the Patient Has Fever and has any History Of Travel Perform the Ebola Screen

If The Ebola Screen is Positive Call the Manager on Call Immediately

Patient Condition	Precaution	AMS PPE
Acute diarrhea and/or vomiting of suspected infectious etiology Abscess or Draining Wound that cannot be contained VRE or MRSA	Contact	☐ Gloves ☐ Gown for staff in direct contact ☐ Pilots may remove gown after loading ☐ Patient to remain in closed sleeping bag ☐ Single Patient Transport if patient uncooperative
Acute respiratory infection, undiagnosed Measles Varicella Meningitis	Droplet	☐ Gown ☐ Goggles ☐ Full face mask For Airway procedures ☐ Gloves ☐ N-95 Mask ☐ Pilots shall remove mask & gown after loading ☐ Mask patient if tolerated ☐ Escort N-95 or surgical Mask
Respiratory infection with risk factors and symptoms suggestive of Tuberculosis	Airborne	☐ Gloves ☐ N-95 mask all crew members for flight ☐ Mask patient if tolerated
Copious bleeding, diarrhea or other bodily fluids	Enhanced	☐ Full Tyvek suit ☐ Boot covers ☐ Full length Gloves
Undiagnosed Rash without Fever	Routine	☐ Gloves

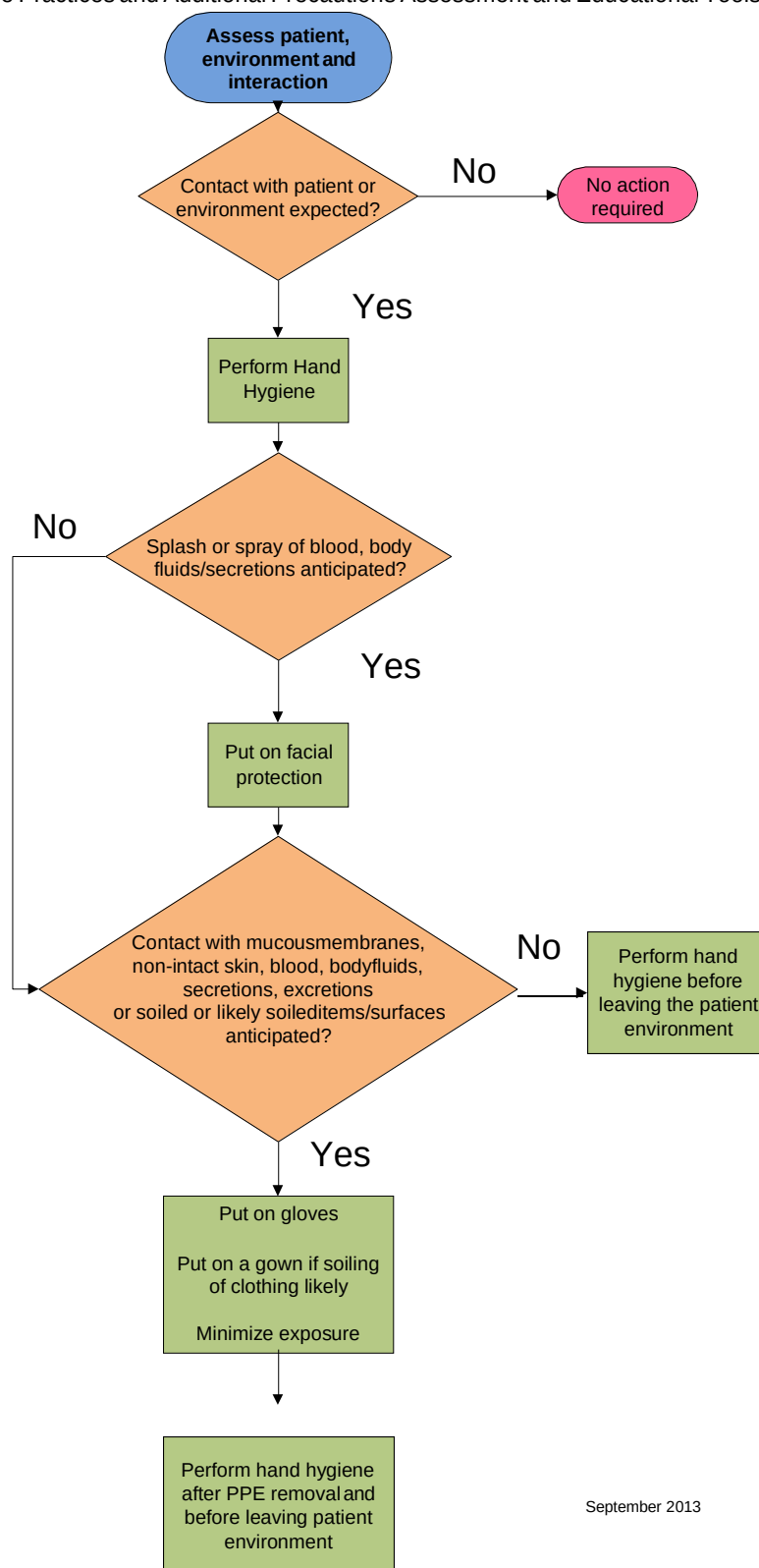
All Medical equipment anticipated for patient should be removed from Kits before donning PPE. Place all

kits in sealed plastic bags for flight. This applies to transport of patients in Droplet/Contact and enhanced.

Routine Practices Point of Care Risk Assessment Algorithm

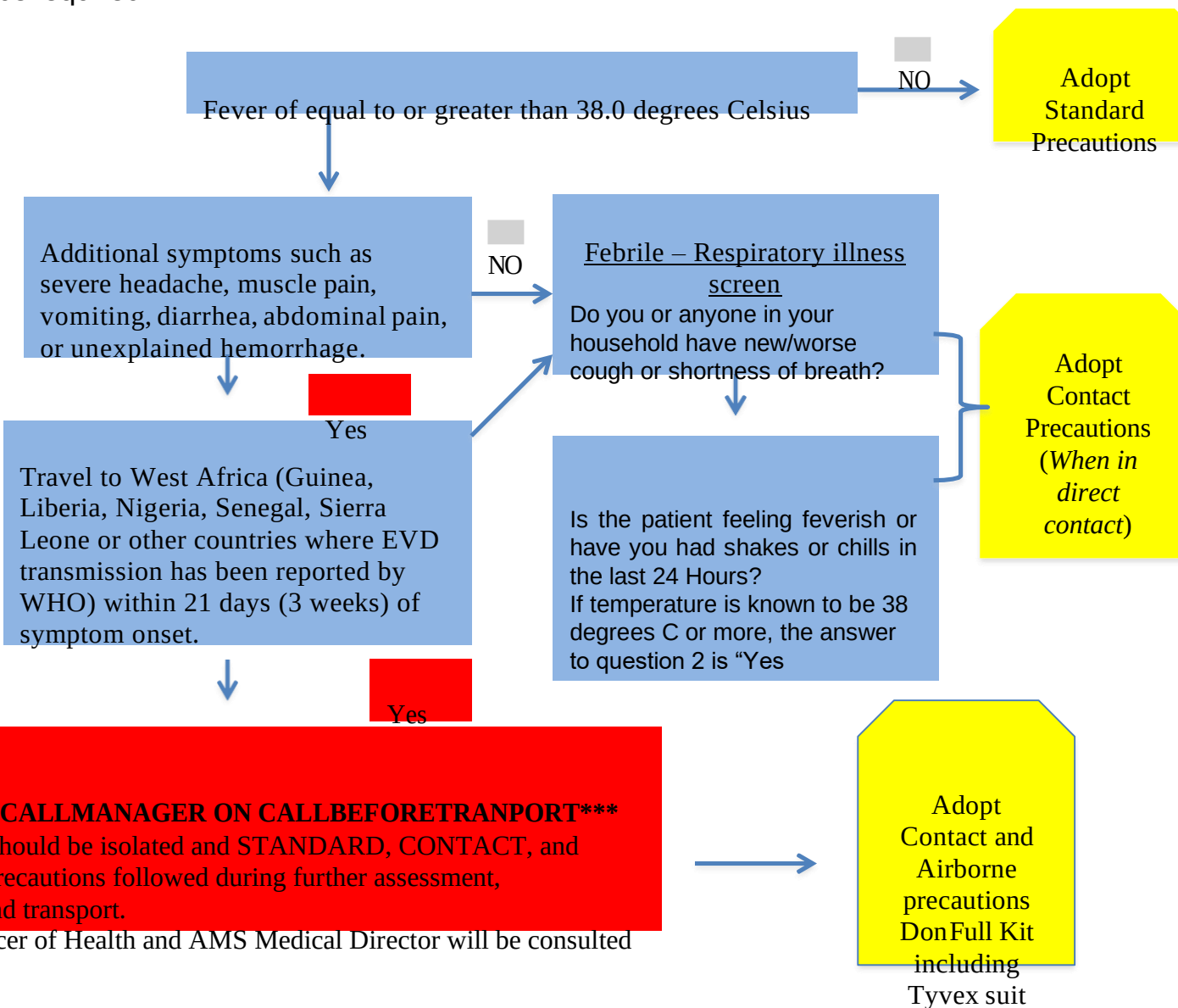
APPROPRIATE USE OF PERSONAL PROTECTIVE EQUIPMENT (PPE)

Adapted from PHAC Routine Practices and Additional Precautions Assessment and Educational Tools 2012



Infectious Disease Screening Tool USE DURING PREFLIGHT

If any part of the Patient history indicates infectious disease process please ask the following questions. If any screen is positive inform SOC and ensure pilots and ground staff are equipped with appropriate PPE. Inform SOC at this time if post flight decontamination is likely to be required.



Diarrhea Screen

Does the Patient have Diarrhea?

Yes or No

Contact precautions should be implemented empirically, at onset of diarrhea, for patients with acute diarrhea, suspected or confirmed to be *C. difficile* infection, and not otherwise explained.