National Defence / Défense nationale

B-GA-005-000/FP-D01

1 Canadian Air Division

Search and Rescue Technician Pre-Hospital Protocols and Procedures

6th Edition

Canada

Effective Date 31 Oct 2023

WPO31868

SAR TECH PLEDGE

Without regard for my personal comfort
or self-advancement
to the best of my ability
and to the limits of my physical and psychological endurance,
I solemnly pledge to make every effort to return to safety,
those victims of disaster entrusted to my care
by the assignment of the mission to which I have consented.
These things I shall do:
“That others may live”.

National Defence / Défense nationale

B-GA-005-000/FP-D01

1 CANADIAN AIR DIVISION

SEARCH AND RESCUE TECHNICIAN PRE-HOSPITAL PROTOCOLS AND PROCEDURES

6th Edition

(ENGLISH)

(Supersedes B-GA-005-000/FP-D01 dated 01 January 2015)

NOTICE
This documentation has been reviewed by the technical authority and does not contain controlled goods.

AVIS
Cette documentation a été révisée par l'autorité technique et ne contient pas de marchandises contrôlées.

Issued on Authority of the Chief of the Defence Staff
Publiée avec l'autorisation du chef d'état-major de la Défense

OPI: 1 Canadian Air Division Surgeon

31 Oct 2023

Canada

LIST OF EFFECTIVE PROTOCOLS

Insert latest changed protocols; dispose of superseded protocols in accordance with applicable orders.

NOTE

On a changed protocol, the portion of the text affected by the latest change is indicated by a vertical line in the margin of the protocol. Changes to illustrations are indicated by miniature pointing hands, or black vertical lines.

The AMP SAR Tech will produce and distribute replacement Protocol Stickers if a Protocol requires a major amendment.

Dates of issue for original and changed protocols are:

Original 0 2023-10-31	Ch . . . . . 3 . . . . .
Ch 1	Ch . . . . . 4 . . . . .
Ch 2	Ch . . . . . 5 . . . . .

Total number of pages in this manual is 138.

FOREWORD

B-GA-005-000/FP-D01, Pre-Hospital Protocols and Procedures, Search and Rescue Technician, is issued on authority of the Chief of the Defence Staff. This document is a field manual of medical procedures and protocols to be used by operational SAR Techs to provide pre-hospital care in the performance of Search and Rescue operations. The manual has been developed by the Aeromedical Programs Search and Rescue Technician, Aeromedical Programs Flight Surgeon, and 1 Canadian Air Division Surgeon, and approved by the Surgeon General.

This publication B-GA-005-000/FP-D01, dated 31 Oct 2023, is effective upon receipt.

Inquiries and suggestions for change shall be forwarded through normal channels to the 1 Canadian Air Division Fleet Rdns, SOA SAR Tech, AMP SAR Tech for approval by the Division Surgeon.

In a medical emergency outside SAR when the services of civilian health care personnel are not readily available or, are not likely to be available within a reasonable period of time, CF health care providers should not hesitate to provide Good Samaritan Assistance (GSA), within the scope of their professional competence, to someone not normally entitled to CF medical care. CF health care providers should retire from the case as soon as civilian medical personnel accept the patient.

PREFACE

This set of medical protocols and procedures is evidence-based and forms the bonafide occupational medical requirement for CF SAR Technicians.

A formal board including members who are SAR Techs, paramedic instructors, physician specialists in aerospace medicine, anaesthesiology, trauma surgery, intensive care, emergency medicine, and medical and paramedical education met together and in subcommittee to produce this manual.

The protocols have been colour coded for ease in identifying qualification levels specific tasks. All of the components of the protocols that are not in yellow highlight are trained at the Team Member (TM), Primary Care Paramedic level. The steps in protocols that are in **yellow highlight** require more skill and/or experience and they are instructed at the **Team Leader (TL) part 1 level.** The portions in **blue** refer to pediatric patients.

The protocols emphasize the use of clinical judgement. This is reflected in both the protocols themselves and especially in the associated curriculum. This is not cookbook medicine and the SAR Flight Surgeons endorse the need for SAR Techs to act and be supported as fellow clinicians making difficult choices based on the specifics (environmental and medical) of each case. A specific example is the fact that these protocols are designed to function with two SAR Techs on scene. In emergencies, where patient numbers and/or condition and/or multiple locations make it necessary for a SAR Tech to act alone, it is understood that slight alterations to these protocols, which do not deviate from the key therapeutic principles (i.e. MARCH, early transport, etc.), may be required due to the environment (e.g. too cold to start an IV) or safety of the patient or SAR team.

These protocols have been reviewed by representative(s) of the Standing Committee on Operational Medicine in Ottawa before being sent to the Surgeon General for approval. The Clinical Council and Surgeon General have reviewed the final product and have sanctioned these protocols for field use.

A. Minkey, CD, MD, DAvMed, FCFP
Lieutenant-Colonel
Air Division Surgeon

M.E. Gear, CD, MD, MPH, CCFP, ABPM(AM)
Major
Aerospace Standards and Clinical Services Flight Surgeon and
Search and Rescue Medical Director

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SAR Tech Contact Numbers	
JRCC Halifax	1 800 565-1582 or 902 427-8200 (SAT)
JRCC Trenton	1 800 267-7270 or 613 965-3870 (SAT)
JRCC Victoria	1 800 567-5111* or 250 413-8933 (SAT)
Local Flight Surgeon	
Local Wing Ops	
Local Sqn Ops	
Other	

*This 1-800 number is not available east of Saskatchewan.
The 1-800 numbers do not work for the satellite (SAT) phone.

MENTAL HEALTH CONTINUUM MODEL

Chain of Command / Health Services	Chain of Command / Health Services	Chain of Command / Health Services	Chain of Command / Health Services
Calm & Steady	Nervousness, anxiety	Excessive anxiety/panic	Excessive anxiety
Normal mood fluctuations	Irritability, anger	Angry outbursts	Regular panic attacks
Fit, fed, rested	Impatience	Noticeable fatigue	Angry outbursts
In control physically, mentally, emotionally	Trouble sleeping	Forgetting important things	Noticeable fatigue
Performing well	Low energy/fatigue	Impaired decision making	Severe memory lapses
Behaving ethically & morally	Muscle tension/ headaches	Taking risks	Cannot concentrate
Sense of humour	Forgetfulness/ procrastination	Inappropriate aggression	Cannot perform duties
Relaxing & recreating	Decreased productivity	Insubordination	Significant change in behaviour
Socially active	Often late for work	Absenteeism	Loss of control
Confident in self & other	Poor concentration	Presenteeism	Suicidal thoughts, intentions
	Negative attitude	Increased accidental injuries	Legal charges
	Increased swearing		Avoiding or withdrawing
Focus on task at hand	**Recognize limits, take breaks**	**Talk to someone, ask for help**	**Follow care recommendations**
Break problems into manageable tasks	**Adequate rest, food, exercise**	**Tune into own signs of distress**	**Seek consultataion as needed**
Controlled, deep breathing	**Reduce barriers to help-seeking**	**Make self care a priority**	**Respect confidentiality**
Nurture a support system	**Identify/resolve problems early**	**Get help sooner, not later**	**Know resources and how to access them**
	Example of personal accountability	**Maintain social contact, don't withdraw**	

Source: www.forces.gc.ca/en/caf-community-health-services-r2mr/index.page

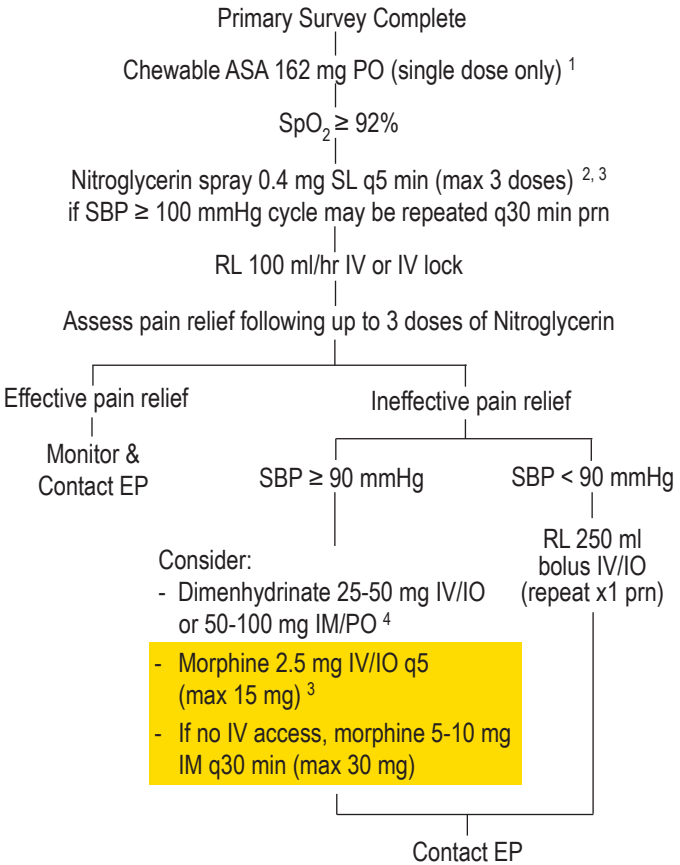
Notes:

SECTION 1 – CARDIOVASCULAR (CV) PROTOCOLS

1.1 Cardiac Chest Pain

Indications

◊ Patients with a history suggestive of cardiac chest pain.



1. If cardiac ruled in, complete set of vital signs not required for administration of ASA.
2. Withhold nitroglycerin if patient has recently taken a phosphodiesterase inhibitor (Cialis, Levitra, Viagra) and/or pulse <50 or >100 BPM. Refer to drug monograph.
3. If no or limited pain relief with nitroglycerin, consider morphine early.
4. > 60 years – ½ the dose of dimenhydrinate.

1.2 Cardiac Arrest – AED

Indications

◊ Absent carotid pulse AND loss of consciousness AND not breathing/agonal breaths only.

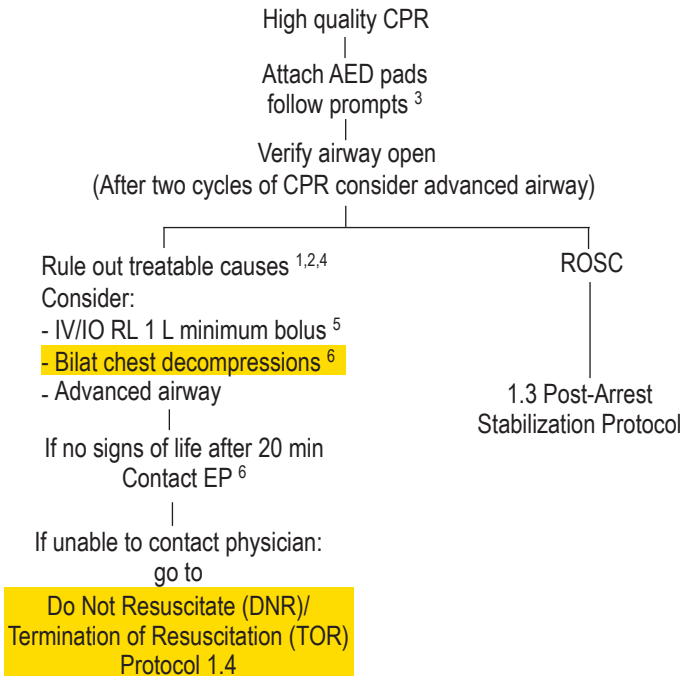
Cautions

◊ Children 0-8 YOA use child pads and child key/settings on AED if available.

◊ Severe hypothermia. [1]

◊ Asphyxiation. [2]

◊ Traumatic Arrest.



Note 4 – Causes of Arrest – H's & T's Diagram

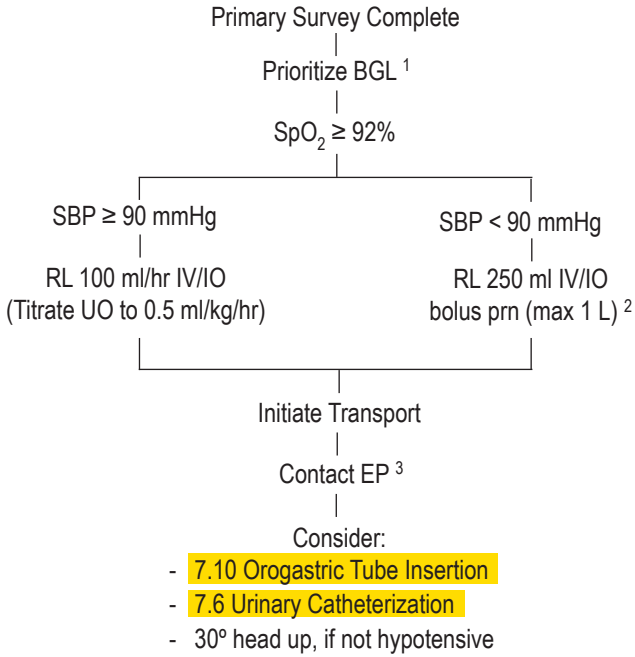
5 H's	5 T's
Hypovolemia	**Tension Pneumothorax**
Hypoxia	Thrombosis (MI)
Hypothermia	Thrombosis (PE)
Hypo/Hyper Kalemia	Toxin
H+ (Acidosis)	Tamponade

1. Defibrillation is less likely to be effective in severely hypothermic patient. Deliver maximum 3 shocks until patient rewarmed above 30°C core temperature. Focus on quality chest compressions. Fixed & dilated pupils, areflexia or stiffness that resembles rigor mortis are not reliable indications of death in hypothermia. Take 45 seconds to determine absence of pulse at carotid in the severely hypothermic patient prior to starting chest compressions. Rewarm patient (see 5.1 Hypothermia Protocol), consider transferring to ECMO facility. Continue chest compressions until patient rewarmed or physician order to discontinue or discontinue Do Not Resuscitate (DNR)/Termination of Resuscitation (TOR) Protocol 1.4 satisfied.
2. If hypoxic arrest, e.g. drowning, emphasis should be on oxygenation.
3. Continue CPR while AED is charging to maximize cerebral perfusion pressure.
4. 5H's – Hypovolemia, Hypoxia, Hypothermia, , H+ (acidosis), Hypo/hyperkalemia (K+).
   5T's – Tension pneumothorax, Thrombosis (MI, PE), Toxins, Tamponade.
5. Pediatric fluid replacement – treat as per 3.1 Pediatric Hypovolemic Shock.
6. Consider needle decompression as potential treatment for pneumothorax caused by trauma or CPR. (See 7.9 Decompression of Tension/Symptomatic Pneumothorax Procedure)

1.3 Post-Arrest Stabilization/Care

Indications

◊ Patient post-cardiac arrest with a pulse +/- spontaneous respirations.



1. Constant monitoring of the patient's pulse and vitals is critical post ROSC. Turn off AED and leave pads in place. Attach 3 leads ECG if available.
2. Pediatric fluid replacement – treat as per 3.1 Pediatric Hypovolemic Shock.
3. Refer to 1.2 Cardiac Arrest - AED, Note 4 – Causes of Arrest – H's & T's Diagram.

1.4 Do Not Resuscitate (DNR)/ Termination of Resuscitation (TOR)

Indications

◊ Patient with absent vital signs/no sign of life.

Primary Survey Complete

CPR Indicated?

YES

Start CPR
1.2 Cardiac Arrest

Continue CPR?

YES

Continue Resuscitation: [4]
Special Circumstances:
- Hypothermic Cardiac Arrest
- Prolonged Avalanche Burial with Open Airway
- Lightning Strike
- Poisoning
- Pediatric Patient
- Pregnant Patient

Team Based Reassessment
Consider Ongoing Resuscitation & Transport
Contact EP

NO

Consider TOR: [5]
- TOR for adult non-traumatic cardiac arrest
- TOR for adult traumatic cardiac arrest
- $ETCO_2$ (if available)
- Submersion Drowning
- Avalanche Burial

Team Based Reassessment
Consider TOR
Contact EP if available
Document TOR decision
Update NOCL
Follow Coroner/RCMP instruction

NO

Unacceptable Risk [1]
Lethal Injury/Futility [2]
Valid DNR [3]

Discontinue resuscitation

Document
Update NOCL
Follow Coroner/RCMP instruction

1. Unacceptable risk to rescuer, exhaustion, extraction not possible or safe.
2. Lethal injury/futility: Decapitation, transection, trauma with evisceration of heart, lungs or brain, incineration, rigor mortis, post mortem lividity, decomposition, whole body frozen solid.
3. Documentation or verification of advanced directive, medical order for scope of treatment, no CPR form or presence of MedicAlert no CPR indicator.
4. Special circumstances:
   - Hypothermic cardiac arrest with no history of death before cooling .
   - Cold water immersion drowning, breathing air prior to arrest (flotation device).
   - Prolonged avalanche burial with open airway, core temp <30º C, no signs of traumatic arrest.
   - Fixed & dilated pupils, areflexia or stiffness that resembles rigor mortis are not reliable indications of death in hypothermia.
   - Lightning Strike – prioritize AED.
   - Poisoning – known toxin with reversible agent.
   - Pediatric Patient – prioritize ventilations, transport.
   - Pregnant Patient – manual left uterine displacement, or LUD; focus on high quality CPR.
5. Consider TOR
   - Unwitnessed adult non-traumatic arrest AND no ROSC after 20 min AND no shock advised by AED OR asystole on monitor.
   - Adult traumatic arrest with no signs of life – VSA, asystole on monitor, no ROSC after treatment of reversible causes and minimal CPR interruptions.
   - $ETCO_2$ < 10 mmHg (with quality CPR) after 20 min of resuscitation.
   - Submersion drowning – patient underwater with hypoxic arrest prior to cooling. Poor prognosis unless very young with rapid cooling.
   - Avalanche burial <35 min – hypoxia or trauma likely cause of cardiac arrest.
   - Avalanche burial >35 min and airway packed with snow: hypoxia likely.

1.5 Stroke

Indications

◊ Rapid onset of unilateral facial droop, unilateral arm weakness, speech difficulties, or gait abnormality.

Primary Survey Complete including blood glucose

↓

Prioritize BGL

↓

Stroke assessment using FAST VAN [1, 2]
Document time of onset or when patient last seen normal.

↓

$SpO_2 \geq 92\%$

↓

Contact EP
(Initiate urgent transport to stroke centre)

↓

Consider IV lock; must not delay transport

↓

Document 8.4 Rapid Neurologic Assessment [3]

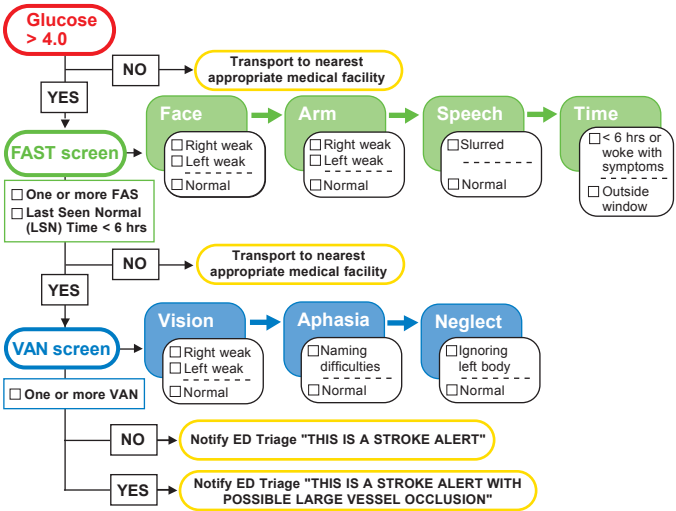
↓

Keep patient supine with airway protection [4]

Stroke Centres		
Name	**Phone**	**Location**
1.		
2.		
3.		
4.		

1. Refer to FAST • VAN Hot Stroke Reference Guide on next page.
2. Vision loss or defect may also be a sign of stroke.
3. Patient with symptoms that have resolved still needs to be transported for medical assessment. (possible TIA)
4. If hypertensive consider head up at 30º.

FAST • VAN Hot Stroke Reference Guide



REMEMBER: TIME IS BRAIN

+ VISION =	**Patient looking preferentially to one side** **!** Usually away from the hemiparesis
+ APHASIA =	**Patient looks at simple objects but can't name them** *(e.g. pen, watch)* **!** Usually goes with **right** hemiparesis
+ NEGLECT =	**Patient ignores left side when both sides are touched simultaneously** **!** Usually goes with **left** hemiparesis

NEGLECT STEP TESTING:

- **Provide Instructions** Ask patient to close their eyes and say aloud **"left, right, or both"** when arms are touched.
- **Provide Neglect Test** Touch right, then left, then both arms together – asking for a response after each stimulus.

Neglect is positive when patient is only able to identify that the right side was touched, when both sides were touched at the same time.

DON'T FORGET:

1. Perform and document a **glucose check** to rule out stroke-mimics.
2. **Provide oxygen** for suspected stroke patien when O_2 stats < 94%.
3. Transport patient to appropriate hospital with your best attmept at an **on scene time of < 20 minutes**.
4. **Pre-hospital IV placed** if possible (without delay of transport).
   ! *Preferably above hand, using a 20 gauge IV (or larger).*
5. **Pre-notify** the ED with stroke alert as per algorithm.
   ! *Pt Name • PHN • DOB • SEX • LSN 00:00 • FAST VAN Fingings • ETA* (IMIST/AMBO)
6. Document the **onset of symptoms** time.
7. Document pertinent neurological signs and symptoms on the PCR.

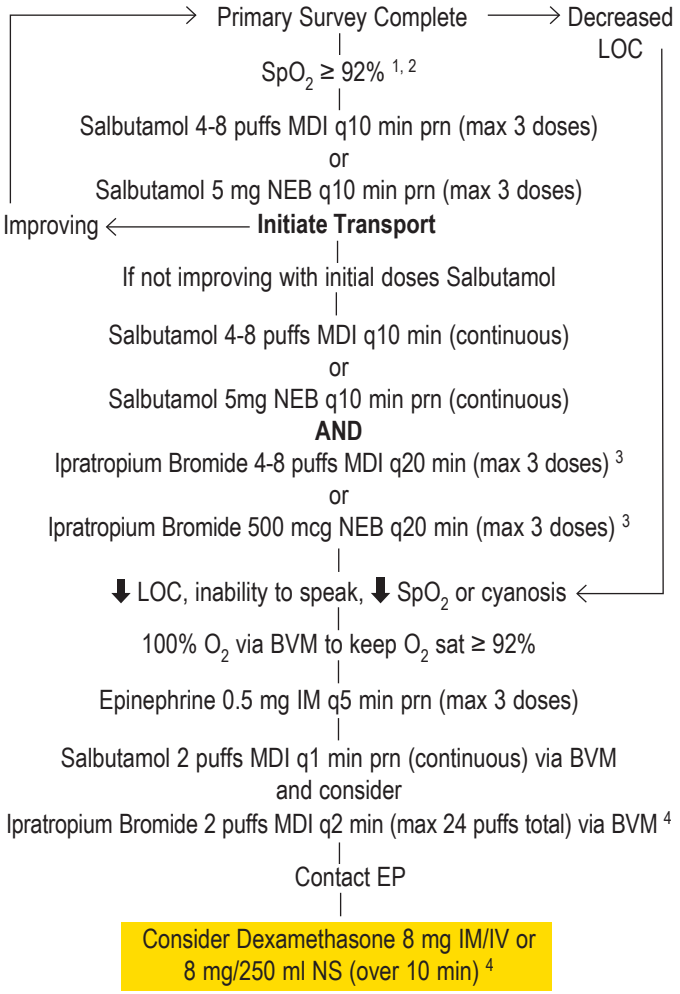
Notes:

SECTION 2 – RESPIRATORY PROTOCOLS

2.1 SOB with a History Suggestive of Asthma/COPD

Indications

◊ SOB with a history of asthma / COPD / bronchospasm.



PEDIATRIC: See notes on next page.

REFER TO 8.6 PEDIATRIC TABLES

PEDIATRIC < 50 kg

Salbutamol:

2.5 mg NEB prn q 10 mins

or

2-4 puffs (100 mcg/puff) MDI with spacer prn q 10 mins

Ipratropium:

250 mg NEB prn q 20 mins (max 3 doses)

or

2-4 puffs (20 mcg/puff) MDI with spacer prn q 20 mins (max 12 puffs)

Epinephrine:

0.01 mg/kg (Max 0.3 mg) IM q5 min prn max 3 doses

0.6 mg/kg IV/IM once (max 8 mg)

1. Consider other causes of SOB such as CHF, MI, pulmonary embolism, pneumothorax, pneumonia, foreign body (especially in children) and HAPE. Salbutamol, ipratropium bromide, epinephrine could be harmful.
2. Watch for decreased hypoxic drive in COPD patients receiving supplemental oxygen – SpO_2 of 92 to 95% is generally safe in these patients.
3. Give Ipratropium in a ratio of one dose for every 2 doses of Salbutamol. (max 3 doses total 24 puffs MDI or 1.5 mg NEB for adults)
4. Consider Dexamethasone if patient response is poor or symptoms reoccur; to be given by physician order only.

2.2 Anaphylaxis/Anaphylactic Shock

Indications

◊ Acute onset after suspected exposure to an allergen, multi-system – hives (urticaria), SOB/wheezes, tachycardia/weak pulse, angioedema (swelling), nausea /vomit /diarrhea.

Primary Survey Complete [1]

|

Epinephrine 0.5 mg IM q5 min prn (max 3 doses) [2, 3]

|

SpO_2 ≥ 92%

|

RL 1L IV/IO bolus [4]
Repeat boluses to titrate to SBP ≥ 90 mmHg

|

Diphenhydramine 25-50 mg IV/IM [5] q2-4 hr prn

|

If SOB or wheezes persists following repeated doses of Epinephrine:
Salbutamol 4-8 puffs MDI q10 min prn (continuous) [6] or
5 mg NEB q10 min prn (continuous)

AND

Ipratropium Bromide 4-8 puffs MDI q20 min (max 3 doses) [6] or
500 mcg NEB q20 min (max 3 doses)

OR

Salbutamol 2 puffs q1 min prn (continuous) [6] via BVM
Ipratropium Bromide 2 puffs q2 min (max 24 puffs total) via BVM

|

Contact EP

|

Consider Dexamethasone 8 mg IM/IV or
8 mg/250 ml NS (over 10 min) [7]

PEDIATRIC: See notes on next page.

REFER TO 8.6 PEDIATRIC TABLES

PEDIATRIC

Epinephrine:
< 10 kg - 0.01 mg/kg IM q5 min prn (max 3 doses)
- consider diluting with NS to equal up to 1 ml total
10-30 kg - 0.15 mg IM q5 min prn (max 3 doses)
> 30 kg - 0.30 mg IM q5 min prn (max 3 doses)

Fluid replacement:
Treat as per 3.1 Pediatric Hypovolemic Shock

Diphenhydramine:
1 mg/kg IM/IV/IO q6-8 hr (max 50 mg) or
1 mg/kg PO q6-8 hr (max 50 mg)

Salbutamol/Ipratropium:
Treat as per 2.1 SOB
0.6 mg/kg IV/IM once (max 8 mg)

1. Remove precipitant (e.g. bee sting – remove stinger).
2. If anaphylaxis is anticipated in an asymptomatic patient because of prior history, nature of exposure or patient's condition, consider contacting EP for Epinephrine/Diphenhydramine orders.
3. For mild allergic rash without other symptoms of anaphylaxis, consider Diphenhydramine.
4. Anaphylaxis results in considerable fluid loss from angloedema/capillary leak/ vasodilation.
5. > 60 years – ½ the dose of diphenhydramine.
6. Consider spacer when given by MDI.
7. Consider Dexamethasone if patient response is poor or symptoms reoccur; to be given by physician order only.

Notes:

SECTION 3 – TRAUMA PROTOCOLS

3.1 Hypovolemic Shock

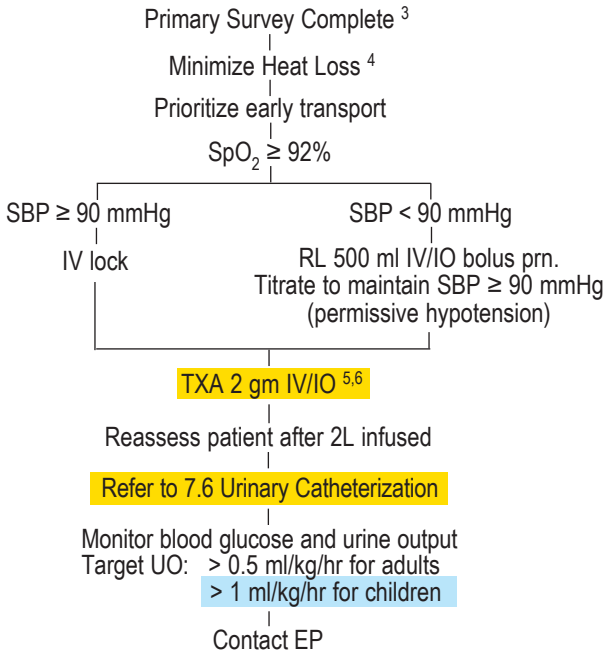
Indications

◊ Signs of shock (tachycardia, altered mental status in the absence of head trauma and/or absent radial pulse).

Precautions

◊ Head injury. [1]

◊ Blunt/crush injury to the chest. [2]



1. Refer to 3.2 Traumatic Brain Injury.
2. Rule out tension pheumothorax as the cause.
3. Consider sites of potential blood loss: chest, abdomen, pelvic fracture, femur fracture. Focus on hemorrhage control including pelvic binder if indicated.
4. Early focus must be on keeping trauma patients warm.
5. Adult trauma with clinical evidence of significant hemorrhage shock. (SBP < 90 mmHg and/or HR > 110 BPM) ≤ 3 hours from time of injury.
6. See drug monograph for delivery methods.

REFER TO 8.6 PEDIATRIC TABLES

Pediatric Hypovolemic Shock

RL/NS 5-10 ml/kg IV/IO (max 500 ml) bolus (may repeat x1).

Maintain SBP ≥ 70 + 2 (age in yrs) or SBP 90 mmHg.

- If unable to obtain SBP due to equipment sizing or other factors contact EP.
- < 2 YOA - Signs of hypovolemia: delayed cap refil > 3 sec, mettled skin, compensatory HR (high end of normal range), sunken fontanelles, decreased skin tugor.

Consider syringe boluses to control precisely delivered volumes.

Contact EP for further bolus > 20 ml/kg.

No maintenance rate* – flush line with NS and IV/IO lock.

Note:*Uncontrolled fluid administration may lead to serious harm (fluid overload) in pediatrics.

Pediatric Fluid Replacement Table

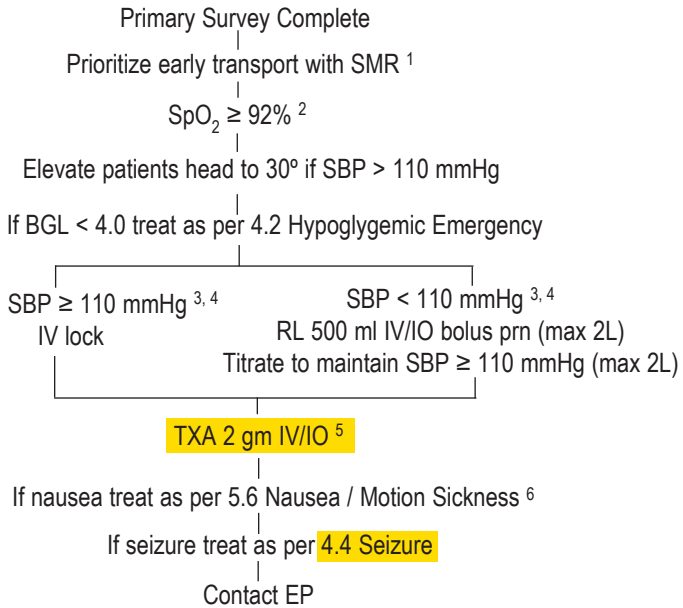
			Normal			
	kg	lbs	HR	Resp	Min SBP	RL/NS Bolus (20ml/kg)
Grey	3-5 kg	6-11	100-180	30-45	70	100 ml
Pink	6-7 kg	12-16	100-180	30-45	71	130 ml
Red	8-9 kg	17-20	100-180	25-35	72	170 ml
Purple	10-11 kg	21-25	100-180	25-35	72	210 ml
Yellow	12-14 kg	26-31	80-130	20-30	74	260 ml
White	15-18 kg	32-40	80-120	20-30	78	325 ml
Blue	19-23 kg	41-51	70-110	18-24	82	420 ml
Orange	24-29 kg	52-65	70-110	18-22	85	500 ml
Green	30-36 kg	66-80	70-110	16-20	88	500 ml

Notes:

3.2 Traumatic Brain Injury (TBI)

Indications

◊ Evidence of TBI with GCS 3-13.



REFER TO 8.6 PEDIATRIC TABLES

PEDIATRIC

Pediatric fluid replacement - treat as per 3.1 Pediatric Hypovolemic Shock.

Nausea - treat as per 5.6 Nausea / Motion Sickness.

1. Prevent secondary brain injury by searching for and aggressively treating all causes of hypotension and hypoxia. $ETCO_2$ if measured through advanced airway should be maintained between 35-40mmHg. Close clinical observation and prevention of hypotension, hypoxia and hypocapnia (hyperventilation) is key.
2. Release tight fitting stiff neck collar if possible while maintaining SMR to allow for venous drainage.
3. Goal is to maintain adequate SBP (>110) to maintain cerebral perfusion and overcone increased intacranial pressure.
4. TBI in multi trauma – Consider sites of potential blood loss: chest, abdomen, pelvis fracture, femur fracture.
5. Adult multi-trauma with clinical evidence of significant hemorrhage. (SBP < 90 mmHg and/or HR < 110 BPM) ≤ 3 hours from time of injury.
6. > 60 years – ½ the dose of dimenhydrinate.

3.3 Burns

Indications

◊ Patients with 2nd and 3rd degree burns covering greater than 20% BSA or lesser area with hand, face or genital involvement.

Primary Survey Complete

↓

SpO_2 ≥ 92% [1]

↓

Irrigate burn and apply sterile occulsive dressing
Avoid inducing hypothermia

↓

If SBP < 90 mmHg treat as per 3.1 Hypovolemic Shock

↓

If pain treat as per 3.5 Pain Protocol

↓

Initiate fluid replacement plan
(see next page)

↓

Treat as per 7.6 Urinary Catheterization [2]
Consider within 1st hour of initial fluid replacement

Monitor urine output [3]
> 0.5 ml/kg/hr for adult
> 1 ml/kg/hr for children

↓

UO high decrease IV fluid rate by 20%.
UO too low increase IV fluid rate by 20% (reassess hourly)

↓

Contact EP

REFER TO 8.6 PEDIATRIC TABLES

PEDIATRIC

Pediatric fluid replacement – treat as per 3.1 Pediatric Hypovolemic Shock.

Once hemodynamically stable, consult EP for $D_{10}NS$ order to prevent hypoglycemia.

1. If concern with CO poisoning, SpO_2 is unreliable. Consider high flow O_2.
2. Do not delay transport to complete urinary catheterization.
3. Titration of fluid administration to urinary output is the only reliable way to ensure adequate fluid resuscitation in the field.

Fluid Replacement Requirements for Burn Victims

Adult:

Estimate total BSA burned to the nearest 10% using Rule of Nines.

Fluid Resuscitation using the USAISR Rule of Ten:

- If burns are greater than 20% of total BSA, fluid resuscitation should be initiated as soon as IV/IO access is established. Resuscitation is to be initiated with Ringers Lactate.
- Initial IV/IO fluid rate is % total BSA burned x 10 ml/hr for adults weighing 40-80 kg.
- For every 10 kg above 80 kg, increase initial rate by 100 ml/hr.

If hypovolemic shock is also present, resuscitation for hypovolemic shock takes precedence over resuscitation for burns. Remember the need for maintenance fluids.

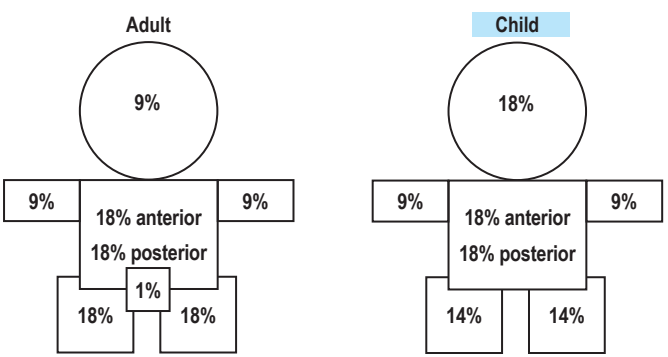
REFER TO 8.6 PEDIATRIC TABLES

PEDIATRIC

4 ml RL x Weight in (kg) x Body Surface Area (BSA) affected in (%) = ml/24 hrs amount.

1/2 in 1st 8 hrs
1/4 in 2nd 8 hrs
1/4 in 3rd 8 hrs
= Total in 24 hrs

This is expected minimum fluid requirement, however you must titrate to clinical condition (adequate = good urinary output, oversupply = fluid overload including pulmonary edema). Adequate urinary output rate is > 0.5 ml/kg/hr for adults and > 1 ml/kg/hr for children < 25 kg.



3.4 Crush Syndrome/Injury

Indications

◊ Entrapment of parts of the body due to a compressive force that results in physical injury and or ischemic injury to the muscle of the affected area. If significant muscle mass is involved, it can lead to crush syndrome following release of the compressive force.

◊ Unconscious patients following a stroke, drug overdose, or intoxication, who have been in the same position ≥1 hr are susceptible to limb crush injury if pressure areas are not protected.

Precautions

◊ With extremity injuries, tourniquets should NOT be applied until immediately before extrication, unless there is hemorrhage that is not controllable by other means.

Primary Survey Complete
|
Minimize Heat Loss [1]
|
SpO_2 sat ≥ 92%
|
For patients that are still entrapped
RL 1-2L IV/IO bolus (repeat x1 prn) [2]
|
Treat as per 7.6 Urinary Catheterization [3]
Maintain UO ≥ 100-200 ml/hr
|
If pain treat as per 3.5 Pain Protocol [4]
|
Reassess mental status [5]
|
Contact EP [6]
|
Salbutamol MDI 4 puffs **OR** Salbatamol 5 mg NEB
Consider MDI/NEB continuous with EP advice
|
When ready for extrication [7, 8]
Apply tourniquet(s) to crushed extremity(ies) (pneumatic preferred)
Discuss possible tourniquet removal with EP
Consider pelvic binder
|
Initiate Transport

PEDIATRIC: See notes on next page.

REFER TO 8.6 PEDIATRIC TABLES

PEDIATRIC

Pediatric fluid replacement - treat as per 3.1 Pediatric Hypovolemic Shock.

1. Early focus must be on keeping trauma patients warm.
2. Consider sites of potential blood loss: chest, abdomen, pelvic fracture, femur fracture etc.
3. Do not delay transport to complete urinary catheterization.
4. Do not use NSAIDs in crush injury.
5. In a casualty with an altered mental status due to a head injury, treat as per 3.2 Traumatic Brain Injury. A higher SBP is often needed to maintain cerebral perfusion. Therefore, the systolic pressure must be titrated to ≥ 110 mmHg.
6. Contact EP early for treatment and transport advice.
7. Be ready to perform CPR.
8. Extrication: free or release from entrapment.

3.5 Pain

Indications

◊ Patients exhibiting signs of pain.

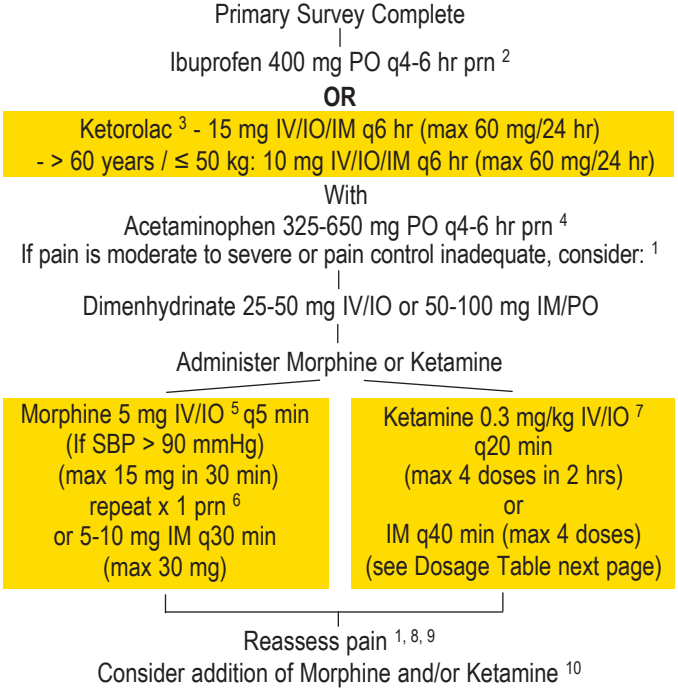
Contraindications

◊ Morphine: Altered LOC and/or hypotension (hypotensive for age) and/or respiratory distress or at significant risk of developing hypotension or respiratory distress.

◊ NSAID: Uncontrolled bleeding, crush syndrome/injury.

Cautions

◊ Severe chest injuries or blunt or penetrating head trauma.



IV/IO/IM Ketamine Dosage Table *, **

Patients Weight (kg)	IV/IO	IV/IO	IM
< 50 kg		0.3 mg/kg	0.5 mg/kg
50 to 60 kg	15 mg	0.3 mg/kg slow push (1-2 min)	25 mg
60 to 70 kg	20 mg		50 mg
70 to 90 kg	25 mg		
> 90 Kg	30 mg		

* For IM Ketamine, use 50 mg/ml undiluted.

** For IV Ketamine mix 1cc (50 mg/ml) with 9 ml RL/NS = 5 mg/ml

PEDIATRIC: See notes on next page.

1. See 8.13 Visual Analogue Pain Scale.
2. Do not administer two NSAIDs together. Ketorolac and Ibuprofen are not to be given within 8 hrs of each other. For all other NSAIDs taken by the patient, contact EP.
3. Consider Dimenhydrinate with Keterolac administration for nausea if required.
4. Acetaminophen may be given concurrently with Ibuprofen or Ketorolac for synergistic effect.
5. Use Morphine 2.5 mg for elderly.
6. Ensure Narcan is available in case of overdose.
7. Observe for increased secretions or laryngospasm. Be prepared to reposition airway, suction or use BVM to resolve transient laryngospasm.
8. If pain relief not adequate with either morphine or ketamine, consider administration of combination of both.
9. Stop administration when pain relief is adequate. Adequate pain relief is when patient is able to tolerate all treatment, assessment, movement or activity including extraction without significant discomfort.
10. Observe for agitation, combativeness or delirium. Treat with Midazolam 2 mg IM/IV/IO q10 min prn (max 4 doses).

REFER TO 8.6 PEDIATRIC TABLES

PEDIATRIC

< 2 YOA - Contact EP

> 50 kg - treat as per adult protocol

Ibuprofen:
10 mg/kg PO q6-8 hr prn (max 400 mg)

Acetaminophen:
10 mg/kg PO q4-6 hr prn (max 500 mg)

Ketorolac:
0.5 mg/kg IV/IO/IM (max 15 mg)

Dimenhydrinate:
1 mg/kg IM/IV/IO q6-8 hr prn (max 50 mg) or
1 mg/kg PO q6-8 hr prn (max 50 mg)

Morphine:
0.1 mg/kg IV/IO q5 min (max 3 doses in 30 min) repeat q2-4 hr or
0.1 mg/kg IM q30 min (max 3 doses)

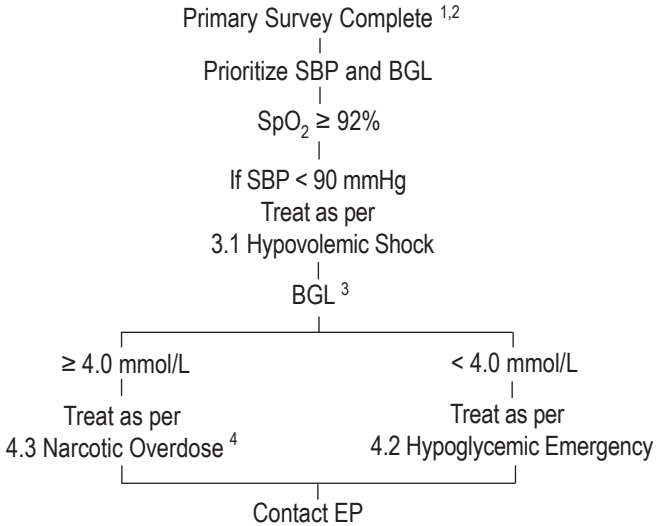
Ketamine:
0.3 mg/kg IV/IO or 0.5 mg/kg IM

SECTION 4 – MEDICAL PROTOCOLS

4.1 Altered LOC – NYD

Indications

◊ For patients presenting with a decreased LOC.



REFER TO 8.6 PEDIATRIC TABLES

PEDIATRIC

Pediatric fluid replacement - treat as per 3.1 Pediatric Hypovolemic Shock.

Naloxone:

< 20 kg - 0.1 mg/kg IV/IM/IO prn q5 min (max doses 2 mg)

20-50 kg - 2 mg IV/IM/IO prn q5 min

1. Causes of altered LOC may include Alcohol, Epilepsy, Insulin, Overdose, Uremia, Trauma, Infection, Psychological, and Stroke (**AEIOUTIPS**). AMS, hypoxia, and hypothermia should also be considered.
2. Check pupils, check for a medical alert bracelet and S/S for stroke.
3. If glucose > 20 mmol/L Contact EP – high risk of DKA (Diabetic Ketoacidosis) or HHS (Hyperosmolar Hyperglycemia State). Urinary output will remain high even if patient is hypovolemic.
4. Naloxone has a shorter half life than most narcotics, so recurrent symptoms may require repeat dosing. Consider escalating dosing if strong suspicion of narcotic overdose and initial dosage of naloxone ineffective.

4.2 Hypoglycemic Emergency

Indications

◊ For patients with known or suspected hypoglycemia.

◊ Blood glucose < 4.0 mmol/L.[1]

Primary Survey Complete [2]

↓

Prioritize BGL

↓

Oral glucose PO [3] (if conscious)

OR

$D_{50}W$ 12.5 g (25 ml) IV (repeat x 1 if BGL < 4.0 mmol/L) [4,5]

or

$D_{10}NS$ 12.5 g (150 ml) IV (repeat x 1 if BGL < 4.0 mmol/L)

↓

If no IV access

Glucagon (BAQSIMI™) 3 mg IN [6] q5 min prn (max 2 doses)

↓

If IV access, consider RL or $D_{10}NS$ @ 100 ml/hr IV prn [7,8]

or IV lock

↓

Oral glucose / food for alert patient prn

↓

Recheck BGL prn

↓

Contact EP

PEDIATRIC: See notes on next page.

REFER TO 8.6 PEDIATRIC TABLES

PEDIATRIC

D_{10}NS:

5 ml/kg (max 150 ml) repeat x1 if BGL < 4.0 mmol/L

Consider syringe boluses to control volume delivered precisely.

If no IV access

Glucagon (BAQSIMI™):

≥ 4 YOA 3 mg IN

< 4 YOA Contact EP

Pediatric fluid replacement – treat as per 3.1 Pediatric Hypovolemic Shock.

Nausea - treat as per 5.6 Nausea / Motion Sickness.

---

1. If BGL ≥ 4.0 mmol/L treat as per 4.1 Altered LOC-NYD Protocol.
2. Check pupils, check for a medical alert bracelet and S/S for stroke.
3. Post oral glucose administration if patient BGL improves IV not required.
4. Do not administer D_{50}W IV to pediatric patients. Maximum dextrose concentration for pediatric patients is D_{10}.
5. D_{10}NS is D_{50}W (25 g) in 250 ml NS.
6. Glucagon often causes nausea and vomiting. Treat as per 5.6 Nausea / Motion Sickness.
7. BGL ≥ 4.0 oral intake is preferred.
8. D_{10}NS 100 ml/hr option until complete. (300 ml max dose).

4.3 Narcotic Overdose (Suspected)

Indications

◊ Decreased LOC in an adult with a history that suggests narcotic overdose and respiratory depression.[1]

Precautions

◊ Watch for acute withdrawal in narcotic-dependent patients.

Primary Survey Complete [2]
|
Prioritize SBP and BGL
|
Naloxone 0.8 mg IM q5 min [3]
Initiate IV
or
Naloxone 0.4 mg IV/IO q2-3 min
|
SBP < 90 mmHG
|
RL 500 ml IV/IO bolus prn
Titrate to achieve SBP ≥ 90 mmHg
|
Continue assessment/treatment
|
If no improvement to GCS
|
Naloxone 0.4 mg IV/IO q2 min prn [4]
|
No Improvement
|
Treat as per
4.1 Altered LOC – NYD
|
RL 100 ml/hr IV/IO
or IV lock
|
Contact EP

PEDIATRIC: See notes on next page.

REFER TO 8.6 PEDIATRIC TABLES

PEDIATRIC

Pediatric fluid replacement – treat as per 3.1 Pediatric Hypovolemic Shock.

Naloxone:
< 20 kg - 0.1 mg/kg IV/IM/IO prn q5 min (max doses 2 mg)
20-50 kg - 2 mg IV/IM/IO prn q5 min
> 50 kg - use adult treatment protocol

1. Narcotic medications include (but are not limited to) Codeine, Fentanyl, Hydrocodone, Hydromorphone, Methadone, Morphine, Oxycodone, Oxymorphone, and Meperidine.
2. Check pupils, check for a medical alert bracelet and S/S for stroke.
3. IV/IO is the preferred method of administration if available. IM route may be more practical for initial dosage. If SBP less than 90 mmHg IM, absorbtion may be delayed – consider IV/IO.
4. Naloxone has a shorter half life than most narcotics, so recurrent symptoms may require repeat dosing. Consider escalating dosing if initial dosage of naloxone ineffective.

4.4 Seizure

Indications

◊ Witnessed, prolonged seizure activity with or without respiratory compromise.[1]

Primary Survey Complete [2]
|
Prioritize BGL
|
BGL < 4 mmol/L, treat as per 4.2 Hypoglycemic Emergency
|
Midazolam 10 mg IM/IV/IO q5 min (max 30 mg) [3]
or
Midazolam 10 mg IN (5 mg each nostril) q10 in (max 20 mg)
|
RL 100 ml/hr IV/IO or IV lock
|
Recheck Glucose [4]
|
Consider Lorazepam 1-2 mg SL (max 6 mg per day)
for delayed or long transport [5]
|
Contact EP

REFER TO 8.6 PEDIATRIC TABLES

PEDIATRIC

2 MOA and ≤ 50 kg
Midazolam 0.1 mg/kg IV q5 min (repeat x 1 prn) or
0.2 mg/kg IM q5 min (repeat x 1 prn)
or
0.2 mg/kg IN q 10 min (max 5 mg/nare) (repeat x 1 prn)
> 50 kg Treat as per adult protocol
Contact EP if seizure persists
If BGL < 4 mmol/L with symptoms, treat as per Hypoglycemic Emergency

1. As most seizures are self-limiting, only those that are prolonged or cause respiratory distress need to be treated. Status epilepticus is defined as a seizure lasting 5 minutes or more or recurrent seizure activity without recovery between seizures. Early treatment in 3.2 TBI is urgent.
2. Check pupils, check for a medical alert bracelet and S/S for stroke.
3. If IV already in place, IV should be used as primary route.
4. Even if glucose is not initially low, it can become low by this point due to the energy expenditure caused by the seizure.
5. Continuing seizure may be due to a number of causes including hypoglycemia, drug withdrawal, or head injury. Consider febrile seizures especially in pediatric patients 6 months to 6 years.

4.5 Antibiotic

Urgent Indications

◊ Penetrating eye injury. [1]

◊ If sepsis is suspected contact EP with critical history and baseline vitals. Sepsis is caused by a serious infection. Early and appropriate antibiotic coverage is essential.

Indications

◊ Open wounds with obvious surface contamination and delayed transit times (>2hrs). This includes open fractures, open wounds, penetrating injuries to the thoracic cavity.

◊ Abdominal injury with suspected/known hollow viscus injury.

Contraindications

◊ Hypersensitivity to specific antibiotics.

◊ Do not give moxiflaxacin (fluoroquinolone) drugs to person under 18 YOA. [2]

◊ Do not give cefoxitin if penicillin or cephalosporin allergy.

Primary Survey Complete [3]
|
If able to tolerate PO medication [4]
Moxifloxacin 400 mg PO q24 hr
OR
If not able to tolerate PO meds
Cefoxitin 2 g IV (over 5 min) or IM [5] q8 hr
OR
Clindamycin 600 mg/250 ml NS IV (over 30 min) q8 hr [6]
or
Clindamycin 600 mg IM q 8 hr [7]
|
Monitor patient
|
Consider RL 100ml/hr
or IV lock

PEDIATRIC: See notes on next page.

REFER TO 8.6 PEDIATRIC TABLES

PEDIATRIC > 1 MOA

Cefoxitin:
30 mg/kg IV (over 5 min) (max 1 g) or IM [6] q8 hr or

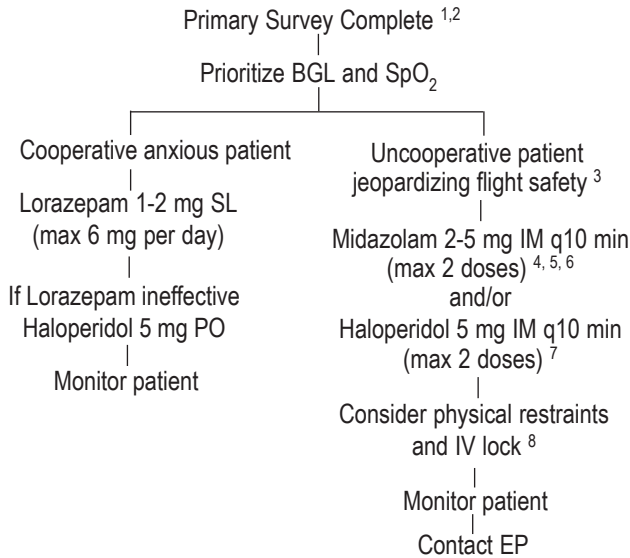
Clindamycin:
5 mg/kg IV (over 30 min) or IM q8 hr (max 600 mg)

1. Antibiotics should be given ASAP and preferably within 60 minutes of penetrating eye trauma.
2. All end in "floxacin" s: ciprofloxacin, levofloxacin, norfloxacin, ofloxacin, gatifloxacin and besfloxacin.
3. Burns, if transport greater than 2 hrs contact EP to discuss treatment.
4. PO medication may be given with small amount of fluid even if surgery is anticipated.
5. IV administration is preferred. IM administration, when required, should be into large muscle masses.
6. Penicillins all end in "cillin" such as amoxicillin (Amoxil, Clavulin). All Cephalosporins start with "Ceph" or "Cef" such as Cephalexin (Keflex), Cefazolin (Ancef) or cefixime (Suprax).
7. Clindamycin is the alternative to Cefoxitin where a patient is allergic to Penicillin and cannot take moxifloxacin.

4.6 Agitated Patient

Indications

- ◊ Uncooperative, uncontrollable adult, threatening to harm themselves, others, **or** otherwise jeopardizing flight safety.
- ◊ Cooperative anxious patient.



1. Rule out underlying causes that may include tension pneumothorax, head injury, hypoglycemia, hypotension, drug/alcohol problems, postictal confusion and hypoxia.
2. Check pupils, check for a medical alert bracelet and S/S for stroke.
3. If patient > 60 years, consider using ½ dose with Haloperidol, Midazolam, and Lorazepam. This population is more susceptible to side effects.
4. If IV in place then consider Midazolam 1 mg IV q5 min (max 3 doses) unless further ordered by physician.
5. Midazolam is the first choice for intoxicated agitated patient. Higher doses than usual may be required. Haloperidol may be added if the situation requires but there is a higher chance of side effect. Monitor closely.
6. Midazolam and Haloperidol are compatible when combined in the same syringe. Consider this with uncooperative patients.
7. Always be prepared to administer Diphenhydramine 25-50 mg IV/IM in case of emergence of extra-pyramidal symptoms. Haloperidol lowers seizure threshold.
8. In highly uncooperative patients, Midazolam and Haloperidol should be delivered from the same syringes as one IM injection if no IV access available. Ideally multiple people should hold patient in place for IM injection; one for the head and one for each extremity. Chemical restraint should be only be considered when all other means of de-escalation have failed.

Notes:

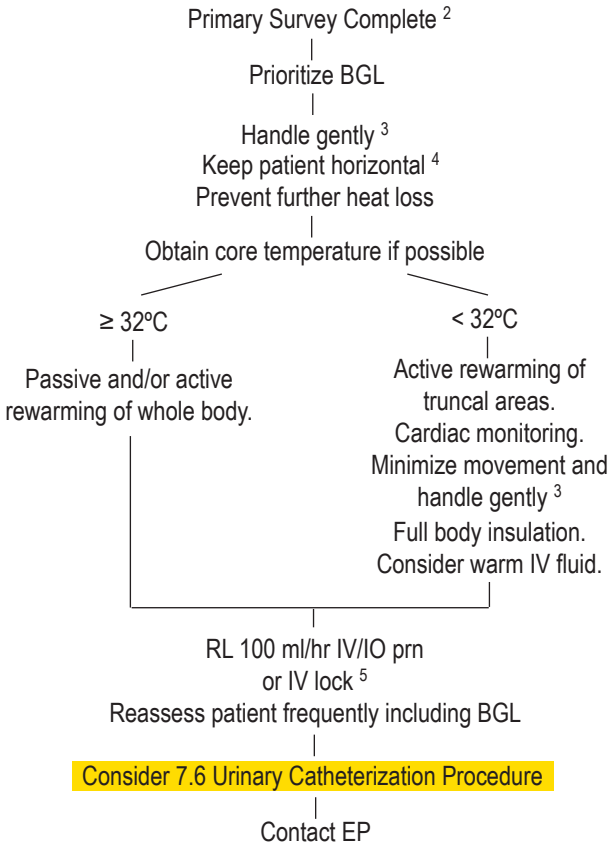
SECTION 5 – ENVIRONMENTAL PROTOCOLS

5.1 Hypothermia

Indications

◊ Core body temperature <35ºC or patient with S & S of hypothermia in an appropriate clinical setting. [1]

◊ Trauma



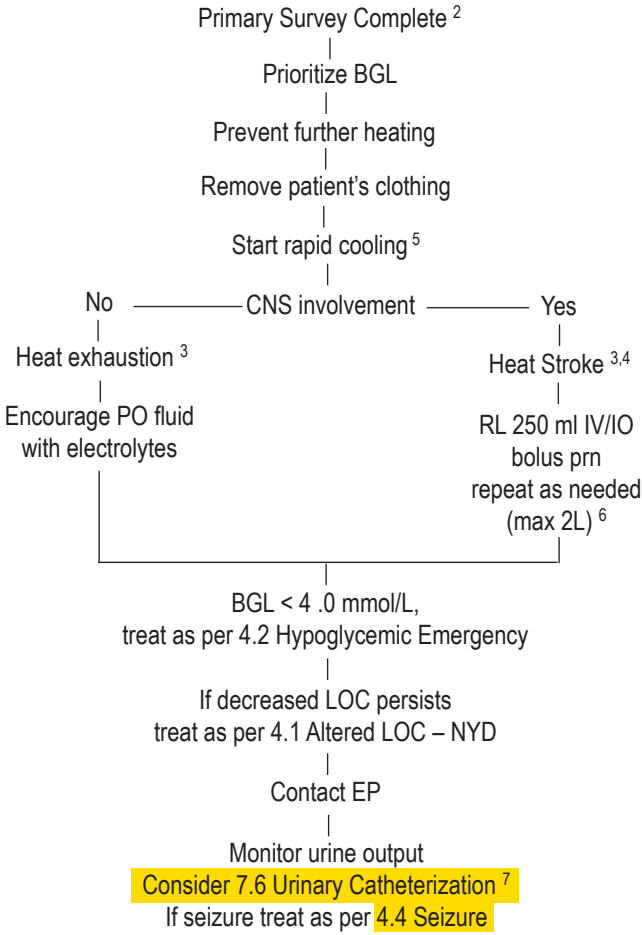
1. A Degrees of Hypothermia:
   - Mild (32–35°C) Shivering, normal HR, normal RR, vasoconstriction (cold extremities), apathy, slurred speech, ataxia, impaired judgment ("paradoxical undressing").
   - Moderate (28–32°C) Altered LOC, decreased HR, decreased RR, dilated pupils, NO SHIVERING.
   - Severe (< 28°C) Coma, apnea, asystole, nonreactive pupils.

   Also consider hypothermia following trauma, IV administration, unconsciousness for an extended period, near drowning, and in the clinical settings of CVA, AMS, drug overdose, alcohol intoxication, and dehydration.
2. Ventilate the non-breathing, severely hypothermic patient at a rate of 8-10 resps/min. Take 45 seconds to determine pulselessness at carotid in the severely hypothermic patient prior to starting chest compressions.
3. Patients with core body temperature below 32°C should be handled and moved gently as they are susceptible to cardiac dysrhythmia including ventricular fibrillation.
4. If core temperature < 35ºC then horizontal position will minimize work load on cold heart.
5. If IV fluid resuscitation is used, IV fluid should be warmed utilizing IV fluid warmer.

5.2 Hyperthermia

Indications

◊ Core body temperature >40ºC or symptoms consistent with Hyperthermia in an appropriate clinical setting.[1]



1. May occur at moderate temperature with exertion and/or high humidity.
2. Ventilate the non-breathing, severely hyperthermic patient at a rate of 8-10 resps/min.
3. **Heat cramps:** Involuntary muscle spasms most often affect calves, arms, abdominal muscles and back.

   Heat exhaustion: Nausea; Muscle cramps; Headache; Feeling faint; Fatigue; Pale/cool/clammy skin; Heavy sweating.

   Heat stroke: Core body temperature >40ºC; Confusion; Irrational behaviour (or delirium); Tachycardia initially than bradycardia late; Hypotension; Rapid and shallow breathing; Dry or wet hot skin; No sweating; Loss of consciousness; Seizures and Coma.
4. A heat stroke casualty requires immediate evacuation whereas a casualty with heat exhaustion may be delayed after consultation with EP.
5. Cooling methods are dependent on available resources. Wet patient with water, fan dry and repeat. If cold/ice packs are available, pack in groin/axilla/neck. Rapid cooling reduces morbidity and mortality. Initiate ASAP before transport.
6. Exertional hyperthermia usually has a component of dehydration. However, too much IV fluid can also be detrimental after total 2 L RL boluses contact EP for further direction.
7. Perform 7.6 Urinary Catheterization Procedure if patient is not fully conscious.

5.3 Decompression Illness

Indications

◊ Patient with symptoms suggestive of decompression illness (DCI) including arterial gas embolism (AGE) and/or Decompression sickness (DCS) and/or patients with a history of : SCUBA diving, rapid decompression or exposure to extreme altitude within 48 hours of the onset of symptoms that cannot be fully explained by incurred trauma or a previously known medical problem.[1]

Primary Survey Complete

↓

Prioritize BGL

↓

SpO_2 100% [2]

↓

Treat all life-threatening medical conditions [3]

↓

Document 8.4 Rapid Neurologic Assessment

↓

RL 500 ml IV bolus

↓

Consider RL 100 ml/hr IV
or IV lock

↓

Keep patient warm/comfortable in supine position

↓

Initiate transport to nearest hyperbaric chamber [4, 5]

↓

Contact EP [6]

1. Decompression Illness (DCI) includes both decompression sickness (DCS) and Arterial Gas Embolism (AGE). Both conditions are treated in the same fashion and symptoms may include joint pain, skin mottling, headache, visual disturbance, numbness, weakness, paralysis, confusion, vertigo, SOB, cough, chest pain, and/or loss of consciousness.
   - **Arterial Gas Embolism (AGE) –** Generally presents immediately or within 5-10 min of surfacing. Most commonly results in: LOC; Neurologic deficits or confusion; Chest pain; Shortness of breath may also be present. It requires immediate treatment in a recompression chamber.
   - **Decompression Sickness (DCS) –** Generally severe symptoms will present within 1-3 hrs of decompression, and most symptoms will present within 24hrs (further decompression via altitude exposure may lengthen these timelines). The most common presenting symptoms are: Joint pain; Paresthesia; Skin rash or swelling. Less common but more severe signs can include: Neurologic deficits; Vertigo; Shortness of breath; Chest pain.
2. Focus on oxygenation to achieve highest possible O_2.
3. In addition to DCI, life threatening medical conditions associated with SCUBA diving include myocardial infarction, bronchospasm & asthma exacerbation, pneumothorax, trauma, hypoglycemia and hypothermia.
4. Maintain cabin pressure at sea level if possible or at lowest possible altitude.
5. Divers Alert Network (DAN) Emergency Hotline (919) 684-9111 has a list of chambers.
6. If unable to contact EP, contact Advanced Diving MO/Hyperbaric Physician or Flight Surgeon.

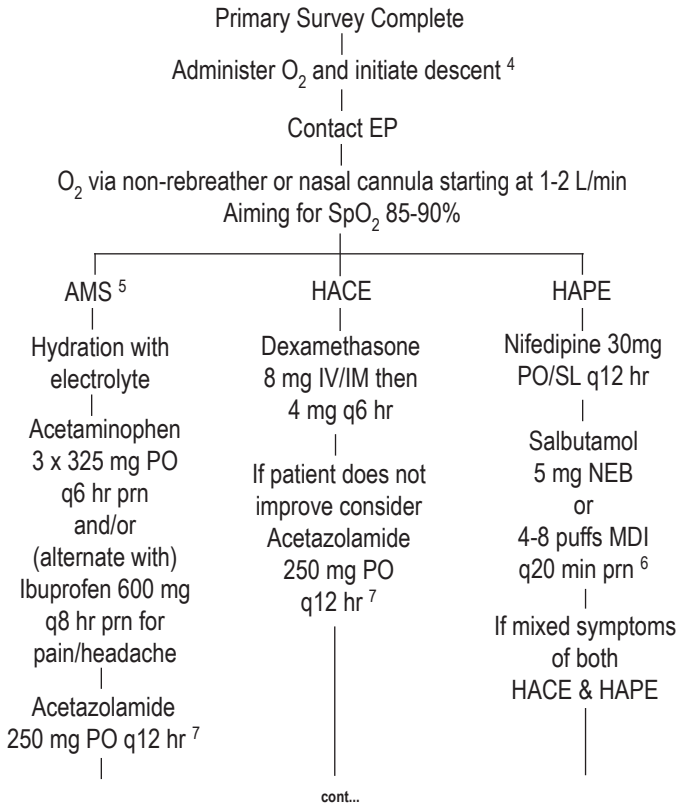
5.4 High Altitude Illness

Indications

- ◊ Exposure to altitude in excess of 6500ft (2000m) and signs or symptoms of Acute Mountain Sickness (AMS)[1], and/or High Altitude Cerebral Edema (HACE)[2], and/or High Altitude Pulmonary Edema (HAPE)[3].
- ◊ Between altitude of 6500ft (2000m) and 8000ft (2500m) strongly consider other cause of symptoms including infectious diseases, dehydration, electrolytes disturbance, etc.

Precautions

- ◊ Patients in hypovolemic and/or cardiogenic shock.
- ◊ Consult with physician prior to giving Acetazolamide in patients with sulfa or penicillin allergies.



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...cont.

If moderate to severe symptoms of AMS or not responding to treatment

Consider Dexamethasone 4 mg IV/IM q6 hr

Consider Dexamethasone 8 mg IV/IM then 4 mg q6 hr

If nausea treat as per 5.6 Nausea / Motion Sickness

Consider 7.6 Urinary Catheterization Procedure if not voiding

Monitor vitals and urinary output

REFER TO 8.6 PEDIATRIC TABLES

PEDIATRIC

Acetazolamide:
2.5 mg/kg PO twice a day
Dexamethasone:
0.15 mg/kg IV/IM/PO q6 hr

1. Signs and symptoms of AMS include the presence of headache and anorexia, nausea, vomiting, fatigue, weakness, dizziness, lightness, or difficulty sleeping in the setting of recent gain of altitude.
2. Signs and symptoms of HACE include mental status changes (disorientation, psychotic or bizarre behaviour, memory loss), loss of coordination/ataxia, coma. Pt may exhibit signs of urinary retention and require catheterization. HACE is a medical emergency requiring immediate descent if possible.
3. Signs and symptoms of HAPE include SOB at rest, cough, weakness/ decrease exercise performance, chest tightness/congestion, frothy sputum, and feeling of impending suffocation during sleep.
4. Descend to below 6500ft (2000m) ASL. If not able to descend this much a descent of as little as 1500-3000ft (500-1000m) may be sufficient. If immediate descent is not available, treat on scene. Pulmonary edema or neurologic signs (decrease LOC or ataxia) are reasons for emergency descent. Consider hyperbaric treatment with Gamow bag if available and unable to descend.
5. Refer to 8.12 Lake Louise Score table reference for severity assessment.
6. If available and patient load permit administer by MDI/space (BVM with MDI adapter): 4-8 puffs (100 mcg MDI) q20 min prn for symptoms otherwise use NEB meds. Frequency of dosing may be adjusted IAW symptoms and onset of adverse effects. However, at least q6 hr is usually required to control symptoms. All nebulizer doses must be in no less than 5 ml total fluid volume.
7. If immediate descent not possible.

5.5 High Altitude Illness – Rescuer Prophylaxis

Indications

◊ When possibility of rapid ascent is being considered as part of the Rescue.

◊ When possibility of insertion greater or equal than 8000ft (2500m) with prolonged stay or descent by foot, consider the following prophylaxis.[1]

Contact EP prior to initiation of prophylaxis

|

1 day before ascent: [2]
Acetazolamide 125 mg PO q12 hr,
Ibuprofen 600 mg PO q8 hr with food and
continue until descending

|

On the day of ascent:
Dexamethasone 4 mg q12 hr continue until descending [3,4]

|

Dimenhydrinate 50 mg every 4 hrs prn for nausea
Acetaminophen 1 g q6 hr prn for headache/pain

1. For aircraft planned descent, rescuer to have medication available in case extraction not possible.
2. Or when mission departure confirmed.
3. Not to be used for more than 10 days.
4. If rescuer(s) experience any symptoms of HACE descend immediately.

5.6 Nausea / Motion Sickness

Indications

◊ For patients experiencing nausea due to medical or medication causes.

◊ For patients or passengers exhibiting S/S of motion sickness. [1]

Primary Survey Complete

↓

Alcohol swab sniff

↓

Dimenhydrinate 50-100 mg PO q4-6 hr prn [2,3]

↓

If unable to tolerate PO medications give
Dimenhydrinate 50-100 mg IM q4-6 hr prn [2,3]
or
Dimenhydrinate 25-50 mg IV q4-6 hr prn

↓

Consider RL 100 ml/hr IV/IO prn
or IV lock

REFER TO 8.6 PEDIATRIC TABLES

PEDIATRIC > 2 YOA
Dimenhydrinate:
> 50 kg - 50 mg PO q4-6 hr prn
< 50 kg - 1 mg/kg IM/IV/IO q6-8 hr (max 50 mg)
If unable to tolerate PO medication
1 mg/kg IM/IV/IO q6-8 hr (max 50 mg) [4]

1. Signs and symptoms of motion sickness include malaise, warmth, flushing, salivation, swallowing, headache, abdominal awareness or discomfort, lethargy, apathy, nausea, pallor, sweating, retching, and/or vomiting.
2. Motion sickness medications are not approved for use by CF aircrew.
3. > 60 years – ½ the dose of dimenhydrinate.
4. Not to be repeated except on the advice of a physician.

5.7 HIV Post Exposure Prophylaxis (PEP) SAR Tech Use

Indications

◊ Management of significant exposure to fluids capable of transmitting HIV [1,2,3] on the order of a physician (preferably a CF Flight Surgeon, but consult most available physician to avoid unnecessary delays).

◊ The PEP starter kit is for SAR Tech use only (i.e. do not give to patients except on order of physician).

Immediate Assessment/Actions to be taken:

Upon exposure, contaminated clothing should be removed to allow bleeding of the wound. The affected area should then be washed with soap and water. If the eyes, nose or mouth are involved, they should be flushed with copious amounts of water. Prophylactic medications should be initiated quickly (preferably within 2 hours) after significant exposure.

Primary Survey Complete

|

Prophylactic treatment should generally be initiated within 2 hours post-exposure.

Ensure source patient's identifying information and location is recorded.

Ask patient if they have HIV or hepatitis and if so have they been treated (Patient has right to refuse answering)

|

Specific treatment will be as per physician order which will likely include: [4]

Raltegravir (Isentress) 400mg PO BID [5] and

Tenofovir and emtricitabine (Truvada) PO Once Daily [5]

(tenofovir 300 mg and emtricitabine 200mg)

|

Report to nearest physician on completion of mission whether or not PEP drugs taken [6] and for full post exposure assessment including for other bloodborne pathogens. (Eg. Hepatitis)

|

Complete CF 98

and occurrence forms

1. Significant exposure to blood-borne viruses include infectious fluid exposure through a penetrating injury (e.g. needle-stick, bite with broken skin), non-intact skin (e.g. abrasion) or mucous membrane (eyes, nose, mouth).
2. Infectious fluids include any blood, semen, CSF, amniotic fluid, peritoneal fluid, synovial fluid, inflammatory fluid or exudate, breast milk, vaginal secretions, or tissues and organs.
3. Non-infectious fluids (unless visibly contaminated with blood) include stool, urine, tears, nasal secretions and vomitus. No PEP or MO follow-up required for exposure to these fluids. Must see MO if have significant exposure to saliva as it can transmit Hepatitis B.
4. The medications will be carried for immediate administration. The medications will be adjusted periodically in order to achieve best possible treatment results.
5. With food if possible.
6. Physician will assess risk of HIV, Hepatitis B, and C and need for prophylaxis.

Notes:

SECTION 6 – DRUG MONOGRAPHS

***** If any of the liquid medications are frozen and then thawed, those medications should be replenished and returned to the pharmacy when you RTB.

6.1 Acetaminophen (Tylenol, Atasol, Tempra) – Analgesic.

Indications: 3.5 Pain, 5.4 High Altitude Illness, 5.5 High Altitude Illness – Rescuer Prophylaxis.

Contraindications: Hypersensitivity to acetaminophen, known G6PD deficiency (inherited condition) or liver failure.

Precautions: May cause severe liver toxicity in overdose. Use cautiously in patients with alcoholic liver disease. Excessive alcohol intake can increase risk of acetaminophen-induced liver toxicity.

Adverse effects: Uncommon, as < 1% patients experience any adverse effects.

Pharmacology: Onset of action < 1 hr; peak effect (oral dosing) 10-60 min; half-life 1-3 hrs; duration of action 4-6 hrs.

Dosage and administration:

◊ Adults/Children > 50 kg:

- Pain 325-650 mg PO q4-6 hr prn.
- High altitude illness 3 x 325 mg PO q6 hr prn.
- Max 3000 mg.

◊ Pediatric < 50 kg: 10 mg/kg PO q4-6 hr prn (max 500 mg) (max 2500 mg/day)

6.2 Acetazolamide (Diamox)

Indications: 5.4 High Altitude Illness, 5.5 High Altitude Illness – Rescuer Prophylaxis.

Contraindications: Hypersensitivity to acetazolamide, sulfonamides, or penicillin. History of liver disease (see Precautions), or severe kidney dysfunction.

Precautions: Use in impaired liver function may result in coma. May cause hyperglycemia. Consult EP if history of allergy to: sulfonylureas, penicillin, thiazide diuretics (hydrochlorothiazide, indapamide, metolazone, chlorthalidone), and loop diuretics (furosemide, ethacrynic acid). Avoid the use of acetazolamide if previous reaction was severe.

Adverse effects: More than 10% of individuals will experience malaise, unusual drowsiness or weakness, nausea, vomiting, diarrhea, metallic taste, polyuria, numbness, tingling, or burning in hands, feet, fingers, toes, mouth, lips, tongue, or anus. Convulsions and/or hyperglycemia have been noted in less than 1% of individuals.

Pharmacology: Time to peak effect = 1-4 hours; t½ (half-life) = 2.4-5.8 hours; duration of action = 8-12 hours.

Dosage and administration:

- ◊ AMS/HACE: 500 mg PO initially followed by 250 mg PO q12 hr.
- ◊ Prophylaxis: 125-500 mg PO q12 hr for un-acclimatized rescuers working at high altitudes. Generally should start taking 48 hrs prior to ascent and continue as needed. For rapid ascent, 500 mg PO q12 hr is recommended.

6.3 Acetylsalicylic Acid (ASA, Aspirin) – Cardiac Antiplatelet Agent. (NSAID)

Indications: 1.1 Cardiac Chest Pain.

Contraindications: Hypersensitivity to ASA or other anti-inflammatories, bleeding disorder or active gastrointestinal bleeding. Not for use in children (< 12 YOA) (Reyes syndrome).

Precautions: Patients with a history of asthma and/or nasal polyps.

Adverse effects: Mainly gastrointestinal complaints, nausea and heartburn.

Pharmacology: Onset of action 5 to 30 min; duration 4 to 6 hrs; peak effect 15 min to 3 hrs; half-life 2 to 3 hrs; duration of action 7 days; Inhibits platelets for approx. 7 days.

Dosage and Administration:

◊ Chewable ASA 162 mg PO (single dose only).

Note: If cardiac is ruled in, you do not require a complete set of vitals signs for administration of ASA.

6.4 Bacitracin & Polymyxin B (Polysporin, Polytopic) – Antibiotic.

Indications: Infected minor wounds.

Contraindications: Hypersensitivity to either component.

Precautions: Application to extensive open areas of skin may increase systemic absorption.

Adverse effects: Rash and pruritis.

Pharmacology: Onset of action < 10 min; half-life 6 to 12 hrs; topical cream duration of action 12 hrs.

Dosage and administration:

◊ Apply topically to affected areas 3-4 times daily.

6.5 Cefoxitin – Antibiotic.

Indications: 4.5 Antibiotic.

Contraindications: Hypersensitivity to cephalosporins and/or penicillins.

Precautions: Review with EP before using in patients with history of penicillin allergy, especially anaphylaxis or urticaria.

Adverse effects: Diarrhea and mild headache. Rash, urticaria and/or pruritis are manifestations of allergic reactions which can be severe or precede anaphylaxis.

Pharmacology: Onset of action 15 to 20 min IM; peak effect 20 to 30 min; half-life approx 1 hr; duration of action 12 hrs.

Dosage and administration:

◊ Adults:
- 2 g/10 ml NS/RL (over 2 min).
- 2 g/250 ml NS/IV (8 drops/sec).
- 2 g/4 ml IM (max 1 g/large muscle).

◊ Pediatric (>1 MOA):
30 mg/kg in 10 ml NS or RL IV over 5 min (max 1g)
or
30 mg/kg in 2 ml NS or RL (larger muschle) (max 1 g)

Note: Cefoxitin and Ringers Lactate are compatible.

6.6 Clindamycin (Dalacin-C) – Antibiotic.

Indications: 4.5 Antibiotic.

Contraindications: Hypersensitivity to clindamycin, liver impairment. Do not use in infants < 1 month old (neonates).

Precautions: Use with caution in patients with history of Ulcerative Colitis or Crohn's.

Adverse effects: Hypotension, nausea, vomiting, diarrhea and abdominal pain, urticaria and rashes, thrombophlebitis, irritation at injection site.

Pharmacology: Onset of action 30 min; peak effect (IM) 1-3 hr; half-life 1.6-5.3 hr (average 2-3 hr); duration of action 8 hrs.

Dosage and administration:

◊ Adults: 600 mg IM q8 hr or
600 mg/250 ml NS over 30 min (1 drop/sec)

◊ Pediatric (> 1 MOA): 5mg/kg IV over 30 min (1 drop/sec) or IM (max 600 mg).

Note: Clindamycin and Ringers Lactate are compatible.

6.7 Dexamethasone (Decadron, Dexasone) – Steroid.

Indications: 2.1 SOB with History of Asthma/COPD, 2.2 Anaphylaxis/ Anaphylactic Shock, 5.4 High Altitude Illness, 5.5 High Altitude Illness – Rescuer Prophylaxis.

Contraindications: Hypersensitivity to dexamethasone.

Precautions: Use cautiously in patients with diabetes or history of peptic ulcer.

Adverse effects: Nausea, vomiting, insomnia, nervousness, euphoria, hyperglycemia, arthralgia, epistaxis.

Pharmacology: Onset of action 30-60 min; peak effect (oral) 1-2 hrs, (IM) ≈ 8 hrs; half-life 1.8-3.5 hrs; biological t½ 36-54 hrs; duration of metabolic action 72 hrs.

Dosage and administration: IV/IM for patients unable to swallow the oral tablets.

◊ Asthma and anaphylaxis by physician order. Adult dose:
- 8 mg IV/IM (over 2 min) or
- 8 mg/250 ml NS IV (over 10 min),
- Then 4 g IV/IM q 6 hr.

◊ HACE: 10 mg IV/IM initially followed by 4 mg IV/IM q6 hr.

◊ AMS: 4 mg IV/IM q6 hr.

◊ Pediatric: 0.6 mg/kg IV/IM once (max 8 mg).

6.8 Dextrose – Glucose. $D_{50}W$ or $D_{10}NS$

Indications: 3.3 Burns, 4.2 Hypoglycemic Emergency, 4.4 Seizure, 7.2 Prolonged Casualty Care – HITMAN.

Contraindications: Hyperglycemia

Do not administer $D_{50}W$ IV to pediatric patients.

Precautions: Contact EP before administering to a patient with suspected head injury. Interstitial dextrose is extremely damaging to tissues.

Adverse effects:

Pharmacology: Onset of action < 10 min for hypoglycemia; peak effect < 10 min; half-life 30-40 min; duration n/a.

Dosage and administration:

◊ Adult:

$D_{50}W$ - 12.5g/25ml (half ampule) IV/IO

or

$D_{10}NS$ - 12.5g/150ml IV/IO (may repeat x 1 if BGL remains <4.0mmol/L) then maintenance $D_{10}NS$ 100ml/hr (max 300 ml)

or

If no IV access (>4 YOA) Glucagon (Baqsimi) 3 mg IN (may repeat x 1 if BGL remains <4.0 mmol/L)

◊ Pediatric: D_{10} NS

5 ml/kg IV/IO (max 150 ml) repeat x 1 if BGL < 4.0 mmol/L.

Consider syringe boluses to control volume delivered precisely.

6.9 Dimenhydrinate (Gravol) – Anti-Emetic.

Indications: 1.1 Cardiac Chest Pain, 3.2 Traumatic Brain Injury (TBI), 3.5 Pain, 4.2 Hypoglycemic Emergency, 5.4 High Altitude Illness, 5.5 High Altitude Illness – Rescuer Prophylaxis, 5.6 Nausea/Motion Sickness.

Contraindications: Hypersensitivity to dimenhydrinate, do not administer to children < 2 YOA.

Precautions: Overdose can cause seizure or respiratory depression. Be prepared to assist ventilations or initiate 4.4 Seizure Protocol.

Adverse effects: drowsiness, dizziness, lassitude, excitement (children), dry mouth, nausea.

Pharmacology: Onset of action 20-30 min IM; peak effect 15-30 min PO; half-life unknown; duration 3-6 hrs.

Dosage and Administration:

◊ Adults:

- 25-50 mg (diluted in RL to a total of 10 ml) IV/IO over 2 min
- 50-100 mg IM or 50-100 mg PO q4-6 hr prn. Maximum dose 400 mg in 24 hrs.

◊ > 60 years – ½ the dose of dimenhydrinate.

◊ Pediatric:

1 mg/kg IM/IV/IO q6-8 hr prn (max 50 mg) (400 mg/day) or

1 mg/kg PO q6-8 hr prn (max 50 mg) (400 mg/day)

6.10 Diphenhydramine (Benadryl, Allerdryl, Allernix) – Antihistamine.

Indications: 2.2 Anaphylaxis/Anaphylactic Shock, 4.6 Agitated Patient.

Contraindications: Hypersensitivity to diphenhydramine or acute asthma. Do not use in neonates.

Precautions: Use with caution in patients with angle-closure glaucoma, patients with urinary obstructions, elderly, and may cause paradoxical excitation in children.

Adverse effects: Hypotension, tachycardia, palpitations, drowsiness, dizziness, coordination difficulties, headache, nervousness, paradoxical excitement, insomnia, euphoria, confusion, nausea, vomiting, diarrhea, dry mouth and mucous membranes, urinary retention, urinary frequency, difficulty urinating, tremor, paresthesia, blurry vision.

Pharmacology: Onset of action 15-30 min; peak effect 2 hrs; half-life 5 hrs child, 9 hrs adult; duration 10-12 hrs.

Dosage and administration:

Anaphylaxis/anaphylactic shock:

◊ Adults: 25-50 mg IV/IM q2-4 hr prn (max 400 mg/day).

◊ Pediatric: 1 mg/kg IM/IV/IO q6-8 hr (max 50 mg) or 1 mg/kg PO q6-8 hr (max 50 mg)

Agitated Patient: (to reverse extra-pyramidal symptoms)

◊ Adults: 25-50 mg IV/IM q2-4 hr prn.

6.11 Epinephrine (Adrenaline, Epipen, Epipen Jr) – Beta-Adrenergic Agonist.

Indications: 2.1 SOB with a History of Asthma/COPD, 2.2 Anaphylaxis/ Anaphylactic Shock.

Contraindications: There are no contraindications to giving epinephrine for a life threatening allergic response such as anaphylaxis.

Precautions: Use with caution in elderly, diabetes mellitus, cardiac arrhythmias, cardiovascular disease or thyroid disease. Watch for tachycardia and hypertension, which may compromise a patient with poor cardio-pulmonary reserve. Be prepared to go to 1.1 Cardiac Chest Pain Protocol.

Adverse effects: Tachycardia, arrhythmias, angina, flushing, anxiety, tremor, headache, dizziness, nausea and vomiting (in children), dry mouth, acute urinary retention in patients with bladder outflow obstruction, weakness and trembling, wheezing and dyspnea, and increased diaphoresis.

Pharmacology: Onset of action 5-10 min (IM); peak effect 15-20 min; half-life confirm with Pharmacy; duration 4 hrs.

Dosage and administration:

◊ Adults: Epinephrine 0.5 mg IM q5 min (max 3 doses).

◊ Pediatric: Epinephrine 0.01 mg/kg (Max 0.3 mg) IM q5 min (max of 3 doses).

Note: The preferred site for administration of Epinephrine IM is in the thigh (use the shoulder as an alternative). Massage the site after administration to promote localized circulation of blood.

Store at room temperature between 15ºC - 30ºC. Do not refrigerate or freeze, protect from light.

MUST NOT BE GIVEN IV – MAY CAUSE CARDIAC ARREST

6.12 Oral Fluids with electrolytes, Gastrolyte™ (Oral rehydration solution).

Indications: 5.2 Hyperthermia, 5.6 Motion Sickness.

Contraindications: Unable to swallow/protect airway (including shock, reduced LOC). Acute abdomen.

Precautions: If unable to tolerate volumes, divide dose and give frequently in small amounts. Monitor response and urine output. Severe dehydration requires IV therapy.

Adverse effects: Nil.

Pharmacology: Onset 30-60 minutes. Absorbed intestinally.

Dosage and administration: Variable depending on degree of dehydration.

Mild dehydration:

◊ Adults: 200-400ml doses (2000ml daily)

◊ Pediatric:
< 2 YOA: 50-100 ml PO (500 ml daily)
2-10 YOA: 100-200 ml PO (1000 ml daily)
>10 YOA: 200-400 ml PO (2000 ml daily)

Moderate dehydration: 40-80ml/kg over 4 hrs.

6.13 Glucagon (BAQSIMI™) – Hypoglycemic Agent.

Indications: 4.2 Hypoglycemic Emergency (no timely IV/IO access), 4.4 Seizure.

Contraindications: Patients with pheochromocytoma, insulinoma, known hypersensitivity to glucagon or to any of the excipients in BAQSIMI™.

Precautions: > 65 YOA use caution. Not studied yet.

Adverse effects: Nausea, vomiting, headache, upper respiratory tract irritation (i.e., rhinorrhea, nasal discomfort, nasal congestion, cough, and epistaxis), watery eyes, redness of eyes, and itchy nose, throat and eyes.

Pharmacology: Onset of action 5-10 min. Peak effect 15 min. t ½ (half-life) 35 min.

Dosage and administration:

◊ Adults and pediatric ≥ 4 YOA: 3 mg IN q5 min prn (max 2 doses).

◊ Children < 4 YOA: Contact EP.

6.14 Glucose Gel (Insta-Glucose) – Glucose.

Indications: 4.2 Hypoglycemic Emergency.

Contraindications: nil.

Precautions: Use caution in patients with decreased LOC.

Adverse effects:

Pharmacology: Onset of action 10-15 min; peak effect 30-40 min (PO); t½ (half-life) N/A, duration 40-60 min (PO).

Dosage and administration:

◊ For conscious patients with decreased BGL.

◊ Glucose 30 g PO.

◊ Give to patient to self administer.

6.15 Haloperidol (Haldol) – Antipsychotic.

Indications: 4.6 Agitated Patient.

Contraindications: Hypersensitivity to haloperidol, severe cardiac or liver disease. Patients with severe CNS depression, a history of spastic disorders, or Parkinson's.

Precautions: Caution with patients with hemodynamic instability, risk of orthostatic hypotension, history of seizure disorder, and severe hepatic or renal impairment. May alter temperature regulation. Use with caution in the elderly; observe for lethargy. Due to the fact that the elderly may lose thirst sensation, monitor for signs of dehydration. Contact EP in the event of hypotension.

Adverse effects: Hypotension, hypertension, tachycardia, arrhythmias, seizure, hypoglycemia, tremors, anxiety, spasms (oculogyric crisis), altered central temperature regulation and heat stroke, drowsiness, vertigo, headache, confusion, nausea, vomiting, dry mouth, urinary retention, bronchospasm.

Pharmacology: Onset of action (sedation) < 1 hr; duration of action = 2-4 hr; t½ (half-life) = 20 hr; time to peak = 20 min.

Dosage and administration:

◊ Adults:

5 mg IM q10 min prn (max 2 doses). Best to wait for approx 45 min until peak biologic effect before repeating dose. May be administered concurrently with Midazolam IM as per 4.6 Agitated Patient Protocol.

or

5 mg PO q1 hr prn (max 2 doses) then q 12 hr prn.

◊ Elderly (> 60 YOA):

2 mg IM q30 min prn (max 2 doses). Best to wait for approx 45 min until peak biologic effect before repeating dose

or

2.5 mg PO q1 hr prn (max 2 doses).

Note: Should be stored at room temperature and away from light.

6.16 Ibuprofen (Advil, Motrin) – Analgesic. (NSAID)

Indications: 3.5 Pain, 5.5 High Altitude Illness – Rescuer Prophylaxis.

Contraindications: Hypersensitivity to ASA, ibuprofen, or other NSAIDs, peptic ulcer, or active inflammatory bowel disease.

Precautions: Use with caution in patients with impaired renal function, heart failure, liver dysfunction, those taking diuretics and anticoagulants, the elderly, those with systemic lupus erythematosus. Do not combine with other NSAIDs. Do not give within 8 hrs of ketorolac.

Adverse effects: Nausea, diarrhea, epigastric pain, abdominal cramps or pain, heartburn, bloating or flatulence, dizziness, headache, nervousness, rash, pruritis, tinnitus, anemia, decreased appetite, edema, or fluid retention.

Pharmacology: Onset of action < 1 hr; peak effect (oral) 1-1.5 hr; half-life 1.8-2.0 hrs; duration of action 4-6 hrs.

Dosage and administration:

◊ Adults/Children > 50 kg:
400 mg PO q4-6 hr prn (Max 2400 mg/day)

◊ Pediatric < 50 kg:
10 mg/kg PO q6-8 hr prn (max 400 mg) (max 1200 mg/day)

Note: May be administered with acetaminophen for synergistic effect.

6.17 Ipratropium Bromide (Atrovent) – Bronchodilator.

Indications: 2.1 SOB with History of Asthma/COPD, 2.2 Anaphylaxis/ Anaphylactic Shock.

Contraindications: Hypersensitivity to Ipratropium Bromide, atropine or other anticholinergics, or any other aerosol components.

Precautions: Should not be used as an initial treatment for acute episodes of bronchospasm where rapid response is required since the drug has a slower onset of action than adrenergic agonist aerosols (e.g. Salbutamol).

Adverse effects: Chest pain/palpitations (3%), hypotension (< 1%), mydriasis (< 1%). Constipation, diarrhea, vomiting, headache, dizziness, dry mouth and throat.

Pharmacology: Onset of action 5-15 min; peak effect 1-2 hrs; half-life 2 hrs; duration of action ≈ 8 hrs.

Dosage and administration:

NEB Inhalation Solution:

◊ Adults:

4-8 puffs MDI q 20 mins (max 3 doses)

- 40 mcg/puff

or

500 mcg NEB q 20 mins (max 3 doses)

- usually administered with salbutamol
- if not, dilute with NS to total of 5 ml

◊ Max 24 MDI puffs

◊ Pediatric < 50 kg:

Ipratropium

2-4 puffs (20 mcg/puff) MDI with spacer q20 min (max 12 puffs)

or

250 mcg NEB q20 min (max 3 doses)

6.18 Ketamine - Analgesic.

Indications: 3.5 Pain.

Contraindications: Hypersensitivity to Ketamine. Patients with a history of cerebrovascular accident. Patients with severe cardiac decompensation. Patients in situations when significant elevation of blood pressure would constitute a serious hazard, such as patients with significant hypertension.

Precautions: Observe for increased secretions or laryngospasm - Be prepared to reposition airway, suction or use BVM to resolve transient laryngospasm. Observe for agitation, combativeness or delirium. You may need to treat with Midazolam 2 mg IM/IV/IO q10 min prn (max 4 doses).

Adverse effects: Increase SBP, tachycardia, increased secretions, nausea, vomiting.

Pharmacology: Onset of action 30 sec (IV), 4-5 min (IM); peak effect 30 sec (IV), 4-5 min (IM), half life 2 hours, duration of action: 20-25 min.

Dosage and administration *, **:

<table>
<tr><th>Patients Weight (kg)</th><th>IV/IO</th><th>IV/IO</th><th>IM</th></tr>
<tr><td>< 50 kg</td><td></td><td>0.3 mg/kg</td><td>0.5 mg/kg</td></tr>
<tr><td>50 to 60 kg</td><td>15 mg</td><td rowspan="4">0.3 mg/kg
slow push
(1-2 min)</td><td>25 mg</td></tr>
<tr><td>60 to 70 kg</td><td>20 mg</td><td rowspan="3">50 mg</td></tr>
<tr><td>70 to 90 kg</td><td>25 mg</td></tr>
<tr><td>> 90 kg</td><td>30 mg</td></tr>
</table>

* For IM Ketamine, use 50 mg/ml undiluted.

** For IV Ketamine mix 1cc (50 mg/ml) with 9 ml RL/NS = 5 mg/ml

◊ Pediatric:
0.3 mg/kg IV/IO q20 min prn
0.3 mg/kg IM q40 min prn

6.19 Ketorolac (Toradol) – Analgesic. (NSAID)

Indications: 3.5 Pain.

Contraindications: Hypersensitivity to Ketorolac or other NSAIDs, active or recent history of peptic ulcer disease or GI bleeding. Uncorrected hypovolemic shock, renal impairment or insufficiency, patient taking pentoxifylline (Trental), and impending or actual labour and delivery.

Precautions: Use with caution in patients with active bleeding (inhibits platelet function), asthma, hypertension, hepatic impairment (for repeat doses), and in those taking concurrent NSAIDs.

Adverse effects: Serious gastrointestinal (GI) effects including bleeding, ulceration and/or perforation of the stomach, small intestine, or large bowel. Headache (17%), GI pain/nausea (13%), hypertension, increased bleeding time, tinnitus, dizziness, drowsiness, pruritis, rash, local injection site pain.

Pharmacology: Onset of action 10 min; peak effect 2-3 hrs; half-life 2-6 hrs (increased 30-50% in elderly, 300% in renal impairment); duration of action 6-8 hrs.

Dosage and administration:

◊ Adults > 50 kg:
15 mg IV/IO/IM q6 hr (Max 60 mg/day)

◊ ≥ 60 YOA / Adults ≤ 50 kg:
10 mg IV/IO/IM q6 hr prn (Max 40 mg/day)

◊ Pediatric:
0.5 mg/kg IV (max 15 mg)
Consider subsequent doses 0.25-0.5 mk/kg IV q6 hr prn (max 60 mg/kg)

Note: Dosage adjustments in elderly (≥ 60 YOA), renal insufficiency, or low body weight (≤ 50 kg). All these groups have an increased incidence of GI bleeding, ulceration and perforation. Maximum combined duration of treatment (for parenteral and oral) is 5 days. Limited pediatric studies.

6.20 Lidocaine 2% (Xylocaine) – Anesthetic.

Indications: 7.7 EZ-IO (Intra-Osseous) Access – For conscious or semi-conscious patients (GCS > 6) where clinical situation allows.

Contraindications: Patient with confirmed hypersensitivity to local anesthetics of the amide type, patients with myasthenia gravis.

Precautions: Intravascular injection or over dosage may result in heart block, myocardial depression, bradycardia, anxiety, apprehension, restlessness, confusion, tremors, convulsions, respiratory arrest, or cardiovascular collapse.

Adverse Effects: Usually a result of improper technique, inadvertent IV, excessive dosage or rate of administration, or injection into highly vascular tissue.

Cardiovascular: Bradycardia, heart block, decreased myocardial contractility (uncommon); arrhythmias, cardiac arrest, death (rare).

CNS: Restlessness, irritability, tremor, sedation, paresthesia or dizziness, occasionally. Seizure, coma, respiratory arrest, and death are rare.

WITH IV/IO ADMINISTRATION SLURRED SPEECH AND DECREASED LOC IS COMMON AND *TRANSIENT*.

Hypersensitivity: Dermatologic reactions, edema, asthma, anaphylaxis and death. True allergy is rare.

Pharmacology: Onset of action (IV) = 45-90 secs; duration of action = 10-20 min.

Dosage and Administration:

◊ Adults and Children ≥ 12 YOA:
40 mg IO over 2 min prior to flush. May be followed by 20 mg IO over 1 min if pain relief is inadequate and patient condition allows temporary cessation of IV therapy.

◊ 1 ml in elderly or cardiac patients.

◊ Pediatric > 3 YOA:
0.5 mg/kg slow push prior to flush
OR refer to 8.6 Pediatric Tables

6.21 Lorazepam (Ativan) – Sedative & Anti-Seizure.

Indications: 4.4 Seizure, 4.6 Agitated Patient.

Contraindications: Hypersensitivity to Lorazepam or its components. Use of benzodiazepines solely for sedation is contraindicated during pregnancy. Not for use in children under 12 YOA.

Precautions: May cause severe respiratory depression. Use caution with the elderly and patients taking CNS depressants (e.g. Morphine or other narcotics – hypotension risk). Should not use in shock, coma, or acute alcohol intoxication.

Adverse effects: Decreased respiratory rate and tidal volume, hypotension, drowsiness, over-sedation.

Pharmacology: Onset of action (SL) 20-60 min (PO) 1-3 hrs; peak effect 1-6 hrs; half-life 12-15 hrs; duration of action 10-16 hrs.

Dosage and administration:

Adults and Children ≥ 12 YOA:

◊ 1-2 mg SL (preferred) or PO q2 hr (max 6 mg/day). Note that 1 mg is the standard initial dose and 2 mg should be used for larger patients (> 70 kg) and for repeat doses where a higher dose has been shown to be needed.

◊ 0.05 mg/kg (max 2 mg) PO q4-8 hr.

Note: Lorazepam has a long duration of action compared to Midazolam. It is used in seizure patients, 4.4 Seizure Protocol, with long or delayed transport, after seizures have been controlled with Midazolam. Lorazepam should only be used if patient's airway is secure.

6.22 Midazolam (Versed) – Sedative & Anti-Seizure.

Indications: 3.5 Pain, 4.4 Seizure, 4.6 Agitated Patient.

Contraindications: Hypersensitivity to Midazolam or its components including benzyl alcohol. Use of benzodiazepines solely for sedation is contraindicated during pregnancy.

Precautions: May cause severe respiratory depression, respiratory arrest or apnea. Use caution with the elderly, patients with hepatic or renal impairment, and patients taking CNS depressants (e.g. Morphine or other narcotics – hypotension risk). May cause hypotension especially in pediatric patients or patients who already have some hemodynamic instability. Should not use in shock, coma, or acute alcohol intoxication.

Adverse effects: Decreased respiratory rate and tidal volume (> 10%), hypotension (1-10%), drowsiness, over-sedation, nausea, vomiting, hiccups.

Pharmacology: Onset of action (IM) 15 min, (IV/IO) 1-5 min; peak effect 5-10 min IV/O or 15-30 min IM; half-life 1-4 hrs (prolonged with cirrhosis, CHF, obesity and elderly); duration of action 2-6 hrs.

Dosage and administration:

◊ Adults and Children ≥ 20 kg:

Seizure Activity:
10 mg IM/IV q5 min (max 30 mg), or
10 mg IN (5 mg/nostril) q10 min (max 20 mg).

Agitation: 2-5 mg IM. 5 mg IV/IO after 30 min prn (max 1 dose).
Note: Dose should be reduced by 50% if narcotics or other CNS depressants have been used or (1-2 mg IV q 5 mins prn (max 3 doses). May be mixed with Haloperidol in same syringe.

◊ Pediatric > 2 MOA and ≥ 20 kg
Seizure Activity:
0.1 mg/kg IV q5 min (repeat x 1 prn)
or
0.2 mg/kg IM q5 min (repeat x 1 prn)
or
0.2 mg/kg IN q10 min (max 5 mg/nare) (repeat x 1 prn)

6.23 Morphine – Analgesic.

Indications: 1.1 Cardiac Chest Pain, 3.5 Pain.

Contraindications: Hypersensitivity to Morphine, severe respiratory distress, severe hypotension, head injuries and decreased LOC.

Precautions: Use with caution in pregnancy, elderly patients, those with pre-existing respiratory conditions (COPD) and those patients that are intoxicated.

Note: If severe respiratory depression or decreased LOC refer to 4.3 Narcotic Overdose (Suspected). If the patient becomes hypotensive, ensure supine, head down position, legs elevated and consider fluid bolus.

Adverse effects: Hypotension, dizziness, sedation and euphoria, nausea and vomiting, respiratory depression.

Pharmacology: Onset of action (IM) 20 min, (IV) 1-5 min, (PO) < 1 hr; half-life 2-4 hrs; peak effect 0.5-1 hr; duration of action 2-3 hrs.

Dosage and administration:

◊ Adults:

Cardiac Chest Pain:
2.5 mg IV/IO q 5 mins (max 15 mg) prn until pain relief.
May repeat cycle in 2 hours.
If no IV access:
5-10 mg IM q 30 mins (max 30 mg).

Pain:
2- 5 mg IV/IO q 5 mins prn (max 15 mg).
May repeat cycle in 30 mins.
If no IV access:
5-10 mg IM q 30 mins (max 30 mg).

Note: Dilute 10 mg/1 ml with 9 ml NS in 10 ml syringe = 1 mg/ ml for easy dosing and administration.

◊ Pediatric:

Patient < 50 kg: 0.1 mg/kg IV/IO over q5 min
(max 3 doses in 30 min) prn may repeat q2-4 hrs
or
0.1 mg/kg IM q30 min (max 3 doses)

If patient > 50 kg use adult dosing.

6.24 Moxifloxacin (Avelox) – Antibiotic.

Indications: 4.5 Antibiotic.

Contraindications: Hypersensitivity to Moxifloxacin hydrochloride or other quinolones and patients < 18 YOA.

Precautions: Serious hypersensitivity and/or anaphylactic reactions have been reported in patients receiving Moxifloxacin. Use caution in patients with known or suspected CNS disorders which may predispose to seizures or lower seizure threshold.

Concurrent administration of NSAIDs may increase the risk of CNS stimulation and convulsions.

Adverse effects: abdominal pain, headache, nausea, diarrhea, vomiting, photoxicity and hypoglycemia. Seizures may occur with quinolone therapy.

Pharmacology: Onset of action 1-3.5 hrs; peak effect N/A; half-life 12 hrs; duration of action once every 24 hrs.

Dosage and administration:

◊ Adults: 400 mg PO q 24 hr.

◊ Pediatric: Contraindicated.

6.25 Naloxone (Narcan) – Opioid antagonist.

Indications: 4.1 Altered LOC – NYD, 4.3 Narcotic Overdose (Suspected).

Contraindications: Hypersensitivity to naloxone.

Precautions: Naloxone may have a half-life as short as 30 min. In the case of narcotic overdose, the patient should be closely observed for a change in mental state. The patient may require further naloxone if the underlying problem is narcotic overdose.

Adverse effects: Abrubt reversal of narcotic. May result in nausea, vomiting, sweating, tachycardia, elevated blood pressure and tremulousness (tremors).

Pharmacology: Onset of action (IV) 2-3 min, IM ≤ 15 min; peak effect 5-10 min IV or 15-30 min IM; half-life 1 hr; duration of action ≤ 1 hr (variable).

Dosage and administration:

◊ Adults: IV, IM or IO may be used if no IV access.
- 0.8 mg IM q5 min prn.
- 0.4 mg IV/IO q2-3 min prn.

◊ Pediatric:
≤ 20 kg: 0.1 mg/kg IV/IM/IO prn q5 min (max dose 2 mg)
20-50 kg: 2 mg IV/IM/IO prn q5 min
> 50 kg: use adult treatment protocol

Note:

◊ If no response is observed after 10 mg total, consider other causes of respiratory depression.

◊ If initial doses not effective on reversing known narcotic overdose, consider escalating doses up to a total of 10 mg. (0.4 mg > 0.8 mg > 1.6 mg etc.)

6.26 Nifedipine (Adalat).

Indications: 5.4 High Altitude Illness.

Contraindications: Hypersensitivity to nifedipine.

Precautions: Use with caution in patients with heart disease. Contact EP if possible.

Adverse effects: Facial flushing, hypotension, palpitations and lower extremity edema, headache, nausea and vomiting.

Pharmacology: Onset of action [IR (immediate release) capsule] = 20 min; duration of action = 4-8 hr; t½ (half-life) = 2-5 hr.

Dosage and administration:

◊ Adults: Nifedipine IR (immediate release) capsule 30 mg PO/SL q12 hr prn.

6.27 Nitroglycerin (NTG, Nitroglycerin Spray) – Vasodilator.

Indications: 1.1 Cardiac Chest Pain.

Contraindications: Hypersensitivity and severe hypotension. Due to hemodynamic concerns, nitrates of any kind must not be used within 24 hr of Viagra (sildenafil) or Levitra (vardenafil), or within 48 hr of Cialis (tadalafil).

Precautions: If considering NTG, and HR<50 (decreased cardiac output) or >100 (compensatory) contact EP for advice. Watch for hypotension. Monitor SBP frequently.

Adverse Effects: Hypotension, headache, fainting, dizziness, weakness, face flushing, burning sensation of the tongue.

Pharmacology: Onset of action (SL spray) 1-2 min; peak effect 4-10 min; half-life 1-4 min; duration of action 30-60 min.

Dosage and administration:

◊ 0.4 mg SL (spray) q5 min (max 3 doses/30 min).

◊ If administering the patient's own nitroglycerin tablets, place them under the tongue (SL).

◊ May repeat cycle q30 min prn if SBP > 100 mmHg.

6.28 Normal Saline (NS, 0.9% Sodium Chloride) Isotonic– IV Fluid.

Indications: All protocols requiring normal saline (NS) administration.

Contraindications: Nil.

Precautions: Cold temperatures or hypothermia. Consider a fluid warmer. Pulmonary edema.

Adverse effects: Risk of causing pulmonary edema especially in pediatric and elderly patients.

Pharmacology: Onset of action immediate 1-2 min; peak effect immediate 1-2 min; half-life N/A; duration of action N/A.

Dosage and administration: As indicated in protocols.

Maintenance Rates (unless otherwise specified):

◊ Adults: 100 ml/hr (1gtt/4 sec) with 10 gtt giving set.

◊ Pediatric: No maintenance fluids. Flush with NS and IV/IO lock.

6.29 Oxygen (O_2) – Medical Gas.

Indications: All Protocols requiring O_2.

Contraindications: Nil.

Precautions: Caution in those patients with COPD, target SpO_2 sat of 92-95%.

Adverse effects: Potential fire hazard.

Pharmacology: Onset of action immediate; peak effect immediate; half-life N/A; duration of action N/A.

Dosage and administration:

TYPE	FLOW RATE	O_2 % *
Nasal Canula	2-6 L/min	Up to 40%
Simple Face Mask	6-10 L/min	40-60%
Non-Rebreather Mask	12-15 L/min	80-95%
Non-Rebreather Mask and Nasal Canula (No DSAT)	15 L/min	100%
Bag-Valve-Mask (BVM) with tight seal	15 L/min	100%

* percentages are approximate depending on seal, respiratory rate and depth.

6.30 PEP (Post Exposure Prophylaxis for HIV).

Indications: 5.7 HIV Post Exposure Prophylaxis (PEP) SAR Tech Use.

Contraindications: Hypersensitivity to the medication(s).

Adverse effects:

- ◊ TDF: Renal insufficiency, Fanconi Syndrome, osteomalacia, osteoporosis, Asthenia, headache, diarrhea, nausea, vomiting, flatulence.
- ◊ RAL: Nausea, headache, diarrhea, pyrexia, muscle weakness, rhabdomyolysis and CPK elevation.
- ◊ FTC: Hyperpigmentation/skin discoloration, Severe acute exacerbation of hepatitis in patients co-infected with HBV when this medication is discontinued.

Precautions: May cause significant side effects such as nausea and flu-like symptoms. Contact EP if in doubt.

Adverse effects: These medications can cause significant symptoms in some people.

Pharmacology: Drug dependent. Combination therapy.

Dosage and administration: Anti-retroviral tablets (ART) should be started within 2 hours of exposure and taken for 28 days total. The PEP starter kit contains 5 days of medication. Medications are taken with meals. MO will prescribe the remaining 23 days of therapy if required. Therapy consists of:

- ◊ Raltegir (Isentress; RAL) 400 mg PO bid and
- ◊ Tenofovir DF (Viread; TDF) 300 mg PO Once Daily and
- ◊ Emtricitabine (Emvtriva; FTC) 200 mg PO Once Daily.

Note: These medications are to be used by SAR Techs on themselves if required, and are not to be administered to patients. Dosage forms may vary as some of these medications are available as combined products.

This is the recommended drug regimen approved by the CF Pharmacy and Therapeutics Committee and the Directorate of Force Health Protection. If SAR Tech chooses to take the medication while on flight then they are immediately grounded and must be removed from aircrew specific duties. They can however continue to provide patient care to complete the mission. If the risk of infection is such that PEP is considered necessary, delay in taking the medication is to be avoided.

6.31 Ringers Lactate (RL) Isotonic– IV Fluid.

Indications: All protocols requiring ringers lactate (RL) administration.

Contraindications: nil.

Precautions: Cold temperatures or hypothermia. Consider a fluid warmer. Pulmonary edema.

Adverse effects:

Risk of causing pulmonary edema especially in pediatrics and elderly patients.

Use with caution and consult EP if large volume resuscitation is required in severe hypothermia (cold liver may not be able to metabolize the lactate).

Pharmacology: Onset of action immediate 1-2 min; peak effect immediate 1-2 min; half-life N/A; duration of action N/A.

Dosage and administration: As indicated in protocols.

Maintenance Rates (unless otherwise specified):

◊ Adults: 100 ml/hr (1gtt/4 sec) with 10 gtt giving set.

◊ Pediatric: No maintenance fluids. Flush with NS and IV/IO lock.

6.32 Salbutamol (Ventolin) – Bronchodilator.

Indications: 2.1 SOB with a History of Asthma/COPD, 2.2 Anaphylaxis/ Anaphylactic Shock – Adult and Child, 5.4 High Altitude Illness.

Contraindications: Hypersensitivity to Salbutamol.

Precautions: CHF.

Adverse effects: Palpitations and tachycardia, nervousness, headache and tremor.

Pharmacology: Onset of action 5-15 min; peak effect 30-60 min; half-life 2.7-5.5 hrs; duration of action 3-6 hrs.

Dosage and administration:

◊ Adults:
Salbutamol 4-8 puffs MDI q10 min prn (max 3 doses)
• 100 mcg / puff
or
Salbutamol 5 mg NEB q10 min prn (max 3 doses)
If BVM:
Salbutamol 2 puffs MDI q1 min prn (continuous) via BVM

◊ Pediatric < 50 kg:
2-4 puff (100mcg/puff) MDI with spacer q10 min prn
2.5 mg NEB q10 min prn

6.33 Tranexamic Acid (TXA) – Antifibrinolytic.

Indications: 3.1 Hypovolemic Shock. 3.2 Traumatic Brain Injury (TBI). Adult trauma with clinical evidence of significant hemorrhage (SBP < 90 mmHg or HR >110 or both).

Contraindications: Hypersensitivity to Tranexamic Acid. Treatment delayed more than 3 hours after injury. Incompatible with solutions containing penicillin. Not for use in Pediatrics < 12 YOA.

Precautions: Severe hypotension if infused too quickly. To be administered as soon after injury as feasible. Delivery of TXA should not delay evacuation of patient. Maximum cumulative dose 3 grams.

Adverse effects: Hypotension (with rapid IV injection), giddiness, allergic dermatitis, diarrhea, nausea, vomiting, blurred vision.

Pharmacology: Onset of action unknown; peak effect 2-3 hrs; half-life approx. 2 hrs; duration of action 3 hrs.

Dosage and administration:

◊ 2 g in 250 ml NS IV/IO over 2-10 mins
or
2 g in (2 x 10 ml syringes) IV/IO over 2 mins

◊ After 1 hour from initial TXA dose
1 g in 10 ml syringe
0.1 mg (1 ml) q1 hr

Notes:

SECTION 7 – STANDARD MEDICAL PROCEDURES

7.1 Patient Assessment Model

RESCUE SCENE EVALUATION (RSE)

- Hazards
- Environmental concerns
- Mechanism of Injury (MOI)
- Number of Patients (Triage)

↓

PRIMARY SURVEY [1]

- C-Spine [2]
- LOC (AVPU) [3]
- MARCH [4]
- Rapid Body Survey (RBS)
- SOAP [5]

↓

DECISION POINT [6]

- Patient is “Stable” or “Unstable” and “Why?”
- Brief Plan: Packaging and “Initiate Transport” or “Treat on Scene”

↓

SECONDARY SURVEY

CRITICAL HISTORY (CHx)

- Confirm Chief Complaint (C/C)
- History of C/C (HxC/C) using LOTAARRP [7] where appropriate including Pain Scale/Work of Breathing Scale (WOB)
- Medications
- Allergies
- Relevant Medical Hx (HIBGIA) [8]
- VITAL SIGNS

↓

PROTOCOLS/TREATMENTS

PHYSICAL EXAMINATION (HEAD TO TOE)

EMERGENCY NOTIFICATION

IDENTIFYING DATA

FUNCTIONAL INQUIRY

HITMAN (PROLONGED CASUALTY CARE) [9]

HOSPITAL REPORT (PATIENT CARE REPORT)

PROCED

1. Critical interventions may be required at any stage of the assessment. Once the critical intervention has been performed, return to the assessment model at the point you left it. Early assessment of pertinent vitals may occur.
2. **C**ervical S**pine** considerations: Rule in/rule out Spinal Motion Restriction techniques.
3. **AVPU**: Assess Level of Consciousness, **A**lert, or responding to **V**erbal stimuli, or responding to **P**ainful stimuli or **U**nresponsive.
4. **MARCH**: **M**assive hemorrhage – immediate treatment of life threatening bleeding; **A**irway – ensure airway is patent. If not, attempt to insert an OPA/NPA and suction where appropriate; **R**espiration – check rate/quality. If poor, provide O_2 +/- ventilator support; **C**irculation – check rate/rhythm (radial/carotid); **H**ypothermia – cover and keep patient warm and dry.
5. **SOAP**: **S**kin – color, temperature, condition; **O_2** – appropriate flow rate/route; **A**irway – recheck to ensure patency; **P**osition – consider airway protection, chief complaint, patient comfort (i.e. supine/semi-prone/semi-sitting).
6. Unstable patient should have vitals monitored at least every 5 min with reassessment at appropriate intervals.
7. **LOTAARRP**: **L**ocation, **O**nset (Time,Rapid/Gradual), **T**ype of pain/discomfort to include severity of attack, **A**ssociated symptoms, **A**ggravating factors, **R**adiating/**R**elieving factors, **P**recipitating events.
8. **HIBGIA**: **H**ad **I**t **B**efore, **G**ot **I**t **A**gain.
9. Refer to 7.2 Prolonged Casualty Care.

7.2 Prolonged Casualty Care – HITMAN

Indications

◊ Transit and/or evacuation time to higher level care is delayed (≥1 hr) or unknown.

H – Head to Toe Assessment/ Hydration/ Hypothermia/ Hygiene

- Perform secondary survey and reassess head to toe every 4-8 hr.
- Infuse warmed fluids whenever possible.
- Consider oral rehydration with electrolyte where appropriate.
- Fluid administration requires monitoring of urinary output. If necessary, perform 7.6 Urinary Catheterization, document, and trend.
- Thermal management to avoid hypo/hyperthermia.
- Patient hygiene.

I – Infection/ Increased Compartmental Pressures

- Assess for signs of infection/sepsis: Suspected source of infection AND any of the following may suggest sepsis: shivering, fever (≥38), or very cold (≤36), low SBP (≤90), high HR (≥90 BPM), high RR (≥20 breaths/min), SOB, altered LOC, extreme pain).
- Use the same thermometer and location (oral, axillary rectal) or accurate temp trending.
- Consider Protocol 4.5 Antibiotic.
- Clean contaminated wounds if practical.
- Monitor wounds and venipuncture sites for redness, swelling or discharge.
- Monitor for signs of rising intracranial pressure (ICP). Refer to Protocol 3.2 Traumatic Brain Injury.
- Beware of compartment syndrome in extremities, particularly in patients with a decreased LOC (who cannot verbalize extreme pain).

T – Tube management/ Tidy up/ Tourniquet Removal

- Tidy up IV lines, catheter tubing and Vital Stats monitoring equipment. This alleviates inadvertent kinks or tangles, making equipment trouble-shooting more efficient.

- Collect and dispose of trash generated by the use of medical equipment and consider re-stocking ready-use kits (IV Pocket, Dressing Pocket, etc.) from the Sup Kit.
- If applicable, refer to Procedure 7.8 Tourniquet Removal.

M – Medications

- Recheck the 6 Rights: patient, drug, dose, time, route and record.
- Is the medication still indicated (i.e. pain relief)? Determine re-dosing intervals (as applicable).
- Are there any new contraindications (i.e. change in patient vital signs, LOC)?
- Confirm amount of medication on hand and manage supply.

A – Analgesia

- Consider patient comfort factors (not too hot/cold, position of comfort, loosen restrictive clothing and devices).
- Refer to Procedure 7.5 Spinal Motion Restriction Guidelines for removal of rigid devices (i.e. spine board or clam shell).
- Release tight fitting stiff neck collar if possible while maintaining SMR.
- Develop an analgesic plan to manage pain. Try to avoid allowing pain medication from wearing off completely when it is still indicated.
- Consider head up positioning for comfort.
- Pad bony prominences and areas where circulation could be impeded.
- Encourage position changes in conscious patients and roll patients with a decreased LOC every 2h to avoid pressure sores.

N – Nutrition/Notes

- Feed patients when it is appropriate. Consider anti-emetic medication for nausea.
- Document and trend vital signs.

7.3 Positive End Expiratory Pressure (PEEP) Valve

Indications

◊ SpO_2 remains below 90% despite good BVM technique and airway management.

Contraindications

◊ Cardiac Arrest.

◊ SBP< 90 mmHg.

◊ Known or suspected pneumothorax.

◊ Traumatic cause of SOB.

Precaution

◊ Increased PEEP can cause increased intrathoracic pressure which can negatively impact cardiac output.

Procedure

◊ Attach PEEP valve to the exhaust port on the BVM.

◊ Set the dial on PEEP valve to 5 cmH2O.

◊ Establish and maintain a good mask seal. Ventilate at an appropriate rate. [1]

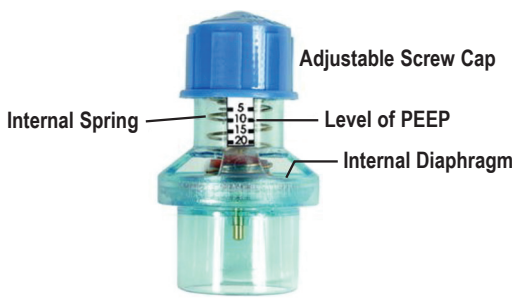
◊ Monitor oxygenation saturation and blood pressure.

◊ PEEP may be increased in increments of 2.5 cmH2O to a max of 10 cmH2O.

Discontinue

◊ Patients SBP drops below 90.

◊ Any contraindication arises.



1. To be effective, PEEP requires a complete mask seal (the “closed circuit”). Removing the mask from the patient’s face will release the end-expiratory pressure and allow alveoli to collapse. For critically ill patients, SARTechs should maximize the amount of time the mask is firmly sealed to the patients face.

7.4 i-gel® Supraglottic Airway Insertion

Indications

◊ Patient in cardio-respiratory arrest.

◊ Patient that requires assisted ventilations, unable to protect own airway and tolerates OPA.

◊ Patient with decreased LOC who is difficult to ventilate and tolerates OPA.

◊ As directed by Physician.

Contraindications

◊ Inability or limited mouth-opening.

◊ Any abscess, trauma or mass that prevents an effective placement.

◊ Patients with blood or vomit soiled airway that cannot be easily cleared with suction and positioning.

◊ Responsive patients with an intact gag reflex.

◊ Airway obstruction.

◊ Suspected epiglottitis.

Precautions

◊ Inability to place patient in the sniffing position, use basic airway management.

◊ Patients at high risk of passive regurgitation (morbid obesity, pregnancy, decreased pulmonary compliance and increased airway resistance).

◊ Maxillofacial trauma.

◊ Pediatric patients who may have enlarged tonsils.

◊ Severe head injuries with signs of increased ICP.

Preparation

◊ Pre-oxygenate the patient and monitor SpO_2.

◊ Choose correct size based on patient's weight (See i-gel® Supraglottic Airway Sizing Chart).

◊ Lubricate the back, sides and front of the cuff with a thin layer of water-soluble lubricant (ensure no bolus of lubricant remains in the bowl of the cuff or elsewhere on the device).

◊ Place patient in the sniffing position.

Insertion

◊ Open the mouth by gently pressing the chin and position the i-gel®'s distal tip against the hard palate (Fig. 7.4a).

◊ Slide the device inwards and downwards, rotating the hand so that the device follows the curvature behind the tongue until definitive resistance is felt.

◊ Slight resistance or 'give-way' may be felt before endpoint resistance is met, as the bowl of the device passes through the back of the oropharynx (Fig.7.4b).

◊ The device should be secured with the provided airway support strap or with tape from maxilla to maxilla (Fig. 7.4c and 7.4d).

Confirmation of Placement

◊ Confirm proper placement by:

- Equal chest rise;
- Auscultation of bilateral breath sounds;
- Absence of sounds over the epigastrium, and;
- Pulse oximetry.

i-gel® Supraglottic Airway Sizing Chart

Colour	i-gel® Size	Patient Size	Patient Weight
Grey	2	Small pediatric	10-25 kg/22-55 lbs
White	2.5	Large pediatric	25-35 kg/55-77 lbs
Yellow	3	Small Adult	30-60 kg/66-132 lbs
Green	4	Medium Adult	50-90 kg/110-198 lbs
Orange	5	Large Adult	90+ kg/198+ lbs

Note: Currently MDI delivery device (aerochamber) does not connect to iGel. MDI medication should be delivered via aerochamber with bag valve mask.

Figure 7.4a
i-gel® Insertion

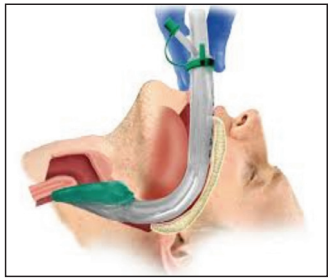


Figure 7.4b
i-gel® Correct placement

Figure 7.4c
i-gel® Airway Support Strap

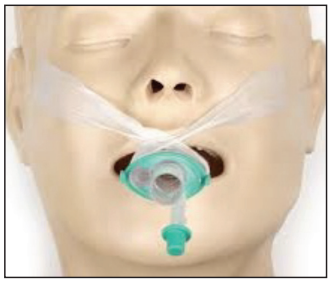


Figure 7.4d
i-gel® Secured with tape

7.5 Spinal Motion Restriction Guidelines

Indications

◊ Alert and stable trauma patient where cervical spine injury is a concern (GSC 15).

◊ Patient received in spinal immobilization from other caregiver.

Contraindications

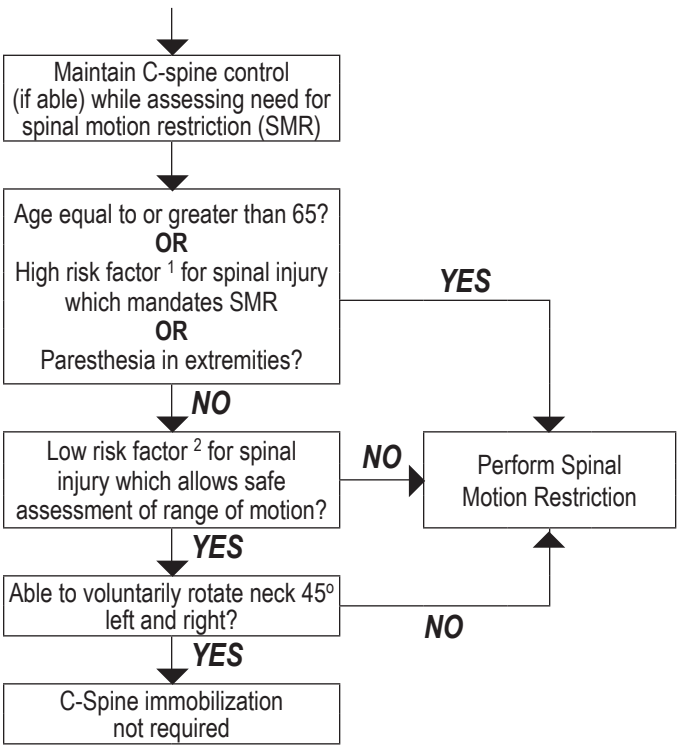
Presence of any 1 or more of the following confounding factors requires use of complete spinal motion restriction.

◊ Patient is uncooperative.

◊ Difficulty or inability to communicate.

◊ Altered level of consciousness, to include intoxication.

◊ Distracting injuries.



SAR Tech Team Leaders should consider the removal of rigid devices (ie. Spine board and/or clam shell) under the following conditions:

- ◊ To facilitate positioning a patient with an isolated, closed head injury 30 degrees head up. Refer to protocol 3.2 Traumatic Brain Injury.
- ◊ When transit and/or evacuation time to higher level care is delayed (≈ 1 hr) or unknown[3].

1. High risk factors for spinal injury include but are not limited to:
   - ◊ Fall greater than or equal to 1 m / 5 stairs.
   - ◊ Axial load to head (e.g. diving accidents).
   - ◊ MVC (e.g. speed greater that 100 km/hr, rollover or ejection).
   - ◊ Bicycle, ATV, or snowmobile collision.
2. Low risk factors for spinal injuries include:
   - ◊ Simple rear-end MVC (excludes patient being pushed into oncoming traffic, hit by bus/large truck, rollover, hit by high speed vehicle).
   - ◊ Ambulatory at any time.
   - ◊ Delayed (not immediate) onset of neck pain.
   - ◊ Absence of midline C-spine tenderness.
3. When possible, consult EP with detailed summary of MOI and physical findings.

7.6 Urinary Catheterization

Indications

◊ Patients who will be under SAR Tech care for an extended time period and who are unable to void themselves.

Contraindications

◊ Blood at meatus, perineal bruising, blood in scrotum, or suspected pelvic fracture.

Precautions

◊ Resistance on insertion.

◊ Ensure aseptic procedure.

Procedure

◊ Explain procedure to patient.

◊ Position patient on back with legs apart (knees bent for females).

◊ If required, clean groin area if heavily soiled.

◊ Prepare equipment

- Open sterile 4x4, layout out open package with 4x4 exposed and squeeze surgical lubricant on sterile 4x4.
- Open wrappers of catheter just enough to have access to ports leaving the bottom portion in sterile wrapper.
- Load syringe and test bulb by injecting 5 ml of sterile fluid, withdraw syringe to ensure integrity of bulb and lumen. Reattach syringe and withdraw fluid, set syringe aside.
- Attach drainage bag to catheter.

◊ One SAR Tech now puts on sterile gloves ensuring sterile procedure

- Non-sterile SAR Tech opens iodine swabs and presents to Sterile SAR Tech.
- Sterile SAR Tech exposes genitalia with non-dominant hand and wipes with the other;
  - Females: Retract labia to expose urethral meatus and maintain this position throughout the procedure. Wipe from front to back 3 separate times.
  - Males: Retract foreskin (if not circumcised) and wipe in circular motion around glans 3 separate times.
- Non-sterile SAR Tech then holds catheter package in one hand and the drainage bag in the other, and retracts catheter for sterile SAR Tech to grab.
- Sterile SAR Tech grasps catheter approximately 3 inches from tip and wraps around hand for control.
- Lubricate tip of catheter with surgical lubricant on sterile 4x4.

◊ Insert into urethra

- In males, hold penis at 60º to patient's body and apply light retraction. Advance catheter until urine flows and advance a further 5 cm. (If slight resistance at prostate, stop and have patient relax and take deep breaths.)
- Inflate balloon with syringe of sterile fluid and gently retract catheter until resistance is felt.
- Secure catheter and bag as required allowing some slack in catheter (use extension if required).

◊ Record time, catheter size, amount and colour of urine.

7.7 EZ-IO (Intraosseous) Access

Indications

◊ Adults (≥ 40 kg) : For intraosseous access anytime in which intravascular access cannot be obtained within two attempts in emergent, urgent or medically necessary cases.

◊ Pediatrics (3-39 kg): For intraosseous access where vascular access is difficult in emergent, urgent or medically necessary cases.

Contraindications

◊ Recent fracture or absent pulse to limbs considered for access.

◊ Excessive tissue and/or absence of adequate anatomical land-marks.

◊ Infection or cellulitis at the site of insertion.

◊ Previous, significant orthopedic procedure at the site (prosthetic joint or any foreign body – plates, screws, stabilizing rods, etc.)

◊ IO placement at insertion site in the past 24hrs.

Site Location and Preparation for Power Driver

◊ Locate insertion site using appropriate land-marking techniques:

◊ Adult: Proximal humerus, Proximal tibia, Distal tibia.

◊ Child: Proximal tibia, Distal tibia, Proximal humerus.

◊ Prepare insertion site: swab site with Iodine solution, ensuring aseptic technique and inform patient if conscious. Allow area to dry completely while preparing infusion kit.

◊ Prep infusion kit: draw up 10ml RL/NS. If using Lidocaine draw up appropriate dose. Open clamp and purge air from line (extension set) with either RL or Lidocaine. Leave syringe attached to line.

Insertion Sites

◊ Ensure area is dry and have stabilization patch ready.

◊ Stabilize the site and position driver at insertion perpendicular to the bone. Insert needle set until needle set tip touches the bone.

◊ Verify that the 5 mm “No Go” line is visible on the needle/stylet.

◊ Squeeze the Power Driver trigger and apply gentle steady downward pressure. Do not rock or bend during insertion.

◊ Stop insertion when a sudden “give” or “pop” is felt or the desired depth is obtained.

◊ Remove stylet and driver and confirm needle stability.

◊ Apply stabilizer patch.

◊ Attach primed line (extension set) to hub's luer lock.

◊ Use Lidocaine for patients responsive to pain and GCS > 6 prior to flush.

- If using Lidocaine, infuse slow at 1 ml per minute, and slow push remaining 1 ml Lidocaine from catheter with 1st ml of IO flush.
- Adults and Children ≥ 12 YOA: 40 mg Lidocaine IO over 2 min prior to flush. May be followed by 20 mg IO over 1 min if pain relief is inadequate and patient condition allows temporary cessation of IV therapy.
- Pediatric:
  0.5 mg/kg slow IO (max 40 mg).
  Dilute with NS if necessary.
  See 8.6 Pediatric Tables.

◊ Flush IO with 9 -10 ml of RL or NS. (4 - 5 ml in Children)

◊ **Remember: NO FLUSH = NO FLOW**.

◊ Attach IV tubing and infuse IV fluids. Stabilize IV line. Place EZ-IO wristband.

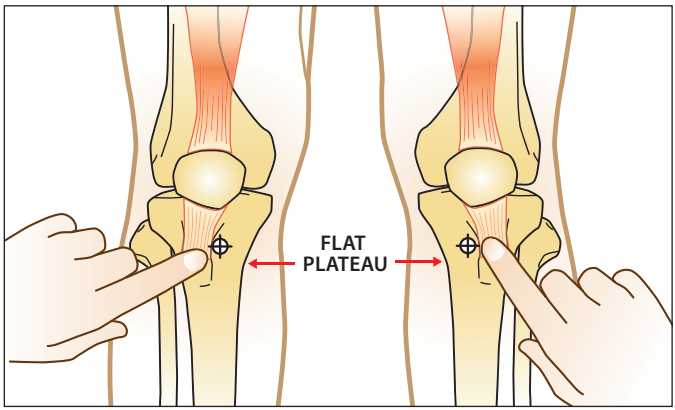
◊ Assess site for extravasion, bleeding, occlusion, or dislodgement.

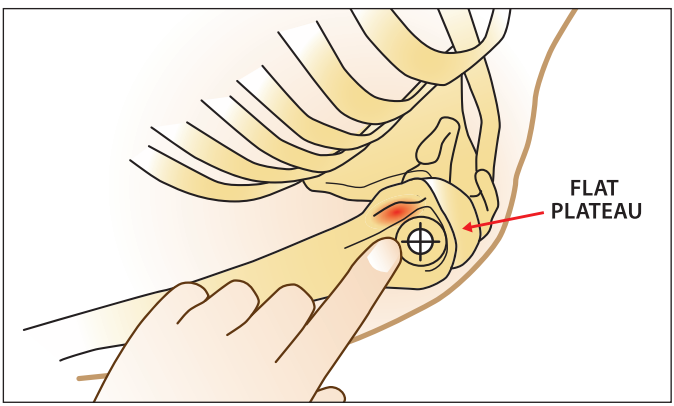
- If using Lidocaine, infuse slow at 1 ml per minute, and slow push remaining 1 ml Lidocaine from catheter with 1st ml of IO flush.
- Flush IO with 9 -10 ml of RL or NS. (4 - 5 ml in Children)
- Remember NO FLUSH = NO FLOW.
- Attach IV line and stabilize IV line. Place EZ-IO wristband.
- Assess site for interstitial leak, bleeding, occlusion, or dislodgement.

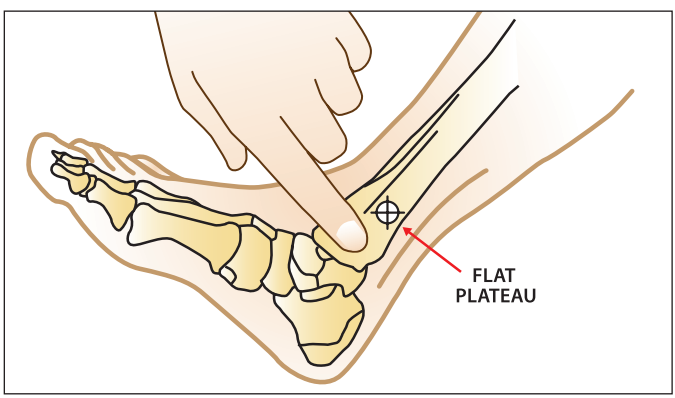
Removal

If removal is required, attach Luer lock syringe, continuously rotate clockwise while slowly and gently applying traction to catheter. **Do not rock or bend the catheter during removal.**

IO LANDMARK SITES







EZ-IO Insertion Sites

Proximal tibia site

- ◊ Adult: 1 cm medially to the tibial tuberosity.
- ◊ Pediatric – Cannot palpate tibial tuberosity: Two finger widths below the patella and one finger width medially along the flat aspect of the tibia.
- ◊ Pediatric – Can palpate tibial tuberosity: One finger width distal to the tibial tuberosity and one finger width medially along the flat aspect of the tibia.

Distal tibia site

- ◊ Adult – Two finger widths proximal to the medial malleolus and positioned midline on the medial shaft.
- ◊ Pediatric – one finger width proximal to the medial malleolus – along the flat aspect of the medial distal tibia.

Proximal humerus

- ◊ Expose shoulder and adduct humerus.
- ◊ Place patient's hand over umbilicus for correct humeral positioning.
- ◊ Palpate and identify the mid-shaft humerus and continue palpating toward the proximal aspect or humeral head.
- ◊ Identify two landmarks on the lateral shoulder consisting of the acromion and the coracoid process.
- ◊ Identify the greater tubercle insertion site approximately two-finger widths inferior to the midpoint of the coracoid process and the acromion.
- ◊ Insert IO needle 45° to opposite hip.

EZ-IO Needle Sets Size

EZ-IO Needle Size / Colour	Patient Size	Insertion Site	Insertion Method
15 mm Pink Hub	3-39 kg	Proximal and Distal Tibia	Manual and Power drill
25 mm Blue Hub	≥40kg	Proximal and Distal Tibia Proximal Humerus	Manual and Power drill
45 mm Yellow Hub	Patient with excessive tissue	Proximal and Distal Tibia Proximal Humerus	Manual and Power drill Ideal for Humerus in Patient ≥40kg

7.8 Tourniquet Removal

SAR Techs should consider removing a tourniquet under the following circumstances:

1. To replace the initial tourniquet with a more effective/comfortable tourniquet such as a pneumatic version (e.g. the EMT) as soon as feasible. It should be applied just proximal to the initial tourniquet provided it is within 2.5-5 cm of the injury;

OR

2. Evacuation time to a surgical facility is expected to take more than 2 hours from time of application of tourniquet.

Removal is **contraindicated** if:

1. The injury is a complete amputation (whereby a tourniquet is likely required and continued use does not threaten the viability of the limb); or
2. The casualty is in hemorrhagic shock or has a decreased level of consciousness presumed secondary to hemorrhagic shock; or
3. The casualty is expected to be assessed in a surgical facility within 2 hours: or
4. The tourniquet has been in place for longer than 6 hours: or
5. Tourniquet has been applied to a crushed limb.

Caution:

Gradually reduce pressure on the tourniquet, leaving tourniquet in position. The wound should be inspected for bleeding to see if further management is required. If feasible, other methods of controlling hemorrhage should be instituted such as direct pressure, pressure dressings, or application of hemostatic agents. If these are unsuccessful in stopping the bleeding and/or the casualty develops symptoms or signs of shock, a tourniquet should be reapplied (preferably the EMT) and should remain in place until the casualty is assessed at a surgical facility.

Before releasing a tourniquet on a casualty that has been resuscitated for hypovolemic shock, ensure a positive response to resuscitation efforts (i.e. a peripheral pulse normal in character and normal mentation if there is no traumatic brain injury).

7.9 Decompression of Tension/Symptomatic Pneumothorax – Needle Thoracostomy

Indications [1, 2]

◊ Penetrating torso trauma above the level of the umbilicus

OR

◊ Unilateral absent breath sounds or tracheal deviation, especially with blunt injury (bruising, crepitus, obvious flail, asymmetry on inspection), blast injury (by history, particularly blast in confined space) or possible hyperbaric injury (diving/high pressure gas) [3]

OR

◊ Rapid decompression.[3]

WITH ANY ONE OF THE FOLLOWING:

◊ SBP < 90 mmHg, or loss of radial pulse

OR

◊ Significant respiratory distress

OR

◊ Oxygen saturation less than 90%

OR

◊ Unexplained VSA or profound instability from unknown source.

Procedure

a. Assess the patient's chest and respiratory status;

b. Apply O_2 at 100% with a non-rebreather mask [4];

c. Preferred landmark is the 4th or 5th intercostal space, mid-axillary line [5]; Secondary site is 2nd intercostal space mid-clavicular line. Subject to change, depending on patient position and site access;

d. Prepare the site by wiping with alcohol or betadine swab;

e. Put tension on skin over puncture site using two fingers and hold until puncture has been completed;

f. Insert 14 gauge needle and catheter unit along the upper border of the rib. You should feel a "pop" as the needle enters the pleural space. You may also hear/feel a rush of air through the catheter hub [6];

g. Advance the needle and catheter 3 to 4 cm. In noisy environments, attach a fluid-filled syringe (sterile water/NS/RL) and draw back on the plunger. Air bubbles in the syringe confirm you are exhausting air from the chest [7];

h. Withdraw the needle from the catheter before transport;

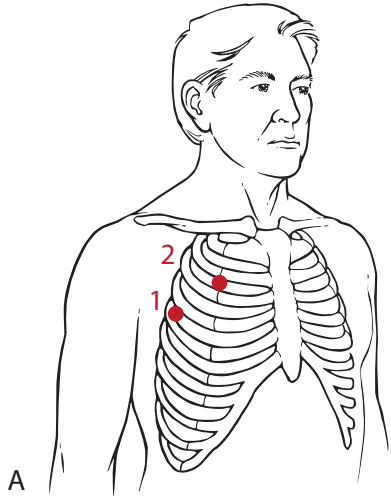
i. Check catheter regularly to insure it has not become occluded. Use a syringe to flush the catheter with 1-2 ml (sterile water/NS/RL) then draw back on the plunger, checking for air bubbles.

j. If patient fails to respond or shows transient improvement only, multiple needle thoracostomies may be required as the initial placement may become occluded. For any repeat thoracostomies, attach a fluid-filled syringe.

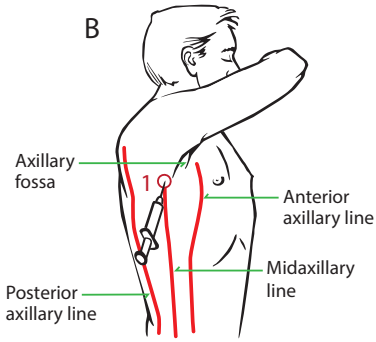
k. After decompression, oxygen flow may be reduced to maintain $SpO_2 \geq 92\%$.

---

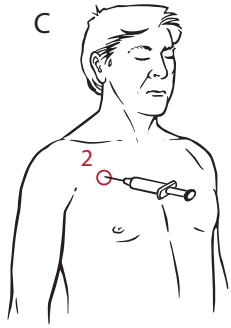
1. Needle thoracostomy is a critical intervention. Contact EP if these requirements are only partially met.
2. During air transport, maintain cabin pressure at sea level if possible or at the lowest altitude possible to prevent complications from air expansion.
3. With any possible decompression injury, go to 5.3 Decompression Illness Protocol once pneumothorax decompressed.
4. Patient may require assisted ventilations. Use caution with bag-valve mask ventilations as aggressive bagging may exacerbate a tension pneumothorax.
5. Alternate placement is the second intercostal space, mid-clavicular line. If in doubt, go more lateral.
6. If you obtain bright red blood while advancing the needle and catheter unit, withdraw the unit completely and attempt insertion in another site. If you obtain dark red blood, advance the needle and catheter another 3 cm. If you continue to obtain blood and there is no rush of air, remove the needle from the catheter and apply chest seal. Reassess the patient condition and reconsider your diagnosis.
7. Confirming that the catheter is venting with a fluid-filled syringe is optional for the first needle insertion but recommended for subsequent insertions (mandatory if the procedure is performed in flight or in noisy environments).



OPTION 1 & 2



OPTION 1



OPTION 2

A – Sites options for chest decompression in tension pneumothorax.

Option 1 (preferred) in the fourth or fifth intercostal space, mid-axillary, shown topographically in **B**. Option 2 is the second intercostal space, mid-clavicular, shown topographically in **C**. Subject to change, depending on patient position and site access.

7.10 Orogastric (OG) / Nasogastric (NG) Tube Insertion

Indications

◊ To accomplish gastric decompression. [1]

Contraindications

◊ Esophageal / Retro-pharyngeal Trauma.

◊ Caustic Ingestion.

◊ Suspected Basilar Skull Fracture (avoid NG insertion). [2]

Advantages

◊ Decreases risk of aspiration.

◊ Improve patient abdominal discomfort caused by gastric distension

Procedure

◊ Without Advance Airway in place:

◊ Select appropriate tube size and apply lubricating gel (e.g. Adult = 36 French; Child = 22 French).

◊ Explain procedure to patient if conscious.

◊ If no C-spine concerns, gently flex patient's head forward.

◊ **For OG Insertion:** Introduce tube into mouth and direct it toward the back of the tongue and then downward through the oropharynx.

◊ **For NG Insertion:** Lubricate tip of tube with surgical lubricant then introduce the tube into the patients largest nare along the patients nasal floor (perpendicular to the patients head).

◊ For both OG and NG insertions, (If conscious, ask patient to continuously swallow and advance tube immediately after each gagging episode).

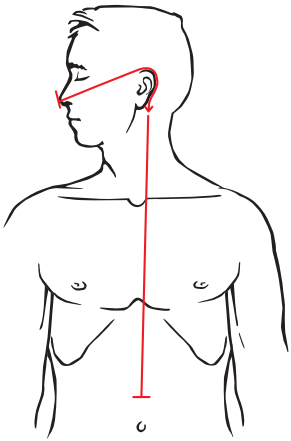
◊ Confirm intragastric placement (auscultate while injecting 30-50 ml of air).

◊ Consider attaching urinary catheter bag.

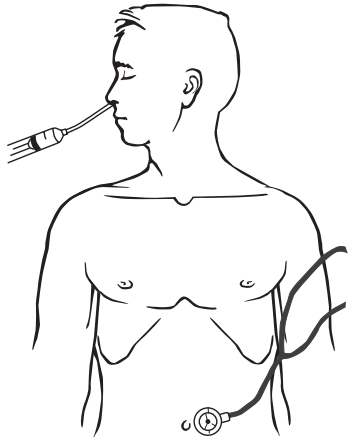
◊ Retention of the OG/NG tube is a clinical decision based on circumstances. [3]

◊ Record time of insertion and removal, catheter size, etc.

NG Displayed Below – Same Applies for OG



Estimating length
of the tube required



Confirming the
correct position of tube

1. Note that any patient who is ventilated by BVM for more than 15 minutes (or pediatric patient for more than 5 minutes) requires an OG tube to prevent regurgitation and subsequent airway compromise. If in doubt, insert an OG tube early.
2. Although proper insertion technique decreases risk of epistaxis (nosebleed), this must be considered by the SarTech before selecting the NG over OG insertion.
3. In general, if a patient is being ventilated by BVM then the tube should remain in place to prevent gastric distention and regurgitation. If a patient is well enough to complain about discomfort from the OG tube, they are much less likely to require it.

7.11 START Triage

Indications

◊ Known Major Air Disaster or Mass Casualty Incident.

◊ Number of patients overwhelm the first SAR Techs on scene, making full patient assessments impractical.

To maximize efficiency, divide and mark the Rescue Scene into Sectors where possible.

↓

Initial survey using START triage. [1]

◊ During initial survey, tag each patient as they are encountered.

ONLY MINIMUM INTERVENTIONS ARE PERFORMED DURING THIS PHASE UNTIL ALL PATIENTS HAVE BEEN SURVEYED. [2,3]

◊ Actively search your sector (create a diagram where possible).

◊ Prioritize patients by condition and count accurately.

◊ Report your findings to the On Scene Commander without delay.

↓

After initial survey is complete, extraction and comprehensive treatment begins.

◊ Ensure casualty reassessment is done as per Primary Survey in 7.1 to find any missed injuries.

◊ Reprioritize patients as necessary.

◊ If established, move casualties through a control point to a central Medical Station, ensuring the Medical Boss is notified.

---

1. START triage applies only to casualties/patients. Missing (Grey) and uninjured (White) person should be accounted and managed for IAW normal SAR procedures.
2. Time is of the essence, the goal in START triage is to provide the greatest good to the greatest number of casualties.
3. SAR Techs should familiarize themselves with Triage Kit contents en route to ensure maximum effectiveness.

7.11 START Triage – Simple Triage and Rapid Transport

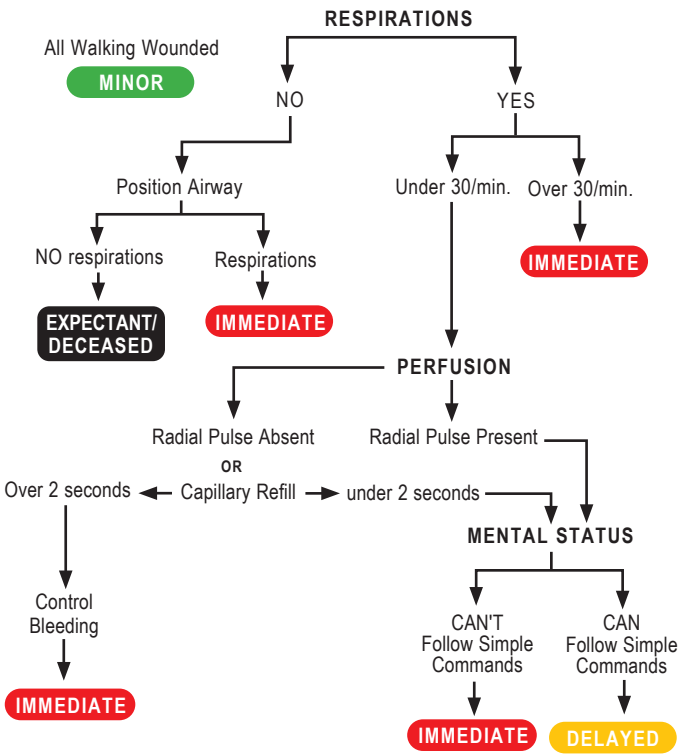
GREEN – Minor
YELLOW – Delayed
RED – Immediate
BLACK – Expectant/ Deceased

30 – 2 – Can Do (RPM Assessment)

Respirations: > 30 or < 10 per minute

Perfusion: Radial pulse or capillary refil < 2 secs.

Mentation: Can do – follows simple commands.



SECTION 8 – ABBREVIATIONS/REFERENCES

8.1 Common Medical Abbreviations

1°	Primary, First degree
2°	Secondary, Second degree
≈	Approximately equal to
Abd	Abdomen (ante)
AED	Automated External Defibrillator
bid	Twice daily
BSA	Body Surface Area
CA	Cancer
CC	Chief Complaint
CO	Carbon monoxide
C/O	Complaining of
CHF	Congestive Heart Failure
CSF	Cerebrospinal Fluid
$D_{10}NS$	10% Dextrose in normal saline
Dx	Diagnosis
D/C	Discontinue
DOB	Date of Birth
DNR	Do Not Resuscitate
ECMO	Extracorporeal membrane oxygenation
ED	Erectile Disfunction
EP	Emergency Physician
ETOH	Alcohol
FAST	Face, Arm, Speech, Time
Fx, #	Fracture
gtt	Drop
GI	Gastrointestinal
GU	Genitourinary
H/A	Headache
HTN	Hypertension
Hx	History
IN	Intra-Nasal
IO	Intraosseous
JVD	Jugular Venous Distension
LSN	Last Seen Normal
LOC	Level of Consciousness
MDI	Metered Dose Inhaler

MI	Myocardial Infarction
MOA	Months Of Age
N&V	Nausea & Vomiting
NEB	Nebulized
NKA	No Known Allergies
NKDA	No Known Drug Allergies
NS	Normal saline
NTG	Nitroglycerin
NYD	Not Yet Diagnosed
PE	Pulmonary Embolism
PHN	Provincial Health Number
PR	Per Rectum
prn	As needed
q	Every
q hr	Every Hour
q 2 hr	Every 2 Hours
Rx	Prescribed for
ROSC	Return of Spontaneous Circulation
SBP	Systolic Blood Pressure
S/S	Signs and Symptoms
SL	Sublingual
SMR	Spinal Motion Restriction
SOB	Shortness Of Breath
T	Temperature
TIA	Transient Ischemic Attack
TBI	Traumatic Brain Injury
TOR	Termination of Resuscitation
UO	Urinary Output
U/S	Ultra Sound
VS	Vital Signs
VSA	Vital Signs Absent
WOB	Work of Breathing
YOA	Years Of Age
↓	Decreased
↑	Increased
Ø	No; None; Null

8.2 Glasgow Coma Scale

INFANT		CHILD/ADULT
	Eye Opening	
4 Spontaneous		4 Spontaneous
3 To speech		3 To speech
2 To pain		2 To pain
1 No response		1 No response
	Best Verbal Response	
5 Coos, babbles		5 Oriented
4 Irritable cries		4 Confused
3 Cries to pain		3 Inappropriate words
2 Moans, grunts		2 Incomprehensible sounds
1 No response		1 No response
	Best Motor Response	
6 Spontaneous		6 Obeys commands
5 Localizes pain		5 Localizes pain
4 Withdraws from pain		4 Withdraws from pain
3 Flexion (decorticate)		3 Flexion (decorticate)
2 Extension (decerebrate)		2 Extension (decerebrate)
1 No response		1 No response

8.3 Neurologic Red Flags

Beware of Red Flags:

Progressively declining level of consciousness
Progressive declining neurologic examination
Pupillary asymmetry
Seizures
Repeated vomiting
Persistent Glasgow Coma Scale < 15
Loss of consciousness greater than 5 minutes
Double vision
Worsening headache
Motor or sensory deficit
Unable to recognize people or disoriented to place
Ataxia

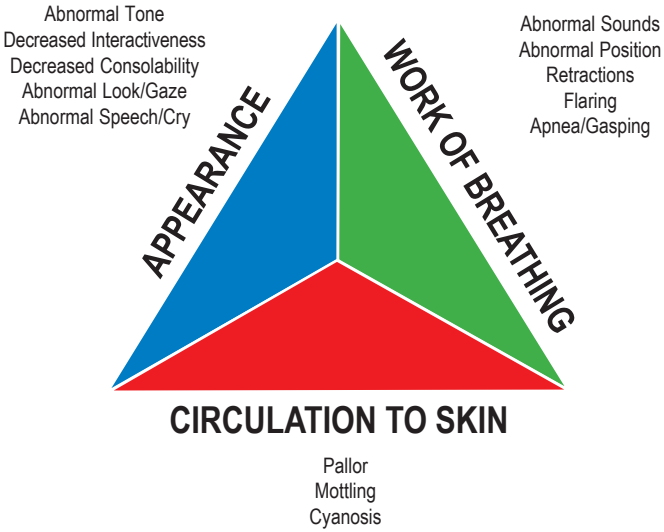
Other important signs (especially after concussion):

Confusion
Slurred speech
Unusual behaviour
Unsteady on feet
Weakness
Vertigo or dizziness
Persistent headache

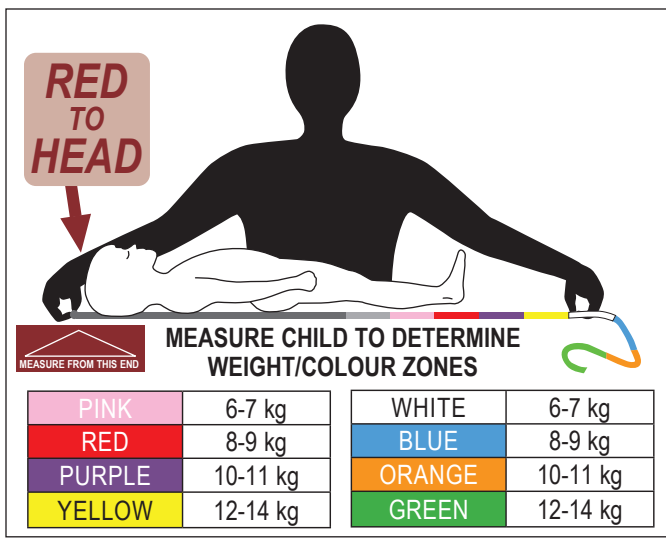
8.4 Rapid Neurologic Assessment

Head and Neck	**Normal**	**Abnormal**
Orientation (time, person, place/situation)	_____	_____
Visual Acuity (count fingers, ask about double vision)	_____	_____
Visual fields (bring fingers from behind patient's head)	_____	_____
Pupils equal and reactive to light	_____	_____
Eye movement ("H" pattern – look for nystagmus)	_____	_____
Sensation of forehead, cheeks, lower jaw	_____	_____
Clench teeth (check jaw muscles)	_____	_____
Furrow brow	_____	_____
Smile or grimace (show teeth)	_____	_____
Check hearing/noises	_____	_____
Swallow	_____	_____
Shrug shoulders (check resistance)	_____	_____
Protrude tongue (check for deviation to one side)	_____	_____
Sensation		
Any unusual sensations?	_____	_____
Check sensation (arms, back, trunk, legs)	_____	_____
Is sensation the same on both sides?	_____	_____
Motor Function		
Finger squeeze bilaterally	_____	_____
Thumbs down, resist pushing arms apart	_____	_____
Flexion and extension of hip, knee, ankle	_____	_____
Plantar reflex	_____	_____

8.5 Pediatric Assessment Triangle



Pediatric Measurement Chart



PINK	6-7 kg
RED	8-9 kg
PURPLE	10-11 kg
YELLOW	12-14 kg

WHITE	6-7 kg
BLUE	8-9 kg
ORANGE	10-11 kg
GREEN	12-14 kg

Measure length of infant/child to determine estimate weight (kg)
1 kg = 2.2 lbs

8.6 Pediatric Tables

Pediatric Fluid Replacement Table

			Normal			
	kg	**lbs**	**HR**	**Resp**	**Min SBP**	**RL/NS Bolus (20ml/kg)**
Grey	3-5 kg	6-11	100-180	30-45	70	100 ml
Pink	6-7 kg	12-16	100-180	30-45	71	130 ml
Red	8-9 kg	17-20	100-180	25-35	72	170 ml
Purple	10-11 kg	21-25	100-180	25-35	72	210 ml
Yellow	12-14 kg	26-31	80-130	20-30	74	260 ml
White	15-18 kg	32-40	80-120	20-30	78	325 ml
Blue	19-23 kg	41-51	70-110	18-24	82	420 ml
Orange	24-29 kg	52-65	70-110	18-22	85	500 ml
Green	30-36 kg	66-80	70-110	16-20	88	500 ml

		PAIN				OVERDOSE	NAUSEA	HYPOGLYCEMIA	SEIZURE		ANAPHYLAXIS		
		Ketamine IV/IO	Ketamine IM	Morphine IV/IO/IM	Ketorolac IV/IO/IM	Naloxone IV/IO/IM	Dimenhydrinate IV/IO/IM	D10NS IV/IO	Midazolam IV/IO	Midazolam IM/IN	Epinephrine IM	Diphenhydramine IV/IO/IM	Lidocaine For IO Insert
		0.3 mg/kg	0.5 mg/kg	0.1 mg/kg	0.5 mg/kg	0.1 mg/kg	1 mg/kg	5 ml/kg	0.1 ml/kg	0.2 mg/kg	0.01 mg/kg	1 mg/kg	0.5 mg/kg
Grey	3-5 kg	1.0 mg	2 mg	0.4 mg	2 mg	0.4 mg	4 mg	15 ml	0.4 mg	0.8 mg	0.05 mg	4 mg	2 mg
Pink	6-7 kg	1.8 mg	3 mg	0.6 mg	3 mg	0.7 mg	7 mg	30 ml	0.6 mg	1.2 mg	0.07 mg	7 mg	3 mg
Red	8-9 kg	2.4 mg	4 mg	0.8 mg	4 mg	0.9 mg	9 mg	40 ml	0.8 mg	1.6 mg	0.09 mg	9 mg	4 mg
Purple	10-11 kg	3 mg	5 mg	1 mg	5 mg	1 mg	11 mg	50 ml	1 mg	2.1 mg	0.15 mg	10 mg	5 mg
Yellow	12-14 kg	3.6 mg	6 mg	1.3 mg	7 mg	1.3 mg	14 mg	60 ml	1.2 mg	2.6 mg	0.15 mg	13 mg	7 mg
White	15-18 kg	4.5 mg	8 mg	1.6 mg	9 mg	1.6 mg	18 mg	75 ml	1.5 mg	3.3 mg	0.15 mg	15 mg	9 mg
Blue	19-23 kg	5.7 mg	10 mg	2.1 mg	11 mg	2 mg	23 mg	100 ml	2 mg	4.2 mg	0.15 mg	20 mg	11 mg
Orange	24-29 kg	7.2 mg	12 mg	2.6 mg	14 mg	2 mg	29 mg	125 ml	2.5 mg	5 mg	0.15 mg	25 mg	14 mg
Green	30-36 kg	9 mg	15 mg	3.3 mg	15 mg	2 mg	36 mg	150 ml	3 mg	6.5 mg	0.3 mg	30 mg	18 mg

8.7 APGAR Score (Newborn assessment)

	0 Points	1 Point	2 Points	0 Min	1 Min	5 Min
Heart Rate	Absent	< 100	> 100			
Resp Effort	Absent	Slow, irreg.	Strong cry			
Muscle Tone	Flaccid	Some flex	Active motion			
Irritability	No response	Some	Vigorous			
Colour	Blue extremities, pale body	Blue extremities, pink body	Fully pink			
			Total			

8.8 Example Calculation of Fluid Replacement for Burn Victims

Adult Patient using USAISR calculation:

◊ Patient weight 95 kg with 25% BSA affected

◊ First 40-80 kg:
25% BSA x 10 ml/hr= 250 ml/hr

◊ For every 10 kg after 80 Kg add 100 ml/hr
15 kg = 150 ml to be added
250 ml + 150 ml=400 ml/hr

◊ IV/IO fluid rate is 400 ml/hr

Pediatric Patient using Parkland calculation:

◊ Patient weight 35 Kg with 35% BSA affected
4 ml x 35 Kg x 36% BSA = 5040 ml/24 hrs

1/2 first 8 hrs = $\frac{5040\text{ ml}}{2} = \frac{2520\text{ ml}}{8}$ = 315 ml/hr for the 1st 8 hrs

1/4 second 8 hrs = $\frac{5040\text{ ml}}{4} = \frac{1260\text{ ml}}{8}$ = 157.5 ml/hr for the 2nd 8 hrs

1/4 second 8 hrs = $\frac{5040\text{ ml}}{4} = \frac{1260\text{ ml}}{8}$ = 157.5 ml/hr for the 2nd 8 hrs

8.9 IV Drip Rate

Macro Infusion Set – 10 Gtt Per Millilitre (Gtt/ml)

Volume Per Hour	Drops Per Minute	<350 ml/Hr - *Drop Rate Interval* >350 ml/Hr - *Gtts/Sec*
50 ml	8	One drop every **7.2** seconds
100 ml	17	One drop every **3.6** seconds
150 ml	25	One drop every **2.4** seconds
200 ml	33	One drop every **1.8** seconds
250 ml	43	One drop every **1.4** seconds
300 ml	50	One drop every **1.2** seconds
350 ml	58	One drop every **1** seconds
400 ml	67	**1.1** drops every sec (5.5 gtts/5 sec)
500 ml	83	**1.4** drops every sec (5.5 gtts/5 sec)
600 ml	100	**1.7** drops every sec (5.5 gtts/5 sec)
700 ml	117	**2.0** drops every sec (5.5 gtts/5 sec)

***** If using 100 ml NS bag – 100 ml in 10 min is 1.7 drops every sec.

8.10 Formulae

IV FLOW RATES

$$\frac{\text{Vol to be Infused in (ml)} \times \text{Drops of Admin Set in (Gtt/ml)}}{\text{Total time of Infusion in (min)}} = \text{Gtts/min}$$

Example

◊ Volume to be infused 2520 ml in 8 hrs

$$\frac{2520 \text{ ml} \times 10 \text{ Gtt/ml}}{480 \text{ min}} = 53 \text{ Gtt/min or @ 1 Gtt/sec}$$

DRUG ADMINISTRATION

$$\frac{\text{Desired dose in (mg)}}{\text{Concentration on hand in (mg/ml)}} = \text{Volume to be administered}$$

Example

◊ Desired dose is 20 mg, Concentration on hand is 10 mg/ml

$$\frac{20 \text{ mg}}{10 \text{ mg/ml}} = 2 \text{ ml Volume to be administered}$$

CHILD'S WEIGHT (1-6 YOA)

2 x Age in (years) + 8 = Approx Weight in (kg)

Example

◊ 2 year old boy

2 x 2 years + 8 = Approx 12 kg

CATHERIZATION URINARY OUTPUT

Adult > 0.5 ml/kg/hr
Child > 1 ml/kg/hr

Example

◊ Weight of adult = 70 kg; Weight of child = 12 kg

Adult: $\frac{0.5 \text{ ml} \times 70 \text{ kg}}{\text{hr}} = 35 \text{ ml/hr urinary output}$

Child: $\frac{1 \text{ ml} \times 12 \text{ kg}}{\text{hr}} = 12 \text{ ml/hr urinary output}$

8.11 Minutes of O_2 Supply by Pressure and Flow Rate

Jumbo 'D' Format O_2 (Full Tank ≈ 640 L)						
Pressure	**Litres Per Minute (LPM)**					
(PSI)	**2**	**4**	**6**	**8**	**10**	**15**
2200	321	161	107	80	64	43
2000	292	146	97	73	58	39
1800	262	131	87	66	52	35
1600	232	116	77	58	46	31
1400	203	101	68	51	41	27
1200	173	87	58	43	35	23
1000	144	72	48	36	29	19
900	129	65	43	32	26	17
800	115	57	38	29	23	15
700	100	50	33	25	20	13
600	86	43	29	21	17	11
500	72	36	24	18	14	10
400	57	29	19	14	11	8
300	43	22	14	11	9	5
200	29	15	10	7	6	4
100	16	8	5	4	**PREPARE TO REPLACE O_2 TANK**	

'EE Lite' Format O_2 (Full Tank ≈ 1360 L)						
Pressure	**Litres Per Minute (LPM)**					
(PSI)	**2**	**4**	**6**	**8**	**10**	**15**
2200	680	340	226	170	136	91
2000	617	308	207	154	123	82
1800	554	277	185	139	111	74
1600	492	246	164	123	98	66
1400	429	214	143	107	86	57
1200	366	183	122	92	73	49
1000	304	152	101	76	61	41
900	273	137	91	68	55	36
800	242	121	81	61	48	32
700	212	106	71	53	42	28
600	182	91	61	45	36	24
500	152	76	50	38	30	20
400	122	61	41	30	24	16
300	92	46	31	23	18	12
200	62	31	21	16	12	8
100	33	17	11	8	**PREPARE TO REPLACE O_2 TANK**	

8.12 2018 Lake Louise Acute Mountain Sickness – Sickness Score

Headache
- 0 - None at all
- 1 - A mild headache
- 2 - Moderate headache
- 3 - Severe headache, incapacitating

Gastrointestinal symptoms
- 0 - Good appetite
- 1 - Poor appetite or nausea
- 2 - Moderate nausea or vomiting
- 3 - Severe nausea and vomiting, incapacitating

Fatigue and/or weakness
- 0 - Not tired or weak
- 1 - Mild fatigue/weakness
- 2 - Moderate fatigue/weakness
- 3 - Severe fatigue/weakness, incapacitating

Dizziness/Light-headedness
- 0 - No dizziness/light-headedness
- 1 - Mild dizziness/light-headedness
- 2 - Moderate dizziness/ light-headedness
- 3 - Severe dizziness/ light-headedness, incapacitating

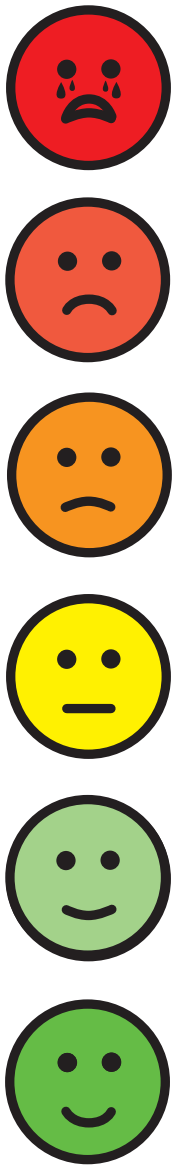
Diagnostic Criteria and Assessment of AMS

AMS is defined as a Lake Louise AMS score total of three or more points from the four rated symptoms, including at least one point from headache in the setting of a recent ascent or gain in altitude.

AMS severity score
Mild – 3-5 points
Moderate – 6-9 points
Severe – 10-12 points

Although symptoms can develop within 6 hours of gain in altitude, assess AMS score only after 6 hours, to avoid confusing AMS with confounding symptoms from travel or responses to acute hypoxia (e.g., vagal responses).

8.13 Visual Analogue Pain Scale



10	Unimaginable unspeakable
9	Excruciating unbearable
8	Utterly horrible
7	Very intense
6	Intense
5	Very distressing
4	Distressing
3	Tolerable
2	Discomforting
1	Very mild
0	No pain

Suggested guidance for pain severity:
Mild < 3 • Moderate 3-7 • Severe > 7

NOTIFICATION

◊ Ensure notification is given ASAP (once in transit and in contact with receiving hospital).

◊ Provide the receiving emergency facility[1] with the following information:

- ♦ SAR Tech Name
- ♦ Patient Age and Gender
- ♦ Chief Complaint (provisional diagnosis)
- ♦ History of the Chief Complaint (Mechanism of Injury)
- ♦ Injuries and relavent physical findings
- ♦ Relevant vitals[2]
- ♦ Treatments and patient trends[3]
- ♦ Estimated time of Arrival (ETA)
- ♦ Are there any questions?

Notes:

HOSPITAL REPORT (Handover Report)

◊ Ensure a hospital report is given upon arrival at the hospital, or handover to another medical authority.[1]

◊ Using IMIST/AMBO provide the receiving medical authority with a hospital report.

I - Identification	**A -** Allergies
M - Mechanism/medical complaint	**M -** Medication
I - Injuries/information related to the complaint	**B -** Background history
S - Signs	**O -** Other info
T - Treatment and trends	

IMIST/AMBO is a popular abbreviation to summarize the headings for notifications and handover reports.

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1. Patients are often handed over to medical authorities other than hospitals (other SAR Tech teams, flight medics, EHS, etc.).
2. Only pertinent vital should be shared in the notification (i.e. SBP in an unstable trauma, or RR and SpO_2 in a short of breath patient.).
3. SAR Tech Protocols differ from other medical authorities and are only known to SAR Techs.Use only standard medical abbreviations and terminologies.

Notes:

RESCUE