Hazardous Materials Medical Operations Manual

Volume 4

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CLINICAL STANDARDS

CLINICAL STANDARDS

HM-CS1 HAZMAT MEDICAL SUPPORT OPERATIONS

Purpose: To describe the appropriate and authorized interventions for supportive care in any hazardous materials operational environment.

Background:
Although general medical priorities remain similar to routine EMS operations, the hazardous materials environment requires modifications to protocol, training, and approach to address the following challenges:

- **Functioning in a known, suspected or potentially hazardous environment**
  - Primary medical function is to ensure the safety and appropriate care of hazmat team members. Medical functions are considered to be in support of the overall hazardous materials mitigation objectives
  - Limitations to equipment, assessment and treatment options, related to factors such as hazardous environment, inability to access a patient/requirement for remote assessment, contamination, decontamination procedures, and responder PPE are recognized
  - Limitations in direct access to online medical control consultation during hazmat operations

All the above factors contribute to different risk/benefit considerations in the hazardous materials environment. Hazardous Materials Medics (Hazmat Medics) must be enabled to assess the situation to determine when altered standards of care are necessary. It is important to know that available assessment and treatment options will vary depending upon level of stress and zone of care at any given time

- **Clinical standard by zones of care:**

  - **Hot Zone:** Care in the hot zone may be limited to extrication to a decontamination or casualty collection point. Basic airway maneuvers and control of life-threatening hemorrhage may be possible depending upon the level of danger. Cardiac arrest patients in the hot zone may be considered non-viable, and resuscitative efforts may be withheld due to inability to provide further care
  - **Warm Zone/Decontamination:** Care in the warm zone should include basic airway maneuvers, control of life-threatening hemorrhage, administration of some antidotes and seizure control medications, and placement of Extraglottic airway devices and Orogastric tubes. Other limited ALS interventions maybe attempted if conditions allow. Cardiac arrest patients may still be considered nonviable and resuscitative efforts withheld or may receive limited resuscitative attempts if conditions allow
  - **Cold Zone:** Care in the cold zone should include care per regular clinical protocols with addition of hazardous materials specific interventions as outlined in this manual and transport to appropriate receiving hospital. Hazmat medics may continue to directly provide care, or transfer care to other providers at this stage

- **Hazmat Medic specific responsibilities:**

1. Ensure the safety of hazmat team members during training and operations
2. Provide pre-and post-medical screening support services to team members
3. Deliver specific advanced interventions to exposed team members and victims during hazmat operations (may occur while in PPE)
4. Oversight of other system clinicians delivering specific interventions in the cold zone and during transport
5. Respond to field requests for hazmat medical consults

HM-CS2 HAZMAT MEDIC CONSULTATION

Purpose: To establish the procedure for Hazmat Medics to utilize when consultation is requested from the field by Pinellas County Certified Clinicians and other system responders

Description:

The Pinellas County EMS System recognizes that Hazmat Medics maintain a knowledge and expertise regarding the potential hazards, situations, specific toxidromes and treatments related to many substances. This policy describes how a Hazmat Medic is to respond to a field request for consultation

NOTE: This policy does not apply to non-medical Hazmat Team Consultations (i.e. fuel spill)

Policy:

- **Pinellas County Certified Clinicians**
  - Pinellas County Certified Clinicians may consult a Hazmat Medic regarding a clinical issue or medical question only in conjunction with the OLMC Physician. Every effort should be made to conference the Clinician, the OLMC Physician, and the Hazmat Medic on a single radio channel (i.e. MED-B) or a recorded telephone line to ensure common understanding of a situation, available resources, and continuity of care
- **Other System Responders**
  - Responders, who are not Pinellas County Certified Clinicians, may consult a Hazmat Medic regarding a clinical issue or medical question only in conjunction with the OLMC Physician. It is recommended that an on-scene Certified Clinician participate in the consultation, if available. Every effort should be made to conference the Responder, Clinician, OLMC Physician, and the Hazmat Medic on a single radio channel (i.e. MED-B) or telephone line to ensure common understanding of a situation, available resources, and continuity of care
- **Medical Direction Standing Orders - Post Consultation**
  - From time to time, the Pinellas County EMS Medical Director or designee may issue standing orders for Hazmat Medics regarding a specific incident or ongoing response to alleviate the need for repeated consultations or ensure timely application of specific treatments. Such standing orders will be valid only for the duration of the incident or response.

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HM-CS3 HAZMAT HOSPITAL DESTINATION POLICY

Patient Status Definitions

Standard Pinellas County EMS Patient Status Definitions (**RED**, **YELLOW**, **GREEN**, **BLACK**) apply to a patient(s) from a Hazardous Materials incident (Ref. PCEMS MOM CS4). In addition, patients with potential to carry toxic substances on/in their body or act as a source of contagion for pathogens described in this manual shall be categorized as: **"CONTAMINATED/CONTAGIOUS"**

Hospital Destination Policy

Patients who are experiencing symptoms of toxic exposure but are **not** **"CONTAMINATED/CONTAGIOUS"** shall be transported according to standard PCEMS protocols (Ref. PCEMS MOM CS4)

Destination selection for **"CONTAMINATED/CONTAGIOUS"** patients shall be determined by the Hazmat Medic in consultation with Hazmat Group Officer/Transport Officer and the OLMC Physician, when needed. Sunstar Communications Center staff may assist with obtaining hospital capabilities and status as needed.

Freestanding Emergency Departments may be utilized for patients who do not meet criteria in PCEMS MOM CS4 if determined to be the best location for ongoing care or quarantine/cohorting of patients after consultation the OLMC Physician.

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HM-CS4 HAZMAT TRANSPORT RESOURCE UTILIZATION POLICY

Patient Transport Considerations

Patients who are **"CONTAMINATED/CONTAGIOUS"** shall be transported in the following manner:

- Aeromedical resources shall not be used
- Sunstar Units shall be equipped and staffed in the following manner:
  - Reference HM-CT1,2,3
  - Sunstar Operations Supervisor shall be notified of any transport requests
- When approved by OLMC and agency command staff, a First Responder Transport Capable unit(s) may be utilized for transport and shall be equipped and staffed in the following manner:
  - Reference HM-CT1,2,3
  - Agency Command Staff shall be notified of any transport requests
- Receiving hospitals shall be notified prior to initiating transport of the:
  - Type and nature of incident
  - Caller's telephone number
  - Number of patients and color category
  - Signs/symptoms being experienced by patients
  - Nature of injuries
  - Name of chemical(s) involved (spelled out)
  - Extent of patient decontamination in the field
  - What isolation precautions are being utilized during transport
  - Estimated time of arrival

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HM-CS5 STANDARDIZED RESPONSE GEAR INVENTORY

Required Medical Equipment

This protocol defines the required medical equipment and supplies for each hazardous materials response unit in the Pinellas County.

Standardization of Equipment

All front-line hazardous materials response units shall utilize standardized medical gear and inventories to promote patient safety.

Unauthorized Equipment

Patient care items (medical equipment, medical supplies, medications, monitors, defibrillators, or any other medical device or equipment, etc.) may not be carried or employed by Certified Professionals in the Pinellas County EMS System while on duty unless specifically authorized in this protocol.

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HM-CS5.1 BLOOD DRAW KIT

Date Completed (mm/dd/yyyy)	
Unit ID #	
Completed By: (first and last name)	
EMS ID#	
Comments	

Kit			
Item Name	**Qty Rqd**	**Qty Present**	**Exp Date**
Tourniquets	15		
Red Top Blood Tubes	15		
Blood Draw Needle	15		
Alcohol Prep Pads	30		
Blood Tube Holder Adapter	15		
Vanishpoint Safety Blood Tube Holder	8		

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HM-CS5.2 ANTIDOTE KIT GENERAL

Date Completed (mm/dd/yyyy)	
Unit ID #	
Completed By: (first and last name)	
EMS ID#	
Comments	

Kit			
Item Name	**Qty Rqd**	**Qty Present**	**Exp Date**
Pyridoxine HCL 100 mg/mL – 1 mL Vial	15		
Thiamine HCL 100 mg/mL – 2 mL Vial	10		
Methylene Blue 0.5% - 5 mg/mL – 10 mL Ampoule	5		
Ondansetron 4 mg/2 mL Vial	10		

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HM-CS5.3 SYRINGE KIT #1

Date Completed (mm/dd/yyyy)	
Unit ID #	
Completed By: (first and last name)	
EMS ID#	
Comments	

Kit			
Item Name	**Qty Rqd**	**Qty Present**	**Exp Date**
3 mL Vanishpoint Safety Syringe	10		
Alcohol Prep Pad	30		
18g x 1.5” Blunt Fill Needle	10		
1 mL Luer-lock Syringe	10		
20 mL Luer-lock Syringe	10		
10 mL Luer-lock Syringe	5		
1 mL Vanishpoint Safety Syringe	10		
3-way Stopcock	10		
3 mL Luer-lock Syringe	10		

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HM-CS5.4 OPIOID ANTIDOTE KIT

Date Completed (mm/dd/yyyy)	
Unit ID #	
Completed By: (first and last name)	
EMS ID#	
Comments	

Kit			
Item Name	**Qty Rqd**	**Qty Present**	**Exp Date**
Naloxone 2 mg/2 mL Prefilled	10		
Narcan 4 mg Nasal Spray	10		

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HM-CS5.5 SURGICAL KIT

Date Completed (mm/dd/yyyy)	
Unit ID #	
Completed By: (first and last name)	
EMS ID#	
Comments	

Kit			
Item Name	**Qty Rqd**	**Qty Present**	**Exp Date**
Emergency Trauma Dressing (ETD) 4”	5		
5” x 9” ABD Pads	5		
Combat Application Tourniquet (CAT) – Orange	10		
#10 Scalpel	5		
Kelly Forcep	5		
20” x 30” Trauma Dressing	5		

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HM-CS5.6 CYANIDE ANTIDOTE KIT

Date Completed (mm/dd/yyyy)	
Unit ID #	
Completed By: (first and last name)	
EMS ID#	
Comments	

Kit			
Item Name	**Qty Rqd**	**Qty Present**	**Exp Date**
Cyanide Antidote Kit	5		
Dextrose 5% - 100 mL	10		

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HM-CS5.7 POLYETHYLENE GLYCOL (PEG) KIT

Date Completed (mm/dd/yyyy)	
Unit ID #	
Completed By: (first and last name)	
EMS ID#	
Comments	

Kit			
Item Name	**Qty Rqd**	**Qty Present**	**Exp Date**
GoLytely (PEG) 4000 mL	3		

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HM-CS5.8 FLUIDS KIT

Date Completed (mm/dd/yyyy)	
Unit ID #	
Completed By: (first and last name)	
EMS ID#	
Comments	

Kit			
Item Name	**Qty Rqd**	**Qty Present**	**Exp Date**
0.9% Sodium Chloride – 1000 mL	5		
Dextrose 10% - 250 mL	5		

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HM-CS5.9 NERVE AGENT ANTIDOTE KIT (NAAK) - VIALS

Date Completed (mm/dd/yyyy)	
Unit ID #	
Completed By: (first and last name)	
EMS ID#	
Comments	

Kit			
Item Name	**Qty Rqd**	**Qty Present**	**Exp Date**
Pralidoxime Chloride 1g	12		
Sterile Water 20 mL Vial	12		
Atropine Sulfate 0.4 mg/mL – 20 mL Vial	12		

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HM-CS5.10 NERVE AGENT ANTIDOTE KIT (NAAK) - AUTOINJECTORS

Date Completed (mm/dd/yyyy)	
Unit ID #	
Completed By: (first and last name)	
EMS ID#	
Comments	

Kit			
Item Name	**Qty Rqd**	**Qty Present**	**Exp Date**
Duodote	30		

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HM-CS5.11 SYRINGE KIT #2

Date Completed (mm/dd/yyyy)	
Unit ID #	
Completed By: (first and last name)	
EMS ID#	
Comments	

Kit			
Item Name	**Qty Rqd**	**Qty Present**	**Exp Date**
3 mL Vanishpoint Safety Syringe	10		
Alcohol Prep Pad	30		
18g x 1.5” Blunt Fill Needle	10		
1 mL Luer-lock Syringe	10		
20 mL Luer-lock Syringe	10		
10 mL Luer-lock Syringe	5		
1 mL Vanishpoint Safety Syringe	10		
3-way Stopcock	10		
3 mL Luer-lock Syringe	10		

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HM-CS5.12 CARDIAC KIT

Date Completed (mm/dd/yyyy)	
Unit ID #	
Completed By: (first and last name)	
EMS ID#	
Comments	

Kit			
Item Name	**Qty Rqd**	**Qty Present**	**Exp Date**
Nithiodote Kit	4		
60 mL Luer-lock Syringe	10		
Calcium Chloride 1g/10 mL Prefilled Syringe	5		
18g x 1.5” Blunt Fill Needle	10		
Sodium Bicarbonate 8.4% - 50 mL Prefilled Syringe or Vial	10		
Amyl Nitrite Inhalants	1 bx		

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HM-CS5.13 HF/EYE KIT

Date Completed (mm/dd/yyyy)	
Unit ID #	
Completed By: (first and last name)	
EMS ID#	
Comments	

Kit			
Item Name	**Qty Rqd**	**Qty Present**	**Exp Date**
Tongue Depressors	15		
Calgonate Gel	5		
Water for Irrigation – 250 mL	5		
Emesis Basin	5		
pH Paper	1 roll		
Lactated Ringers 1000 mL	3		
Morgan Lens	6		
Morgan Lens Fluid Delivery Sets	5		
Calcium Gluconate 10% - 10 mL Vial	5		
Tetracaine – 15 mL	5		
Lubricating Jelly 4 oz. Tube	5		

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HM-CS5.14 RESPIRATORY IRRITANT/CPAP KIT

Date Completed (mm/dd/yyyy)	
Unit ID #	
Completed By: (first and last name)	
EMS ID#	
Comments	

Kit			
Item Name	**Qty Rqd**	**Qty Present**	**Exp Date**
Tee Adapter	5		
Superset with Mask Elbow Adapter	5		
Sodium Bicarbonate 8.4% 50 mL Prefilled Syringe or Vial	1		
Calcium Gluconate 10% - 10 mL Vial	1		
Sterile Water – 20 mL Vial	2		
Albuterol Sulfate 2.5 mg/3 mL	20		
Ipratropium Bromide 0.5 mg/2.5 mL	10		
Adult Aerosol Mask	5		
Pediatric Aerosol Mask	5		
Large Adult CPAP Setup	5		
Child CPAP Setup	5		
Nebulizer Setup	5		

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HM-CS5.15 AIRWAY KIT

Date Completed (mm/dd/yyyy)	
Unit ID #	
Completed By: (first and last name)	
EMS ID#	
Comments	

Kit			
Item Name	**Qty Rqd**	**Qty Present**	**Exp Date**
Adult Tube Holder	5		
60 mL Luer-lock Syringe	5		
60 mL Syringe with Catheter Tip	5		
King LTS-D Airway Size 3	5		
King LTS-D Airway Size 4	5		
King LTS-D Airway Size 5	5		
Adult BVM Resuscitator with Adult Mask and Filter	5		
18 Fr Salem Sumps OG Tube	5		

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UNIVERSAL

UNIVERSAL

HM-U1 UNIVERSAL APPROACH TO HAZMAT MEDICAL CARE

ADULT and PEDIATRIC	GOALS OF CARE
	Identify hazards, mobilize resources, assess risk/benefit balance for rescue, determine need for decontamination, and initiate stabilizing care while ensuring responder safety

BLS

SAFETY ALERT

RESPONDER SAFETY IS PARAMOUNT

- Ensure isolation and safety, including proper responder PPE
- Determine number of patients, request additional resources and initiate triage when appropriate (Ref. PCEMS MOM CS17)
- Initiate gross decontamination, as indicated
  - Remove contaminated clothing
  - Refer to specific Hazmat Medical Care protocol(s) and Pinellas County Hazmat SOPs for further decontamination methods (Ref. HM-M1 through HM-M15), as needed
- Identify/research hazards utilizing resources according to Pinellas County Hazardous Materials Team Standard Operating Procedures Manual (PCHMT SOPs)
- Identify route of entry/exposure and prevent further/secondary exposure
- Suction as needed
- If patient has evidence of dyspnea, apply supplemental O2 (if safe to do so in environment)

  *****EXCEPTION - Suspected Dipyridyl exposure*****
- Provide ventilation assistance (BVM and airway adjunct), as needed (Ref. PCEMS MOM CP1.1, CP3.1)

ALS

- Establish IV/Intraosseous access when indicated and safe to do so (Ref. HM-CS1)
- Initiate cardiac monitoring when indicated and safe to do so (Ref. HM-CS1)
- Assess and treat cardiac dysthymias (Ref. PCEMS MOM C4, C5)
- Capnography is highly recommended in all Hazmat patients
- If evidence of shock or hypotension (SBP less than 90 mmHg) initiate fluid resuscitation with 0.9% Sodium Chloride:
  - Adult (greater than 13 years old): 500 mL increments. Repeat to max of 2000 mL as needed
  - Pediatric: Age/weight-based dosing per PCEMS Handtevy Medication and Equipment Guidebook

HM-U1 UNIVERSAL APPROACH TO HAZMAT MEDICAL CARE HM-U1

- If actively seizing:
  - Adult:
    - Midazolam 2.5 mg IV/Intraosseous as needed to max of 10 mg **OR**
    - Midazolam 5 mg Intranasal, may repeat once
  - Child:
    - Midazolam IV/Intraosseous or Intranasal per PCEMS Handtevy Medication and Equipment Guidebook
- Provide ventilation assistance and airway management as required (Ref PCEMS MOM CP1, CP3)
  - Airway management may not be feasible in Hot Zone and is not required
  - A King Airway may be used in the Warm Zone prior to or during decon
  - Endotracheal intubation should not be performed until after decon or in the Cold Zone
- Ensure appropriate transportation unit precautions/isolation measures are implemented (Ref. HM-CS4)
- Ensure early hospital notification to allow for appropriate isolation/decontamination procedures (Ref. HM-CS4)

OLMC

- Consult Online Medical Control Physician as needed or to facilitate Poison Information Center consultation.
- Use of Chempack

PEARLS

- Consider the need for additional Hazmat Medics on scene based upon patient number or severity.

QUALITY MEASURES

1. Pending

REFERENCES

- Pinellas County Hazardous Materials Response Team Standard Operating Procedures Manual 10/2011

MEDICAL

MEDICAL

HM-M1 CONVULSANTS

GOALS OF CARE
• Identify specific route and amount of exposure and initiate stabilizing care while ensuring responder safety.

APPLICABILITY		
Chemical Warfare Agents	**Toxic Industrial Chemicals/Materials**	
• None	• Hydrazine • Strychnine	•

BLS

SAFETY ALERT

USE EXTREME CAUTION DURING DECONTAMINATION

Even the small amount of heat generated by physically brushing/wiping Hydrazine off a patient may cause spontaneous combustion

- Universal approach to Hazmat Medical Care (Ref. HM-U1)
- Assess for the presence of ocular involvement:
  - Initiate eye irrigation as needed (Ref. HM-CP2)
- Assess for and treat external burns (Ref. PCEMS MOM T6)

ALS

- For known ingestion without neurologic symptoms (i.e. altered mental status, seizure, etc.) or concern for airway compromise:
  - Initiate Gastric Dilution: Administer eight (8) ounces of water by mouth (four (4) ounces in children or small adults)
- If evidence of bronchospasm initiate bronchodilator and CPAP therapy as needed (Ref. PCEMS MOM A2)
- If neurologic symptoms:
  - Administer Pyridoxine 2.5g IV/Intraosseous slow, may repeat once in 5-10 minutes for continuing symptoms
  - If active seizure:
    - Adult: Midazolam 2.5 mg IV/Intraosseous as needed to max of 10 mg ***OR*** Midazolam 5 mg Intranasal, may repeat once
    - Child: Midazolam IV/Intraosseous or Intranasal
- If respiratory distress or cardiovascular instability, initiate empiric Methemoglobinemia treatment (Ref. HM-M9)
- Provide ventilation assistance and airway management as required (Ref. PCEMS MOM CP1 & CP3)

OLMC

- Consult Online Medical Control Physician as needed or to facilitate Poison Information Center consultation

PEARLS
• Hydrazine has multiple effects that cross standard hazmat categories including corrosives, irritant gases and Methemoglobin Formers. Treatment should be tailored to the predominant symptoms/toxidrome and may be multimodal

QUALITY MEASURES
• Pending

REFERENCES
• Pending

HM-M2 CYANIDE

ADULT and PEDIATRIC	GOALS OF CARE
	Identify specific exposure/toxidrome and initiate stabilizing care while ensuring responder safety

APPLICABILITY		
Chemical Warfare Agents	**Toxic Industrial Chemicals/Materials**	
• None	• Hydrogen Cyanide	• Potassium Cyanide

BLS

- Implement Universal Approach to Hazmat Medical Care (Ref. HM-U1)
- Administer O2 15L via NRBM to all patients with suspected Cyanide exposure
- Provide airway assistance with BVM for unconscious patients (Ref. PCEMS MOM CP1.1, CP3.1)
- Suction as needed

ALS

- Initiate symptomatic treatment:
  - If evidence of bronchospasm, administer aerosol therapy: Albuterol 2.5 mg, repeat as needed
  - If no improvement with initial aerosol treatment, may initiate CPAP (Ref. PCEMS MOM CP6) and continue aerosol therapy via tee piece
  - If seizure occurs treat per Universal Approach to Hazmat Medical Care (Ref. HM-U1)
  - Provide ventilation assistance and airway management as required (Ref. PCEMS MOM CP1, CP3)
  - Assess cardiac rhythm and if dysrhythmias:
    - Sodium Bicarbonate 8.4% (100 mEq) IV/Intraosseous
    - If dysrhythmia persists treat per PCEMS MOM C4, C5
- Determine exposure potential and need for antidote/reversal:
  - If Cyanide exposure suspected AND patient has symptoms of Cyanide exposure (anxiety, headache, agitation, altered mental status, abnormal/unstable vital signs:
    - Establish IV/Intraosseous access (2 sites required) if not already done
    - Draw blood samples prior to administration, time permitting
    - Use dedicated access site to administer CyanoKit 5g IV/Intraosseous over 15 minutes if not in arrest, IVP if in cardiac arrest

      OR
    - If CyanoKit unavailable, administer a Nithiodote Kit:
      - Sodium Nitrite 300mg over 10 minutes followed by
      - Sodium Thiosulphate 12.5 g over 10 minutes
- If suspected Cyanide exposure and altered mental status/unstable vital signs and in a contaminated/hazardous environment (e.g. decon line) may administer Amyl Nitrite via inhalation, but should not delay definitive treatment with Cyanokit

- Treat thermal burns per PCEMS MOM T6

OLMC

- Consult Online Medical Control Physician as needed or to facilitate Poison Information Center consultation

PEARLS

- DO NOT administer Sodium Nitrite for those who were in a structure fire and may have Carbon Monoxide poisoning
- Administering Sodium Nitrite will cause an increase in the patients Methemoglobin levels, if the patient's condition worsens, consider nitrite toxicity
- If Sodium Nitrite is contraindicated, Sodium Thiosulphate can still be administered

QUALITY MEASURES

- Pending

REFERENCES

- Borron SW, Baud FJ, Barriot P, Imbert M, Bismuth C. Prospective study of hydroxocobalamin for acute cyanide poisoning in smoke inhalation. *Ann Emerg Med.* 2007;49(6):794-801.

HM-M3 HYDROCARBONS AND NON-POLAR SOLVENTS

ADULT and PEDIATRIC	GOALS OF CARE
	Rapid decontamination, aggressive airway management and treatment of tachyarrhythmia's due to sensitized myocardium

APPLICABILITY		
Chemical Warfare Agents	**Toxic Industrial Chemicals/Materials**	
• None	• Methylene Chloride • Hexane	• Ethylene Chloride

BLS

- Decontaminate patient
- Universal Approach to Hazmat Medical Care (Ref. HM-U1)

ALS

- If evidence of bronchospasm/pulmonary edema, initiate CPAP as first line therapy (Ref PCEMS MOM CP6)
- If continued evidence of severe bronchospasm after treatment with CPAP: Albuterol 2.5 mg nebulized via tee piece
    - May repeat one time if needed
    - Note that albuterol should be used with caution in hydrocarbon exposure due to sensitization of the myocardium and risk of potentiating cardiac tachyarrhythmias.
- Provide ventilation assistance and airway management as required (Ref. PCEMS MOM CP1, CP3)
- Assess and treat tachyarrhythmias (Ref PCEMS MOM C5)

OLMC

- Consult Online Medical Control Physician as needed or to facilitate Poison Information Center consultation

PEARLS

- Hydrocarbons sensitizes the myocardium causing tachyarrhythmia's, therefore the use of Epinephrine for bronchospasm is contraindicated
- Max dose of Albuterol is 5 mg due to potential for worsening tachyarrhythmias
- Ipratropium is not indicated

QUALITY MEASURES
• Pending

REFERENCES
• Pending

HM-M4 HYDROFLUORIC ACID

ADULT and PEDIATRIC	GOALS OF CARE
	Identify specific route and severity of exposure and initiate stabilizing care while ensuring responder safety

APPLICABILITY		
Chemical Warfare Agents	**Toxic Industrial Chemicals/Materials**	
• None	•	•

BLS

- Universal approach to Hazmat Medical Care (Ref. HM-U1)
- Perform gross decontamination per 600-22
- Perform initial irrigation to affected areas:
  - Flush burns with 0.9% Sodium Chloride or sterile water
  - Irrigate eyes with 0.9% Sodium Chloride or sterile water
- If patient has evidence of dyspnea apply supplemental oxygen if safe to do so in environment
- Provide ventilation assistance (BVM and airway adjunct) as needed (Ref. PCEMS MOM CP1.1 & CP3.1)
- Suction as necessary

ALS

- If evidence of pulmonary edema without respiratory failure:
  - Nebulize Calcium Gluconate 10% 1 mL mixed with 3 mL sterile water (Ref PCEMS MOM CP8.1)
  - Initiate CPAP if not contraindicated and continue nebulizer therapy using in-line Tee-piece (Ref PCEMS MOM CP6, CP8.2) (Note this will require 2 sources of Oxygen)
- Provide ventilation assistance and airway management as required (Ref. PCEMS MOM CP1, CP3)
  - Provide nebulized Calcium Gluconate 10% 1 mL mixed with 3 mL sterile water using Tee-piece and superset adaptor if available (Ref. PCEMS MOM 8.3)
    Note: Requires two (2) sources of Oxygen
- Assess and treat cardiac dysthymias (Ref. PCEMS MOM C4 & C5)

- For severe respiratory depression/arrest and/ or cardiac toxicity dysrhythmia- (prolonged QT interval, hypotension), administer
    - Calcium Gluconate (10%) 1 g slow intravenous push over 5 min. May repeat once in 3-5 minutes if systemic symptoms persist.
    - May substitute Calcium Chloride 10% 1 g slow intravenous push, repeat once in 3-5 minutes if systemic symptoms persist.
- Initiate Pain Management for Burns:
    - Initiate opioid pain management per PCEMS MOM M13
    - Apply 2.5% Calcium Gluconate Gel liberally to burned area (if premixed not available, prepare a 2.5% Calcium Gluconate Gel by mixing Calcium gluconate 10% 50 mL with 10 oz. of water-soluble gel (ex. K-Y jelly))
    - If pain persists, inject Calcium Gluconate 5% 0.5 mL subcutaneous every ½ inch around periphery of localized sites of exposure/burn (Dilute 5 mL of Calcium Gluconate 10% with 5 mL sterile water)
- If ocular involvement:
    - If no globe perforation suspected:
        - Instill Tetracaine 0.5% solution, 2 drops in affected eye (Ref. HM-CP2)
        - Place Morgan Lens in affected eye (Ref. HM-CP2)
    - Perform copious irrigation with premixed Calcium Gluconate ocular solution
        - If ocular solution not available, prepare by mixing Calcium Gluconate 10% 50 mL with 500 mL Sodium Chloride 0.9%

OLMC

- Consult Online Medical Control Physician as needed or to facilitate Poison Information Center consultation.

PEARLS

- Once HF is absorbed into the tissues, it binds to calcium and magnesium. This form of fluoride poisoning can be fatal, even if exposure is due to a dilute solution (< 3%). As little as 7 mL of 100% solution can cause death.
- If open globe suspected, perform irrigation with nasal cannula on bridge of nose as tetracaine and Morgan Lens are contraindicated

QUALITY MEASURES

- Pending

REFERENCES

- Pinellas County Hazardous Materials Response Team Standard Operating Procedures Manual 10/2011
- Florida State Emergency Response Commission Subcommittee on Training: Hazardous Materials Treatment Protocols Version 3.3

HM-M5 HYDROGEN SULFIDE

ADULT and PEDIATRIC	GOALS OF CARE
	Identify specific exposure/toxidrome and initiate stabilizing care while ensuring responder safety

APPLICABILITY		
Chemical Warfare Agents	**Toxic Industrial Chemicals/Materials**	
•	•	•

BLS

- Universal Approach to Hazmat Medical Care (Ref. HM-U1)
- Assess respiratory status and provide supplemental O2 as needed
- Provide airway assistance with BVM for unconscious patients (Ref. PCEMS MOM CP1.1, CP3.1)
- Suction as needed

ALS

- Initiate symptomatic treatment:
  - If evidence of bronchospasm, administer aerosol therapy: Albuterol 2.5 mg, repeat as needed
  - If no improvement with initial aerosol treatment, may initiate CPAP (Ref. PCEMS MOM CP6) and continue aerosol therapy via tee piece
  - If seizure occurs treat per Universal approach to Hazmat Medical Care (Ref. HM-U1)
  - Provide ventilation assistance and airway management as required (Ref PCEMS MOM CP1, CP3)
  - Assess cardiac rhythm and if dysrhythmias:
    - Sodium Bicarbonate 8.4% (100 mEq) IV/Intraosseous
    - If dysrhythmia persists treat per PCEMS MOM C4, C5
- Determine exposure potential and need for antidote/reversal:
  - If Hydrogen Sulfide exposure suspected AND patient with severe symptoms of exposure (unstable vital signs or altered mental status) administer:
    - Sodium Nitrite 300 mg over 10 minutes
    - May administer Amyl Nitrite via inhalation (30 second intervals) prior to establishment of IV access but should not delay initiating Sodium Nitrite therapy
- Treat thermal burns per PCEMS MOM T6

OLMC

- Consult Online Medical Control Physician as needed or to facilitate Poison Information Center consultation.

PEARLS

- **Do not administer sodium thiosulphate for those with H2S poisoning**
- Administering sodium nitrate will cause an increase in the patient's methemoglobin levels, if the patient's condition worsens, consider nitrite toxicity

- High concentration of Hydrogen Sulfide can cause olfactory paralysis and smell can be an unreliable indicator

REFERENCES
• Pending

HM-M6 IRRITANT/CORROSIVE – INHALATION

ADULT and PEDIATRIC	GOALS OF CARE
	Identify specific exposure/toxidrome and initiate stabilizing care while ensuring responder safety

APPLICABILITY		
Chemical Warfare Agents	**Toxic Industrial Chemicals/Materials**	
• None	• Chlorine	• Hydrochloric Acid

BLS

- Universal Approach to Hazmat Medical Care (Ref. HM-U1)
- Assess for the presence of ocular involvement:
  - Check the pH (using Litmus paper)
  - Initiate eye irrigation as needed (Ref. HM-CP1)
- Assess for and treat external burns (Ref. PCEMS MOM T6)

ALS

- If evidence of pulmonary edema:
  - Initiate CPAP unless contraindicated (Ref. PCEMS MOM CP6)

- If clinical evidence of bronchospasm or capnography indicative of obstruction:
  - Bronchodilator aerosol therapy:
    - Albuterol 2.5 mg mixed with Ipratropium 0.5 mg. May repeat x 1 ***followed by***
    - Albuterol 2.5 mg repeat as needed (Ref. PCEMS MOM CP8.1 - 8.3)
    - If Chlorine, Hydrochloric acid, Chloramine gas exposure suspected:
      - Substitute 3 mL Sodium Bicarbonate 8.4% mixed with 2 mL Sodium Chloride 0.9% via nebulizer
    - Administer Methylprednisolone Sodium Succinate 125 mg slow intravenous push
    - If no improvement with initial aerosol treatment, may initiate CPAP (Ref. PCEMS MOM CP6) and continue aerosol therapy via tee piece (Ref. PCEMS MOM CP8.2)
  - Monitor EtCO2 and SpO2
- If patient progresses to respiratory failure, provide ventilation assistance (BVM and adjunct) followed by airway management (Ref. PCEMS MOM CP1, CP3) and continue aerosol therapy via tee piece
  - Airway management may not be feasible in Hot Zone and is not required
  - A King Airway may be used in the Warm Zone prior to, or during decontamination

- Endotracheal intubation should not be performed until after decontamination or in Cold Zone
- Aerosol/nebulizer treatments may be continued via Superset (Ref. PCEMS MOM CP8.3)

OLMC

- Consult Online Medical Control Physician as needed or to facilitate Poison Information Center consultation

PEARLS

- Corrosive/chemical irritant induced pulmonary edema may resemble the respiratory component of the Cholinergic toxidrome (Organophosphates and Carbamates). Lack of miosis may help you differentiate between these two presentations

QUALITY MEASURES

- Pending

REFERENCES

- Pascuzzi TA, Storrow AB. Mass Casualties from acute inhalation of chloramine gas. Mil Med. 1998 Feb;163(2):102-4.
- https://chemm.nlm.nih.gov/countermeasure_sodium-bicarbonate.htm

HM-M7 IRRITANTS/CORROSIVE – TOPICAL

ADULT and PEDIATRIC	GOALS OF CARE
	Identify specific exposure/toxidrome and initiate stabilizing care while ensuring responder safety

APPLICABILITY		
Chemical Warfare Agents	**Toxic Industrial Chemicals/Materials**	
• Mustard Agents • Phosgene	• Phenol • Chlorine	• Riot Control Agents

BLS

- Universal Approach to Hazmat Medical Care (Ref. HM-M1)
- Removing exposure and RAPID SKIN DECONTAMINATION IS CRITICAL:
  - Copiously flush exposed skin with polyethylene glycol
  - May substitute vegetable oil if not available
- If patient has evidence of dyspnea, apply supplemental oxygen if safe to do so in environment
- Provide ventilation assistance (BVM and airway adjunct) as needed (Ref. PCEMS MOM CP1.1 & CP3.1)
- Suction as necessary

ALS

- If evidence of bronchospasm/obstructive findings:
  - Initiate nebulizer treatment: Albuterol 2.5 mg mixed with Ipratropium 0.5 mg, may repeat x 1 followed by Albuterol 2.5 mg, repeat as needed
  - May initiate CPAP if not contraindicated and continue nebulizer therapy via Tee Piece (Ref PCEMS MOM 8.2)
- If ocular involvement:
  - Remove contact lenses if present
  - If no suspicion for open globe, administer Tetracaine 0.5% solution, two (2) drops in affected eye to manage pain, place Morgen Lens (Ref. HM-CP1) and copiously irrigate with Lactated Ringers or 0.9% Sodium Chloride
- Provide ventilation assistance and airway managing as required (Ref PCEMS MOM CP1 & CP3)

OLMC

- Consult Online Medical Control Physician as needed or to facilitate Poison Information Center consultation.

PEARLS
• Phenol is highly corrosive and will cause chemical burns on contact • There is no antidote to Phenol poisons, so it is imperative the start decontaminating the patient immediately • Repeated cycles of decontamination may be warranted to ensure no ongoing absorption

QUALITY MEASURES
• Pending

REFERENCES
• Pending

HM-M8 METHEMOGLOBIN FORMERS

ADULT and PEDIATRIC	GOALS OF CARE
	Identify specific exposure/toxidrome and initiate stabilizing care while ensuring responder safety

APPLICABILITY		
Chemical Warfare Agents	**Toxic Industrial Chemicals/Materials**	
• None	• Aniline dyes • Nitrites • Nitrates	• Nitrobenzene • Nitrogen Dioxide

BLS

- Universal Approach to Hazmat Medical Care (Ref. HM-U1)
- Administer oxygen 10-15 L via non-rebreather mask or BVM
- Suction as necessary

ALS

- Provide ventilation assistance and airway management as required (Ref. PCEMS MOM CP1, CP3)
- Evaluate probability of methemoglobinemia based on exposure risk and presence of symptoms including:

Mild < 20%	Moderate 20% - 50%	Severe > 50%
May be relatively asymptomatic Peripheral cyanosis	Confusion/Headache/Altered Mental Status Nausea and dizziness Dyspnea Increased RR, HR, BP	Seizure/Coma Cardiovascular Collapse Death
General Supportive Care	Mild treatment plus: Methylene Blue 0.5% solution (5 mg/mL) or 1% solution (10 mg/mL) 1 mg/kg slow IV push over 5 minutes Repeat dose in 10 minutes if symptoms persist to Max dose of 3 mg/kg Administer D10W 500 mL over 10 minutes to facilitate action of Methylene Blue	Mild and Moderate treatment plus: Administer 1000 mL bolus 0.9% Sodium Chloride. Continue repeat 500 mL boluses until arrival at hospital or a maximum of 20 mL/kg reached If SBP remains less than 90 mmHg after initial 1000 mL bolus, add Norepinephrine Drip Infusion at 1 mcg/min (Ref. PCEMS MOM CT21)

- Preferentially transport to tertiary/large receiving hospital

OLMC
• Consult Online Medical Control Physician as needed or to facilitate Poison Information Center consultation.

PEARLS
• None

QUALITY MEASURES
• Pending

REFERENCES
• Pending

HM-M9 OPIOIDS AND SYNTHETICS

ADULT and PEDIATRIC	GOALS OF CARE
	Identify specific exposure/toxidrome and initiate stabilizing care while ensuring responder safety

APPLICABILITY		
Chemical Warfare Agents	**Toxic Industrial Chemicals/Materials**	
• Unknown may possibly be weaponized	• Carfentanil • Fentanyl • U-47700	• Acetyl-fentanyl

BLS

- Universal Approach to Hazmat Medical Care (Ref. HM-U1)
- Assess respiratory status and provide supplemental O2 and/or BVM ventilation with airway adjunct as needed/practicable
- If suspected opioid exposure and opioid overdose triad present (respiratory depression, difficulty arousing, pinpoint pupils) may direct BLS/First Responder/Law Enforcement Naloxone administration if available and practical:

BLS Responder and Victim Naloxone	4mg intranasal, may repeat once in 3-5 min

- **NOTE: Do not delay airway maneuvers or CPR for naloxone administration**

ALS

- Initiate naloxone reversal as follows:

	Mild (confusion/dizziness)	Mod/Severe (AMS Respiratory depression, hypotension)	Cardiac Arrest
IV/IO	0.5 mg	2mg	4mg
Intranasal	2 mg	4mg	4mg
Doses may be repeated every 3-5 minutes as needed			

- If no response after 4 mg, consider need for airway management prior to further Naloxone as field reversal may not be possible
- Provide ventilation assistance and airway managing as required (Ref PCEMS MOM CP1, CP3)
- Initiate IV/Intraosseous access when safe to do so
- Initiate cardiac monitoring when safe to do so
- Assess and treat cardiac dysthymias (Ref PCEMS MOM C4, C5)
- If evidence of shock or hypotension (SBP less than 90 mmHg) initiate fluid resuscitation with 0.9% Sodium Chloride

- Adult (greater than 13 years old): 500 mL, repeat to max of 2000 mL as needed
- Pediatric per Handtevy age/weight-based dosing

- Ensure appropriate transportation unit precautions/isolation measures are implemented if necessary (Ref HCS4)

OLMC

- Consult Online Medical Control Physician as needed or to facilitate Poison Information Center consultation
- Naloxone infusion: Start at 0.4 mg/hr (Mix 4 mg Naloxone in 1000 mL 0.9% Normal Saline and infuse at 100 mL/hr). Titrate until respiratory rate and level of consciousness improve

PEARLS

- The goal for managing a narcotic overdose is to maintain adequate respirations, not to fully reverse the sedative effects of the narcotics. Full reversal can cause seizures, non-cardiogenic pulmonary edema, and violent behavior.
- There is no maximum dose of naloxone, but airway management should not be delayed for multiple doses/awaiting response to naloxone.

QUALITY MEASURES

1. Pending

REFERENCES

- Pinellas County Hazardous Materials Response Team Standard Operating Procedures Manual 10/2011
- Florida State Emergency Response Commission Subcomitte on Training: Hazardous Materials Treatment Protocols Version 3.3

HM-M10 TOXIC ALCOHOLS

ADULT and PEDIATRIC	GOALS OF CARE
	Identify specific exposure/toxidrome and initiate stabilizing care while ensuring responder safety

APPLICABILITY

Chemical Warfare Agents	Toxic Industrial Chemicals/Materials	
• None	• Methanol • Ethylene Glycol	• Propylene Glycol • Isopropyl Alcohol

BLS

- Universal Approach to Hazmat Medical Care (Ref. HM-U1)
- Assess respiratory status and provide supplemental O2 as needed
- Suction as necessary

ALS

- Assess and treat cardiac dysthymias (Ref PCEMS MOM C4, C5)
- Administer Sodium Bicarb 1mEq/Kg
- Administer Thiamine 100 mg IV
- Administer Pyridoxine 1 mg/kg IV

OLMC

- Consult OLMC Physician for administration of Ethanol 10% 8 mL/kg IV or Ethanol 20% 4 mL/kg PO if available
- Consult Online Medical Control Physician as needed or to facilitate Poison Information Center consultation

PEARLS

- Ethylene Glycol and toxic alcohol poisoning can be fatal. Accurate diagnosis and intervention is imperative to prevent the damaging effects of the metabolites on multiple organ systems.

QUALITY MEASURES

1. Pending

REFERENCES

- Pending

Intentionally
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HM-M11 CHOLINERGIC

ADULT and PEDIATRIC	GOALS OF CARE
	Identify specific exposure/toxidrome and initiate stabilizing care while ensuring responder safety

APPLICABILITY

Chemical Warfare Agents

- Nerve Agents – may be weaponized
  - GA (tabun)
  - GB (sarin)
  - GD (soman)
  - VX

Toxic Industrial Chemicals/Materials

- Carbamate Insecticides
  - Aldicarb
  - Methomyl
- Organophosphate Insecticides
  - Chlorpyrifos
  - Parathion

BLS

- Universal Approach to Hazmat Medical Care (Ref. HM-U1)
- Assess respiratory status and provide supplemental O2 as needed
- Administer oxygen 10-15 L via non-rebreather mask or BVM
- Suction as necessary

ALS

SELF/BUDDY AID - DUODOTE

Mild Symptoms: 1 Duodote – Repeat every 2 minutes until symptoms improve

Moderate/Severe Symptoms: 2 Duodotes, repeat every 2 minutes until affective Atropinization

Civilian Treatment:

- Mild Symptoms:
  - Administer Atropine 2 mg IV. Repeat every 2 minutes until symptoms resolve.
  - After symptoms begin to improve, administer Pralidoxime 1 Gram IV over 2 minutes.
  - For pediatrics (13 years or younger) follow dosing on inside back cover of Handtevy book
  - Ensure proper decontamination/prevent secondary exposure
- Moderate/Severe Symptoms:
  - Administer Atropine 4 mg IV. Repeat every 2 minute until airway secretions dry
  - Following effective Atropinization, administer Pralidoxime 2 Grams IV over 2 minutes
  - For pediatrics (13 years of younger) follow dosing on inside back cover of Handtevy book

- If seizures:
  - Adult: Midazolam 2.5 mg IV/Intraosseous/Intramuscular. Repeat every 2 minutes to max of 10 mg
  - Peds: Midazolam IV/Intraosseous/Intramuscular. Repeat every 2 minutes to max of 10 mg.
- Ensure proper decontamination/prevent secondary exposure

- Provide ventilation assistance and airway managing as required (Ref H1 and PCEMS MOM CP1, CP3)
- Monitor ETCO2 if any respiratory symptoms
- Observe for recurrence of symptoms and re-dose atropine as needed per above parameters.
- Initiate fluid resuscitation with 0.9% Sodium Chloride
  - Adult (greater than 13 years old): 500 mL, repeat to max of 2000 mL as needed
  - Pediatric per Handtevy age/weight-based dosing

OLMC

- Consult OLMC for authorization/deployment of Chempack
- Consult OLMC for dosing/redosing questions
- Consult Online Medical Control Physician as needed or to facilitate Poison Information Center consultation.

PEARLS

- Not all pesticides are considered organophosphates or carbamate. In addition, Carbamate tend to be less severe and self-limiting and may require less aggressive treatment. Atropine should be titrated to clinical effect
- Emesis, respiratory, and other secretions should be considered to be highly contaminated and pose significant risk for secondary exposure
- Extreme caution should be used when performing airway management and/or ventilation assistance and these interventions may need to be postponed until effective decontamination/PPE is in place
- Pulmonary edema in the setting of anti-cholinergic toxidrome is not cardiogenic and should not be treated with nitroglycerine

QUALITY MEASURES

- Pending

REFERENCES

- Pending

HM-M12 BIOLOGICAL AGENTS

ADULT and PEDIATRIC	GOALS OF CARE
	Identify specific exposure/toxidrome and initiate stabilizing care while ensuring responder safety

BLS

- Refer to SOP 600-15 "Response to Suspicious Powders/Products" for entry/investigation team requirements
- Universal Approach to Hazmat Medical Care (Ref. HM-U1)
- Assess for clinical picture and required level of clinician PPE based upon suspected pathogen (Ref. HM-CT2)

- Ensure proper decontamination of medical equipment and transport units per SOPs.

ALS

- Establish IV access ***ONLY*** if needed. May defer on stable patient.
- Administer Ondansetron 4 mg slow intravenous push over two minutes or intramuscular or Ondansetron ODT 4 mg orally for nausea/vomiting
- Provide ventilation assistance and airway managing as required (Ref. PCEMS MOM CP1 & CP3)
- If SBP less than 90 mmHg administer fluid bolus, 500 mL 0.9% Sodium Chloride, may repeat to maximum of 2000 mL

OLMC

- Consult Online Medical Control Physician as needed or to facilitate Poison Information Center consultation

PEARLS

- Exposures to Biological agents are treatable with rapid recognition and initiation of treatment in hospital facilities. It is important for responders to don proper PPE and ensure proper removal and decontamination of victims before treatment and transport to hospital facility

QUALITY MEASURES

1. Pending

REFERENCES

- Pending

Intentionally
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HM-M13 RADIOLOGICS

ADULT and PEDIATRIC	GOALS OF CARE
	Identify specific route and amount of exposure and initiate stabilizing care while ensuring responder safety

APPLICABILITY		
Chemical Warfare Agents	**Toxic Industrial Chemicals/Materials**	
• None	• Alpha • Beta • Gamma	•

BLS

- Universal Approach to Hazmat Medical Care (Ref. HM-U1)
- **For contaminated patient ensure the following is completed *prior to transport*:**
  - Assess contamination pattern/source
    - Scan body head to toe with radiation survey meter
    - Document contamination pattern on triage tag (body diagram)
  - Determine when sufficient decontamination has been completed:
    - May take several (2-3) cycles of gross decontamination to achieve acceptable level
    - Re-scan patient with radiation survey meter between decon cycles
    - Goal is less than 2x background level decontamination prior to transport
    - Refer to ALS for mitigation of internal contamination
- Following decontamination, ensure proper clinician PPE and vehicle protective measures (Ref. HM-CT3)
- Document time, type, and dose of radiation exposure as well as presence or absence of contamination for hospital information

ALS

- Mitigate internal contamination as necessary:
  - DO NOT induce vomiting, however if vomiting, properly secure and contain all emesis for disposal
  - Place orogastric/nasogastric tube to evacuate radioactive stomach material. Properly secure all contents for disposal
  - Remove any embedded shrapnel/foreign material with forceps (Note that tissue dissection/use of scalpel requires OLMC authorization) (Ref. HM-CP5)
- Evaluate for Acute Radiation Syndrome (ARS) and implement appropriate supportive care
- If nausea and vomiting with no gastro-intestinal contamination:
  - Administer Ondansetron 4 mg IV/Intraosseous or 4 mg ODT.
  - Repeat every 5 minutes as needed to maximum dose of 12 mg
- Implement Burn Care (Ref. PCEMS MOM T6) and Pain Management (Ref. PCEMS MOM M13) as needed.

OLMC
• Consult Online Medical Control Physician as needed or to facilitate Poison Information Center consultation

PEARLS
• Hydrazine has multiple effects that cross standard hazmat categories including corrosives, irritant gases and Methemoglobin Formers. Treatment should be tailored to the predominant symptoms/toxidrome and may be multimodal

QUALITY MEASURES
• Pending

REFERENCES
• Pending

CLINICAL PROCEDURE

CLINICAL PROCEDURE

HM-CP1 EYE IRRIGATION

INDICATIONS
• Ocular injury due to acid/alkali burns • Ocular irritants such as solvents, gasoline, detergents, etc. • Non-embedded foreign body removal (i.e. dirt, dust, debris)

CONTRAINDICATIONS
• Protruding foreign body • Penetrating eye injury • Suspected or actual ruptured globe • **Tetracaine and use of a Morgan Lens are contraindicated in Hydrofluoric acid burns**

CAUTIONS
• None

PROCEDURE

- **Morgan Lens Insertion (Ref. HM-CT4)**
  1. Remove contact lenses if present
  2. Instill 2-3 drops of Tetracaine HCl 0.5% to the affected eye(s) and allow 2-3 minutes for onset prior to lens placement
  3. Attach the Morgan lens to Morgan lens delivery set
  4. Prime the tubing and lens with irrigation solution and allow to flow during insertion
  5. Have the patient look down; insert the Morgan lens under the upper lid
  6. Have the patient look up; retract the lower lid to drop the lens in place
  7. Release the lower lid over the lens.
  8. Adjust the flow to maximum tolerated rate
  9. Tape the tubing to the patient's forehead to prevent accidental lens removal

- **Irrigation times/amount**
  1. Acid/Alkali burns: Irrigate with a minimum of 2000 mL Lactated Ringers, 0.9% Sodium Chloride, or Sterile Water per eye
  2. Irritants: Irrigate for a minimum of 30 minutes
  3. Check pH with Litmus paper after irrigation to achieve a pH between 7-8
  4. Repeat if needed

- **Removal of Morgan Lens**
  1. Have the patient look up; retract the lower lid behind the interior border of the lens.
  2. Have the patient look down; retract the upper lid and slide the lens out.

- **Hydroflouric Acid Burns**
  1. DO NOT use Morgan Lens
  2. Tetracaine is contraindicated
  3. Initiate irrigation with Lactated Ringers, 0.9% Sodium Chloride, or Sterile Water followed by 1% Calcium Gluconate solution.

COMPLICATIONS
• Morgan lens administration may not be feasible until the patient is in the cold zone and has been properly decontaminated • Patients may exhibit a level of anxiety prior to Morgan lens administration • DO NOT administer Tetracaine to patients with a known allergy to the medication

NOTES
• Lactated Ringers is recommended because the pH level of 6.0 to 7.5 is much closer to tears (approx. pH 7.1) than 0.9% Sodium Chloride (pH 4.5 to 7.0). In addition, the lactate ion in Lactated Ringers exhibits a buffering capacity, returning the pH of either an acid or a base to neutral much more rapidly than a solution (such as Sodium Chloride) without any buffering capacity

REFERENCES
• Morgan Lens website: http://morganlens.com/

HM-CP2 NEBULIZED SODIUM BICARBONATE

INDICATIONS
• Treatment of respiratory distress caused by inhalation of Hydrogen Chloride (HCL), Chlorine, and possibly Chloramine gas.

CONTRAINDICATIONS
• Respiratory distress of other etiology

CAUTIONS
• Administration of nebulized Sodium Bicarbonate can worsen respiratory distress that has etiologies of an inhaled base/alkali chemical, therefor the administration of Sodium Bicarbonate should only be initiated with known exposure to the above chemicals. • Nebulized Sodium Bicarbonate has not definitively been shown to be of benefit in Chloramine gas exposure. • Anticipate difficulty with excess soft tissue and previous scarring to neck

PROCEDURE
• Assemble nebulizer setup per manufacturer's instructions • Instill 3 mL of Sodium Bicarbonate 8.4% with 2 mL of Sodium Chloride 0.9% in the reservoir well of the nebulizer making a 5% Sodium Bicarbonate solution. • Connect the nebulizer device to oxygen at eight (8) LPM • May connect to CPAP mask or endotracheal tube/King LTD-S as per PCEMS MOM CP 8.2 and CP 8.3 • Monitor patient for response to treatment

COMPLICATIONS
• Burning sensation within the chest during treatment. • Inability to tolerate • Pneumothorax • Apnea • Hypotension • Worsening respiratory distress/progression to respiratory failure

NOTES
• Hydrogen Chloride turns to Hydrochloric Acid when mixed with water

REFERENCES
• Pascuzzi TA, Storrow AB. Mass Casualties from acute inhalation of chloramine gas. Mil Med. 1998 Feb;163(2):102-4 • https://chemm.nlm.nih.gov/countermeasure_sodium-bicarbonate.htm

HM-CP3 CALCIUM CHLORIDE INJECTIONS – (*PENDING)*

INDICATIONS
•

CONTRAINDICATIONS
•

CAUTIONS
•

PROCEDURE
•

COMPLICATIONS
•

NOTES
•

REFERENCES
•

HM-CP4 RADIOACTIVE SHRAPNEL REMOVAL

INDICATIONS
• To safely remove radioactive foreign bodies from patients in order to minimize the spread of radiation

CONTRAINDICATIONS
• Respiratory distress of other etiology

CAUTIONS
• Ensure proper decontamination has been completed to avoid excessive responder dosing • Consider proper container to store shrapnel after removal

PROCEDURE

- Consider all open wound(s) contaminated until proven otherwise
- Use appropriate radiation survey meter to evaluate and monitor the medical management of radioactive shrapnel in order to protect medical team
- Assume embedded foreign bodies will produce uptake (internal contamination).
- Cover skin surrounding open wound/s (with or without foreign bodies) with waterproof dressings or drapes, to limit the spread of radioactivity by water run-off during wound irrigation/decontamination
- Initiate pain management if able and not already done (Ref PCEMS MOM M13)
- Irrigate wound/s gently with copious amounts of water or saline
    - Multiple irrigation attempts are usually necessary
    - Cleanse skin with Betadine or alcohol
    - Remove visible radioactive foreign bodies (e.g., metallic fragments or shrapnel) using forceps
    - Removed foreign bodies and any instruments used to handle foreign bodies should be properly stored in lead containers and labeled for forensic evaluation and proper disposal
- If contamination levels remain high after primary decontamination attempts, perform surgical debridement of wound(s) with a #10 scalpel
    - Surgically removed tissue and all surgical supplies should be properly stored and labeled by for forensic evaluation and proper disposal
    - Control bleeding with direct pressure followed by appropriate device when indicated (Ref PCEMS MOM CP16 and CP18)
- Cover decontaminated wound/s with a waterproof dressing to prevent further contamination
- Decontaminate skin around wound/s as thoroughly as possible before suturing or other treatment

COMPLICATIONS
• Pain • Bleeding • Infection • Injury to other structures • Inability to release foreign body

NOTES
• None

REFERENCES
• https://www.remm.nlm.gov/ext_contamination.htm#shrapnel

FORMULARY

FORMULARY

HM-F1 CALCIUM GLUCONATE GEL

Trade Name	Calgonate® Gel	
Class(es)	Unknown	
Action(s)	Calgonate® Gel is an effective topical 2.5% calcium gluconate gel that is used in first aid response to hydrofluoric acid (HF) exposure or contact to the body. Calcium gluconate combines with hydrofluoric acid to neutralize the powerful fluoride ion.	
Indication(s)	Calcium gluconate gel is indicated as an integral part in responding to Hydrofluoric Acid exposure to the body, mitigating or preventing the related pain and potential tissue burns and bone damage.	
Contraindication(s)	External use only	
Precaution(s)	? Store between 15-30°C (59-86°F). • Use directly from tube, one tube per application, then safely discard. • Ensure adequate ventilation at all times.	
Pharmacokinetics	Onset: Unavailable	Duration: Unavailable
Routes of Administration	Topical application	
Technique for Administration	• Apply Calgonate® Gel freely to the affected areas and continuously massage into the skin. • Reapply Calgonate® Gel and massage into the affected area every 15 minutes until medical assistance is given. • If the acid has penetrated below the nails, Calgonate® Gel should be liberally applied over and around the nail area, and the area should be continually massaged for 15 minutes.	
PEARLS	N/A	
Y-Site Compatibility	N/A	
Interactions	None	
Reference	http://www.calgonate.com/calgonate_gel.php	

HM-F2 POLYETHYLENE GLYCOL (PEG)

Trade Name	GoLytely	
Class(es)	Unknown	
Action(s)		
Indication(s)		
Contraindication(s)	None	
Precaution(s)		
Pharmacokinetics	**Onset:** Unavailable	**Duration:** Unavailable
Routes of Administration	Topical	
Technique for Administration	Must be reconstituted before use	
PEARLS	N/A	
Y-Site Compatibility	N/A	
Interactions	N/A	
Reference	N/A	

HM-F3 METHYLENE BLUE

Trade Name	Provay Blue	
Class(es)	Unknown	
Action(s)	Methylene Blue will produce two opposite actions on hemoglobin. 1. Low concentrations will convert methemoglobin to hemoglobin. 2. High concentrations convert the ferrous iron of reduced hemoglobin to ferric iron which results in the formation of methemoglobin.	
Indication(s)	Drug-induced methemoglobinemia	
Contraindication(s)	Women who are or may become pregnant – can cause fetal harm; Subcutaneous injections; Known hypersensitivity to the drug.	
Precaution(s)	May cause fetal serotonin toxicity when combined with serotonin reuptake inhibitors.	
Pharmacokinetics	**Onset:** Unavailable	**Duration:** Unavailable
Routes of Administration	Intravenous	
Technique for Administration	Flip Tear-off Seal: 1. With the thumb, flip the plastic button up to reveal the rubber stopper 2. Pull the button to tear the seal at the score line and twist to remove 3. Inject intravenously very slowly over a period of several minutes to prevent local high concentrations of the compound from producing methemoglobin.	
PEARLS	N/A	
Y-Site Compatibility	N/A	
Interactions	N/A	
Reference	https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=fde64824-2be5-4d85-8d57-5098ca6890bb	

HM-F4 PRALIDOXIME CHLORIDE

Trade Name	Protopam Chloride	
Class(es)	Unknown	
Action(s)	reactivate cholinesterase (mainly outside of the central nervous system) which has been inactivated by phosphorylation due to an organophosphate pesticide or related compound.	
Indication(s)	In the treatment of poisoning due to those pesticides and chemicals (e.g., nerve agents) of the organophosphate class which have anticholinesterase activity and In the control of overdosage by anticholinesterase drugs used in the treatment of myasthenia gravis.	
Contraindication(s)	None	
Precaution(s)	PROTOPAM Chloride is not effective in the treatment of poisoning due to phosphorus, inorganic phosphates, or organophosphates not having anticholinesterase activity. PROTOPAM Chloride is not indicated as an antidote for intoxication by pesticides of the carbamate class since it may increase the toxicity of carbaryl.	
Pharmacokinetics	**Onset:** Unavailable	**Duration:** Half-life 74 to 77 minutes
Routes of Administration	Intravenous, Intramuscular, Subcutaneous, Intraosseous	
Technique for Administration	Intravenous administration of PROTOPAM Chloride should be carried out slowly and, preferably, by continuous or intermittent infusion, since temporary worsening of cholinergic manifestations (i.e. tachycardia, cardiac arrest, laryngospasm, and muscle rigidity or paralysis) may occur if PROTOPAM Chloride is infused too rapidly. The intermittent infusion rate should not exceed 200 mg/minute. Preparation for Administration PROTOPAM Chloride is supplied as 1000 mg single-dose vials for injection. For INTRAVENOUS infusion: Reconstitute a single PROTOPAM Chloride 1000 mg vial by adding 20 mL of Sterile Water for Injection, USP, which results in a 50 mg/mL concentration. The solution should further be diluted with Normal Saline for Injection, USP to achieve a concentration of 10 to 20 mg/mL (e.g. 1000 mg in 100 mL or 2000 mg in 100 mL). For fluid restricted patients or for rapid administration (over at least 5 min), a maximum concentration of 50 mg/mL may be used. For INTRAMUSCULAR injection: Reconstitute a single PROTOPAM Chloride 1000 mg vial by adding 3.3 mL of Sterile Water for Injection, USP for an approximate concentration of 300 mg/mL.	

PEARLS	Because Pralidoxime Chloride is less effective in relieving depression of the respiratory center, Atropine is always required concomitantly to block the effect of accumulated acetylcholine
Y-Site Compatibility	Unavailable
Interactions	None
Reference	https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=2741d8fd-51c2-46be-880b-99f2b20a6137

HM-F5 PYRIDOXINE HYDROCHLORIDE

Trade Name	N/A	
Class(es)	Vitamin	
Action(s)	Vitamin B^6 acts as a coenzyme in the metabolism of protein, carbohydrate, and fat. In protein metabolism, it participates in the decarboxylation of amino acids, conversion of tryptophan to niacin or to serotonin (5-hydroxtryptamine), deamination, and transamination and transulfuration of amino acids. In carbohydrate metabolism, it is responsible for the breakdown of glycogen to glucose-1-phosphate.	
Indication(s)	Toxic alcohols	
Contraindication(s)	A history of sensitivity to pyridoxine or to any of the ingredients in Pyridoxine Hydrochloride Injection, USP	
Precaution(s)	None	
Pharmacokinetics	**Onset:** Unknown	**Duration:** Unknown
Routes of Administration	Intravenous, intramuscular	
Technique for Administration	None	
PEARLS	None	
Y-Site Compatibility	None	
Interactions	None	
Reference	https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=2741d8fd-51c2-46be-880b-99f2b20a6137	

HM-F6 SODIUM NITRITE

Trade Name	Nithiodote (1 of 2 drugs in the kit)	
Class(es)	Unknown	
Action(s)	Sodium nitrite is thought to exert its therapeutic effect by reacting with hemoglobin to form methemoglobin, an oxidized form of hemoglobin incapable of oxygen transport but with high affinity for cyanide. Cyanide preferentially binds to methemoglobin over cytochrome a , forming the nontoxic cyanomethemoglobin. Methemoglobin displaces cyanide from cytochrome oxidase, allowing resumption of aerobic metabolism.	
Indication(s)	NITHIODOTE is indicated for the treatment of acute cyanide poisoning that is judged to be serious or life-threatening. When the diagnosis of cyanide poisoning is uncertain, carefully weigh the potentially life-threatening risks associated with NITHIODOTE against the potential benefits, especially if the patient is not in extremis.	
Contraindication(s)	None	
Precaution(s)	**Sodium nitrite has been associated with severe hypotension, methemoglobinemia, and death at doses less than twice recommended therapeutic doses.** Use sodium nitrite with caution in persons with smoke inhalation injury or carbon monoxide poisoning because of the potential for worsening hypoxia due to methemoglobin formation	
Pharmacokinetics	**Onset:** Unavailable	**Duration:** Unavailable
Routes of Administration	Intravenous	
Technique for Administration	None	
PEARLS	N/A	
Y-Site Compatibility	N/A	
Interactions	N/A	
Reference	https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=ff4941b3-9901-4aab-adcf-c5327bede34e	

HM-F7 SODIUM THIOSULFATE

Trade Name	Nithiodote (2 of 2 drugs in the kit)	
Class(es)	Unknown	
Action(s)	Converts cyanide to the less toxic thiocyanate, which is excreted in the urine. Increases the rate of detoxification of cyanide by the enzyme rhodanese by providing an extra sulfur	
Indication(s)	• Cyanide toxicity • Arsenic poisoning • Tinea versicolor (inorganic bleaching reducing agent) • Selenium dioxide burns • Iodine exposure • Chlorate salt and bromate toxicity • Sodium nitroprusside toxicity	
Contraindication(s)	• Known hypersensitivity • Hydrogen sulfide exposure	
Precaution(s)	**None**	
Pharmacokinetics	**Onset:** Unavailable	**Duration:** Unavailable
Routes of Administration	Intravenous	
Technique for Administration	Slow intraveous infusion	
PEARLS	N/A	
Y-Site Compatibility	N/A	
Interactions	N/A	
Reference	https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=ff4941b3-9901-4aab-adcf-c5327bede34e	

HM-F8 TETRACAINE HYDROCHLORIDE 0.5% OPTHALMIC

Trade Name	Tetracaine, Pontocaine, Ametop, Amethocaine Hydrochloride, Tetracaine Hydrochloride	
Class(es)	Unknown	
Action(s)	Blocks the initiation and conduction of nerve impulses by decreasing the neuronal membranes permeability to sodium ions, which results in inhibition of depolarization with resultant blockade of conduction. Anesthetizes the eyes within 20 seconds and lasts up to 15 minutes.	
Indication(s)	• Cyanide toxicity • Arsenic poisoning • Tinea versicolor (inorganic bleaching reducing agent) • Selenium dioxide burns • Iodine exposure • Chlorate salt and bromate toxicity • Sodium nitroprusside toxicity	
Contraindication(s)	• Allergy to any topical anesthetic • Liver disease • CNS disease • Myasthenia gravis	
Precaution(s)	• Used for topical ophthalmic use only, not for injection. • Cardiac disease • Hyperthyroidism	
Pharmacokinetics	**Onset:** Unavailable	**Duration:** Unavailable
Routes of Administration	Topical	
Technique for Administration	None	
PEARLS	N/A	
Y-Site Compatibility	N/A	
Interactions	N/A	
Reference	Pending	

CLINICAL TOOLS

CLINICAL TOOLS

General Hazmat Classification

MAY BE WEAPONIZED

Asphyxiants	Irritant Gas	Corrosives	Hydrocarbons	Opioids	Toxic Alcohols	Cholinergic	Biologics	Radiologic
Simple	**Highly Hydrophilic**	**Acids**	**Aromatic**	Fentanyl	Methanol	**Organophosphates**	**Bacterial**	**Alpha**
Nitrogen	Ammonia	Hydrochloric	Benzene	Carfentanil	Ethylene Glycol	Diazinon	Anthrax	Radon (Environmental)
CO2 etc.	Formaldehyde	Nitric	Toluene	Morphine	Isopropanol	Malathion	Cholera	
Chemical	**Mod Hydrophilic**	Sulfuric	**Aliphatic**	Heroine	Propylene Glycol	Parathion	Tularemia	
CO	Chlorine	**Bases**	Gasoline			**Carbamates**	**Viral**	**Beta**
Met HB formers	**Hydrophobic**	Ammonium Hydroxide	Kerosene			Carbaryl (Sevin)	Small Pox	
Cyanides	Phosphine/Ketones	Potassium Hydroxide	**Halogenated**			Aldicarb	VEE	
Sulfides	Nitrogen Dioxide	Sodium Hydroxide	Methyl Chloride			**Nerve Agents**	VHF	
Azides		**Hydrofluoric (H,)**	Trichloroethane			Tabun (GA)	**Toxins**	**Gamma**
		Hydrogen Fluoride (HF)	Phenol			Sarin (GB)	Botulism	
		Sodium fluoride				Soman (GD)	Staph	
		Phosphorous				VX	Ricin	
		White Phosphorous						
Cross Category--Hydrazine's (H13)								
Signs /Symptoms	Signs /Symptoms	Signs /Symptoms	Signs /Symptoms	Signs /Symptoms	Signs /Symptoms	Signs /Symptoms	Signs /Symptoms	Signs /Symptoms
Dyspnea	Choking Agent	Burns	CNS depression	Respiratory Failure	Unresponsiveness	DUMBELLS	G.I. Sx	Malaise
Low Pa02	Dyspnea (Rales)	Respiratory Irritants	Tachy arrhythmias	Miosis	Irregular breathing	SLUDGEM	Fever	Nausea Vomiting
cyanosis	Non-Cardiogenic PE		Dyspnea	Unresponsiveness	Nausea Vomiting		Septic Shock	Erythema of the skin
Protocols	Protocols	Protocols	Protocols	Protocols	Protocols	Protocols	Protocols	Protocols
H2, H3, H4, H6,H7	H2, H10	H2, H9	H3, H8	TBD	H11	H5,	H13?	H12 ?

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	Anthrax	Botulism	Tularemia	Plague	Small Pox	Viral Hemmoragic Fevers (Ebola)
	Use similar precautions for Category B and C agents			Use similar precautions for Ricin or unknown agent		
Clinical Effects	**Skin:** Blisters/bumps/ulcers **GI:** pain, N/V/D **Pulmonary**: Cough, Resp. distress **Systemic:** general malaise, sepsis	Early Symptoms: muscle weaknes of eyes, face, mouth, and throat. Weaknes may also spread to the extremities and muscles involving respiration causing death	**Skin:** Blisters/bumps/ulcers **GI:** pain, N/V/D **Pulmonary**: Cough, Resp. distress **Systemic:** general malaise, sepsis	**Skin:** digits turn black and dye **GI:** Pain, discomfort **Pulmonary:** Pneumonia (late sign) **Systemic:** flu like symptoms, swollen lymph nodes	Early Symptoms: High fever, head and body aches, some nausea vomiting. Disease progresses to rash and pustular rashes, pt will be very contagious during this stage	**Skin:** unexplained hemorrhage (bruising or bleeding **GI:** pain, N/V/D **Systemic:** general malaise, sepsis, muscle pain, severe headach
	Transmission via Environmental Exposure			Contagious Person to Person		
PPE Isolation Level during Patient Care	**Patient**: Surgical mask. Wrap in space blanket **Responder:** N95, gown, gloves, eye protection	**Patient:** Surgical mask. Wrap in space blanket **Responder:** N95, gown, gloves, eye protection	**Patient:** Surgical mask. Wrap in space blanket **Responder:** N95, gown, gloves, eye protection	**Patient:** Surgical mask. Wrap in space blanket **Responder:** Tyvex suit, Gloves/Boots, and Full Facepiece/PAPR or P100 Filter Cartridge	**Patient:** Surgical mask. Wrap in space blanket **Responder:** Tyvex suit, Gloves/Boots, and Full Facepiece/PAPR or P100 Filter Cartridge	**Patient:** Surgical mask. Wrap in space blanket **Responder:** Tyvex suit, Gloves/Boots, and Full Facepiece/PAPR or P100 Filter Cartridge
	Note: If active aeorsolizattion upgrade to next leveL--->					
Transport Considerations	Visqueen Sheeting, ensure exhaust fans are operational, conduct a thorough cleaning/disinfectant post transport	Visqueen Sheeting, ensure exhaust fans are operational, conduct a thorough cleaning/disinfectant post transport	Visqueen Sheeting, ensure exhaust fans are operational, conduct a thorough cleaning/disinfectant post transport	Visqueen Sheeting, ensure exhaust fans are operational, Remove unnecessary equipment prior to loading, park/secure unit until Dx.	Visqueen Sheeting, ensure exhaust fans are operational, Remove unnecessary equipment prior to loading, park/secure unit until Dx.	Visqueen Sheeting, ensure exhaust fans are operational, Remove unnecessary equipment prior to loading, park/secure unit until Dx.

HM-CT2 BIOLOGICAL REFERENCE

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	Radiation Type and Exposure Ranges		
	Alpha	Beta	Gamma
	Some sources may emit more than one type		
Common Sources	Radium-226 Americium-241 Polonium-210	Tritium Iodine-131 Srontium-90 Carbon -14	Electromagnetic-radiation Cobalt-60
Shielding	Paper (Tyvek)	Bunker Gear	Lead
	Note: Guidance is for POST-DECON CARE		
PPE Isolation Level during Patient Care (Warm Zone)	Contact and Respiratory Precautions: Level C with PAPR or N100 Cartrige		
Transport Considerations	Standard Universal Precautions: Full body Isolation and N95 Mask Post Transport, ensure proper decontamination and monitoring of transport unit.		

	Radiation Syndromes Clinical Effects (ARS)		
	GI	Hematopoietic	Cerebrovascular
	Larger doses will cause more rapid onset of symptoms		
Prodromal Phase	25-100 rad whole body dose Diarrhea, vomiting, fatigue, and fever within a few hours of exposure	100-600 rad whole body dose Bone marrow and stem cells depleted latent period of 4-5 weeks, pt possibly asymptomatic	1000-3000 rad whole body dose Siezures, tremors, ataxia
Latent Phase	600-800 rad GI mucosal cells die, severe dehydration and electrolyte imbalances	Neutropenia and decreased antibody production (2-4 weeks)	Cerebral edema
Overt Systemic Phase	Larger doses > 1000 rad. Necrosis of intestines, intestinal perforation and sepsis	Anemia develops, increased incidence of radiation induced cancer and leukemia	Always fatal. Death within 1-2 days

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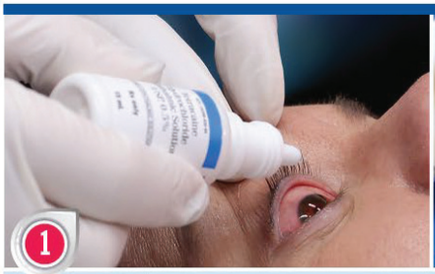
CT4 MORGAN LENS

Morgan Lens Instructional Chart

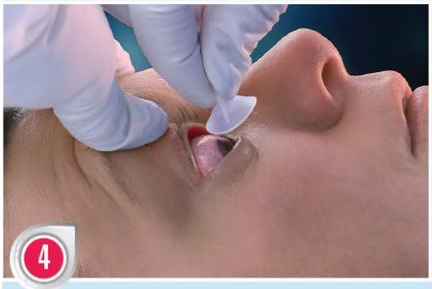
Instructions for using the Morgan Lens for continuous medication or lavage to the cornea and conjunctiva.



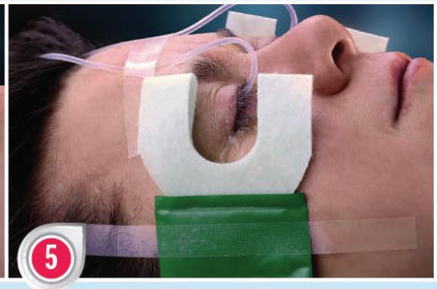
INSERTION
Instill topical ocular anesthetic, if available.

Attach a Morgan Lens Delivery Set (or a syringe or an I.V. set-up).

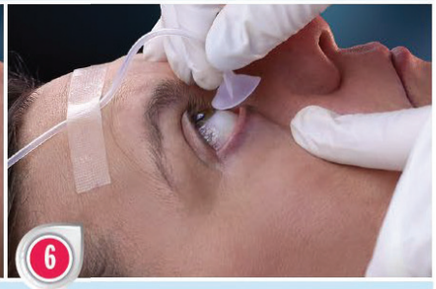
Using solution and rate of choice*; **START FLOW**. This allows Lens to "float" over cornea and sclera.



Have patient look down, insert Morgan Lens under upper lid. Have patient look up, retract lower lid, drop Lens in place.



Release the lower lid over Morgan Lens; adjust flow. Tape tubing to patient's forehead to prevent accidental Lens removal. Absorb outflow with the Medi-Duct (for best results, tape to head as shown). **DO NOT RUN DRY.**



REMOVAL
CONTINUE FLOW. Have patient look up, retract lower lid—hold position. Slide Morgan Lens out. **TERMINATE FLOW**.

Morgan Lens Uses	Solution	Mode with Morgan Lens	Rate	Frequency
Ocular injury due to acid burns or solvents, gasoline, detergents, etc.	Lactated Ringer's* Solution	Morgan Lens Delivery Set or I.V. set-up	500 ml rapid/free flow. Reassess and continue at slower rate.	Once. Repeat as necessary.
Alkali burns		Morgan Lens Delivery Set or I.V. set-up	2000 ml rapid/free flow. Reassess. Continue at 50 ml/hour or 15 drops/minute.	Continuous until pH of cul-de-sac is returned to neutrality.
Non-embedded foreign bodies		Morgan Lens Delivery Set or I.V. set-up	500 ml rapid/free flow. Reassess and continue at slower rate.	Once. Repeat as necessary.
Foreign body sensation with no visible foreign body	20 cc sterile solution	20 cc syringe	Slowly without force.	Once. Repeat once if necessary.
Routine pre-operative	10 cc of preferred ocular antiseptic	10 cc syringe	Slowly without force.	Once.
Eyelid surgery (protecting the cornea during eyelid surgery)	Lactated Ringer's* Solution	Morgan Lens Delivery Set or I.V. set-up	4 drops/minute.	During entire procedure.
Severe infection	Lactated Ringer's* Solution with suitable antibiotic and steroid**	Morgan Lens Delivery Set or I.V. set-up	50 ml/hour or 15 drops/minute.	Continuous for 70 hours, then 10-hour intervals until marked improvement.

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HM-CT5 FLUID REPLACEMENT

Work/Rest Times and Fluid Replacement Guide

Heat Category	WBGT Index (°F)	Easy Work: Walking on hard surface, 2.5 mph, <30 lb. load; weapon maintenance, marksmanship training.		Moderate Work: Patrolling, walking in sand, 2.5 mph, no load; calisthenics.		Hard Work: Walking in sand, 2.5 mph, with load; field assaults.	
		Work/Rest (minutes)	*Fluid Intake (quarts/hour)*	*Work/Rest (minutes)*	*Fluid Intake (quarts/hour)*	*Work/Rest (minutes)*	*Fluid Intake (quarts/hour)*
1	78° - 81.9°	NL	½	NL	¾	40/20 (70)*	¾ (1)*
2 (GREEN)	82° - 84.9°	NL	½	50/10 (150)*	¾ (1)*	30/30 (65)*	1 (1¼)*
3 (YELLOW)	85° - 87.9°	NL	¾	40/20 (100)*	¾ (1)*	30/30 (55)*	1 (1¼)*
4 (RED)	88° - 89.9°	NL	¾	30/30 (80)*	¾ (1¼)*	20/40 (50)*	1 (1¼)*
5 (BLACK)	> 90°	50/10 (180)*	1	20/40 (70)*	1 (1¼)*	10/50 (45)*	1 (1½)*

NL = No limit to work time per hour.

*Use the amounts in parentheses for continuous work when rest breaks are not possible. Leaders should ensure several hours of rest and rehydration time after continuous work.

This guidance will sustain performance and hydration for at least 4 hours of work in the specified heat category. Fluid needs can vary based on individual differences (± ¼ qt/hr) and exposure to full sun or full shade (± ¼ qt/hr).

Rest means minimal physical activity (sitting or standing) in the shade if possible.

Body Armor - Add 5°F to WBGT index in humid climates.

NBC (MOPP 4) - Add 10°F (Easy Work) or 20°F (Moderate or Hard Work) to WBGT Index.

CAUTION: Hourly fluid intake should not exceed 1½ qts. Daily fluid intake should not exceed 12 qts.

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HM-CT5 FLUID REPLACEMENT HM-CT5

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HM-CT6 HEAT INDEX GUIDE

NOAA's National Weather Service

Heat Index

Temperature (°F)

Relative Humidity (%)	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	128	136					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

Caution | Extreme Caution | Danger | Extreme Danger

The "Heat Index" (HI) is sometimes referred to as the "apparent temperature" and can also be used to guide rest and hydration. The HI, given in degrees Fahrenheit, is a measure of how hot it really feels when the relative humidity (RH) is added to the actual air temperature. To find the Heat Index, look at the Heat Index Chart or Calculator below. As an example, if the air temperature is 94° F, and the relative humidity is 55%, the HI -- or how hot it really feels -- is 106° F. This is at the intersection of the 94° row and the 55% column.

*****Important: Since HI values were devised for shady, light wind conditions, exposure to full sunshine can increase HI values by up to 15° F. Also, strong winds, particularly with very hot, dry air, can be extremely hazardous. Note on the HI chart the shaded zone above 105° F. This corresponds to a level of HI that may cause increasingly severe heat disorders with continued exposure and/or physical activity*****

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