

CBRN MED = (MARCHE)²

The Tactical Medic's Approach to the
Poisoned & Traumatically Injured Casualty



Agenda

- ☢ CBRN Environment
- ☢ CBRN Casualty Assessment & Approach
- ☢ Decontamination
- ☢ Kit Specifics & Toxic Inhalation SOP

CBRN Environments – Mindset

- *Avoid the mindset that your casualty has been dipped in agent like a candied apple*
- *In the event of trauma to an HIV, Hepatitis, or MRSA infected casualty, do providers demand that the casualty be completely cleansed of any blood, feces, or vomitus before rendering care or transport? The answer is no. Yet these viruses and bacteria are more lethal than mustard agent or the TIC/TIM threat. Take BSI precautions by wearing appropriate mask, eye pro, and gloves. Adequately clean up afterwards. Additionally, all providers should learn more about individual CBRN agent lethality.*
- *Risk aversion leads to Hypothermia which is going to kill casualties. Cutout and Decontamination needs to be conducted fast. Take into account the agent of concern. If the patient is alive and not dead after being decontaminated then, even if some spot was missed, the likelihood of that spot severely harming medical staff or destroying a medical treatment facility is little to none. Do away with unnecessary lengthy contamination checks with detectors and monitors while a casualty is naked, shivering, and dying. I recommend doing a good visual contamination check in the case of TIC/TIM or Mustard before crossing the cold line. If no gross contamination is seen after being decontaminated then medical providers should accept as clean and continue to provide care.*
- *Know the differences in terms such as: Contaminated, Infectious, Exposed, Irradiated. These terms mean different things. Use them correctly.*

CBRN Environments – Mindset

- Can I take a knee? – Traditional CBRN medical courses will penalize the student if the responder takes a knee while providing care. This is usually done by telling the student that he is now dead or down because agent has entered the suit by being pressed through the fabric where the student placed their knee. The student is then added to the problem set of casualties without really learning anything. This mindset teaches the students to be all fearful of the CBRN environment – that everything they touch is deadly. It is my intent to get providers out of the mind state that once inside the hot zone it is as if someone has been dipped in agent like a candied apple. This is simply not the case. This mindset is too restrictive. In reality, someone that is in, or has entered the hot zone should be “treated as if they stepped in mud and we don’t want them tracking it in our house when they come over for dinner.”

CBRN Environment – Casualty Types

Two Instances for Contact with CBRN on the Battlefield

- Asymmetric Attack, Not dressed in PPE prior to exposure
- Purposeful Contact, Poised in PPE prior to exposure

Three Types of Casualties

1. Standard Battlefield Trauma
2. Poisoning
3. Combination of Both Poisoning and Trauma

Just as trauma casualties present differently (blunt trauma, GSW, Blast etc.) and require different approaches towards stabilization the CBRN casualty presents differently. Chlorine casualties for instance will require more attention to the toxic inhalation symptoms; contrasted with, the Mustard casualty will require more attention to any associated trauma before addressing the agent specific effects.

You should always be asking yourself, “What is killing the casualty right now?” If it is the environment pick up the casualty and move to safe area. If it’s the bleeding more than the agent then treat the bleed.

CBRN Environment – Special Concerns

What are the Environmental Threats?

- Vapor Hazard, Liquid, Confined Space, Low Oxygen
- Can I take a knee?

Protect Yourself, Don PPE, Move Casualty Away from the Threat or Agent

Fresh Air

Upwind, Uphill, Upstream

Time, Distance, Shielding

Triage

- How many casualties do I have, which ones can I help?
- Is the casualty suffering from trauma, poisoning, or both?
- This type of casualty requires twice as much time and effort.

Is the patient alive?

- Assessment in PPE can be difficult. CRESS.
- PPE on the casualty may hide pooling blood and small penetrating trauma.

Constantly ask your self, “**What is killing the casualty right now?**” Your answer will dictate your treatments.

Casualty Assessment – CRESS

CRESS is the NATO method for CBRN Casualty Assessment developed by toxicology and CBRN medical experts in UK SOF. It is a very helpful tool that will lead the Tactical Medic to quickly determine agent of concern, conduct triage, and recognize symptoms.

C – Consciousness (unconscious, convulsing, altered?)

R – Respirations (present, labored, or absent?)

E – Eyes (pupil size, PERRLA?)

S – Secretions (absent, normal, increased?)

S – Skin (diaphoretic, cyanotic, dry, hot?)

-“CRESS” from NATO Management of CBRN Casualties Handbook AMedP-7.1

Notes:

For example a severe nerve agent casualty would present as unconscious and seizing; absent respirations; miosis and dim vision; excessive secretions; diaphoretic and cyanotic.

Compared to a Mustard casualty presenting as conscious; labored (delayed); gritty eye sensation progressing to redness, severe swelling, and blindness; normal secretions, normal skin progressing to redness with delayed onset blisters and pain.

Remember to take into account the effects of associated trauma with poisoning may mask or confuse the CRESS assessment.

CBRN Casualty Approach – (MARCHE)² or M²A²R²C²H²E²

Goals of CBRN Trauma Medicine:

1. Limit and Minimize Exposure and Contamination
2. Treat the Immediate Life Threat
3. Administer Appropriate Antidotes, Countermeasures, utilize (MARCHE)²

Point of Injury

- Massive Hemorrhage, Mask/Air Check
- Airway, Administer Antidotes (ATNAA, CANA)
- Respirations, Rapid Spot Decontamination (RSDL)

Move to EPDS or Dirty CCP if able

- Circulation, Administer Countermeasures
- Hypothermia / Head Wound
- Extraction/Evacuation

Notes:

CBRN Casualties take twice as long to treat as conventional wartime casualties. Reasons for this are the added complexity of working in PPE and the complexity of CBRN Trauma and Poisoning. Therefore (MARCHE)² “Marche Squared” or via the distributive property M²A²R²C²H²E²

Limiting exposure and the catastrophic impacts of hypothermia will be some of the Medic’s biggest hurdles.

HOT ZONE
Care Under Fire

WARM ZONE
Tactical Field Care

COLD ZONE
Evacuation/PFC

**POINT
OF
INJURY**

Extraction

Dirty CCP

Evacuation



Treat the Agent Like a Bullet

Casualty Cutout & Decontamination

Clean Medic Receives

CRESS

CRESS Reassessment

CRESS Reassessment

(MAR)²

(MAR)² Reassessment

(MARCHE)² Reassessment

“Expose to Treat”

(CHE)²

CBRN Casualty Assessment at the Point of Injury – M² A² R²

- Check and Find Massive Bleeding
 - Only expose the casualty to the point that is necessary taking into account the risks of environmental exposure
 - Apply Tourniquets or Pack and Wrap, Tourniquets over the suit are prone to fail
- Check Mask and Air
 - Is the casualty's protective mask in place?
 - Is the PAPR working?
 - If SCBA is worn is the system providing air?
- Assess Airway, is the casualty talking?
 - Does it make sense to unmask the casualty to provide an airway in a contaminated environment?
 - If so, which airway adjunct should be used? NPA, King LTD, iGel, Cric, or Patient Positioning
 - Which airway will allow the casualty to be re-masked, if necessary? Is a RDIC (Resuscitator Device Individual Chemical NSN 6665-01-338-6602) indicated? If you are on filtered air your casualty should be too.

CBRN Casualty Assessment at the Point of Injury – M² A² R²

- Administer Antidotes
 - Are antidotes given in the Hot Zone? Will your casualty die before decontamination? If nerve agent, yes. ATNAA, CANA. If Cyanide, yes. Know the agents that are immediate killers and those that present initially as only a decontamination problem.
- Assess Respirations
 - Normal, Shallow, Labored, Absent? Caused by the agent or trauma? Needle D indications? Chest Seal, BVM (RDIC) Ventilations
- Rapid Spot Decontamination
 - At the point of injury a rapid spot decontamination may be indicated if agent can be seen on the skin or in the event there is a breach in the suit. Apply RSDL, M295, Sorbent, tech wipe, etc.

Notes:

M² A² R² may be the extent of your treatment if dirty evacuation is possible. The goal is to prevent death and further CBRN Injury. Minimize care to what is only necessary and get the casualty to decontamination. Only after decontamination can true definitive care be given. Surgery should not be done on someone who is contaminated.

CBRN Patient Assessment at the Dirty CCP – C² H² E²

Once the patient has been moved to the Dirty CCP (i.e. the Hot Line) and triaged, designated personnel will begin cutout and decontamination of the casualty. It is important to reassess treatments done at the point of injury and possibly remove and replace dirty treatments with clean ones. Medic will need to work and communicate with decontamination personnel. “Expose to Treat”

- Administer Countermeasures
 - Nebulized medications (conscious and unconscious casualty capable), IV/IO Drips, Suction the airway, RSI, Ventilator
- Assess Circulation
 - Pause in your assessment. Take a Breath. Did you get the immediate life threats? ARC Check (Airway Respirations, Circulation), Pulse Check, Skin Check, Shock Status, IV/IO, Splint broken bones and IV/IO Sites.
- Prevent Hypothermia/Manage Head Wounds and Altered Mental Status
 - Package the Patient. Lethal Triad: Hypothermia, Acidosis, Coagulopathy
 - Is the casualty’s altered mental status due to an agent, blast exposure, or direct trauma?
- Extraction / Evacuate the Patient
 - Determine Evac Priority, Fill out CBRN Casualty Card, Move patient for further decontamination or to Cas/Med Evac platform. Extraction or rescue is an ongoing process throughout CBRN response. The Dirty CCP may be far from the point of injury necessitating exhausting casualty carries and exposing them to heat injury from the burdens of PPE .

Notes for CBRN Patient Assessment at the Dirty CCP – C² H² E²

“Expose to treat” is the command to the medic’s assistants that are performing decontamination. Use this command when making the determination to remove PPE at the hotline when it is in the best interest of the casualty. “Exposing to treat” entails rapidly decontaminating the head/face and chest removing the mask to be able to assist in ventilating the casualty and exposing the chest for the application of a FAST1 to facilitate rapid dosing of countermeasures.

Important to know what the Antidotes/Countermeasure/Chelators do to the casualty. i.e. raise BP, lower HR, prolong bleeding time, allergic reaction possibility

Casualty extraction often times in CBRN environments is complicated and takes place from the point of injury to the hotline. The burden of conducting casualty extraction in PPE is difficult to say the least. This can require carrying casualties longer distances; utilizing special equipment such as tripods, ropes, rigging, and skedco litters; or dealing with confined space. Watch out for heat injury in responders wearing PPE for long periods of time. Have a plan to deal with this when it happens.

CBRN Med = (MARCHE)² Principles & Phases of Care Summary

Hot Zone

Principles:

1. Sometimes the agent is like the bullet, think Care Under Fire
2. Always ask yourself, "what is killing my casualty now, is it the agent or the wound?" The answer to this question dictates your treatments
3. Triage
4. Only expose on the casualty what is needed to save life
5. Do what needs to be done
6. Protect yourself from the threat: time, distance, shielding, wind, uphill, upstream
7. Heat casualties from operating in PPE is a common injury for providers and may not be agent related
8. May have a casualty extraction problem: confined space, vehicle, high angle, etc.
9. Everything is agent dependent.
10. Getting to the warm zone may require prolonged movement of the casualty
11. Dirty Medic

M: Massive Hemorrhage
M: Mask Check, (PAPR/Tank)
A: Auto-Injector (ATNAA/CANA)
A: Airway
R: Respirations
R: Rapid Spot Decontamination
E: Extraction

Warm Zone/ Dirty CCP

Principles:

1. Think Tactical Field Care
2. Always ask yourself, "what is killing my casualty now, is it the agent or the wound?" The answer to this question dictates your treatments
3. Triage
4. Minimal life saving care, get them to the cold zone for definitive care.
5. Replace dirty treatments, TQ's, etc.?
6. May require heavy airway management
7. Cutout and thorough decontamination
8. Do treatments while decontamination is being conducted. "Expose to Treat"
9. Hypothermia is a big threat due to the time it takes to decontaminate and the exposure time

M.A.R. reassessment
C: Circulation and Shock Status
C: Countermeasures (drips)
H: Hypothermia
H: Head Wounds

Cold Zone

Principles:

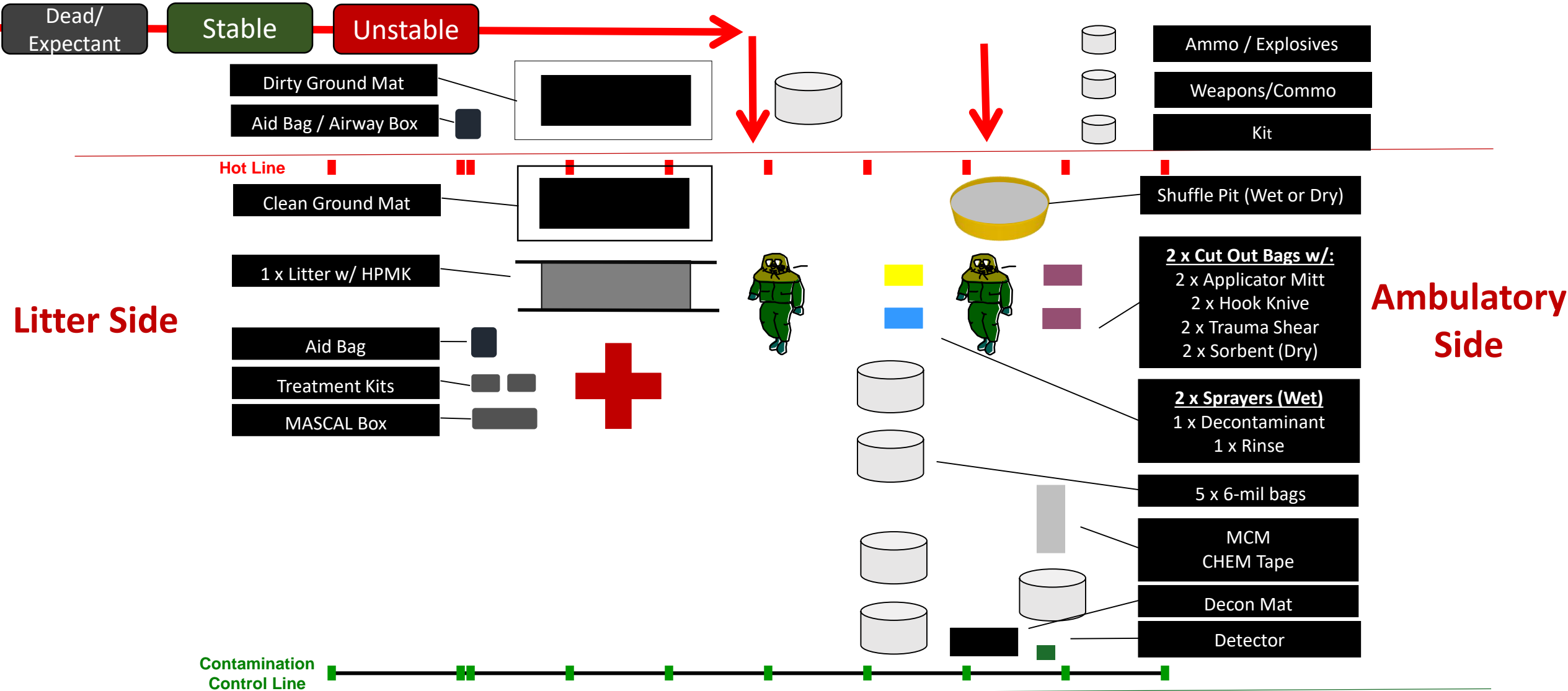
1. Think Prolonged Field Care
2. Always ask yourself, "what is killing my casualty now, is it the agent or the wound?" The answer to this question dictates your treatments.
3. Triage
4. Hypothermia
5. Receiving medical personnel may have little to no experience with CBRN, anticipate fear, misunderstanding, requiring another unneeded decontamination process and/or an unwillingness to treat
6. Clean Medic

M.A.R.C.H. reassessment
E: Evacuation

Notes:

- Extraction (Rescue) may be at issue throughout the phases of care. Have a plan ahead of time for contaminated human remains.

Schematic – DIRTY CCP



Notes:

- Casualty Flow moves north to south in this diagram
- Triage Flows West to East in the hot zone
- Medical Personnel, at least one designated clean and one provider designated dirty.

DIRTY CCP – Casualty Cut Out

Cut out and removal of PPE and clothing removes most of the contamination. Technique is extremely important in order to minimize and eliminate cross contamination

- Wipe away remove any gross contamination utilizing the M295, FiberTect, Micro Fiber Towel
- RSDL the cut lines
- “Expose to Treat” if required
- Work away from the head
- Cut, splay, tuck
- RSDL skin where required
- Remove RSDL after 2 min if possible with a wipe.
- Treat life threats
- Task organize helpers
- The *Cleaner / Spotter*
- Mind hands and tools
- Bag and dispose



Decontamination – Proper Terms on Levels & Principles

It is important to use the correct terms when talking about decontamination so that CBRN experts and medical personnel understand across the spectrum of effort. As a medic responsible for operating in this environment it is important that you use and teach others what the correct terminology is.

Levels of Casualty Decontamination

- *Immediate*: Spot decontamination within minutes saves lives. Usually done by first responder or self.
- *Operational*: Complete decontamination of contaminated areas of service member's MOPP prior to evacuation or return to duty, without removing MOPP. (allows the continuation of mission in MOPP)
- *Thorough*: Remove patient's clothing and decontaminate the skin. This may involve decontaminating only the contaminated areas of the skin (especially if water is scarce) or a full-body wash. Removes contamination prior to admission to clean treatment area / medical facility (*not necessary for all agents*)
- *Clearance*: provides decontamination to a level that allows unrestricted transportation, maintenance, employment, and disposal. Required for contaminated human remains.

Principles of Decontamination

- *Speed*: Timely physical removal is critical
- *Need*: Decontaminate what is necessary
- *Priority*: Decontaminate according to triage category
- *Limit*: Area of contamination

Decontamination – Proper Terms on Methods

Methods of Decontamination

- *Neutralization*: the most widely used method of decontamination, particularly for chemical warfare (CW) agents. Neutralization is the reaction of the contaminating agent with other chemicals to render the agent less toxic or nontoxic. When mixed with a reactive decontaminant, the agent is converted into other substances (i.e., reaction products). The reactive decontaminant may be a commonly available material (e.g., household bleach) or a specifically designed decontaminating agent.
- *Physical Removal*: the relocation of the contamination from one mission-critical surface to another less important location. Physical removal generally leaves the contamination in toxic form. It often involves the subsequent neutralization of the contamination. For example, if soap and water are used to remove the agent, the runoff may be drained into a pit containing bleaching powder. However, depending on mission requirements, physical removal can be an effective technique without subsequent neutralization.
- *Weathering*: involves such processes as evaporation and irradiation to remove or destroy the contaminant. The contaminated item is exposed to natural elements (e.g., sun, wind, heat, precipitation) to dilute or destroy the contaminant to the point of reduced or negligible hazard. This may be as simple as letting a vehicle sit in the hot desert sun to bake off the contaminant. Natural weathering is the simplest and most often preferred method of decontamination, particularly for terrain and non-mission-essential buildings and roads.

Decontamination – Risks to Medical Facilities

Risk: Foreign material (uniforms, PPE, debris, shrapnel) will be the most likely sources of residual agent.

Mitigation: Utilize a casualty decontamination process that completely removes the casualty's garments—this reduces most of the contamination. The casualty's skin will be decontaminated using RSDL and/or an absorbing decontamination material. Cross-contamination will be reduced by medics removing their own contaminated garments during the cut-out process. Additionally, patient will be placed on clean surface away from vapor hazard after skin is decontaminated.

Risk: Vapor off-gassing from foreign material buried in wounds of patients brought into the medical facility.

Mitigation: The risk is VERY LOW and NOT SIGNIFICANT. Any foreign material, i.e. imbedded shrapnel, removed from the casualty should be removed utilizing a no touch technique and the instrument and material placed in, then sealed in, a container containing 10% hypochlorite.

Risk: Off-gassing wounds and wound cavities will be sources of secondary exposure to medical personnel.

Mitigation: Risk of a wound off-gassing is negligible to zero.

Risk: Thickened agents such as Mustard (HD) will persist in a wound and cause secondary exposure to medical personnel.

Mitigation: Irrigate or physically decontaminate any large quantities of thickened agent that is in the wound, if able. If the agent cannot be removed from the wound, it does not present a vapor hazard, only a contact hazard. NORMAL no-touch surgical technique/PPE should protect against this. RECOMMEND medical personnel use at least 3 layers of nitrile medical gloves. This will allow them to remove the first layer once they are sure there is no residual contamination.

Decontamination – Wounds and Bandages

- Standard irrigation and debridement is best. In extremis the medic can use kerlix or similar material to wipe a wound then pack and bandage.
- Remove foreign material in wound
 - Porous material acts as agent depot
 - Risk to casualty and medical staff is minimal
 - Remove with no-touch technique
 - Do not attempt field decontamination of abdominal, thoracic, or intracranial cavities
- Tourniquets: New tourniquet applied ½ -1" above old one. Old one is removed and skin is decontaminated if necessary
- Bandages: Cut away and decontaminate wound and area around wound. If no bleeding is present DO NOT re-bandage. If bleeding is present re-bandage.

CBRN Medic – Kit Specifics

- ☢ KICP, RSDL, 295
- ☢ CBRN Casualty Card
- ☢ Tics/Tims, Mustard Kit

Reactive Skin Decontamination Lotion – RSDL



- Allow RSDL to remain on skin for at least 2 minutes.
- Maximum skin contact time is 24 hours.
- Remove the lotion by washing with soap and water when able.
- Not used in wounds because systemic toxicity of 2,3-butanedione monoxime and there is evidence that it impairs wound strength and decreases collagen content in early phases of wound healing.
- RSDL may cause a false positive on M8 paper and M9 Tape.
- RSDL will remove the ink print on the packaging of M256 tickets
- Not for prophylactic use or whole body decontamination.
- For external use only. RSDL should not be used for wound decontamination or eye.
- Avoid extended contact with the skin. The active ingredient: is absorbed through the skin and causes dermatitis.
- The RSDL vehicle, m-propylene glycol (MPEG), when combined with solid powdered HTH (calcium hypochlorite) or solid powdered Supertropical Bleach (STB), causes spontaneous combustion.

- Walters, mil med 2007

Individual Equipment Decontamination Kit – M295



Notes:

- Sorbent decontamination system (SDS) powder
- 2 packets per KICP
- External use only
- Keep powder out of eyes and wounds

Procedures

1. Remove one packet from kit, tear packet at notch, remove mitt
2. Unfold mitt, grasp green side of mitt and pat the mitt against the other hand to start the flow of powder
3. Use mitt to completely cover dominant hand with powder, insert decontaminated hand into the mitt and tighten wristband
4. Pat suspected contaminated areas until thoroughly covered with powder, pay attention to cracks, crevices, and absorbent materials.
5. Repeat with a second mitt to complete decontamination

Kit Individual Chemical Protective – KICP

Carried on individual's kit in its own pouch

Consists of:

- M8 Paper
- 3 ATNAA (Nerve Antidote)
- 1 CANA (Nerve Antidote)
- Trauma Shears
- 1 RSDL Pkg – 3 Packets.
- M295 Equip Decontamination Mitt

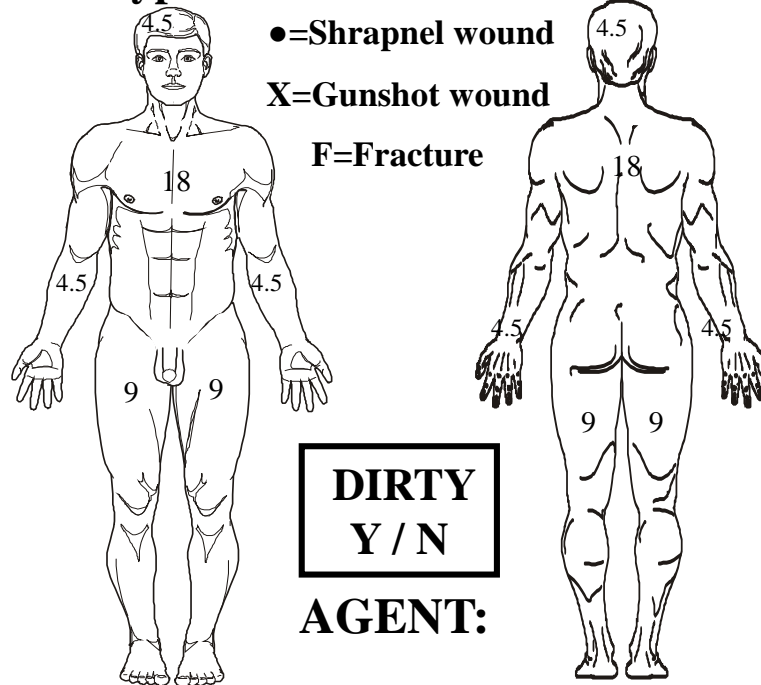
Notes:

Know how to use the auto injectors. Indications for administration. No thumbs over the end of injector. Large muscle sites clear of items in cargo pockets. Once Injector fires must hold in place for ten seconds as the dose is administered.

NAME _____

ID/ Call Sign _____

Blood Type • O • A • B • AB • NEG • POS



UNSTABLE STABLE EXPECTANT

TIME

AVPU

PULSE

RESP

BP

SPO₂

ETCO₂

ALLERGIES _____

- M:** • Tourniquet • HemostaticDx • PackedWound
A: • NPA • King LTD • iGel • ET tube • Cric
R: • Occlu Dressing • ND • ChestTube • Cook 10ga
C: • IV • IO • SalineLock

FLUIDS: HEXTEND • PlasmaLyte • NS • RL
500 • 1000 • 1500 • 2000

TXA _____ FDP _____ FWB _____

MEDS: KETAMINE _____ VERSED _____
 VALIUM _____ MORPHINE _____ SCOPE _____
 FENTANYL _____ ERTAPENEM _____ ROCEPHIN _____

Decon Type Performed:

CBRN CASUALTY CARD

TICS/TIMS Toxic Inhalation/ Eye Exposure Box

This kit is meant to be carried as an adjunct in aid bag as mission dictates the threat to personnel. The surplus of drugs is meant to provide continuous care and re-dosing as symptoms persist. Be mindful that nebulizers don't work if they are not kept upright. Collapsible and bendable airway tubes may be needed to provide nebulizer treatment to a casualty that is prone. If you use the Omron Nebulizer, read the directions for use and maintenance before you pack it in your aid bag.

1ea Pelican 1150 Case

1ea Toxic Inhalation SOP Quick Ref Card
1ea Omron Micro Air Nebulizer w/ batteries
1ea Extension Tubing
1pkg (5 vials) 5mL 4% Lidocaine HCl 40mg/mL
1ea 8.4% Sodium Bicarbonate 50mEq/mL
15ea bullets 2.5mg Albuterol in 3mL
4ea vials Dexamethazone IV 20mg/5mL
5ea 3mL NS Pre-Filled Syringes
3ea 18g Hard Needles
2ea Neomycin or Gentamicin Ophthalmic Oint.
2ea Tetracaine Ophthalmic

Eye treatment not in case, carried in Aid Bag:

1ea 1000cc bag of NS or Lactated Ringers
2ea Morgan's Lens
1ea Morgan's Lens Admin Set

Carried on Vehicle

2 ea D Cylinders of O₂
Multitator
10ea NRB Masks
10ea Nebulizer Masks

Supplemental items:

1ea Airlife Asthma Check Peak Flow Meter
1ea Capno Check



Toxic Industrial Chemicals/Materials Inhalation Injury Treatment SOP

Administration via Nebulizer (in order)

- 1 Albuterol bullet, 2.5mg in 3mL, by nebulizer
- 1cc 4% lidocaine w/ 1 cc normal saline or 2cc 2% lidocaine w/o NS by nebulizer (for cough / pain suppression)
- Administration via IV/IO:
 - Dexamethasone: 8mg q6hrs (Preferred)
Or
 - 125mg Solumedrol IV/IM q6hrs

If no resolution of symptoms (efficacy is unproven by research) attempt

- 1cc Bicarb w/ 1cc normal saline by nebulizer. Do not use undiluted Bicarb!
 - for acidic inhalation
 - do not mix with other drugs

TIC/TIMS Eye Injury Treatment SOP

- Tetracaine Eye Drops for Pain
- 20 min NaCl Flush with Morgans Lens
- Neomycin Eye Drops Prevent Eyelids Sticking Shut
- Allow Eyes to Drain. Avoid Tight Bandaging.

Last Update: AUG 2016

Recommendations for the Tactical Medic

1. Wear PPE and shakeout your kit and aid bag during casualty scenarios
2. Train your teammates to assist you in the CBRN environment: (MARCHE)², casualty cut out, establish a dirty CCP
3. Have a CBRN MASCAL Plan
4. The Basics Will Save Lives

Questions?

devin.r.defeo.mil@mail.mil