South Dakota Healthcare Coalition

PPE and Special Pathogens for EMS Providers

A guide to the selection and use of Personal Protective Equipment in the Emergency Medical setting

Presented by

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AVERA SIMSD

Disclaimer

- No Financial interest/gain from any of the products in this Presentation

What is PPE?

- Specialized clothing or equipment worn by Emergency Medical responder for protection against infectious materials
- OSHA states employers must :
    1. Provide appropriate PPE for employees
    2. Ensure PPE is properly disposed of or reusable PPE is cleaned, laundered, repaired and stored after use

Goal and Objectives

Goal

Improve personnel safety in the Emergency Medical environment with the appropriate use of PPE

Objectives

1. Provide information on the selection and use of PPE in the Emergency Medical setting
2. Practice how to safely don and remove PPE

Types of Personal Protective Equipment

- Gloves –hand protection
- Gowns/Aprons– protect skin and or clothing
- Masks and respirators-protect mouth and nose

  Respirator N95- Protects respiratory tract from airborne infectious agents
- Goggles- protects eyes
- Face shield – Protects face, mouth, nose, eyes

Factors and how to select proper PPE

- Type of exposure anticipated

  --Splash/Spray vs. Contact Vs. Airborne

  -- Category of precautions

    1. Standard Precautions
    2. Contact Precautions
    3. Droplet Precautions
    4. Airborne Precautions
    5. Special Respiratory Precautions
    6. EVD-VHF Precautions
- Durability and appropriateness for the task at hand
- Fit

Standard Precautions

- Risk-Bloodborne pathogens-Diseases causing infectious drainage- Use Common Sense– If it looks like a duck, quacks like a duck…….
- Examples- AIDS- Spread person to person with infectious agent residing in blood. Transmitted through blood or semen.

  ZIKA- typically spreads Mosquito to person. Agent resides in blood. Blood or semen transmission.

  ANTHRAX- Contact with infected animals. Pulmonary infections in humans are not contagious. Cutaneous Anthrax drainage can be infectious. Stays in soil. 2018 186 cases in Uganda

  WOUND INFECTIONS – Cellulitis

Gloves, handwashing, facial protections, gowns if manipulating airway or splash risk.

Contact Precautions

- EXAMPLES– Excessive wound drainage, MRSA, Vancomycin-resistant enterococci “VRE”, C. Difficile, Norovirus, any suspected infectious Diarrhea
- GOAL- Provide impermeable barriers to infectious agents that are either that can easily be contracted or spread to other environments via fomites and surface contact.
- PPE- Disposable fluid-resistant gown that protects the providers legs; consider fluid resistant coveralls.
- Hand hygiene, gloves as part of standard precautions

Contact Precautions

- Impermeable barrier in the presence of excessive wound drainage, fecal incontinence, or other discharge.

Remember- Ambulance Decontamination

- Any visibly soiled ambulance surface must be deconned using EPA-registered hospital disinfectant
- Medical equipment(stethoscope, BP cuff, etc.) making patient contact should be disposable or cleaned and disinfected and before use on next patient.

Droplet Precautions

- EXAMPLES-Meningitis, Streptococcal and other causes of pneumonia,
- Pertussis, Rhinovirus, Seasonal Influenza, Strep throat
- GOAL –Additional respiratory protection against inhalation of larger infectious droplets
- PPE- Surgical masks and possible eye protection
- Patient Care Considerations

1. Provide surgical mask for patient (if tolerated)
2. Tissues to patient
3. Medical provider distance (Yeah right)
4. Use of nebulizers increase droplet risk

Droplet Precautions

- Transport considerations

1. Consider ambulance airflow. Exhaust vent, driver compartment
2. Increase ventilation with air or heat on non-recyle and or open windows.

Remember Ambulance Decontamination

Airborne Precautions

- EXAMPLES-Measles, TB (suspected or confirmed pulmonary or laryngeal) Chickenpox
- GOAL- Provide respiratory protection against inhalation of infectious aerosols. (agent that remain infectious over long distances when suspended in the air)
- PPE- Respirators for EMS -N95
- Patient Care Considerations

1. Strict adherence with standard precautions
2. Mask Patient if tolerated
3. Tissues for patient
4. Nebulizers, Intubation, airway manipulation, increase aerosol in air.

Airborne Precautions

- Transport Considerations

1. Notify receiving hospital of the need for negative pressure room
2. Ambulance airflow- Exhaust vent, driver compartment
3. Increase ventilation by having air or heat on non-circulating cycle or open windows.
4. N95 mask for driver
5. Intubated should be ventilated with HEPA filter on exhalation port. (what happens if vent circuit get disconnected?)

Remember to Decontaminate Ambulance

Special Respiratory

- EXAMPLES- SARS (Severe Acute Respiratory Syndrome), MERS (Middle Eastern Respiratory Syndrome), Novel Influenza strains
- GOAL- Additional respiratory precautions against inhalation of larger infectious droplets during direct patient care activities. Include impermeable barrier to reduce spread of highly pathogenic viruses on surfaces.
- PPE Standard + Contact + Airborne
- Patient Care Considerations

1. Strict adherence with standard precautions
2. Mask Patient if tolerated
3. Tissues for patient
4. Nebulizers, Intubation, airway manipulation, increase aerosol in air. Extra Caution needed

Special Respiratory

- Transport Considerations

1. Notify receiving hospital of the need for negative pressure room
2. Ambulance airflow- Exhaust vent, driver compartment
3. Increase ventilation by having air or heat on non-circulating cycle or open windows.
4. N95 mask for driver
5. Intubated should be ventilated with HEPA filter on exhalation port. (what happens if vent circuit get disconnected
6. Have a plan for family members who wish to accompany patient that prevents crew exposure to highly infectious diseases. They are probably contagious too.

Ebola Virus Disease “EVD”
Viral Hemorrhagic Fever “VHF”

- EXAMPLES- Ebola, Marburg Virus, Lassa Fever Crimean- Congo Fever
- GOAL- Provide Maximal impermeable barrier and respiratory protection against highly pathogenic VHF viruses
- PPE-- ALL PRECAUTIONS
- State Plan to Transfer to Sanford with Patient Care EMS 605-275-2770

- Waste is considered Level A and requires special disposal

Ambulance Decon with All precautions PPE

Gloves

- Purpose—Patient care, environmental services, other
- Glove material –vinyl, latex, nitrile, other
- Sterile or non sterile
- One or two pair
- Single use or reusable

Do's and Don'ts of Glove use

- Limit "touch contamination" if possible, protect yourself and others

  ****** **Don't take germs Home*****

  Never touch your face or eyes or adjust PPE with contaminated gloves

  Don't touch environmental surfaces except as necessary while conducting patient care. Examples: phone use, laptop, multiple stethoscopes, so don't touch anything you don't have to touch☺

Do’s and Don’ts of Glove use

- Change gloves often – they are “cheap insurance” 8 to 10 bucks per 100

  Change-- if torn or heavily soiled, even if same patient

  Change between patients

  Carry spare gloves on your person

  EMS--Glove up PTA

  Discard into appropriate receptacle

  Never wash or reuse disposable gloves

Gowns, Coveralls and Shoe/Boot Covers

- Purpose of Use -- will review later in slide show
- Reusable or disposable
- Resistance to fluid penetration

- Boot covers of adequate height—May need second over first to get coverage. (cut foot off of cover and slide over to proper height on leg and secure with duct tape.)

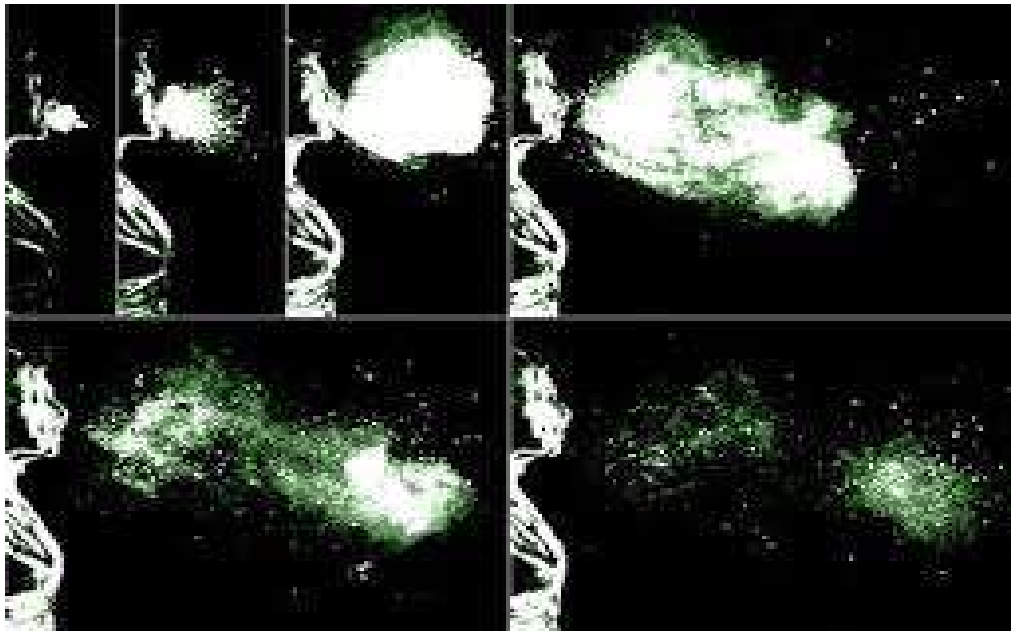
Face Protection

- Masks- protect nose and mouth- should completely cover nose/mouth and prevent fluid penetration
- Goggles- protects eyes, should fit snugly over and around eyes

  *personal eyeglasses are not substitute for goggles
- Face Shield protects full face, nose, mouth and eyes

  * Covers from top of forehead to below chin and wraps around sides

Cough Spray Dispersion



Respiratory Protection

- **Surgical mask**-A surgical mask, also known as a **procedure** mask, is intended to be worn by health professionals during surgery and during nursing to catch the bacteria shed in liquid droplets and aerosols from the wearer's mouth and nose. Surgical masks may also be used to help reduce the risk of splashes or sprays of blood, body fluids, secretions, and excretions from reaching the wearer's mouth and nose. Surgical masks may also be worn by patients to help limit the spread of **infections**. Jul 11, 2017

- Surgical masks are not designed for use as particulate respirators and do not provide as much respiratory **protection** as an N95 respirator. Surgical masks provide barrier **protection** against droplets including large respiratory particles

Respiratory Protection

- N-95 Mask ---**N95** Respirators. An **N95 respirator** is a respiratory protective device designed to achieve a very close facial fit and very efficient filtration of airborne particles. The '**N95**' designation means that when subjected to careful testing, the **respirator** blocks at least 95 percent of very small (0.3 micron) test particles. May 16, 2018

N95 respirators are not designed for children or people with facial hair. Because a proper fit cannot be achieved on children and people with facial hair, the N95 respirator may not provide full protection.

- **How to Make Sure the Mask Fits**
- Do a user seal check, including both positive and negative pressure checks, to verify that you have correctly put on the mask and adjusted it to fit properly.
- **Negative pressure check**
- Place both hands completely over the mask and inhale sharply. Be careful not to disturb the position of the mask. The mask should pull into your face. If air leaks around your face or eyes, adjust the nosepiece and straps and repeat the positive pressure check.
- **Positive pressure check**
- Put your hands over the mask and breathe out sharply. If your mask has an exhalation valve (like the one pictured above) be sure to cover the exhalation valve when you exhale. No air should leak out of the mask if it fits properly. If air leaks out, re-adjust the nosepiece and straps and repeat the negative pressure check.

N-95 Mask

Respiratory Protection

- **PAPR** Positive Airway Pressure Respirator or Powered Air Purifying Respirator
  * PAPR generally not available to EMS

General Guidelines for Donning Equipment

- Lay out and inspect equipment
- Remove all jewelry, watches, personal items
- Hand Hygiene
- Have a partner to help and to inspect for proper application
- Consider a checklist
- Take care of personal needs

General Guideline to Donning Equipment

Boot/Shoe Covers

General Donning

Inner gloves

General Donning

Inner Gown

General Donning

N-95 Mask

General Donning

Hood /Hair Cover

General Donning

Outer Gown

General Donning

Outer Gloves and Face Shield

General Donning

- Verify Freedom of Movement
- Partner to check for vulnerable areas

Be Smart Be safe

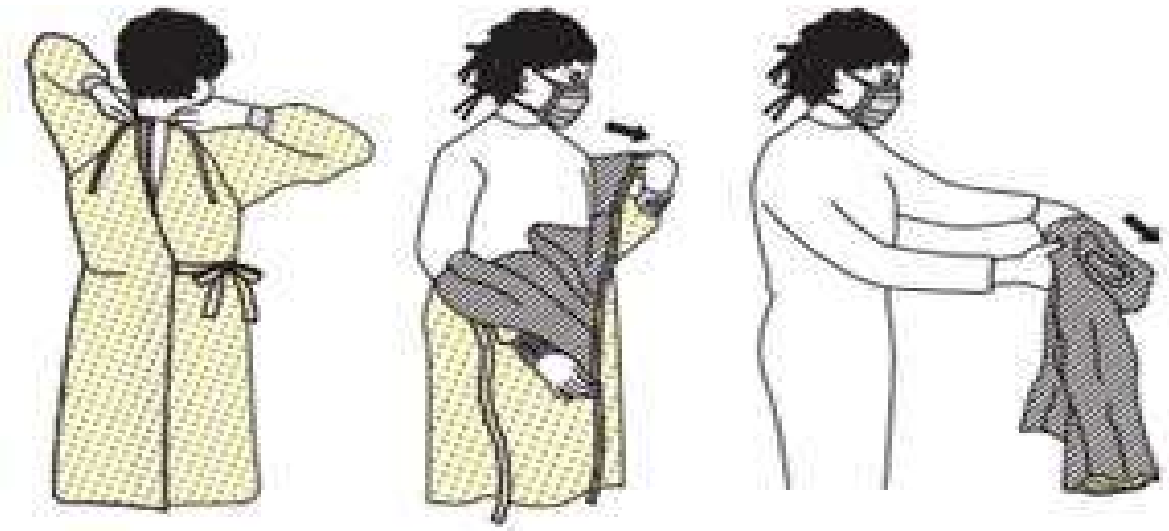
Doffing PPE

- Remove outer gloves
- Face shield or goggles
- Gown
- Shoe covers
- Mask or Respirator
- Hand hygiene between steps with ABHR (Alcohol Based Hand Rub)

Glove removal

Face Shield/ Goggles Removal

PPE Gown removal



General Doffing

N-95 Mask

Where to remove PPE

- At the doorway as you leave the room
- Remove respirator outside of room after door has been closed
- All soiled/used PPE into biohazard bag

Boot Cover and Mask Removal

Boot covers/shoe covers second to last

Mask last

What Type of PPE Would you Utilize ?

- Suctioning oral secretions – Gloves, mask/goggles, gown
- Transporting patient on ambulance cot—generally none unless……
- Blood splash or spirt—Gloves, mask impermeable gown, face shield or goggles
- Blood draw/ IV start ---Gloves
- Cleaning incontinent patient with diarrhea—Gloves with gown
- Taking VS—Generally none
- Irrigating a wound- Gloves, gown, face shield or goggles

Versa Flow TR600
Powered Air Purifying Respirator

Biggest Problem? Battery Information

- **General Recommendations**
- • Always read and follow the *User Instructions* that accompany the battery pack and charger.
- • Use only 3M TR-600 chargers to charge TR-600 battery packs.
- • Use only 3M TR-300 chargers to charge TR-300 battery packs.
- • Battery pack capacity may be reduced if stored or used in high temperature environments or near radiant heat sources.
- • 3M™ Versaflo™ PAPR battery packs can be charged any time during the discharge cycle. Battery memory (also known as voltage depression) is not a significant factor.
- • Battery packs can be cleaned with a damp cloth and mild detergents. Solvents and strong detergents may damage the battery pack case.
- • Do not charge battery packs in an enclosed cabinet without ventilation. Do not stack batteries together or on top of charger when charging. Heat naturally generated during charging must be allowed to dissipate or it may damage battery pack cells.
- • 3M™ Versaflo™ battery pack capacity can be checked directly with the status indicator on the battery pack.
- • Do not attempt to discharge the battery pack by short-circuiting the terminal pads.
- • For long-term storage, disconnect battery pack from the motor/blower unit. See storage recommendations in this document

Battery Information

- Quick Charging – to 100% typically within 3.5 hours
- Temperature range of operation- 14 degrees to 129 degrees
- Run Time Varies -depending on headgear, filter, selected airflow, battery condition
- Service life of Battery- Approximately 250 full capacity cycles while maintaining 80% over the first year when used as recommended. If battery is used infrequently over extended period of time full cycle equivalents may not be reached due to natural degradation of battery chemistry
- Consider replacing battery when maximum charge capacity fall below 80%

Battery Information

- Cleaning- Do NOT use solvents, Do Not submerge
- Self Discharge- Battery will lose 2.5 % to 4.0 % per month
- Deep Discharge- (Dead Battery) Prolonged storage, Storage without charging, Forded Overuse
- Batteries should be charged soon after use to maximize service life
- Disposal -- use normal Li-ion disposal-- call Biomed

- 1-800-3M HELPS

Versa Flow TR600

- **1. Inspect the TR-600 PAPR system.** If parts are missing or damaged, replace only with TR-600 replacement parts before proceeding.
- • **Motor/blower**. Inspect for cracks, holes, damage to user interface panel and belt attachments.
- • **Battery pack**. Confirm case is intact. Press TEST button on pack to confirm charge is sufficient for duration of the work period.
- • **Breathing tube**. Examine breathing tube for tears, holes or cracks. Bend the tube to verify that it is flexible and not showing signs of wear. Ensure the o-rings located at both ends of the breathing tube are present and intact.
- • **Filter/cartridge**. Closely inspect filter/cartridge plastic housing including the corners and latches, outer rectangular barrier, and inner circular filter seal gasket for cracks, tears, cuts, distortion, indentations or debris. Replace filter/cartridge if damaged. If the filter/cartridge has been mishandled or dropped, re-inspect fully. If you have any concern, contact 3M Technical Service for guidance.
- • **Headgear.** Inspect the headgear for tears, cuts, loose stitching, cracks, discoloration or other signs of damage

Versa Flow Assembly and Use

- **2. Assemble TR-600 PAPR system**
- • Attach battery pack to bottom of motor/blower. Pack latches with a distinct click. Gently pull to confirm a secure connection.
- • (If being used) Install spark arrestor, then prefilter into filter cover.
- • Place the filter/cartridge into the filter cover, ensuring bottom latching tab snaps into place. Note: If not using the filter cover, proceed to next step and attach the filter/cartridge directly to the motor/blower.
- • Place the hinge side of the filter/cartridge into the motor/blower, then snap latch side into the filter latch. Filter/cartridge latches with a distinct click. Gently pull to confirm a secure connection.
- • Attach motor/blower to belt or backpack.
- • Insert the end of the breathing tube with the two small prongs into slots in the motor/blower air outlet. Twist the breathing tube ¼ turn to the right (clockwise) to lock.
- • Attach breathing tube to headgear. Push the QRS end of the breathing tube (blue pinch clip) onto the air inlet of the headgear. Headgear will secure with a distinct click. Gently pull to confirm a secure connection

Versa Flow TR600 Assembly and Use

- **3. Perform flow check.**
- • If installed, remove breathing tube.
- • Insert air flow indicator TR-971 into the outlet on the TR-600 motor/blower unit.
- • Start motor/blower. Run for 1 minute.
- • With the airflow indicator TR-971 in a vertical position, bottom of the floating ball must be at, or above, the minimum flow level indicated on airflow indicator chart for your 'zone'. If not above minimum level, respirator system must not be used until evaluated and repaired.
- • Remove air flow indicator TR-971 and perform low flow alarm test per TR-600 *User Instructions*.
- • Reattach breathing tube and headgear before use.

- **4. Don TR-600 PAPR system**
- • Turn on motor/blower by pressing and holding blue on/off button.
- • Use belt or backpack to attach PAPR to wearer.
- • Pull headgear over head and adjust. Adjust following the user instructions for the specific headgear

Cartridge vs. Gas/Vapor Types

$ Each		Protection	HE	HF	OV	FM	AM	MA	Acid Gases (AG) SD	HC	CL	CD	HS
$50	TR-6710N	HE	X										
$115	TR-6320N	SD/HC/CL/CD/HS /HE	X						X	X	X	X	X
$60	TR-6350N	FM/HE	X			X							
$70	TR-6360N	AM/MA/HE	X				X	X					
$55	TR-6510N	OV/HE	X		X								
$110	TR-6530N	OV/SD/HC/CL// HF/HE	X	X	X				X	X	X		

HE - High efficiency particulate
HF - Hydrogen fluoride
OV - Organic vapor
FM - Formaldehyde
AM - Ammonia
MA - Methyl amine

SD - Sulphur dioxide
HC - Hydrogen chloride
CL - Chlorine
CD - Chlorine dioxide
HS - Hydrogen sulfide

Visit 3M.com/PPESafety to access Respirator Selection and Service Life calculation software

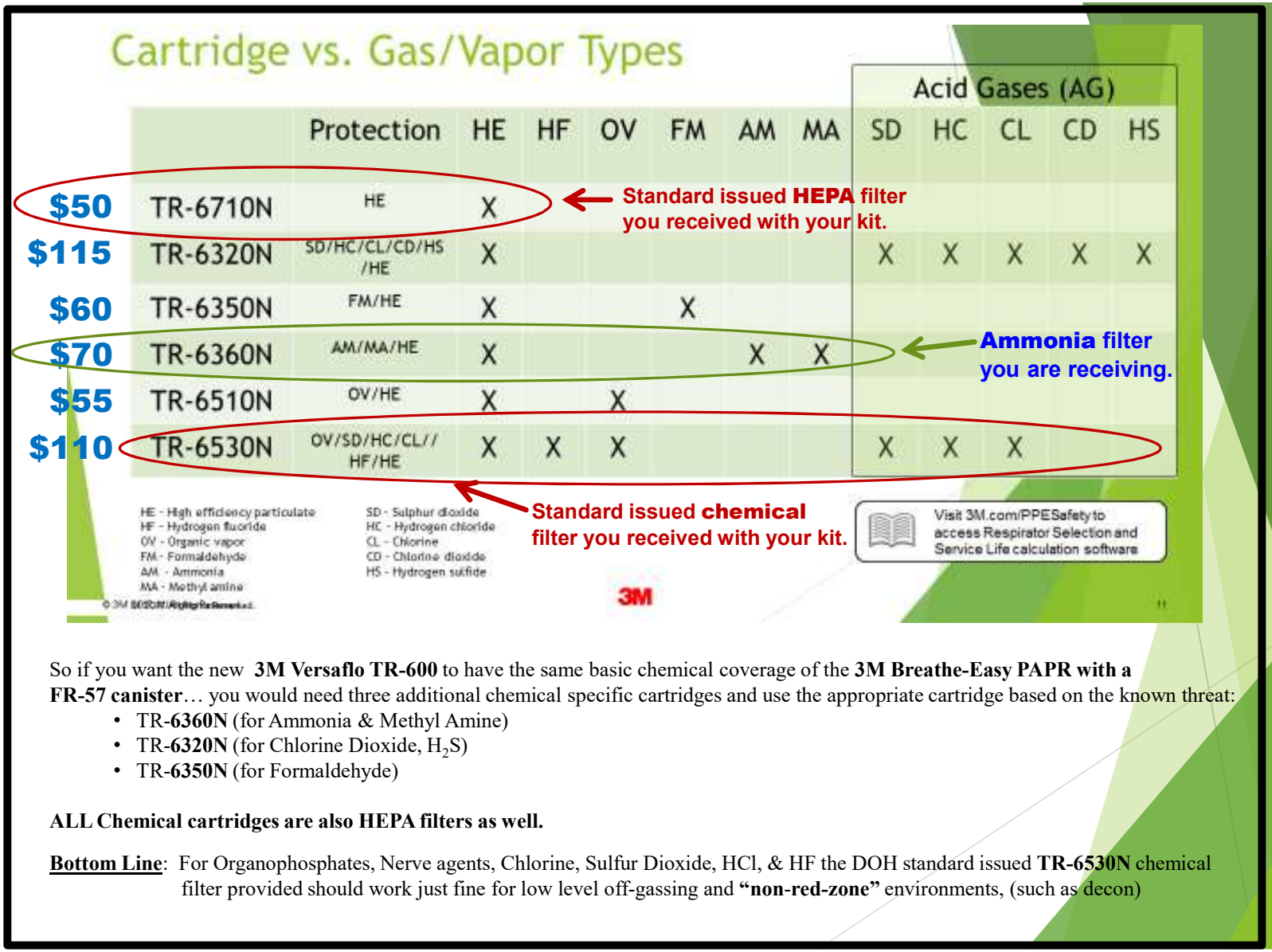
3M

So if you want the new **3M Versaflo TR-600** to have the same basic chemical coverage of the **3M Breathe-Easy PAPR with a FR-57 canister**… you would need three additional chemical specific cartridges and use the appropriate cartridge based on the known threat:

- TR-**6360N** (for Ammonia & Methyl Amine)
- TR-**6320N** (for Chlorine Dioxide, H_2S)
- TR-**6350N** (for Formaldehyde)

ALL Chemical cartridges are also HEPA filters as well.

Bottom Line: For Organophosphates, Nerve agents, Chlorine, Sulfur Dioxide, HCl, & HF the DOH standard issued **TR-6530N** chemical filter provided should work just fine for low level off-gassing and **"non-red-zone"** environments.



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Avera Simulation In Motion SD

Resources

- Ryan Dellman RN ryan.dellman@avera.org
- Brandon Marienau brandon.marienau@avera.org
- Alexandra Little Hospital Preparedness Program Coordinator
- Office 605-626-2227 Cell 605-280-5238
- Alexandra.Little@state.sd.us

- 1-800-3M-HELPS

EMS Infectious Disease Playbook

https://www.ems.gov/pdf/ASPR-EMS-Infectious-Disease-Playbook-June-2017.pdf


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