

Prehospital Evidence Based Medicine



TRANSLATING KNOWLEDGE FOR PARAMEDIC USE

Trust NOT in Twitter (or Facebook)... Consider Evidence for COVID-19

RESPIRATORY SUPPORT FOR ADULT PATIENTS WITH COVID-19

Jessican Whittle, Ivan Pavolv, Alfred Sacchette, Charles Atwood, Mark Rosenberg
In Journal of the American College of Emergency Physicians (April 2, 2020)

AIRBORNE TRANSMISSION & PRECAUTIONS: FACTS AND MYTHS

W.H. Seto In Journal of Hospital Infection (2015)

SARS TRANSMISSION AMONG HOSPITAL WORKERS IN HONG KONG

W.H. Seto In Journal of Hospital Infection (2015)

WHAT YOU NEED TO KNOW ABOUT PREHOSPITAL AEROSOL GENERATING MEDICAL PROCEDURES (AGMPs)

DROPLETS FROM NATURAL COUGH



DROPLETS FROM AN AEROSOL



- Only **small particles of <5 μm**, known as aerosols, will result in airborne transmission potentially over longer distances because these **particles can remain suspended** in the air for prolonged periods.
- Most lung infections **result in droplet transmission** whereby the larger particles from the cough are **transmitted for <1m and do not remain suspended** in air.
- Selection of oxygen delivery must balance the **clinical benefit vs in-hospital spread risk**, and providers need to consider this in their selection of device.
- Supplemental oxygenation and respiratory support **may aerosolize respiratory pathogens**, making small aerosols by removing excess mucus from the droplet.
- **Isolation and PPE are most important!** Respirators need to be worn by health care providers for all AGMPs and surgical masks should be placed on all patients.
- Suspected COVID-19 patients **receiving supplemental oxygen** should be treated in negative pressure rooms or closed rooms when no isolation rooms are available.
- **In natural coughing, >99% of droplets are larger than 8 μm**, and therefore cannot remain airborne, but are **transmitted through CONTACT** with fallen drops.

STUDY PURPOSE

Clinical review of options for providing supplemental oxygen and provide practical recommendations for respiratory support in COVID-19 patients.

METHODS

Measured Aerosol dispersion distance (in cm) of various oxygen supplementation modalities. Did not consider tidal volume of breath. Used high-fidelity human mannequin model.

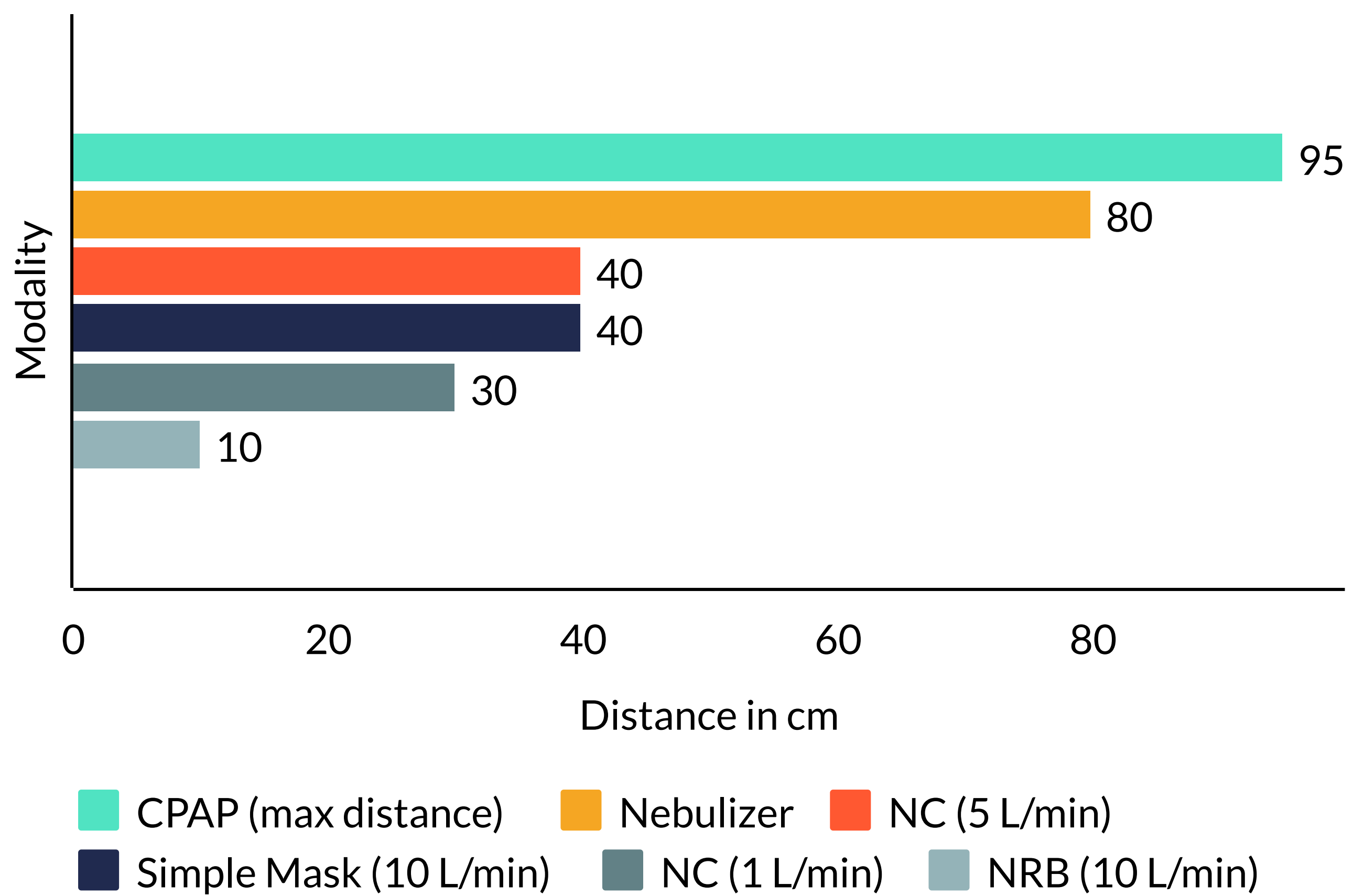
MODALITIES

Studied the following:

- Non-Invasive Positive Pressure Ventilation
- Nebulizer
- Simple Mask
- Nasal Cannula
- Non-Rebreather Mask

WHAT WERE THE RESULTS?

The following table compares aerosol dispersion differences (in cm) using the various treatment modalities using a high fidelity human simulator.



A NON-REBREATHER MASK AT 10 L/MIN FLOW DISPERSE AEROSOLS AT LESS THAN 10CM DISTANCE FROM PATIENT BECAUSE OF TIGHTER MASK FIT.

WHAT DOES THIS MEAN FOR PARAMEDIC OXYGEN ADMINISTRATION?

- 1** AIRBORNE PRECAUTION PPE MUST BE WORN FOR AGMPs
- 2** CPAP AND NEBULIZATION OF MEDICATIONS HAVE THE FARTHEST SPREAD AND SHOULD NOT BE PERFORMED
- 3** A NRB WITH HYDOPHOBIC SUBMICRON FILTER WITH A FLOW RATE OF 10L/MIN SHOULD BE THE FIRST CHOICE

REMINDE ME AGAIN ... WHAT ARE AGMPs?

CONSIDERED TO BE AGMPs

- Intubation or Extubation during CPR
- Supraglottic Airway Insertion during CPR
- CPAP
- Bag-Valve Mask Ventilation
- Administration of High Flow Oxygen (greater than 15 L/min)
- Open suctioning - tracheostomy or ETT
- Nebulization of medications

Not specifically AGMP but NOT recommended is use of nasal cannula with flow rate >6L/min

OBHG RECOMMENDATIONS

- Use High Conc/Flow mask with **hydrophobic submicron filter**
- ACPs consider **SGA insertion over ETI** if your general success rates are low
- **Withhold BVM ventilation** in all spontaneously breathing patients that do not improve with BLS airway maneuvers and High Conc/Low Flow mask with filter at 10-15 L/min
- **NO CPR during airway insertion**
- Withhold ventilation if possible but maintain seal while transporting **through LTC facilities, hospitals or enclosed public buildings**



REMEMBER WITH ALL LEVELS OF PPE...

MASK IS THE LAST THING TO COME OFF!

SARS Transmission among Hospital Workers in Hong Kong

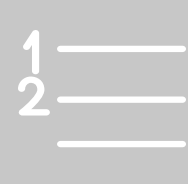
J. Lau, K. Fung, T. Wong, J. Kim, E. Wong, S. Chung, D. Ho, L. Chan, S. Lui, and A. Cheng. In Emerging Infectious Diseases (Feb 2004)

PURPOSE



We investigated the factors associated with breakthrough transmission of the SARS virus among hospital workers infected in hospital settings.

METHODS



PPE use (N95, surgical mask, gloves, goggles, gown, and cap) examined under three settings: direct contact with SARS patients, contact with patients in general and "no patient contact." Information about frequency of PPE use (never, occasionally, most of the time, or all of the time) was asked for each setting.

RESULTS

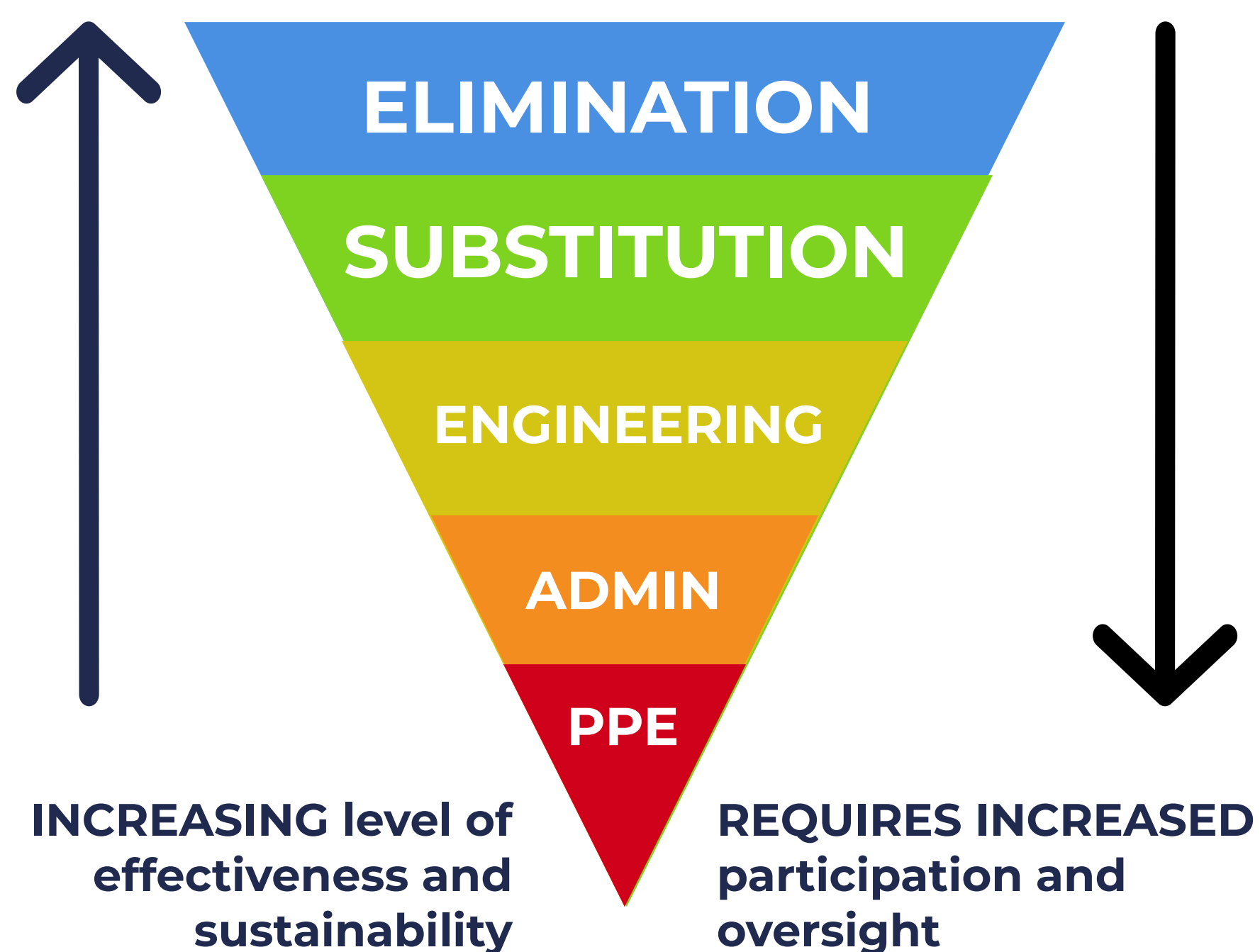


Using protective masks alone is not sufficient to eliminate SARS transmission among hospital workers. Data from all the three settings show that inconsistent use of gown, cap, and goggles were all very strongly associated with breakthrough transmissions. Hand hygiene remains primary prevention strategy.

Consistent and proper utilization of PPE is what matters most!

CANADIAN CENTRE FOR OCCUPATIONAL HEALTH AND SAFETY HIERARCHY OF CONTROLS

Government of Canada



ELIMINATION CONTROLS - REMOVE the hazard from the workplace whenever possible

SUBSTITUTION CONTROLS - REPLACE hazards with less hazardous ones

ENGINEERING CONTROLS - MODIFY equipment systems and processes to reduce exposure

ADMINISTRATIVE CONTROLS - CHANGE the way work is done to limit exposure

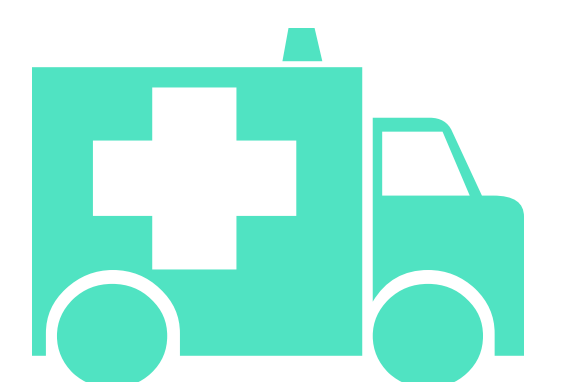
PPE CONTROLS - PPE IS THE LAST level of protection to reduce risk of exposure

HOW HAS MLPS, THE MINISTRY OF HEALTH, AND THE ONTARIO BASE HOSPITAL GROUP WORKED TO IMPROVE FIRST RESPONDER AND PUBLIC SAFETY?

- E REMOVE** excess responders from coming in contact with potential COVID-19. Changes to the TIERED RESPONSE agreement and direction to minimize paramedics/fire fighters on scene when AGMPs are being performed, isolation practices for paramedic exposures to minimize transmission to community and colleagues, etc.
- S REPLACE** equipment with safer options. Replacing the use of reusable homemade surgical caps with professional grade caps that have rating supported by manufacturers and guidelines, adding the C6000s Respirator, etc.
- E MODIFY** patient care practices to reduce risk by minimizing AGMPs & viral exposure. Cardiac arrest practice changes (stop CPR for SGA insertion, SGA over ETT to reduce exposure during ETI, pause BVM ventilations in public areas and hospitals, etc.), withholding CPAP, etc.
- A CHANGE** the paramedics initial approach to a call. Require Paramedic Screening before contact, donning of Airborne PPE before contact for cardiac arrests, increasing the level of cleaning and decontamination practices, etc.
- P PPE IS THE LAST** step in prevention. Stakeholders are responsible for education and training on appropriate utilization of PPE and practice guidelines, enforcing stewardship of PPE, etc. **The paramedic is ultimately responsible to ensure safe practice with Personal Protective Equipment and adherence to recommended practice guidelines.**



REDUCING TRANSMISSION OF COVID-19 TO HEALTH CARE WORKERS IS THE NUMBER ONE PRIORITY!



TAKE HOME MESSAGE FOR PARAMEDICS...

Proper **AIRBORNE PPE** (Gown, Surgical Cap (optional), Respirator Mask, Goggles, Face Shield and Gloves) **MUST BE WORN FOR ALL AGMPs**, including some forms of supplemental oxygen delivery.

Health Care Providers need to **CONDUCT A THOROUGH RISK/BENEFIT ANALYSIS** when deciding what modality of respiratory support to use.

MLPS COVID-19 CARDIAC ARREST ALGORITHM

April 8, 2020



Written by MLPS Education Team and approved by SWORBHP, Medical Director and Senior Leadership.

Be confident in your skills. Take your time, and follow the algorithm for the safety of all responders on scene. There is no emergency in a pandemic!

1

BOTH PARAMEDICS DON AIRBORNE PRECAUTION PPE: In the following order... Sanitize hands, gown, respirator mask, surgical cap (optional), goggles, face shield, gloves. **PARAMEDIC ONE = ACP, PARAMEDIC TWO = PCP**

2

PRIOR TO PATIENT CONTACT (if possible): Perform Paramedic Screen and CONFIRM there is no DO NOT RESUSCITATE FORM. Note positive or negative screen. **If valid DNR, PARAMEDIC ONE** enters room to confirm VSA as per DNR Standards.

3*

Immediately upon patient contact, **PARAMEDIC ONE** applies **HIGH CONCENTRATION FILTER MASK (HCFM)** to patient at 10 L/min. **PARAMEDIC TWO** performs a rhythm analysis **THEN BEGINS CPR AFTER THE MASK IS ON.**

4

PARAMEDIC ONE prepares for the insertion of a SGA **WITHOUT** prior BVM ventilations. When SGA is ready for insertion, **STOP CPR.** Resume CPR **after successful insertion and BVM WITH FILTER is attached** to SGA adapter. ACPs will consider ETI if SGA is contraindicated or ineffective.

5

PARAMEDIC TWO will now apply the **LUCAS CPR DEVICE** if available at this point. **ONLY 2 PARAMEDICS** will remain in the room if the LUCAS is in use. **IF NO LUCAS, ONE** additional responder may remain to assist with chest compressions.

6

PARAMEDIC ONE will now perform any remaining cardiac arrest care (ACLS medications for ACPs). **PARAMEDIC TWO** will watch the defibrillator and perform 1 person CPR and ventilation. **Resume care as per ALS PCS/BLS PCS direction.**

7

ACPs ENSURE YOU USE MANDATORY PATCH POINT PRIOR TO EXTRICATION. IF EXTRICATION IS REQUIRED, only the necessary number of additional responders may enter the scene to assist.

3*

IF CPR and BVM ventilations are ongoing on arrival to the scene (LFD): Have the fire fighter hold a **tight mask seal and jaw thrust using 2 HANDS** instead of application of HCFM and resume ventilations with LOW TIDAL VOLUME until SGA is inserted. IF SGA is not indicated or unsuccessful, **tight mask seal and jaw thrust with 2 hands** is the preferred method for airway management.