CHEO

Interim Guidelines for Children with Suspected or Confirmed Infection with COVID-19 that Require Care in the PICU

Version 2
3/31/2020

Care Guidelines for

Pediatric Critically Ill COVID-19 Patients

The aim of this document is to provide PICU care providers with basic principles of management of pediatric critically ill patients with confirmed or suspected COVID-19. This document does not cover all possible topics and the level of detail is not exhaustive. *It reflects current knowledge and will be modified as new information becomes available.*

Warning: This document is not necessarily the current version. The most current version, along with COVID-19 related resources, can be found on CHEOnet at https://cheonet.cheo.on.ca/clinical-teams-programs/infection-prevention-and-control-ipac/covid-19-2019-novel-coronavirus/clinical-guidance-covid-19

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Interim Guidelines for Children with Suspected or Confirmed infection with COVID-19 that Require Care in the Pediatric Intensive Care unit

Preamble

Sars Cov- virus causes COVID-19 infections. Its presentation in children is similar to adults (a febrile respiratory illness). The morbidity and case fatality rate in adults is much higher compared to children. Therefore one of the key issues in critical care management of children is to prevent spread of the virus to others including health care workers.

The transmission of SARS-CoV occurs mainly through respiratory droplets generated by coughing and sneezing and through indirect contact with contaminated surfaces. In addition the Sars CoV-2 virus has also been found in stools and conjunctival secretions therefore all secretions should be considered as potentially infectious.

It is theoretically possible that the droplets are aerosolized during aerosol generating medical procedures (AGMP) such as intubation and CPAP, however this has not been confirmed for COVID infection. Nasopharyngeal (NP), pharyngeal swabs and oral/nasal suctioning are not considered AGMPs. A complete list of aerosol generating procedures is found at the end of this document and in the **Interim IPAC Guidelines for patients with confirmed or suspected COVID-19 on CHEOnet (see also Appendix A in that document).**

Personal Protective Equipment (PPE) for additional (isolation) precautions
(see CHEO spectrum APP/Guidelines/Infection Prevention and Control manual available on CHEOnet)

Airborne precautions – N95 mask
Droplet-Contact Precautions – Gloves/Face shield/Surgical mask/Gown

If testing result for COVID-19 is negative, additional precautions may be discontinued in consultation with IPAC.

A. Care in PICU (COVID-19 positive or suspected)

- **Intubated, stable patient**
  - Private/Isolation room
    - Droplet-Contact Precautions (+N95 if unplanned risk of AGMP)
- **Intubated patient with imminent risk of AGMP**
  - Negative pressure room with Airborne/Droplet-Contact precautions

  OR
  - Private/Isolation room
    - Door of isolation room closed at all times.
    - Airborne/Droplet-Contact precautions
- **Non-intubated patient possible risk of AGMP**
  - Private/Isolation room
  - Airborne/Droplet-Contact Precautions
- **Non- intubated with minimal risk of AGMP**
  - Private/Isolation room
  - Droplet-Contact Precautions

B. Intubation and Extubation:

I. Intubation

- **Routine and Airborne and Droplet-Contact precautions**
    - Hand hygiene
    - Yellow gowns, full face shield and gloves, N95.
    - Don PPE one at a time with an observer, if possible.

  Procedure performed in negative pressure room (ED, PICU room 1, 2 or 21). This recommendation may become infeasible, and timely care should not be delayed for patient transport, provided that staff dons adequate PPE. In case of intubation in a regular patient room, the door should be kept closed for the duration of the intubation.

- **Assemble Team**

  Limit people in room to the minimum required to safely perform the procedure
  Inside room:
    1. 1 MD lead
    2. 1 MD intubator
    3. 1 RN
    4. 1 RT
    5. Documenter

  Designate the most experienced professional available to perform the intubation (this may be PICU staff, PICU senior trainees, PICU CA, and anaesthesia)

  In Anteroom:
    1. Airborne/Droplet-Contact PPE Support nurse
    2. Support RT

  PPE not needed while in anteroom
    3. Observer for PPE
    4. Pharmacist
    5. Order Entry provider

  The RN and RT in PPE in the anteroom should:
  - provide support if someone needs to leave the room
  - be ready to get whatever team needs inside
  - facilitate communication with team inside and the rest of the team
  - observe for breaches in PPE.

  Other: “Runner” to assist with supplies and activate others as needed

- **Plan:** Identify roles, primary and alternative plans, communication, review checklists

- **Equipment**
    - Assemble equipment and supplies before procedure and bring only essential equipment into the room, leaving non-essential equipment in the ante room. The airway cart and supply cart are kept in the ante room. Ante room is clean. Code Blue cart close by.
      Airway/ Breathing
        - Appropriate sized ETT and 0.5 size smaller in room & laryngoscope and two blade options.
        - Oral airway

- Mask, MIE and suction present and tested
- Ensure placement of HEPA filter between the elbow and oxygen tubing connector of MIE
- Capnostat for intubation verification
- EtCO2 in-line of ventilator with in-line suction catheter

Medication

- PALS sheet verified
- At least 2 doses of intubation medications
- Vasoactive infusions and resus meds prepared if unstable
- Fluid bolus prepared

- **Clinical Recommendations for intubation:**
  - Team pause prior to procedure with MD lead recap
    - Pt. age, weight, reason for intubation
    - Verify meds
    - Verify equipment
    - Patient and intubator appropriately positioned (bed at waist height of intubator, rolls positioned if needed)
  - Pre-oxygenate with bag and mask, minimize bagging if possible (free flow O2 with MIE)
  - Perform rapid sequence induction
  - Inflate cuff, capnostat and connect MIE – this is now a closed system
  - Intubator will hold ETT while RT secures it
  - Prior to disconnecting ETT from MIE, pinch the ETT or consider using a clamp if available and attach to ventilator with EtC02 and in-line suction
  - Avoid disruption of ventilator circuit as much as possible.
  - Ensure use of HEPA filter in ventilator circuit on expiratory limb.
  - Re-sheath laryngoscope, wipe all non-disposable equipment with Oxivir and place into tied bag to ensure that contaminated supplies are contained.

- **Communication**
  - If available, use hands free audio communication device (e.g. walkie-talkie, Ipad, speaker phone, intercom).

- Retain airborne precautions in this room until room has reset. (1 hour if in negative pressure or 2 hours in any other room)
- Doff PPE slowly and carefully. One at a time with PPE observer when possible.

II. Extubation

- **Routine and Airborne and Droplet-Contact precautions**
    - Hand hygiene
    - Yellow gowns, full face shield and gloves, N95.
    - Don PPE one at a time with an observer, if possible.

  Procedure performed in negative pressure room (ED, PICU room 1, 2 or 21). This recommendation may become infeasible, and timely care should not be delayed for patient transport, provided that staff dons adequate PPE. In case of extubation in a regular patient room, the door should be kept closed for the duration of the extubation.

- **Assemble Team**

  Limit people in room to the minimum required to safely perform the procedure
  Inside room:
    1. 1 MD
    2. 1 RN
    3. 1 RT

  In Anteroom:
    6. Support nurse
    7. Support RT
    8. Support MD

  The RN, RT and MD in the anteroom should:
  - provide support if someone needs to leave the room
  - be ready to get whatever team needs inside
  - facilitate communication with team inside and the rest of the team
  - observe for breaches in PPE.

  Other: "Runner" to assist with supplies and activate others as needed

- **Plan:** Identify roles, primary and alternative plans (e.g. risk of reintubation), communication, review intubation checklist and prepare as described.

- **Clinical Recommendations for extubation:**
    - Team pause prior to procedure with MD lead recap
        - Pt. age, weight
        - Plan for extubation
        - Verify meds
        - Verify equipment
    - Position pt. to optimize airway patency and diminish work of breathing post extubation.
    - If pt. is clinically stable, avoid auscultation or consider other techniques to assess breathing. If necessary, ensure stethoscope is disinfected before and after use.
- **Communication**
    - If available, use hands free audio communication device (e.g. walkie-talkie, Ipad, speaker phone, intercom).
- Retain airborne precautions in this room until room has reset. (1 hour if in negative pressure or 2 hours in any other room)
- Doff PPE slowly and carefully. One at a time with PPE observer when possible.

C. PICU Resuscitation of COVID-19 Possible or Confirmed COVID-19 infection

- **Routine and Airborne and Droplet-Contact precautions**
    - Hand hygiene
    - Yellow gowns, full face shield and gloves, N95.
    - Don PPE one at a time with an observer, if possible.
- If not in negative pressure room keep doors closed at all times if possible.
- CPR is an AGMP. Don Routine and Airborne and Droplet-Contact precautions quickly but meticulously before starting chest compressions.
- Limit people in room to the minimum required to safely perform resuscitation.

Inside room:

1. 1 MD lead
2. 1 MD intubator
3. 1 RN
4. 1 RT
5. Documenter

In Ante room (if there is one):

Airborne/Droplet-Contact PPE

1. Support nurse
2. Support RT

PPE not needed while in anteroom

3. Observer for PPE
4. Pharmacist
5. Order Entry provider

The RN and RT in PPE in the anteroom should:

- provide support if someone needs to leave the room
- be ready to get whatever team needs inside
- facilitate communication with team inside and the rest of the team
- observe for breaches in PPE.

Other: “Runner” to assist with supplies and activate others as needed.

- **Equipment**
    - Assemble equipment and supplies outside of the room and pass them in when possible. Bring only essential equipment into the room The Code Blue cart is kept outside the room.
    - Medications and fluids prepared by team outside of the room and passed into the room when possible.
    - If needed the defibrillator and drawer with drugs can be removed and brought into the room.
    - No equipment can leave the room until the end of the code blue and without appropriate cleaning.

- **Intubation**
    - Follow guidelines for intubation.

- If performing intubation during CPR, hold CPR during intubation to minimize aerosolization and optimize intubation success.

- Retain airborne precautions in this room until room has reset. (1 hour if in negative pressure or 2 hours in any other room)
- Doff PPE slowly and carefully. One at a time with PPE observer when possible.

D. Intra-Hospital Transport of Intubated Patients

- **Routine and Airborne and Droplet-Contact precautions**
  - Hand hygiene
  - Yellow gowns, full face shield and gloves, N95.
  - Don PPE one at a time with an observer, if possible.

  Assemble team: Two teams will be necessary for transfer.

  Team 1 (preparation team)
  - will be responsible for preparing the patient for transport
  - one ICU RN and one RT

  Team 2 (transportation team)
  - receives patient outside the room to minimize risk of contamination
  - RN, RT, MD, HCA
  - One team member will be assigned the role of "clean" HCW
  - Both teams will wear PPE as per IPAC policy.
  - If only one team is available, it will be necessary to doff and re-don clean PPEs between
- Patient preparation and transportation.
  - Team huddle - Clarify all roles and ensure all necessary tasks to prepare the patient for transport are completed.
  - Identify clean HCW

- **Communication**

  PICU to call receiving unit/service (e.g. medical imaging) to ensure:
  - Awareness of isolation requirements and diagnosis
  - Clarify which door/room to use to enter receiving unit
  - Prepare equipment/medications currently running

  Receiving unit/service:
  - Confirms that door and room, equipment, and medications are prepped
  - Checks hallway to ensure clear path of entry (service elevators to unit)
  - Alerts receiving team of transport on their way
- **Equipment**
  - Transport monitor
  - Transport boxes (intubation/meds)
  - IV Pumps
  - Resuscitation bag with appropriate filter and mask
  - O_2 tank
  - Clean drape
  - Clear large plastic bags
  - Stretcher/bed
  - Consider suction machine to remain with clean HCW for use if required

- **Patient preparation**
    - Consider paralytics when transporting patients with COVID-19.
    - Connect patient to appropriate monitors covered with clear plastic bag
    - IV pumps moved to transport pole or pole on stretcher/bed (IV pumps should be covered with a clear plastic bag
    - Suction patient with in-line suction prior to departure
    - Place ventilator on stand-by
    - Attach resuscitation bag (or portable ventilator) with mechanical HEPA filter to O_2 tank and patient
    - Wipe stretcher/bed handles and IV pole handle (if not on stretcher pole) with Oxivir
    - The patient will be pushed out of the room and accepted by the transport team

- **Transportation**
    - HCW assigned as "clean" should not touch patient or patient environment. Clean HCW will push elevator buttons, clear elevator
    - Ensure transfer pathway is clear (clean HCW or alternative HCW)
    - Transport boxes and clean equipment should be placed in separate clear plastic bags and, if possible, transported by the clean HCW
    - Other HCWs (eg. RN, RT) not designated as clean person(s) do not touch anything in the hospital environment

- **For medical imaging/procedures**
    - The patient will be moved onto imaging table and connected to the ventilator
    - The stretcher must remain in the room during the procedure
    - The transport team must approach the control room door and doff. The dirty apparel must be discarded into the biohazard waste container in the procedure room, following institutional doffing procedures.
    - Once inside the control room the team should re-don, as soon as possible.
    - Once the procedure is complete the team enters the procedure room and removes patient from the ventilator and attaches the patient to the resuscitation bag (or transport ventilator) with mechanical HEPA filter.
    - The patient is then transferred to the stretcher/bed.
    - Once the patient arrives (back) to the receiving unit, he/she is (re)attached to ICU monitors and ventilator.
    - Once the patient is settled, members of the team may doff and exit isolation room as per IPAC guidelines.

- **Cleaning transport equipment and contaminated areas**
    - If a stretcher has been used (e.g., transfer from emergency department to ICU), it will be wiped down, pushed outside of room to another HCW with clean PPE who will wipe it a second time with a hospital approved disinfectant wipe.
    - All non-disposable transport equipment, including O_2 tank, must be wiped with a hospital approved disinfectant wipe and handled as per usual procedures.
    - Disposable equipment no longer necessary must be discarded (e.g., unused drugs, filters, ECG electrodes, IV supplies, bags, etc.).
    - Environmental services should clean elevators, procedure rooms and equipment following usual procedures.

E. Transfer of Intubated Admissions from ED

- **Routine and Airborne and Droplet-Contact precautions**
    - Hand hygiene
    - Yellow gowns, full face shield and gloves, N95.
    - Don PPE one at a time in clean area (may be in hallway), with an observer if possible.
- Once patient intubated PICU contacted for handover.
- PICU to send the admitting RN and 2 MDs if possible (CCRT MD/PICU Fellow/PICU CA/PICU staff)
- Handover / report given through intercom
- Clean Team will don Routine and Airborne and Droplet-Contact precautions for Transfer
- Once patient ready for transfer, sliding doors will be open to allow stretcher to pass through.
- Clean team will consist of ED RN, RT, PICU RN and Intensivist that did not provide patient care inside room
- Handover from Resus team to PICU team will move from Infectious to Clean, requiring all equipment to be handed over through doors to clean team.
- Patient Parent / Guardian will accompany patient
    - Parent should perform hand hygiene prior to transport and wear mask (as possibly infected)
- Sliding door will be closed with Resus team inside
- Resuscitation team will doff one at a time with an observer
- Identify clean health care worker whose role is to push elevator buttons, clear elevator and use phone outside of unit, if required.

F. Admission of Intubated Patient from Referral Hospital

- Communication received from referral hospital or ward with decision to transfer patient
    - Prepare appropriate room for admission (see cheo general clinical guideline)
- Admission team (RN, RT, MD) will don PPE, one at a time with an observer
- Transfer patient into room and provide handover report in room to admission team
- Support staff will remain outside to help if needed
- All additional required equipment to be handed over through doors to clean team.
- Patient Parent / Guardian will accompany patient provided they have passed current COVID screening at CHEO
    - Parent should perform hand hygiene prior to transport and wear mask (as possibly infected)
- Transport team will doff one at a time with an observer

G. SPOT Team – Activations and Follow-Up

- Usual calling criteria apply.
- In case of unclear isolation status, staff should don appropriate PPE for Droplet-Contact precautions before entering the room, or if it is obvious from the door that intubation (or another AGMP) is needed, staff should don Airborne/Droplet-Contact precautions.
- If AGMPs are required, these should ideally be performed in a negative pressure room. However, severely ill patients may not be stable enough for transport to a negative pressure room, and life-saving interventions should be delivered promptly and without delay due to transportation.

H. Transfer of SPOT Call from Ward to PICU for Admission

- SPOT team will transport patient to PICU.
- If AGMP not being performed or expected use Droplet-Contact Precautions and place a procedure mask on patient if possible.
- If AGMP being performed or expected use Airborne/Droplet-Contact precautions.

I. Post Anesthetic Recovery in PICU

- Covid suspected and confirmed positive pts will be intubated and extubated in OR 5.
- After hours, awake patients may be transferred to an isolation room in PICU with Droplet-Contact Precautions.
- A verbal telephone report to PICU Nursing must be conducted prior to patient transfer.
- Patients must wear a face mask during transfer. Nasal Prongs at < 3L/min may be applied under procedure or surgical mask if necessary.
- Recovery nurse or PICU nurse to don Droplet-Contact PPE during Recovery Period unless performing AGMP then use Airborne/Droplet-Contact PPE
- Ensure placement of HEPA filter between the elbow and oxygen tubing connector of MIE
- Patients at risk of laryngospasm may require AGMP
- Put a procedure mask on the patient prior to transport or discharge if possible.

J. General Clinical Guidelines

See the evolving document: "Recommended IPAC measures for patients with suspected/confirmed COVID-19" on cheonet on the Clinical Guidance for COVID-19 section on cheonet:

https://cheonet.cheo.on.ca/clinical-teams-programs/infection-prevention-and-control-ipac/covid-19-2019-novel-coronavirus/clinical-guidance-covid-19

K. Parents of Patients with Suspected of Confirmed Covid-19 in PICU

- Any parent, whether symptomatic or not needs to wear a mask (the one without the shield) and perform hand hygiene every time they leave their child's room
- The only time the parent should leave the room is to exit the building or go to the washroom
- If parent required to leave the patient room for a procedure they will be placed in the quiet room. This room will be disinfected when the parent returns to the patient's room.
- Ideally if a parent is symptomatic they should not be at CHEO at all
- One staff washroom in PICU will be designated as the parent's washroom, signage on the door will indicate this
- This washroom will be cleaned twice a day instead of the usual once a day
- We are currently clarifying the admission process for these patients…**they should not be going down to admitting.**
- Admitting to call the parent and then bring up any paperwork to the unit.

Please see Interim Guidance for Suspected or Confirmed COVID-19 on CHEOnet for details and information on AGMP.

L. AGMP

- Endotracheal intubation including cardio-pulmonary resuscitation (CPR)
- Open airway suctioning*
- Bronchoscopy (diagnostic or therapeutic)
- Non-invasive positive pressure ventilation
- High flow oxygen therapy (includes heated high flow)
- Sputum induction (diagnostic or therapeutic)
- Nebulized mediation by small volume nebulizer
- Humidified 02 therapy using large volume nebulizer
- High-frequency oscillatory ventilation
- Performing a tracheostomy or providing trach care
- Tube or needle thoracotomy
- Ventilation with uncuffed ET tube (neonates)

* Open airway suctioning – procedure where a single-use catheter inserted into an artificial airway below the level of the vocal cords. (Oral and nasopharyngeal suction not considered AGMP).

Notes:

1. Collection of an NP swab and upper respiratory tract suctioning are NOT considered AMGPs (see Appendix A in https://cheonet.cheo.on.ca/clinical-teams-programs/infection-prevention-and-control-ipac/covid-19-2019-novel-coronavirus/clinical-guidance-covid-19 for evidence summary)

2. The number of HCWs present during an AGMP should be limited to those essential for patient care and support.

3. If a negative pressure room is not available and AGMPs are unavoidable, AGMPs should be carried out using a process and environment that minimizes exposure risk (e.g., single room with door closed and away from high-risk patients).

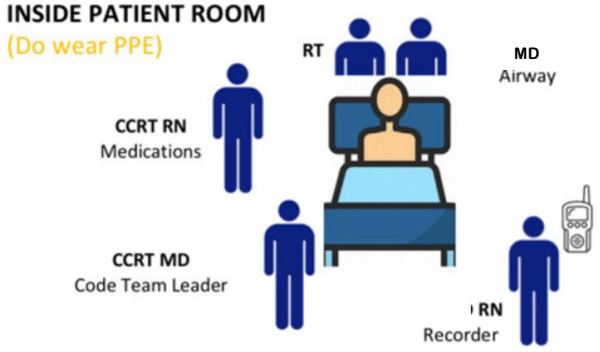
4. After an AGMP has been completed in an negative pressure room Airborne precautions should be maintained (Door closed, HCW should wear an N95 mask) for 1 hour post AGMP; if AGMP performed in a non-pressurized room, following existing policy, Airborne precautions should be maintained (Door closed, HCW should wear N95) for at least 2 hours post AGMP.

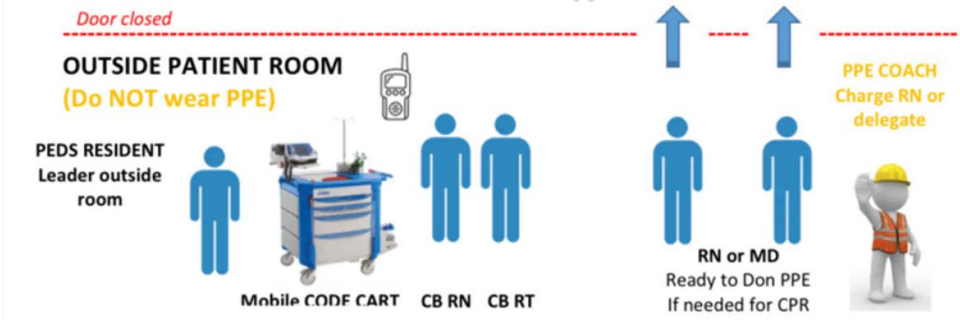
Appendix A : PICU – Intubation of Children with Suspected or Confirmed Infection with COVID-19

KEY PRINCIPLES

1. **Appropriate PPE and ensuring safety of HCPs**
2. **Minimize number of people in the room**
3. **All procedures by most experienced provider**

PARTICIPANTS / ROLES





EQUIPMENT:

- Appropriate sized ETT and 0.5 size smaller in room & laryngoscope and two blade options
- Oral airway
- Mask, MIE and suction present and tested
- Ensure placement of HEPA filter between the elbow and oxygen tubing connector of MIE
- Capnostat for intubation verification
- ETCO2in-line of ventilator with in-line suction catheter

MEDICATION:

- PALS sheet verified
- At least 2 doses of intubation medications
- Vasoactive infusions and resus meds prepared if unstable
- Fluid bolus prepared

TEAM PAUSE:

- Pt. Age, weight, reason for intubation
- Verify meds
- Verify equipment
- Position pt and intubator

INTUBATION:

- Pre-oxygenate with bag and mask, minimize bagging if possible (free flow O2 with MIE)
- Perform rapid sequence induction
- Inflate cuff,capnostat and connect MIE – closed system
- Intubator will ETT – RT will secure place
- Prior to disconnecting ETT from MIE or ventilator, pinch the ETT or consider using a clamp if available

DONNING

1. HANDWASH
2. GOWN
3. N95 MASK
4. FACE SHIELD
5. GLOVES

GO SLOW

DOFFING

1. GLOVES
2. GOWN
3. HANDWASH
4. STEP OUT
5. FACE SHIELD
6. N95 MASK
7. HANDWASH

Consider

- Avoid disruption of ventilator circuit as much as possible.
- Ensure use of HEPA filter in ventilator circuit on expiratory limb.

Adapted from: A. Shevell, A. Lehr,P .Prasertsan, G. Annic
The Hospital for Sick Children Critical Care ResponseTeam (CCRT)

Appendix B : PICU – Intubation Checklist -Children with Suspected or Confirmed Infection with COVID-19

PREPARE LOCATION: Transfer pt to Room 1, 2 or 21. Activate negative pressure.

PERSONEL:

- Responders in the room:
  - 1 MD lead
  - 1 MD intubator
  - 1 RN
  - 1 RT
  - Documenter
- Support staff in Ante room
  - Support nurse
  - Support RT
  - Observer for PPE
  - Pharmacist
  - Order Entry provider

EQUIPMENT:

- Appropriate sized ETT and 0.5 size smaller in room & laryngoscope and two blade options
- Oral airway
- Mask, MIE and suction present and tested
- Capnostat for intubation verification
- ETCO2in-line of ventilator with in-line suction catheter
- Ensure placement of HEPA filter between the elbow and oxygen tubing connector of MIE

MEDICATION:

- PALS sheet verified
- At least 2 doses of intubation medications
- Vasoactive infusions and resus meds prepared if unstable
- Fluid bolus prepared

DON PPE:

Yellow gowns, full face shield and gloves. Use N95 respirators. Don PPE one at a time with an observer

TEAM PAUSE:

- Pt. Age, weight, reason for intubation
- Verify meds
- Verify equipment
- Position pt and intubator

INTUBATION:

- Pre-oxygenate with bag and mask, minimize bagging if possible (free flow O2 with MIE)
- Perform rapid sequence induction
- Inflate cuff,capnostat and connect MIE – closed system
- Intubator will ETT – RT will secure place
- Prior to disconnecting ETT from MIE or ventilator, pinch the ETT or consider using a clamp if available

CONSIDER

- If well oxygenated, immediately following intubation connect to ventilator circuit with ETCO2 monitoring
- If hypoxic, immediately following intubation connect to MIE with filter and capnostat

- Avoid disruption of ventilator circuit as much as possible.
- Ensure use of HEPA filter in ventilator circuit on expiratory limb.

DOFF PPE:

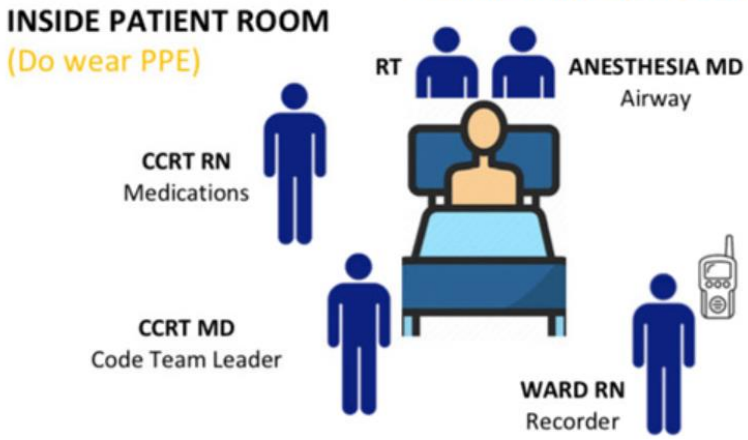
Gloves, gown in room. Face shield and mask in ante room.

Appendix C : CHEO Protected Code Blue

KEY PRINCIPLES

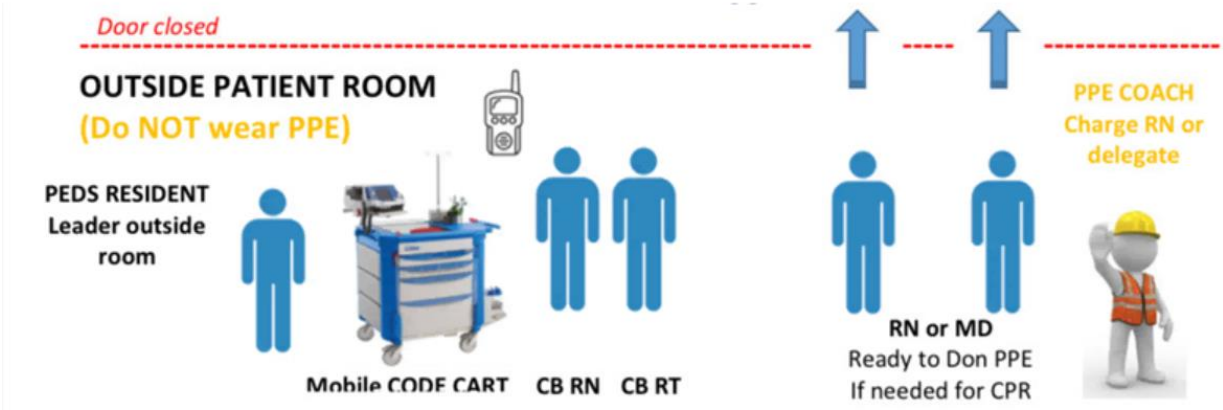
1. **Appropriate PPE and ensuring safety of HCPs**
2. **Minimize number of people in the room**
3. **All procedures by most experienced provider**

PARTICIPANTS / ROLES



Airway

- ***Use filter when bagging***
- ***Avoid nebulized solutions***
- ***Intubation by most experienced provider***
- ***RSI with paralysis***



DONNING

6. **HANDWASH**
7. **GOWN**
8. **N95 MASK**
9. **FACE SHIELD**
10. **GLOVES**

GO SLOW

DOFFING

8. **GLOVES**
9. **GOWN**
10. **HANDWASH**
11. **STEP OUT**
12. **FACE SHIELD**
13. **N95 MASK**
14. **HANDWASH**

Adapted from: A. Shevell, A. Lehr,P .Prasertsan, G. Annic
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