Philippine College of Surgeons – Trauma, Injury, and Burn Care Commission

INTERIM GUIDELINES on Handling Trauma and Burn Patients in the Time of COVID -19 Pandemic

These guidelines have been developed to provide rapid guidance on trauma and burn management in the Philippines in the midst of the COVID-19 pandemic. As new knowledge, updates, guidelines, procedures and protocols emerge and become available from authoritative sources, these recommendations for trauma and burn management may evolve and these guidelines will be updated accordingly.

The recommendations serve as guide to trauma and burn-receiving hospitals and may be adapted based on the capacity, resources, and limitations of the different institutions as well as the community sero-prevalence of COVID-19 in their local setting.

I. Introduction

The new coronavirus COVID-19 pandemic is currently threatening communities globally. With over 6.7 million cases and 400,000 deaths worldwide, the pandemic has already overwhelmed health systems and is reasonably expected to infect 30-70% of the world's population.[1] [2] In the Philippines, coronavirus cases have continued to rise despite strict implementation of community lockdowns [3].

As the overburdened health systems adjust to provide care for COVID-19 patients, some elective interventions have been postponed to manage the influx of COVID cases. However, some urgent and emergent interventions cannot be delayed. Trauma and Burn systems should continue to function to provide timely optimal care to severely injured patients while simultaneously helping to mitigate the risk of COVID-19 transmission [2,4].

With the assumption that all trauma and burn patients potentially pose a risk of COVID-19 transmission, these guidelines aim to minimize the risk of unnecessary COVID-19 exposure and transmission, protect the health care workers, protect the patient, preserve resources as well as supplies and equipment, and finally maintain acceptable standards of care in the management of major trauma and burn patients.

The recommendations are intended to provide guidance and complement existing institution-based practices enacted in response to the coronavirus health crisis in handling trauma and burn patients.

II. Definition of Terms

New Classification of COVID-19 Cases (Department of Health)[5]

Not a COVID-19 case	Not a Person Under Monitoring (PUM) or Person Under Investigation (PUI)
Not included in the new classification	PUM
Suspect	PUI (mild, severe, or critical) who was not tested or awaiting test results
Probable	PUI (mild, severe, or critical) with inconclusive test results
Confirmed	COVID Positive

WHO Surveillance Case Definitions for ILI and SARI[6]

Influenza-like Illness (ILI)	An acute respiratory infection with: measured fever of ≥ 38 C° and cough; with onset within the last 10 days.
Severe Acute Respiratory Illness (SARI)	An acute respiratory infection with: history of fever or measured fever of ≥ 38 C°; and cough; with onset within the last 10 days; and requires hospitalization

Personal Protective Equipment (PPE) - includes any gear to protect against infection (gloves, face masks, N95 mask/respirators, goggles, face shield, gowns, scrub suits, coveralls, shoes, booties/shoe covers) [7]

Level	PPE
Level 1	Surgical mask, alcohol, hand wash/spray
Level 2	Surgical mask, goggles or face shield
Level 3	N95 mask, goggles or face shield, gloves, surgical cap, scrub suits, gowns or coveralls, shoe covers
Level 4	N95 mask or PAPR*, goggles or face shield, double gloves, surgical cap, scrub suits, gowns or coveralls, dedicated shoes, shoe covers

***Powered Air Purifying Respirator (PAPR)** - protects the user by filtering out contaminants in the air and uses a battery-operated blower to provide the user with clean air through a tight-fitting respirator, a loose-fitting hood, or a helmet

COVID area – a space in the hospital or an isolation area (e.g. private room or designated are in the emergency room) where high risk trauma or burn patients are resuscitated or where potentially aerosol generating procedures are performed)

Aerosol Generating Medical Procedures (AGMP) – medical procedures that result in the production of airborne particles or aerosols[8]

Aerosol Generating Medical Procedures (AGMP) in Trauma and Burn management include:

High Risk

- Bag mask ventilation
- Endotracheal intubation and extubation
- Surgical airway (cricothyroidotomy)
- Laryngoscopy
- Bronchoscopy
- Positive pressure ventilation (BIPAP & CPAP)

- Chest drain insertion
- Thoracotomy

Other
- Airway suctioning
- High flow oxygen
- Breaking closed ventilation system, intentionally (e.g. open suctioning), unintentionally (e.g., patient movement)
- Cardiopulmonary resuscitation
- Tracheostomy care
- Chest physiotherapy
- Nebulizing medications
- Naso/orogastric tube insertion

Trauma and Burn Centers – Specialty centers or units for the advanced treatment and management of moderate to major trauma and burns, usually with ICU capability and isolation rooms dedicated for trauma and burn patients where Specialty services are available such as Trauma Surgeons, Burn Surgeons/ Plastic Surgeons, Nurses, Burn Rehabilitation Specialists, and equipped operating rooms capable of operating on major trauma and large burns.

- COVID Referral Hospitals with a Trauma and Burn Center/Unit include Philippine General Hospital and Southern Philippines Medical Center

- NON-COVID Hospitals that are both Trauma and Burn Centers include East Avenue Medical Center, Jose R Reyes Memorial Medical Center, Quirino Memorial Medical Center, and Tondo Medical Center

Trauma and Burn Receiving Hospitals- Hospitals with no dedicated Trauma or Burn Center/Unit but with available Trauma, Burn/Plastic or General Surgeons capable of handling minor/moderate trauma burns, and some major trauma/burns when able. These facilities may need to refer and transfer major trauma cases and burns to a more capable health facility with a specialized Trauma and Burn Units as the need arises

III. General Principles for Trauma and Burn Management During the Pandemic

1. **Protect the patient** – minimize the risk of spreading virus to non-COVID trauma and burn patients because of their inherent immune-compromised state. Surgical masks must be worn by all non-COVID patients during all in-hospital transfers in order to minimize infection risk in the event that they cross the path or come in proximity of a COVID patient.

2. **Maintain an acceptable standard of care** – procedures with established guidelines may be modified such as CPR and intubation to mitigate the risk of virus transmission but acceptable standards of care should be maintained.

3. **Protect the surgical workforce** – all providers must be familiar with institutional infection control practices and with adequate provision of personal protective equipment.

4. **Minimize contamination of shared spaces and equipment** – institution-based decontamination procedures should be strictly followed.

5. **Preserve critical supplies** – rational use of hospital resources should be practiced such as personal protective equipment, blood products, ventilators, infusion pumps, and burn wound care products.

6. **Establish linkages** – local referral systems are encouraged to facilitate transport of major trauma and burn patients since they require highly specialized treatment and care.

IV. Recommendations to Protect and Support the Trauma and Burn Care Surgery Team

1. All members of the team should undergo training in the proper use and donning/doffing of Personal Protective Equipment (PPE) with emerging guidance from authoritative sources.

2. Hand washing, wearing of mask at all times, social distancing, going on self-quarantine (when not on duty) and other individual behaviors that decrease the risk of virus transmission should be promoted.

3. The staff should be updated on the national as well as regional policies, disaster plans and resources laid out by the Local Government Unit (LGU) and the Inter Agency Task Force (IATF) for COVID Response.

4. A skeletal workforce should be adopted whenever possible to reduce the number of providers in the hospital, decrease the risk of exposure and preserve staff.

5. Redundancy in backup schedules for providers should be developed for those who may be ill or exposed.

6. The wellbeing of team members who have potential COVID-19 exposure or who are on quarantine should be monitored.

7. Transition from in-person to virtual meetings for administrative and educational activities should be encouraged.

8. Scheduled communication for team members should be held as hospital policies and procedures evolve and to provide situational assessment of the patient census.

9. A centralized online resource center for the health care facility should be developed to disseminate information, policies and procedures.

10. Personnel skills should be managed wisely for example surgical intensivists may need to help overwhelmed medical intensivists with ventilator management of critical COVID – 19 patients while other surgeons could be assigned to back up the trauma and burn team or given leadership roles in the different hospital committees.

11. Schedules and team culture that optimize wellness and maintain resilience of the team members should be supported.

12. Cohort staff to handle COVID cases only rather than allowing staff to handle both COVID and non COVID cases to minimize exposure of both staff and non COVID patients.

IV. Recommendations on Personal Protective Equipment for Surgical Workforce

1. Trauma and burn team members should wear appropriate Personal Protective Equipment (PPE) depending on the level of risk of the working area. Please see table below adapted from the information guidance of Philippine General Hospital's Infection Control Unit and the Philippine College of Surgeons (PCS) Recommendations for PPE use [7,9]

Specific Areas and Recommended Use of PPE

Area	Activity	Risk Level	Type of PPE
Emergency Department (ED) Triage	Preliminary screening for prioritization of care according to severity	Low	Maintain physical distance of at least 1 meter Create a barrier between health care workers and patients Level 1 PPE Perform hand hygiene

			When physical distance is not feasible and yet no patient contact, Level 2 PPE Perform hand hygiene
ED Resuscitation Area	Providing direct care to trauma and patients, in the **absence** of AGMP	Moderate	Level 3 PPE Perform hand hygiene
ED Resuscitation Area	Providing direct care to trauma and patients, where AGMP are done	High	Level 4 PPE Perform hand hygiene
Operating Room (designated) for emergency trauma/burn surgeries **OR procedures under Local/regional anesthesia, no AGMP**	Surgery on patients of unknown COVID status (treat as COVID positive until tested), probable or suspect Surgery on COVID-19 positive patients	High	Level 4 PPE Sterile gown and gloves over PPE Perform hand hygiene
Operating Room (designated) for emergency trauma/burn surgeries **OR procedures under General anesthesia or with AGMP**	Surgery on patients of unknown COVID status (treat as COVID positive until tested), probable, suspect Surgery on COVID-19 positive patients	High	Level 4 PPE Sterile gown and sterile gloves over coveralls, use of PAPR if available Perform hand hygiene
Surgical Intensive Care Unit (SICU) or Burn Unit	1. IF staying for >4 hrs 2. Performing close contact procedures, intubation and CPR 3. High-Risk Activities Aerosol generating procedures: intubation, endoscopy, suctioning, oral/ET care, inserting NGT, etc; Handling of respiratory specimens for RT-PCR test	High	Level 3 PPE Perform hand hygiene

2. All healthcare workers should also undergo proper fit testing before using N95 masks whenever possible.

3. Proper Donning and Doffing of Personal Protection Equipment (PPE) are imperative to prevent transmission of disease to the healthcare team. Healthcare workers should be trained on how to safely don and doff all levels.

4. All reusable PPEs should undergo disinfection protocols following guidelines of respective institutional infection control committees.

5. Rational use of PPE should be observed at all times in accordance with current guidelines set by the PCS and other relevant specialty societies.

IV. Recommendations on Triage, Emergency Department (ED) Management (Resuscitation Bay)

TRIAGE

1. The assumption is that ALL trauma and burn patients potentially pose a risk of COVID-19 transmission.

2. Individual hospital protocols for triage and screening of patients presenting at the Emergency Department with trauma or burn injuries should be followed.

3. A rapid risk assessment of COVID-19 transmission before the initial management of the trauma or burn patient with major injuries should be made so that appropriate protective measures can be instituted prior to direct contact. See table below:

Classification for the Risk of Transmission and Response[2]

	High Risk	Low Risk
Community Prevalence of COVID	Patient from a high community prevalence of COVID or from a COVID hotspot	Low community prevalence
Risk of releasing aerosols	High probability of AGMP (e.g., intubation, chest tube insertion)	Low probability of AGMP
Hemodynamic status	Unstable, agitated, uncooperative, altered sensorium	Stable, controllable, cooperative
Risk Response	Droplet + contact + airborne precautions Level 4 PPE Minimize exposure, essential personnel only, essential procedures only Resuscitate in a private room, COVID area or Negative pressure isolation room (if	Droplet + contact precautions Level 3 PPE Patient masked if able Common resuscitation area

	available) AGMP by most experienced in the team	

A **low-risk** response directs patients who are stable, alert, cooperative with no clear need for AGMP (intubation, chest tube) to initial management with contact and droplet precautions in an appropriate assessment area (no isolation required) while a **high-risk** response directs patients who are unstable, agitated, uncooperative, have a potential open lung injury, high O2 requirements and likely to need intubation or chest tube to initial management in a COVID area (negative pressure isolation preferred) with appropriate PPE

4. For stable but high risk patients, RT-PCR based swab testing, and chest CT scan should be done at the ED level. A chest CT scan is recommended for all severe trauma patients if there is no contraindication. If abdominal trauma is considered, a whole body CT (WBCT) is recommended to simplify and expedite diagnostic work up and disposition planning. In pediatric patients, usual imaging practices to minimize radiation exposure should be followed. CT features of COVID-19 should be noted such as peripheral interstitial changes, which develop into multiple ground glass shadows in both lungs.

5. Hemodynamically stable patients should undergo screening using significant signs and symptoms, age, comorbidities and possible exposure to COVID in the past 14 days. These patients should be masked if able.

6. For hemodynamically unstable high-risk patients, RT-PCR swab test should be carried out once the patient is resuscitated and stabilized. Swabbing can be done at the ED, OR prior to induction or after the surgery or at the SICU or Burn unit.

7. For low risk, stable patients, the decision to do COVID testing should be based on the classification of the ED or triage officer based on the hospital's COVID pandemic protocol.

8. Triage algorithms may be followed to guide the ER officer in the assessment and management of trauma and burn patients. Please see Appendix 1. Algorithm for Trauma/Burn ED Patient Triage.

INITIAL ASSESSMENT AND MANAGEMENT

1. All trauma and burn patients presenting at the ER should undergo an initial, and methodical evaluation following the ***Advanced Trauma Life Support*** (ATLS) guidelines and performing the PRIMARY and SECONDARY SURVEY with subsequent definitive care plan including referrals and transport

Primary Survey Consists of the following:

A – airway and cervical spine control

B – breathing and ventilation

C- circulation and control of hemorrhage (for trauma); *C may also stand for compartment syndrome for burns*

D – disability

E – exposure and environment

***F** – fluid resuscitation in burn[10]

Aggressive early fluid resuscitation for patients with hemodynamic instability or with significant burns (>20% TBSA)

It is recommended to use the Parkland Formula when doing aggressive fluid resuscitation, using Plain Lactated Ringers solution, computed at 4 ml/kg/%TBSA over a 24-hour period. The first half should be given within the first 8 hours from injury, and the succeeding half given in the remaining 16 hours from injury.

For children (<30 kg), it is advised to use D5LR as the fluid of choice, as they are more prone to hypoglycemia during the first hours of injury. Also, for children, add their maintenance fluid (computed via the Holiday-Segar method) to the computed Parkland formula resuscitation requirements.

NOTE: These formulas only serve as a GUIDE with the goal of titrating fluids to obtain a urine output of:

- **ADULTS: 0.5 ml/kg/hr**
- **PEDIA: 1ml/kg/hr**

PROCEDURES DURING TRAUMA AND BURN RESUSCITATION

1. **Cardiopulmonary resuscitation (CPR)**

   - To be done in a trauma patient with assessment of healthcare worker risk of infection and prognosis.

2. **Intubation**

   - A lower threshold should be adopted for early intubations in

patients likely to need it (e.g., elderly with multiple rib fractures, suspected inhalation injury in burn, massive burns > 50% TBSA)

- Intubation should be performed by the most skilled operator available and strict adherence to protocols created for the COVID pandemic airway management should be implemented to mitigate the risk of COVID-19 transmission. Please see Appendix 2. Guidelines for Airway Management

3. **Emergency Room Thoracotomy**[2]

    - Adopt a higher threshold for ED thoracotomy to limit exposure for procedures with very low benefit

    - For penetrating trauma – loss of vital signs within 15 minutes

    - For blunt – no indication

4. **Surgical airway**

    - Should be performed by most experienced and skilled operator wearing appropriate PPE

    - Bedside tracheostomy is strongly discouraged

5. **Chest tube insertion**[2]

    - Tube thoracostomy should be considered as AGMP especially if associated with open lung injury and PPV further elevates this risk

    - Chest drains should be connected to a closed system with tube clamping if circuit is temporarily interrupted

6. **Wound Management**

    - Open and bleeding wounds do not require airborne precautions when actively managed

    - Strict asepsis and infection control measures should be observed in treating burn wounds[1,SEP]

    - Tetanus prophylaxis and antibiotics should be administered as indicated

7. **Escharotomy/Fasciotomy for Compartment Syndrome**[10]

    - Should be done by a plastic surgeon or a general surgeon with burn surgery training

OTHER CONSIDERATIONS

1. The number of personnel at the bedside should be minimized to only those required for direct patient care

2. If a portable X-ray or ultrasound machine is not available at the ED resuscitation area, a comprehensive infection control work flow for trauma diagnostics should be developed to optimize the quality of patient care at the same time reducing the risk of viral transmission from patient to personnel or vice versa

3. If CT imaging will be performed for major torso trauma, it is recommended to request for a Chest CT scan to expedite decision making and that the Chest CT findings be evaluated for radiologic findings compatible with COVID-19 pneumonia

4. A designated clear route for conduction of the patient from the ED to the OR, and other routes such as ED to SICU or trauma ward or burn unit or ED to radiology suite should be prepared to minimize exposure to other personnel and patients during transport

V. Operating Room Management[11,12]

1. A hospital protocol for managing patients in the operating room with known or suspected COVID-19 infection in agreement with the anesthesia team should be developed to prevent delays in critical operative interventions for the unstable patients.

2. Protection of all healthcare workers is of utmost importance therefore a comprehensive training for the proper use of PPEs that includes donning and doffing, PPE inspection and PPE disposal should be strictly enforced.

3. The recommended proper PPE must be worn by the entire surgical team and for those who will conduct the patient during transfers between hospital units.

4. An ideal trauma or burn designated Operating Room (OR) must have a negative pressure environment with a ventilation system with an integrated

High Efficiency Particulate Air (HEPA) filter to reduce viral spreading beyond the OR.

5. Operators (i.e., surgeon, anesthesiologist, nurses, technicians) should enter and exit the OR in a timely manner to minimize exposure to infected patients.

6. Non-intubated patients should be fitted with a surgical mask over their oxygen delivery device (e.g. nasal cannula or face mask) in order to minimize infection risk to anesthesia and the surgical workforce.

7. The number of staff involved in the surgery as well as the movement of the staff in and out of the OR should be limited to minimize traffic and control the flow of contaminated air.

8. Open surgery is preferred in trauma.

9. The use of electrocautery and other energy devices should be minimized to decrease viral transmission via aerosols.

10. After each case, allow ample time for proper and comprehensive OR decontamination in accordance with hospital COVID policies.

11. After the procedure, proper doffing and disposal of the PPEs should be observed and members of the team should shower and change into clean scrubs prior to resumption of their duties.

GENERAL RECOMMENDATIONS FOR TRAUMA AND BURN SURGERY[10,11,12]

1. Surgical approach should be dictated by best-practice accounting for reduced operative times and optimal surgical outcomes. Adopt a damage control mindset.

2. The surgical procedure should be performed by the most experienced surgeon in the team. Using such cases of teaching purposes should be avoided.

3. Non-operative management for blunt abdominal trauma should be done when applicable.

4. Emergent and urgent operations in burn include, but are not limited to, the following:

    - Escharotomy / Fasciotomy
    - Debridement and skin grafting for large burn areas
    - Debridement of infected wounds

- Debridement and coverage of exposed blood vessels, nerves, and tendons

5. Any elective burn procedures, such as burn contracture release, or chronic burn wound closure, should be delayed until elective surgeries are resumed depending on each hospital's local situation.

VI. Recommendations for Surgical Intensive Care/ Burn Intensive Care Unit Management

1. Situational awareness of the ICU capacity in the hospital should be maintained to ensure that critical care needs of the trauma and burn patients are considered.

2. Strict implementation of the hospital's COVID infection control guidelines should be followed.

3. Patients should be referred to the respective medical team (internal medicine or pediatric service) and their respective infectious disease services for the treatment of COVID infection as the need arises.

4. Reevaluation of the COVID status of trauma and burn patients should be done based on existing infection control protocols. If COVID testing is warranted as per patient's clinical and diagnostic evaluation, the COVID-19 RT –PCR assay test should be done as soon as possible.

5. The following criteria suggests requirement for admission to a Burn ICU facility:

- Suspected/Confirmed inhalation injury
- Massive burn area (>20% TBSA) with increased resuscitation requirements
- Electrical burn with cardiac complications o Burn associated with major trauma
- Burn patients with Severe Acute Respiratory Infection (SARI)

6. For trauma and burn injuries requiring ICU admission, they should be admitted in designated COVID or Non-COVID ICU areas or referred to COVID Referral Centers with the capability of managing major trauma and burn injuries.

7. Proper recommended PPEs should be worn inside the Surgical ICU or Burn Unit by all the staff.

8. Closed suction system should be used inside the ICU.

9. Lung Protecting Ventilatory measures and settings should be used as well as the ICU sedation protocols.

10. The availability of ventilators and oxygen supply should be monitored regularly.

11. If a patient needs to be intubated or re-intubated, policies and procedures for airway management of the COVID patient should be followed.

VII. Recommendations for the Management of Scarce Resources

Personal Protective Equipment (PPE)

1. Procedures and diagnostics that need to be done for a patient should be clustered to minimize room entry/exits and the need for PPE donning/doffing.

2. The number of personnel should be minimized to only those essential for patient care during trauma/burn team activation and in the operating room.

3. When appropriate, hospital policies for reuse of selected PPE should be supported and implemented properly.

Blood Products[14]

1. Blood supply and availability of blood products in the hospital and in the area (Red Cross Blood Banks) should be monitored.

2. When appropriate, restrictive transfusion strategies in the ICU should be implemented.

3. Blood donation in the community should be encouraged. It is safe to donate blood and there is no data yet to suggest that COVID 19 can be transmitted via blood transfusion.

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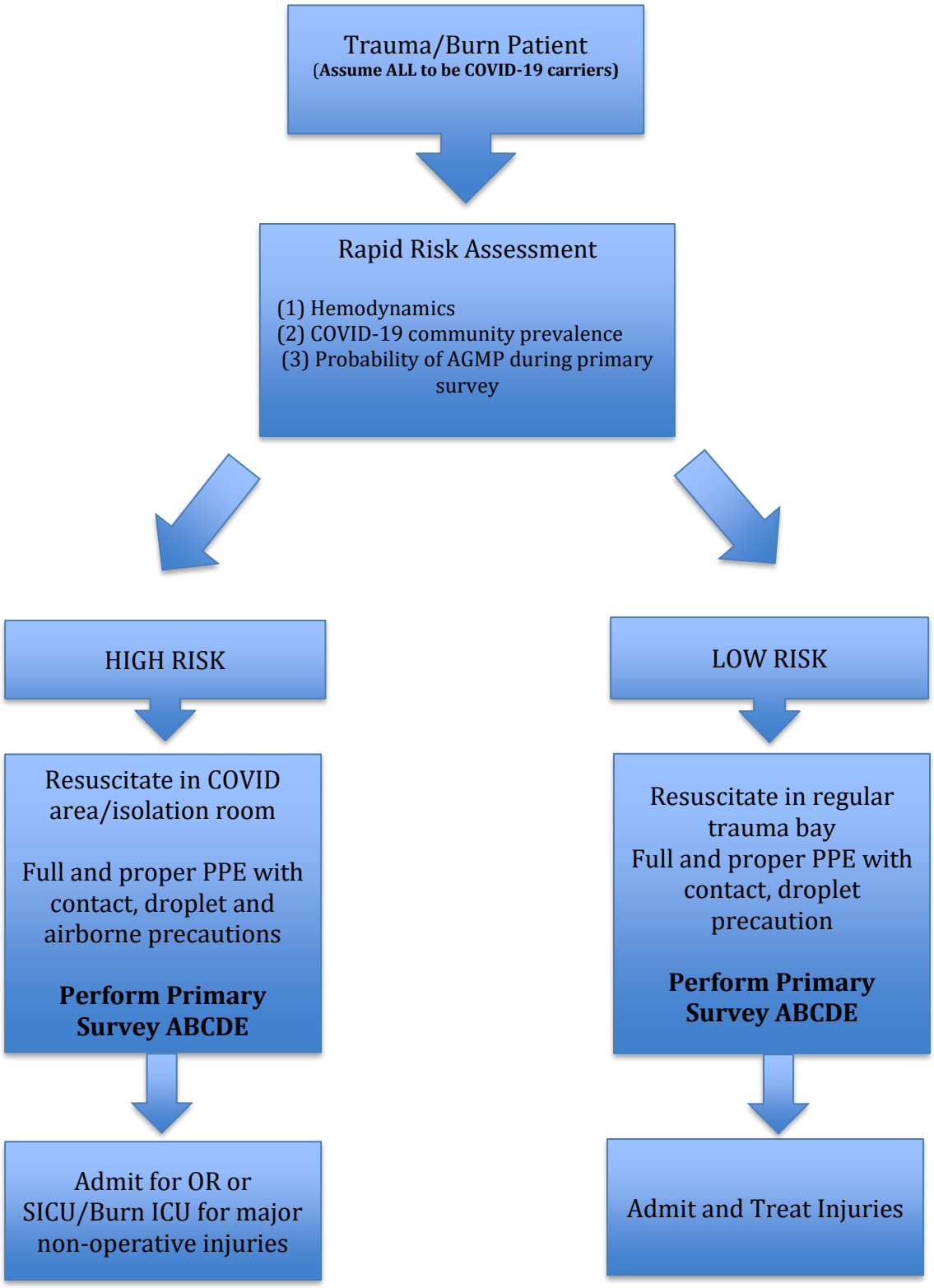
Appendix 1

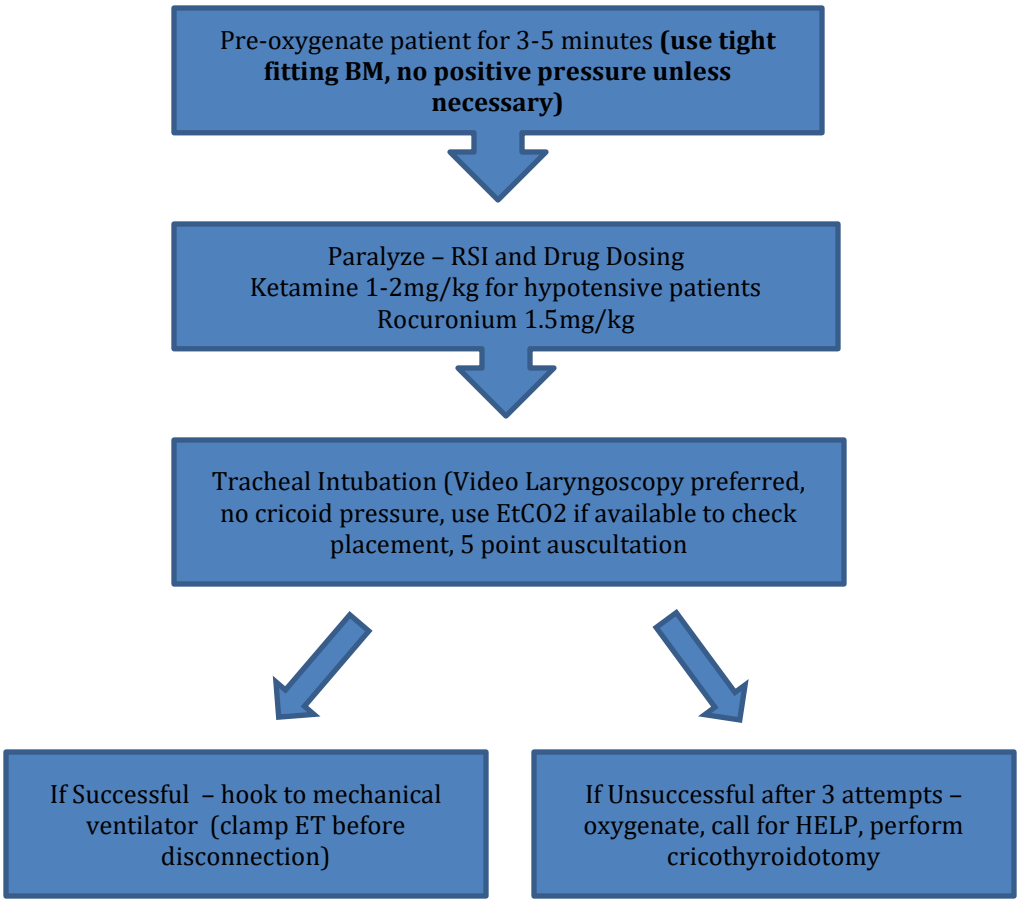
Algorithm for ED Management of Major Trauma/Burn Patient



Appendix 2

Airway Management for Major Trauma and Burn Patients

Intubation Checklist
✓ **Minimize aerosol exposure** ▪ Rapid Sequence Intubation (RSI) ▪ Avoid bag mask (BM) ventilation ▪ Inflate cuff prior to ventilation ▪ Clamp ET before disconnecting ✓ Prepare equipment and medications (ET, syringe, gel, Video laryngoscope, in-line suction etc) ✓ Full and proper PPE for the team ✓ Assign roles (MD airway lead preferably anesthesiologist/most experienced member ✓ Perform intubation COVID area if negative pressure isolation room not available



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