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Acute stroke care algorithm in a private tertiary hospital in the Philippines during the COVID-19 pandemic: A third world country experience

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Background and purpose: Since the declaration of the Novel Coronavirus Disease (COVID-19) pandemic, ensuring the safety of our medical team while delivering timely management has been a challenge. Acute stroke patients continue to present to the emergency department and they may not have the usual symptoms of COVID-19 infection. Stroke team response and management must be done within the shortest possible time to minimize worsening of the functional outcome without compromising safety of the medical team. *Methods:* Infection control recommendations, emergency department protocols and stroke response pathways utilized prior to the COVID 19 pandemic within our institution were evaluated by our stroke team in collaboration with the multidisciplinary healthcare services. Challenges during the COVID-19 scenario were identified, from which a revised acute stroke care algorithm was formulated to adapt to this pandemic. *Results:* We formulated an algorithm that incorporates practices from internationally devised protocols while tailoring certain aspects to suit the available resources in our system locally. We highlighted the significance of the following: team role designation, coordination among different subspecialties and departments, proper use of personal protective equipment and resources, and telemedicine use during this pandemic. *Conclusions:* This pandemic has shaped the stroke team's approach in the management of acute stroke patients. Our algorithm ensures proper resource management while optimizing acute stroke care during the COVID-19 pandemic in our local setting. This algorithm may be utilized and adapted for local practice and other third world countries who face similar constraints.

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Introduction

Since March 2020, we have experienced an influx of COVID-19 positive patients. As of April 27, 2020 the COVID-19 pandemic has claimed the lives of at least 27 healthcare professionals while infecting 1080 healthcare professionals in the Philippines.¹ Despite attempts to formalize protocols and treatment pathways to ensure the safety of healthcare professionals while optimizing patient care, Philippine healthcare workers from every department still continue to suffer from COVID-19 infections. These affect not only acute care but also emergency response systems such as the brain attack code.

The estimated proportion of asymptomatic COVID-19 positive patients is between 17.9 to 30.8%⁶ and 74% of these asymptomatic carriers are contagious.³ Included in this population are those presenting to the emergency department with symptoms of stroke who may appear to be asymptomatic from an infectious standpoint but may in fact be positive for the COVID-19 virus. In fact, 4.9% of COVID-19 infected patients are expected to have acute stroke² and large vessel occlusion can present as stroke in the young in COVID-19 positive patients.⁸ For this reason, donning proper Personal Protection Equipment (PPE) prior to examining patients at the emergency room regardless of COVID-19 status has been emphasized.⁴ There is however, a scarcity of PPE resources globally^{5,6} and during this pandemic, active teams at any given time have downsized due to limitations such as quarantined staff.⁶ Modifications such as team member role designation and triage strategies for proper allocation and utilization of PPEs as well as equipment considerations must therefore be in place.⁷ Evaluation and management must still be done within the shortest possible time to minimize damage to the brain. Given these circumstances, we formulated pathways in reference to the protected code stroke⁷ to ensure safety of brain attack code responders while optimizing acute stroke care.

Brain attack team algorithm for the COVID-19 pandemic

On presentation to the emergency department, all patients are triaged according to the presence or absence of COVID-19 symptoms and they undergo appropriate workup. Simultaneously, patients presenting with symptoms of acute stroke must be evaluated rapidly to institute hyperacute therapies where applicable. For this reason, we have made it a practice that all patients referred to the stroke team are treated as possible or suspected cases of

COVID-19 throughout the brain attack pathway until workup results are released.

Patients are distinguished as a brain attack (BAT) or a non-BAT case based on time of presentation post ictus (Figure 1a). They will be evaluated for eligibility of potential thrombolysis with intravenous tissue plasminogen activator (IV rTPA) along with endovascular thrombectomy when large vessel occlusion is suspected. Patients who arrive at the hospital beyond 6 hours post ictus are determined as non-BAT and will no longer be eligible for these measures. Patients who present within the 6 hours post ictus mark are referred via the BAT code pathway, transferred to the critical department and seen by the BAT team immediately for possible IV rTPA or endovascular thrombectomy.

As mentioned, we have experienced a reduction in workforce capacity during this pandemic as several healthcare professionals have been quarantined due to COVID-19 infections. To minimize exposure, one neurologist (stroke fellow or resident neurologist) and one stroke nurse who are on call will be attending to the patient. Prior to being evaluated, all patients are given a surgical mask to wear in order to secure protection. Donning of appropriate PPE based on the hospital's Infection Control Service (ICS) is practiced. The Protected Code Stroke⁷ recommends the use of a full-sleeved gown, surgical mask (with upgrade to N95 mask for aerosolizing procedures), face shield and/or goggles, and gloves. We have made it a practice in our institution to wear N95 masks regardless of whether aerosolizing procedures will be carried out.

In an effort to further reduce the exposure of patients and doctors given the reduced workforce capacity, telemedicine is utilized through which evaluation and decisions on management are discussed with the stroke consultant. On activation of brain attack code, telemedicine system processes will be explained to the patient and relatives. Once consent is secured, this will be utilized throughout the brain attack pathway (Figure 2). While ongoing telemedicine consultation, the MRI (Magnetic Resonance Imaging) or CT (Computed Tomography) department is pre-alerted as soon as there is a decision for imaging to allow radiology technicians time to don their proper PPEs. Acute stroke patients to undergo imaging will utilize dedicated MRI or CT machines without perfusion studies, solely for use of possible or suspected COVID-19 patients, pending COVID-19 results. In coordination with the radiology and emergency room department, the shortest route possible from the emergency room to the imaging department has been identified to minimize patient and hospital staff exposure (Figure 1a).

All processes are still carried out with precautions for COVID-19 suspects. If the ischemic stroke is not caused by a large vessel occlusion and the patient is eligible for

thrombolysis, intravenous thrombolysis is administered. If there is a large vessel occlusion, the patient is referred to an endovascular specialist and will be moved to the

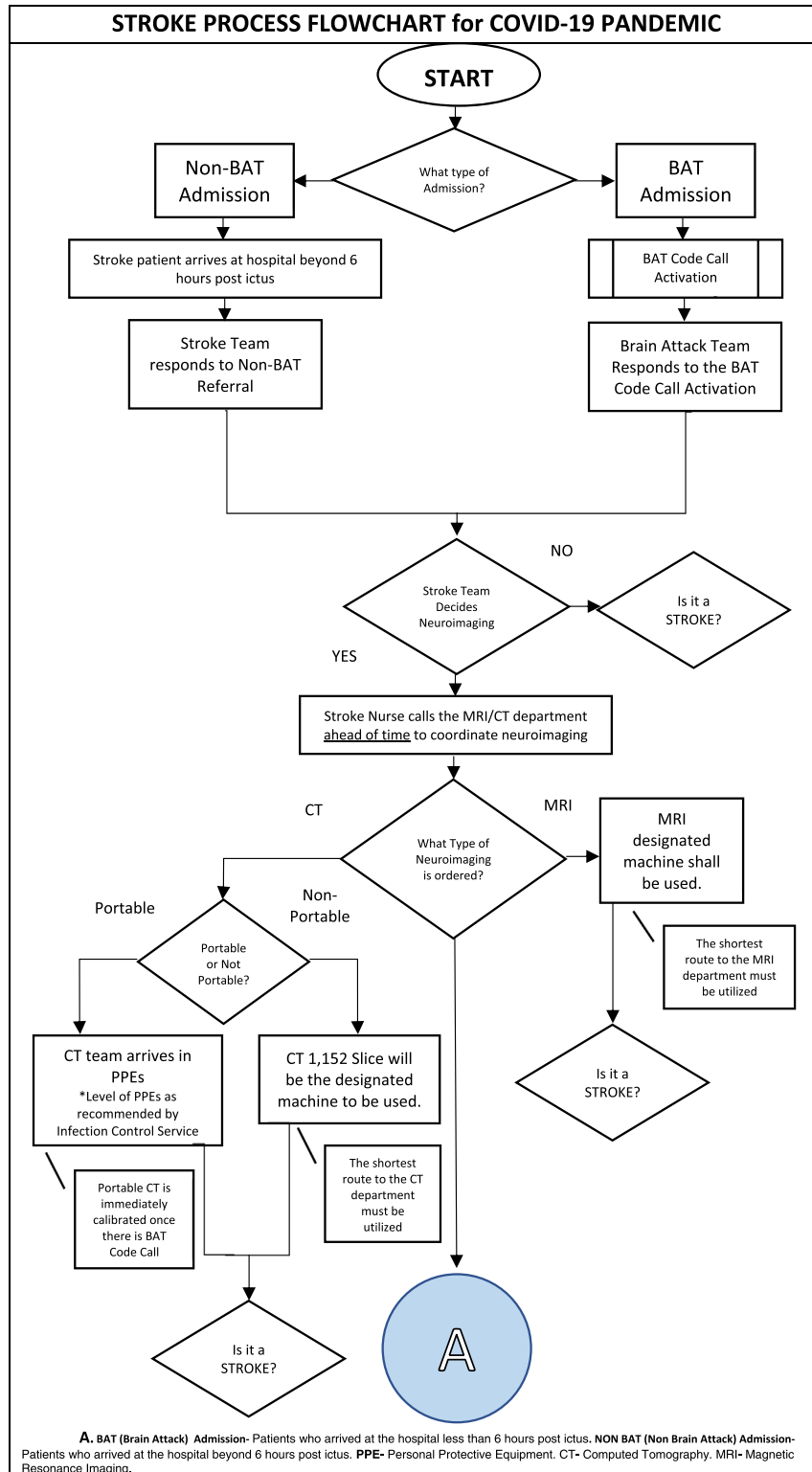


Fig. 1. A. BAT (Brain attack) admission- Patients who arrived at the hospital less than 6 hours post ictus. NON BAT (Non brain attack) admission- Patients who arrived at the hospital beyond 6 hours post ictus. PPE- Personal Protective Equipment. CT- Computed Tomography. MRI- Magnetic Resonance Imaging

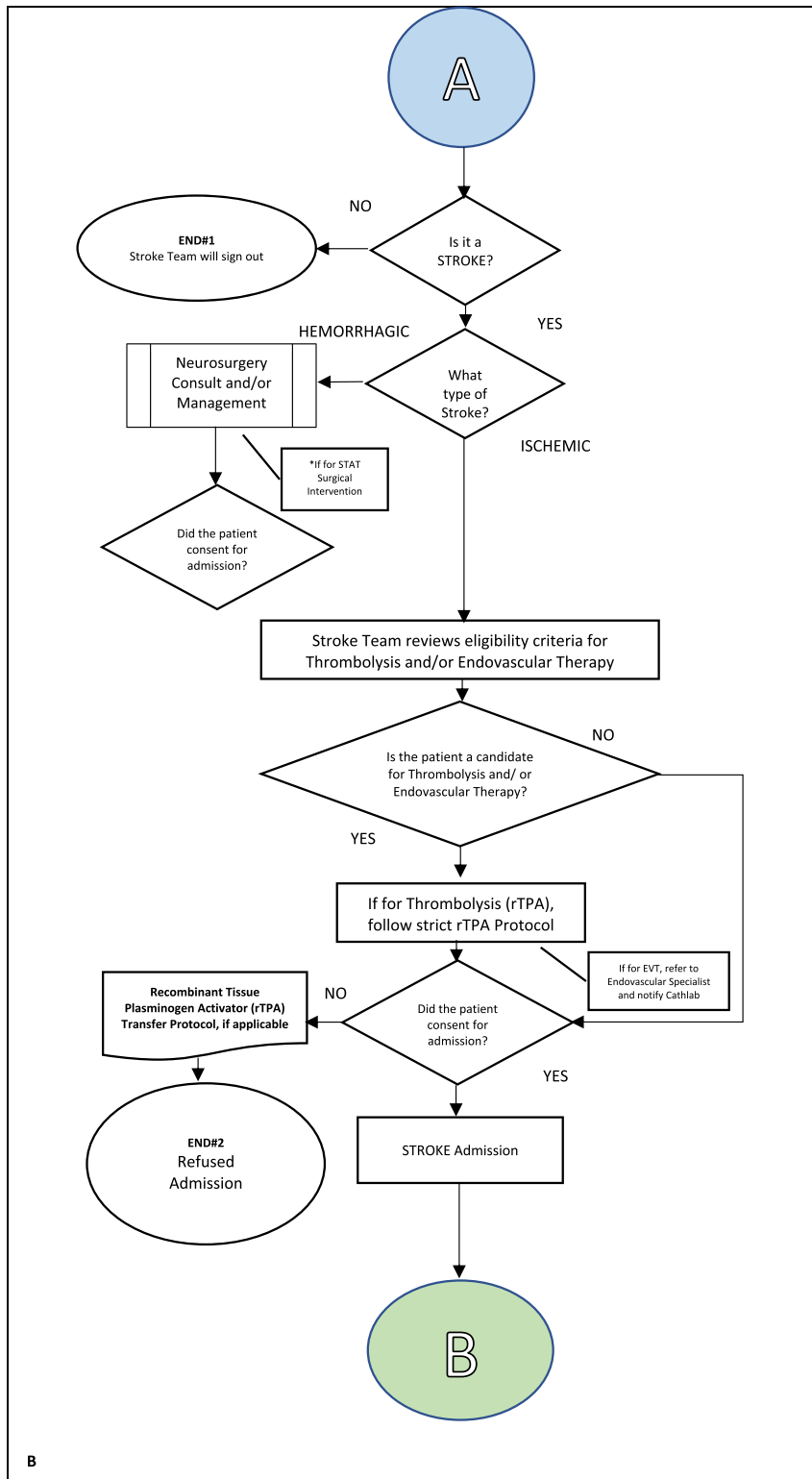


Fig. 1. Continued

Angiography suite/catheterization laboratory for endovascular treatment (Figure 1b). Technicians in the catheterization laboratory are pre-alerted if the patient is to undergo endovascular intervention. In cases of

hemorrhage or large hemispheric strokes requiring surgical intervention, patients are referred to Neurosurgery service. Likewise, the operating room staff is also informed ahead of time.

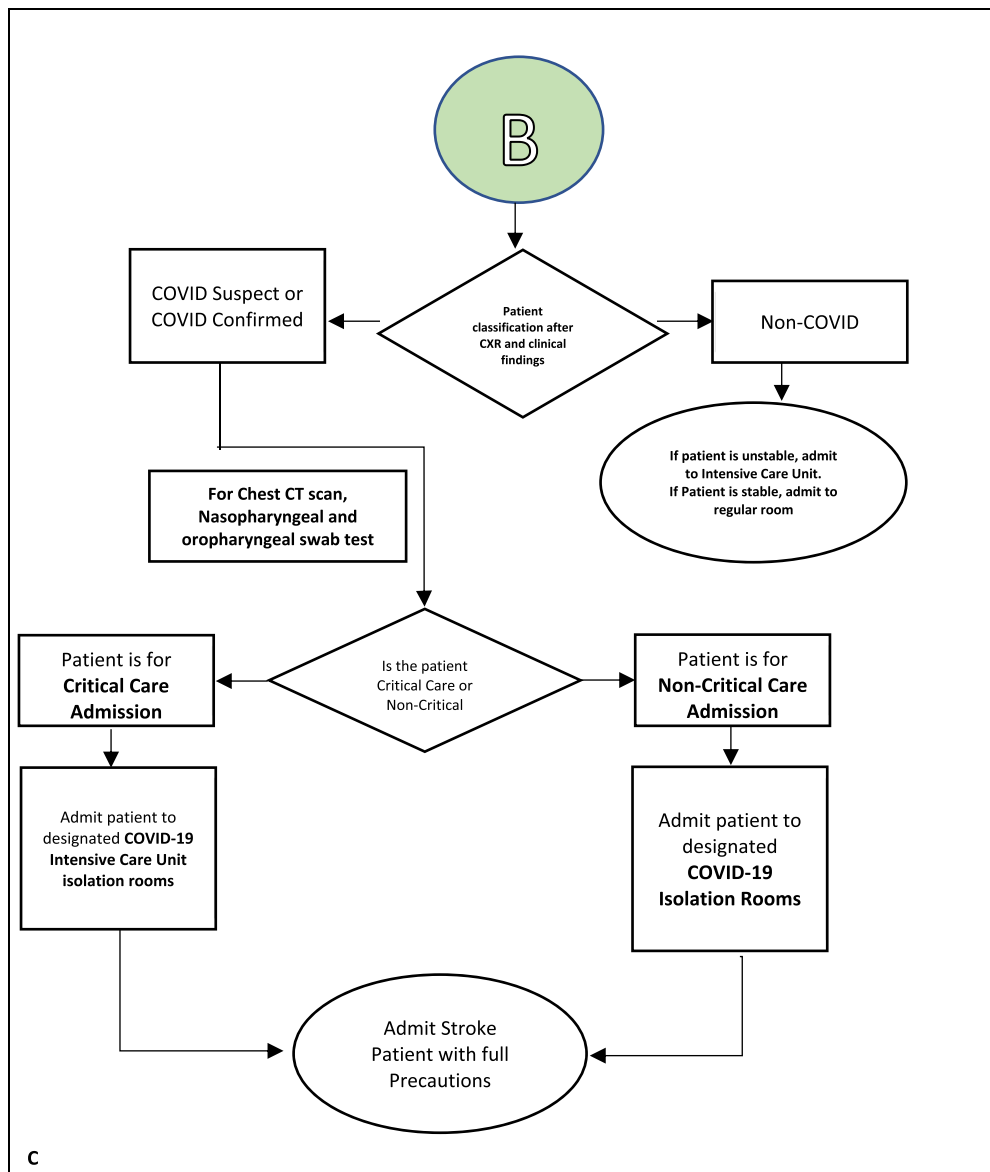


Fig. 1. Continued

After all the initial tests are done and if the patient is cleared from a possible COVID-19 infection by our multi-disciplinary health team, the patient is admitted in a regular acute stroke unit or ward. If the patient remains to be a COVID-19 suspect, complete COVID-19 work up will be done, which includes a nasopharyngeal and oropharyngeal swab for COVID-19 viral RNA Polymerase Chain Reaction test and a Chest CT scan. The patient will then be admitted to the COVID-19 unit or special intensive care unit (ICU) with isolation rooms dedicated to COVID-19 patients depending on the patient’s sensorium and requirement for mechanical ventilator support (Figure 1c)

Whereas the acute stroke management pathway by Baracchini et al² proposed different pathways based on COVID-19 status of the patient, we are unable to implement this in our setting due to the unavailability of quick

turnaround times of COVID-19 nasopharyngeal and oropharyngeal swab test results. Since COVID-19 nasopharyngeal swab results are released within 48-72 hours, we rely heavily on clinical status, chest radiographic imaging and laboratory parameters to determine COVID-19 risk at the emergency department level. Our protocol therefore assumes that all patients are COVID-19 suspects until proven otherwise. We are currently revising the protocol to include routine COVID-19 tests in all patients presenting as acute stroke, considering the fact that they are the vulnerable population for ischemic events and may be asymptomatic at time of presentation. A routine chest CT scan may also be implemented as recommended by Pedicelli et al³. However due to our limited resources, we only implement the nasopharyngeal and oropharyngeal COVID-19 swab test and chest CT scan if the patient has infiltrates on

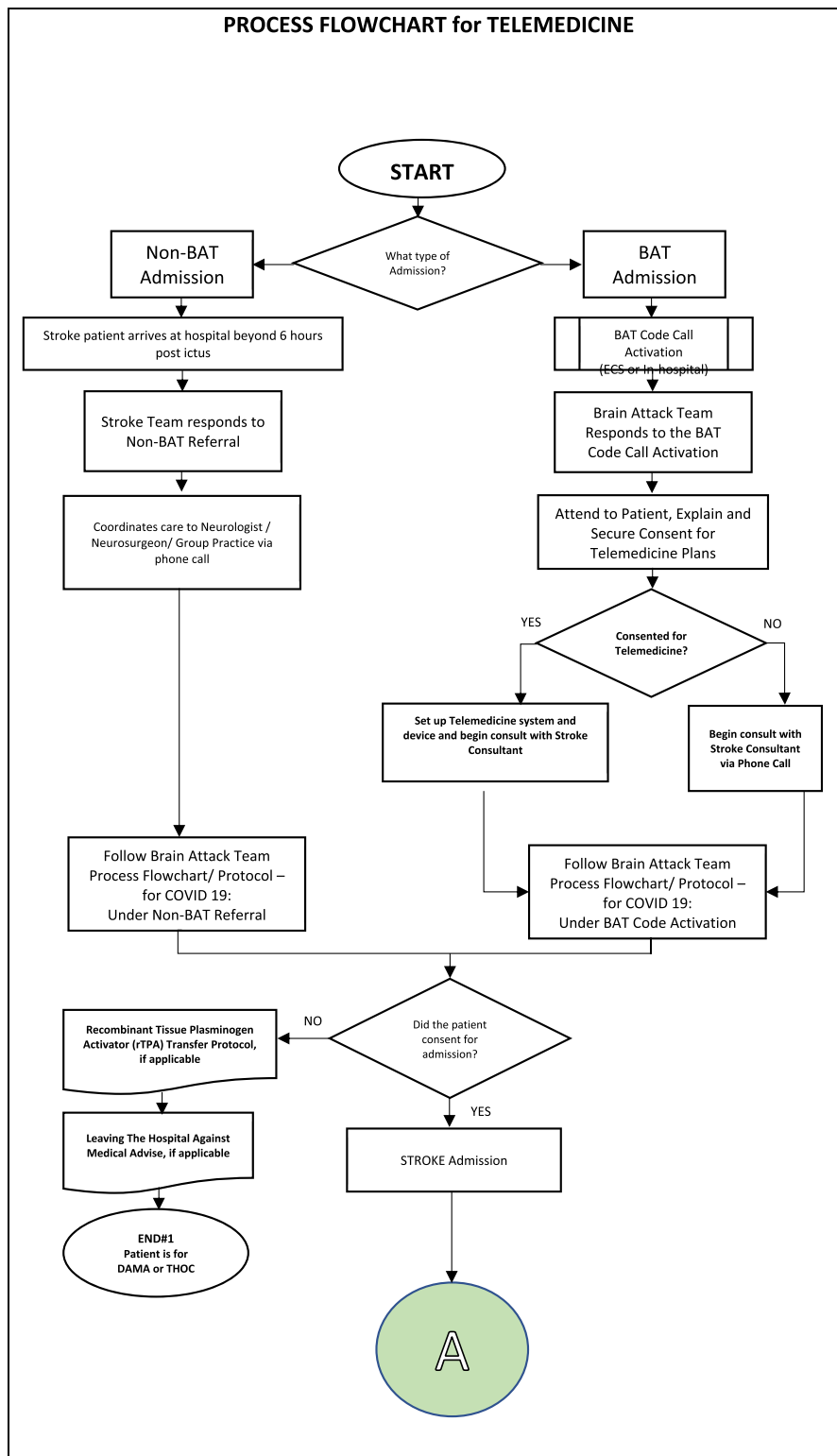


Fig. 2. BAT (Brain attack)- Patients who arrived at the hospital less than 6 hours post ictus. NON BAT (Non Brain attack - Patients who arrived at the hospital beyond 6 hours post ictus.

routine CXR or if the patient presented with common signs and symptoms of COVID-19 infection (Figure 1c). With regards to cranial imaging, the most ideal situation would still be a mobile CT scan located outside the emergency

department premises to minimize exposure. However, the mobile CT scan is not always available in our institution. Instead, we have dedicated MRI and CT scan machines solely for the use of these patients.

Considering the high risk of ischemic events in patients with COVID-19, we must be vigilant in the detection and management of these patients without compromising safety of our healthcare providers. This protocol ensures safety of the brain attack code responders while optimizing acute stroke care in our setting and may serve as a guide for local hospitals as well as other third world countries that face the same constraints.

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