

Current Recommendations for the Management of Stroke Patients in the Middle East in the Era of COVID-19 Pandemic; Statement from the MENA SINO.

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form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active. COVID-19 pandemic has led to a change in the way we manage acute medical illnesses. This pandemic had a negative impact on stroke care worldwide. The World Stroke Organization (WSO) has raised concerns due to the lack of available care and compromised acute stroke services globally. The numbers of thrombolysis and thrombectomy therapies are declining. As well as, the rates and door-to-treatment times for thrombolysis and thrombectomy therapies are increasing. The stroke units are being reallocated to serve COVID-19 patients, and stroke teams are being redeployed to COVID-19 centers. Covid 19 confirmed cases and deaths are rising day by day. This pandemic clearly threatened and threatening all stroke care achievements regionally. Managing stroke patients during this pandemic is even more challenging at our region. The Middle East and North Africa Stroke and Interventional Neurotherapies Organization (MENA-SINO) is the main stroke organization regionally. MENA-SINO urges the need to developing new strategies and recommendations for stroke care during this pandemic. This will require multiple channels of interventions and create a protective code stroke with fast triaging path. Developing and expanding the tele-stroke programs are urgently required. There is an urgent need for enhancing collaboration and cooperation between stroke expertise regionally and internationally. Integrating such measures will inevitably lead to an improvement and upgrading of the services to a satisfactory level.

In this communication, we present recommendations for the Middle East and North Africa Stroke and Interventional Neurotherapies Organization (MENA-SINO) stroke centers that have been reviewed and approved by stroke regional experts.

Stroke is a common medical emergency and requires urgent evaluation, imaging, and treatment. In patients that present early to the hospital, the patients are evaluated for possible intravenous thrombolysis and mechanical thrombectomy. Patients are subsequently admitted to the Stroke Unit as they recover. Stroke patients are frequently extremely ill in the initial days following the acute event and require constant nursing care. Patients that show slower recovery may be transferred to a rehabilitation ward. The care of stroke patients though their journey in the hospital has become challenging in the presence of current pandemic of Covid 19. 1 , 2 , 3

Many challenges contribute to the suboptimal care due to lack during the pandemic. These include the availability of fewer medical staff due to deployment in other parts of the hospital or illness, conservative approach due to fear of a high risk of infection, deferral of the medical resources into the pandemic-specific hospitals, patient's deferral in coming to the ED.

The development of stroke-specific protocols is critical and urgently required so that a regional standardized approach can be offered in the management of stroke patient in the pandemic era. The initiation of tele stroke assessment of patients in the clinic and screening suspected stroke patients in the ED can easily be the first steps. Patients who require in-person evaluation, for example triaging for thrombolysis and/or thrombectomy and transfer to the stroke unit should only be done with protective personal equipment (PPE) when COVID-19 is suspected or the hospital is in a region with higher number of infections.

Several stroke assessment proposals have been developed in that regard. For an example, the stroke team in the University of Calgary came with protected code stroke protocol where patient with acute stroke or his relative will be screened for COVID-19 by a set of questioners and based on that protective protocol can be activated. 4

Middle East and North Africa stroke and interventional neurotherapies organization (MENA-SINO) is the main stroke organization in the Middle East, North Africa, Iran, Turkey, and constitutes of the main stroke leaders in the region. The stroke experts from the representative countries developed a consensus statement on the main recommendations for the management of stroke patient in the MENA-SINO region.

The epidemiological curve of COVID-19 virus is steadily increasing globally. The internationally recognized John Hopkins University web site confirmed on July 8, 2020 a total of 11,799,443 COVID-19 cases globally with 543,558 deaths and total of 188 affected countries and regions. The total reported cases in our region have increased to 1,177,618 confirmed cases with total of 29,199 deaths. 5

Our clinical experience and knowledge on how the COVID-19 virus effects the human body and the central nervous system (CNS) is increasing daily. COVID-19 not only affect respiratory and digestive systems as was learned earlier but seems to attack and affect additional body systems and organs. COVID-19 infections have a broad and variable clinical spectrum. The nervous system is not immune against COVID-19 infections. The data relating to CNS involvement is limited and prospective studies are yet to be published. We have learned through limited retrospective case series from China that the virus can attack both central and peripheral nervous systems. Neurological involvement is evident in up to 36% of COVID-19 patients. 6, 7 Dizziness was the most encountered symptom (16.8%). This was followed by headache (13.1%), and encephalopathy (2.8%). Other symptoms include anosmia (5.1%), dysgeusia (5.6%), and muscle injury (10.1%). 6

The relationship between COVID-19 and stroke incidence remains to be determined. Preliminary studies suggest that there may be an increase in cerebrovascular disease with the infection. This is likely related to a pro-coagulant state seen with COVID-19 infections. In a study of 214 COVID-19 cases from Wuhan, China, stroke occurred in 6 cases (2.8%). Most of the cases were ischemic infarctions except for one hemorrhagic stroke. Although this group of patients had the traditional stroke risk factors, they also suffered from severe pneumonia related to their COVID-19 infection. 7 Aggarwal et al suggests that COVID-19 pandemic has major implications for stroke care. Stroke patients seem to particularly susceptible to developing complications and death when suffering COVID-19 infection. 8 Stroke patients may develop COVID-19 after admission and treatment for stroke or may have asymptomatic SARS-CoV-2 infection. There have been several explanations to link the association of COVID-19 and stroke development; these includes hypercoagulability due to critical illness and cardio embolism from virus-related cardiac injury. 9 The COVID-19 virus may also play a direct role through the injury of the human angiotensin converting enzyme, ACE2, expressed in epithelial cells throughout the body, including in the central nervous system. 10 Other coronaviruses, including SARS-CoV-1 and MERS-CoV have been identified in the brains of patients (case reports) and heavily in the brains of mice that express human ACE2. 11, 12 Further studies are needed to better understand the relationship between COVID-19 and stroke development. Lately, there case series published in the NEJM that revealed possible relation between COVID 19 and embolic stroke in young. 13

1- A lack or limited availability of PPE and its appropriate use has resulted in compromised stroke care due to fear of exposure.

Due to fear of contracting the disease, a significant decline in TIA and minor stroke evaluation in the hospital.

The lack or absence of telestroke service in the region has limited an alternative option for providing assessment, evaluation and management for TIA and minor stroke.

Culture barriers as a result of poor understanding of medical diseases and language in the MENA region has led to limitations with screening for COVID 19 or create discomfort among medical staff in dealing with uncertain stroke cases.

The redeployment of stroke teams to emergency and ICU departments has led to severe shortage of stroke team personnel and therefore compromising the optimal care needed to be provided to stroke patients.

Conversion of stroke units into COVID 19 ICU in some countries leading to compromised care of stroke patients.

Absence or decreased rehabilitation session provided by rehabilitation team due lack of PPE or fear of exposure limiting the rehabilitation role in recovery of stroke patients.

As the COVID-19 pandemic increases in the MENA-SENO region. We recommend the following changes at different levels of stroke care:

In case patient must be transferred to the hospital the following measures need to be taken

Infection control screening, history of infection or contact with infected person or travel history by paramedic if possible. - Using PPE including mask, face shield, gloves, and gown when available as per local hospital protocol, especially when the risk of contact is high or unknown.

Prenotification to hospital stroke and in cases of suspected COVID -19.

Separate pathways and triaging for stroke patients with or suspected of COVID-19 infection versus where Covid-19 infection is not suspected.

It is critical to enhance the public awareness in the MENA region about COVID 19 disease symptoms and method of prevention and screening through podcast social media and workshops in different languages for all ethnic groups.

Emergency room - Establishing protective code stroke protocol similar to the one developed at the University of Calgary (11) that includes the following measures:

Screening for symptoms of COVID 19; travel or contact history, presence of fever, cough, chest pain, dyspnea, headache, myalgias, gastrointestinal symptoms or any others

Personal Safety of stroke team; follow (local, CDC and WHO protocols) including guidelines for hand washing, PPE use, COVID-19 testing and evaluation, and self-quarantine as needed.

Adherence to acute Stroke Guidelines. Continue treating stroke patients as appropriate with full adherence to guidelines.

- A dedicated CT scan room for COVID-19 patients should be established if multiple CT rooms are available.

If there are positive pulmonary symptoms, consider low dose chest CT at the same time as the performance of CT head with

CT angiography (CTA) head and neck - Avoid multiple visits to the CT room to minimize exposure all necessary imaging must be done same time

If within window for thrombolysis adhere to thrombolysis therapy protocol.

Dedicate one member of the stroke team to evaluate and provide the therapy.

Arm the stroke team with PPE, follow local or international protocols when available and take all the protective measures.

Patients eligible for thrombectomy should not be deprived from the procedure.

- Alert Angio suite team about suspect of COVID-19.

Minimize the number of personnel at the angiography suite to the minimum required

Provide all angiography suite personnel with PPE

Alert the anesthesiologist of a COVID-19 or suspect patient.

Local policies for intubation and general anesthesia versus conscious sedation differ at different centers. Follow local guidelines

Consider conscious sedation as first-line to protect anesthesiologists from exposure, and to protect our patients from unnecessary intubation as well as conserving mechanical ventilator resources.

Avoid Converting a patient from conscious sedation to general anesthesia in the middle of the procedure in the angiography suite due to high risk of aerosolization in a positive pressure room.

Transfer of the patient from angiography suite to ICU or stroke unit should be done by the same team to avoid and minimize the exposure of other personnel.

Proper sterilization procedure of the whole angiography suite must be done once the procedure is over

- Splitting the stroke unit to COVID -19 VS non COVID -19 area if feasible.

Provide all stroke team with PPE, enhance, and encourage frequent hand washing and all other protective measures. (follow the local protocol)

COVID-19 or suspect case should be followed and monitored by the same personnel to minimize exposure.

Adhere to stroke protocol and avoid unnecessary compromise on the care provided.

CTA should substitute the carotid doppler unless it is contraindicated to prevent unnecessary exposure of the radiographer due to proximity during the procedure.

MRI should only be done with extreme necessity, otherwise CT head should remain the first option, to avoid and minimize time of exposure.

Rehabilitation sessions can be provided at the unit when possible to minimize exposure.

Provide all the rehabilitation team with PPE to be used for COVID 19 positive patients only and encourage frequent hand washing measures (follow local protocols).

Limit the rehabilitation sessions to the same personnel to minimize exposure and prevent others from exposure

To minimize exposure, increase duration of rehabilitation and decrease frequency to minimize exposure of rehabilitation personnel

Frequent sterilization of monitors and equipment used for COVID -19 cases or suspected cases

Enhancing and Developing the Tele Stroke services in most of the

countries in the region can help facilitate the stroke consultations

Tele stroke is the solution during this crisis, to provide necessary stroke evaluation and avoid unnecessary inter facilities transfer and reduce exposure of stroke team.

It is the ideal tool to provide the following:

Acute stroke assessment for thrombolysis

Acute stroke assessment for non-thrombolysis case

Follow up - Can be facilitated through tele stroke consultation to avoid and minimize the stroke team exposure.

Stroke is a common neurological disease and presents at a younger age in the MENA-SENO region. It is a medical emergency especially when the patient present early following onset of symptoms. Such patients require urgent assessment and imaging. During the current COVID-19 pandemic it is essential that regional stroke program establish stroke –COVID-19 protocols. Such protocols will be very help in the rapid assessment of the acute stroke patients. It will also ensure the safety of the hospital staff and reduce the risk of infection to the patients. We provide a summary of the limitations that are important in the MENA-SENO region and we also propose recommendations that may be helpful in the care when patients with suspected stroke presents to the hospital in the region.