European Society of Minimally Invasive Neurological Therapy (ESMINT) recommendations for optimal interventional neurovascular management in the COVID-19 era

Mohamed Aggour,[1] Phil White,[2,3] Zsolt Kulcsar [ID],[4] Jens Fiehler,[5] Patrick Brouwer[6,7]

[1]Saint Etienne, Rhone-Alpes, France
[2]Institute for Ageing and Health, Newcastle University, Newcastle upon Tyne, UK
[3]Neuroradiology, Newcastle upon Tyne Hospitals, Newcastle upon Tyne, UK
[4]Neuroradiology, Zurich University Hospital, Zurich, Switzerland
[5]Department of Neuroradiology, University Medical Center Hamburg Eppendorf, Hamburg, Germany
[6]Neuroradiology, Karolinska Universitetssjukhuset, Stockholm, Sweden
[7]University NeuroVascular Center - UNVC, LUMC Leiden / HMC The Hague, Netherlands

Correspondence to
Dr Mohamed Aggour, Saint Etienne, Rhone-Alpes, France; aggour.mohamed@gmail.com

INTRODUCTION

The Coronavirus Disease 2019 (COVID-19) pandemic began in December 2019 in Wuhan, China. The outbreak is due to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection. Healthcare contamination and infection rates are thought to be very high (up to 29% in a recent Chinese publication[1]).

These recommendations are not intended to overrule local official safety measures and guidelines but rather to give other insights and perspectives while facing this exceptional situation in the safest way possible for your patient, team, family and yourself.

PRIORITIES

► Early detection and limiting exposure of healthcare workers (HCWs), employees and patients.
► Maintenance of urgent interventional neuroradiology (INR) procedures with adequate staff, materials and precautions.
► Provide infection control tutorials led by hospital infection control experts, as well ensure the availability of personal protective equipment (PPE) and education for HCWs.
► Ensure all department employees are aware of, and are performing, recommended infection control protocols.
► Review and practice protocols for decontaminating imaging rooms after caring for a COVID-19 patient.
► Implementation of 'social distancing' strategies for staff, trainees and faculty.
► Staff protection and their families.
► Adequate mental health and managing stress overload for HCWs.

GENERAL CONSIDERATIONS ABOUT PATIENTS AND PROTOCOLS

► It is advised to limit neurointerventional activity only for acute and relative INR emergencies that cannot be reasonably postponed.
► Limit interventions to those that will actively affect the outcome of your patient with no borderline/extended indications where patients may not benefit from intervention.
► Before accepting a patient in transfer that may need an intensive care unit (ICU) bed later or a long continuous monitoring post-intervention it is important to verify the capacity and availability of such management internally. It might be beneficial to consider re-dispatching patients after intervention to their primary care hospital of origin if possible. It is important to have daily feedback about available ICU beds, as well as anesthesia and staff availability.
► All decisions for management must be taken in a multidisciplinary fashion and adhere to national recommendations, recognizing that these may deviate from usual standard of care during the pandemic. They must take into consideration the status of hospital resources and the expected outcome of the patient regarding his/her medical condition in general.
► Employ tele-medicine consultations whenever possible for patient intake, in hospital management and follow-up.
► Learn about the most recent observations and COVID-19 management trends with colleagues with online tools (eg, videoconferencing organized by scientific societies).
► Participate in registries, research and databases as much as possible for managed COVID-19 patients undergoing INR procedures.

PATIENT COVID-19 CATEGORIES AND INITIAL MANAGEMENT

► **Low-risk patients:** No fever or respiratory symptoms, no history of recent travel or close contact with a COVID-19 patient. No PPE/procedures required as per local protocol – but as a minimum the use of a simple surgical mask to protect against droplet transmission. Consider obtaining a chest CT in stroke patients for evaluation of potential covid infection. If not available, a chest X-ray can be obtained in the angiosuite as soon as the patient has arrived. If suspicious, the patient is to be considered high-risk for COVID-19 infection. For other INR cases, time should be allowed for lung imaging and assessment prior to the procedure, with or without COVID-19 testing. If there is a negative COVID-19 test within the last 48 hours, the patient can be considered low risk.
► **High-risk patients:** Fever, cough, respiratory symptoms, history of recent travel or close contact with a COVID-19 patient, tremors, gastro-intestinal tract (GIT) symptoms, and so on. Patient must wear a mask at all times.

A chest CT is recommended during initial cerebral imaging or soon after. Patients must be tested according to local protocols. Results must be confirmed before transferring the patient to a non-COVID-19 ward/department.

▶ **Known confirmed COVID-19 patients:** Management is according to strict local COVID-19 pathway and protocol.

▶ **Suspected patients:** Immediate measures must be taken according to your local guidelines until adequate verification is carried out (eg, surgical mask for patient, isolation, COVID-19 pathway and precautions, immediately contacting hospital epidemiology and infection control body in accordance with your local protocol).

HEALTHCARE WORKER PRECAUTIONS

▶ Decrease number of attending medical staff in the hospital.
  – Cancel all unnecessary meeting and events.
  – Prioritize remote communication (through phones/emails/online access to data).
  – Staffing models must consider minimizing staff exposures and reducing staffing levels throughout the pandemic period. This can be done by assigning staff to two teams (A and B). Teams A and B would be strictly separated.

▶ Limit interactions with other staff in the hospital.
  – Increase in-hospital tele-meetings rather than physical communication and meetings.
  – Follow safety measures and social distancing during pauses and and breaks for meals.

▶ Limit risk of exposure from patients.
  – Patients should wear a surgical mask when possible.
  – Patient transfer must be along a designated route with minimal contact with others.

▶ Adequate protection gear is mandatory.
  – Cap, gown and single/double gloves.
  – ALL staff must wear goggles and, if available, a face protective shield (visor).
  – Use high-protection masks: N95/FFP2/FFP3/powered air-purifying respirator (PAPR) as per institution's protocol. Follow strict rules concerning donning and doffing protective materials that can be found easily through your hospital guidelines or trusted online resources.
  – In high-risk or confirmed COVID-19 patients, a single-use policy is recommended.

▶ A comprehensive training program for the use of PPE must be enforced.
  – Correct use of N95/FFP2/FFP3 masks.
  – PAPR if available while managing COVID-19-positive patients.
  – It is important also to learn how to clean, disinfect, store and inspect PPE for damage.
  – Training about the extended use and/or re-use is recommended for N95/FFP2/FFP3 masks-respirators in case of shortages.

TRAINING FOR NEW PROTOCOLS

▶ Develop plans with guidance from local resources, including infection control. Emphasize to staff that local recommendations must be followed.

▶ If training of all staff through Infection Control and Occupational Medicine departments is not feasible (cannot mobilise all staff/overextended trainers) consider designating selected staff members to undergo the training and then charge them with teaching and training the rest of your staff.

▶ We recommend neurointerventional team members to be involved with their local COVID-19 response teams, or equivalent. Early involvement can help streamline the flow of patients and minimize unnecessary patient and healthcare provider exposure.

ANGIOGRAPHY SUITE MANAGEMENT

▶ Minimum number of staff in angiosuite and restricted access for essential staff only.

▶ If two or more angiosuites, dedicate one for suspected or confirmed COVID-19-positive patients if possible. Limit traffic and flow of staff and contaminated air into angiosuite with only one possible route for entry and exit via the scrub room. Designate the clean and contaminated areas with tape on the floor.

▶ Only selected essential and needed equipment/materials/drugs should be brought into the angiosuite to decrease contamination. For instance, movable device cabinets should be relocated outside of the suite – so only a runner need leave control room of angiosuite to fetch items – can then hand with no-touch technique to staff within angio room.

▶ Frequently touched equipment within the angiographic suite are wrapped with plastic sheets to facilitate decontamination (eg, anesthesia workstation, anesthesia workstation, laptop for documentation, etc.).

▶ Designate PPE donning and doffing areas. Consider use of 'buddy' approach for doffing process with a colleague observing to ensure absence of contamination.

▶ Patients optimally should receive procedures (urethral catheter, neurological examination, anesthesia consultation, intubation, extubation and recovery, etc.) in one area in order to decrease contamination. Ideally where feasible this should be in a designated COVID-19 anaesthetic room with negative-pressure ventilation.

▶ Make sure protocols are followed in the disinfection process for COVID-19 and include cleaning of all medical devices.

▶ If applicable, ensure quality control of negative-pressure environment and integrated high-efficiency particulate air (HEPA) filter in angiosuites and recovery rooms.

STOCK – NEUROINTERVENTIONAL MATERIALS AND OTHERS

▶ Optimise utilization of all materials during procedures and keep it to its adequate minimum.

▶ Ensure adequate delivery network and supply status of essential INR materials during the coming time period.
  – Calculate quantity and types of materials used for emergency procedures during the same period last year and add annual percentage of growth.
  – Contact industrial partners to ensure their capacity for production and delivery.
  – Take into consideration a safety margin for delayed delivery.
  – In case of limited/lack (or excess) of supplies, communicate with other INR centers in your region about potential mutual collaboration and stock sharing.

PROTECTING FAMILY

It is important to protect families of HCWs and decrease their stress. It is essential that HCWs take every precaution not to contaminate family members. It is recommended to:

▶ Change into scrubs as soon as arriving to hospital (but recognizing hospital protocols may vary on this). Follow strict and attentive measures for donning and doffing PPE all day and when changing into/out of personal clothes.

► Limit any materials to be brought back home (bag, laptop, etc.) and ensure caution with the use of, and practice regular disinfection of, your cell phone all day.
► Disinfect all accessories used before entering home (phone, keys, eyeglasses, etc.).

MENTAL HEALTH

A recent study to assess the magnitude of mental health outcomes and associated factors among HCWs treating patients exposed to COVID-19 in China reported symptoms of depression (634; 50.4%), anxiety (560; 44.6%), insomnia (427; 34.0%) and distress (899; 71.5%).[2] Mental health problems may arise from varying factors such as workload, strict protective measures, patients' triage, fear of personal shortcomings during the pandemic, disease transmission, self-isolation, fears for family, stigma and others. Healthcare providers should consider the measures listed below.[3]

Recommended behaviors for healthcare providers

► Self-monitor and pace.
► Regularly check in with colleagues, family and friends.
► Work in partnerships or in teams.
► Use brief relaxation/stress management breaks.
► Undergo regular peer consultation and supervision.
► Regularly seek accurate information and mentoring to assist in making decisions.
► Focus efforts on what is within your power.

Dealing with stress in the aftermath of the crisis

► Seeking out and sharing social support, which may need to occur virtually.
► Checking in with other colleagues to discuss work experiences.

► Increasing supervision, consultation, and collegial support (remotely).
► Scheduling time off work for gradual reintegration into personal life.
► Preparing for worldview changes that may not be mirrored by others in one's life.

Twitter Mohamed Aggour @Aggour

ORCID iD
Zsolt Kulcsar http://orcid.org/0000-0002-6805-5150

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