Voice of NESON

Amit Thapa MS, MCh, IFAANS
Professor and Head, Department of Neurological Surgery
Kathmandu Medical College Teaching Hospital (KMCTH)
Sinamangal, Kathmandu, Nepal
ORCID iD: https://orcid.org/0000-0003-1896-3115

Krishna Sharma MBBS, MS, DNB
Head, Department of Neurological Surgery
Nepal Medical College Teaching Hospital (NMCTH)
Attarkhel, Kathmandu, Nepal
ORCID iD: https://orcid.org/0000-0002-4401-1022

Prabin Shrestha MD, PhD, IFAANS
Head and Chief Neurosurgeon, Neurosurgical Unit
Department of Neuroscience
B & B Hospital
Gwarko, Lalitpur, Nepal
ORCID iD: https://orcid.org/0000-0002-9068-4543

Address for correspondence:
Professor Amit Thapa
Head of Department, Department of Neurological Surgery
Kathmandu Medical College Teaching Hospital (KMCTH)
Sinamangal, Kathmandu, Nepal
E-mail: dramitthapa@yahoo.com
Contact number: +977 9851177995

To access Nepal Journal of Neuroscience Archives, scan QR code:

Nepalese Society of Neurosurgeons (NESON) Standard Operating Protocol: Operating on COVID-19 patients

---

Key words: Operating Standard Procedure, Operating on COVID-19 patients

---

Disclaimer

- Due to lack of scientific evidence, guidelines cannot be formulated.
- Hence this protocol would serve as STANDARD OPERATING PROCEDURE (SOP) for performing neurosurgical procedures on COVID-19 suspect, probable or positive cases.
- This SOP is based on recommendations from various societies and experiences of the hospitals involved in care of patients with COVID-19
- As the status of COVID-19 in Nepal shall change along with refinement in knowledge of the disease and its management, SOP will be updated
- Objective is to "Serve with caution"

Need

- Nepal is presently in phase 2 of Global COVID-19 pandemic. The doubling time for active infections is shortening over the last two weeks (Figure 1). The healthcare facilities have to gear up and prepare to face the worst with the most efficient use of available resources.
- Neurosurgical emergencies may arise in COVID-19 patients (suspect or probable or positive) who are being managed in isolated wards or ICU.
- Such patients cannot be operated in routine operating rooms nor kept in routine ICU, as they pose threat of transmission of infection to other patients and health care workers (HCW).
- COVID-19 patients undergoing aerosol generating procedures (AGPs) pose higher risk of transmission of the SARS-CoV-2 virus.
- Special isolation precautions should be adopted by all health care workers (HCW) with specific protocols to stay safe as well as manage the case efficiently.
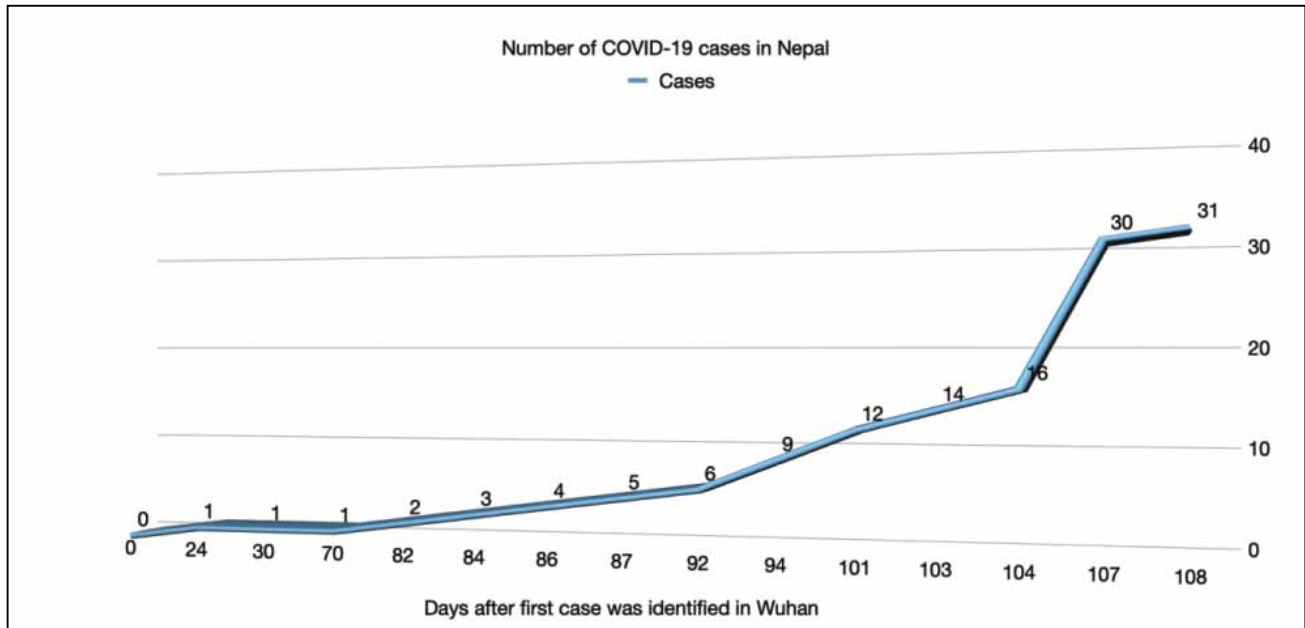
Number of COVID-19 cases in Nepal

Figure 1: Rise in number of COVID-19 cases in Nepal (since the first case was reported in Wuhan, China). Data as recent as 19 April, 2020

Recommendation

- COVID-19 patients should be managed according to the Ministry of Health (MOH), Nepal policy for managing COVID-19 patients (suspect or probable or confirmed). If the hospital cannot offer services as guided by this SOP, they should arrange for safe transfer to a center with facilities available. The directive prepared by MOH, Nepal designating hospitals with a level of health care facility for COVID-19 care should help decide on referral.

- Surgical team on-call (separate from the ones on duty) would confirm the need for surgical intervention and would consult with anesthesia for OT and ICU management and would alert the Hospital Director and Nursing-in-Charge of such intervention.

- The team should take appropriate informed consent for arrangement and risks involved to patients due to the COVID-19 scenario.

- Huddling by the surgical team with anesthesiologists and OT nurses (on phone or internet) help identify the need and optimum preparation for the procedure, avoid prolonging surgeries (waiting for items) and prevent unnecessary movement and confusion.

- A separate designated OR (called COVID-OR) should be used (see details below).

- The patient should be mobilized only after all arrangements are ensured (following Operating Room Flow Chart as in Table 1) and be kept for a minimum time possible outside isolation.

- Staffing in the Operating Room (OR) should be as minimal as required (only essential ones).

- Positive pressure ventilation should be stopped inside the OR to avoid re-circulation of air.

- Health care workers should be wearing appropriate category of Personal Protective Equipment (PPE) (as advised by Nepal Medical Council) at all times using (PPE specific) protocols for donning and doffing-of PPE. Specific training and drills are necessary.

- Use a well-fitting N95 mask (perform FIT Test to ensure proper size fit) and goggles and hood while performing or assisting in procedure.

- Try avoid Aerosol Generating Procedures (AGP) like drilling or cauterizing (which generates smokes) or use them sparingly with constant negative suctioning. Smoke extraction should be adopted (negative pressure rooms with HEPA filter)

- Try avoid endoscope or laparoscope (to perform AGP). Use in only undeniable situations only

- Consideration should be given to surgical approaches that could decrease operating staff exposure (to droplets and aerosols) and shorten case duration. E.g. coiling is preferred to clipping in case of ruptured intracranial aneurysm.

- Keep all equipment, laptops or computers used inside COVID-OR covered with plastic sheet to help clean them easily later

- Keep stationaries separate and discard after use

- Patient should be intubated and if possible extubated inside the designated OR (if there is no facility of negative pressure induction room)

- The corridor through which the patient is shifted, should be enclosed with plastic curtains and be disinfected after use
- Post-operative patient should be kept in Isolation ICU or Isolation wards

Requirements of the Dedicated Covid-OR (Operating Room)

- The Operating Room (OR) should be out of high-traffic area
- Ideally a negative pressure with HEPA filter operating room is good (however such facility is not available in Nepal. It is expensive and difficult to build in a short time)
- Alternatively, OR with central air conditioning can be changed to use fresh air and exhaust used to generate negative pressure. OR with HVAC system can have a damper placed to close the connection between fresh air intake and return air exhaust (to avoid any re-circulation of air). Care should be taken to avoid mixing of air between different rooms in case of central air conditioning system.
- A minimum of 12 air flow changes each hour (Ideally 25 each hour) must be maintained (depending upon on the size of room and the purpose)
- HEPA filters can be used to control the movement of airborne contaminants
- Ensure optimum temperature, humidity and air pressure in the operating room
- Switch off positive pressure ventilation inside COVID-OR (if split AC or cabinet AC is being used to avoid re-circulation of air)
- Remove all non-essential materials like cabinets or racks from COVID-OR
- An adjacent area (Ante-room or buffer room) for donning and doffing of PPE, exchange of equipment, medications and materials for the case is essential.
- A single door should open into COVID-OR through the Ante-room. Self-closing entryway with an adequate seal is recommended. All other doors, ceiling, walls and windows should be sealed.
- All surgical staff entering the OR should be in category 1 PPE (with N95 mask) (as per NMC guidelines)
- For HCW performing AGP, use of Powered Air Purification Respirator (PAPR) is recommended.
- No unnecessary items should be brought into the operating theater
- All traffic in and out of the operating room should be minimized. A dedicated floor nurse (FN) should transfer all required materials.

Huddling With Anesthesiologist

- Online or on-phone discussion on procedure and requirements
- Transfer should be through dedicated corridors
- Adopt measure to reduce exposure to AGP like intubation to the shortest possible duration (experienced hands should intubate)
- Use Powered Air Purifying Respirator (PAPR), Plastic visible hoods for intubation or video laryngoscopy for intubation (figure 2)
- Avoid awake intubation (as it generates coughing)
- Reduce chances of disconnection of anesthesia circuit
- Preoxygenate using well fitted mask (to avoid leak)
- Rapid Sequence Induction (RSI) to reduce need of bag mask ventilation
- Continuous in-line suctioning for endotracheal tube (ET) suctioning
- Extubation should be smooth (to avoid bucking or coughing)
- Avoid venturi type mask for oxygenation

Figure 2: Ways to protect from aerosols during Aerosol generating procedures (AGP) (a) Powered Air Purifying Respirator (PAPR), (b) Plastic visible hoods for intubation, (c) use of video laryngoscopy for intubation

What Cases Would be Operated During this Period?

Category	Clinical Scenarios	Recommendations
Emergent (Immediate to prevent death or permanent disability)	Intracranial (neurotrauma or malignancy or vascular) pathologies (with rapidly evolving intracranial hypertension with deteriorating state of consciousness or acute hydrocephalus) or spinal pathologies (with spinal cord compression with rapid tetra- or paraparesis) Ruptured aneurysm Progressive or severe neurologic deficit due to neurologic compression from any cause (e.g. cauda equina syndrome, infection, tumor, fracture, disc herniation) Spinal instability at risk of causing neurologic injury from any cause (e.g. fracture, tumor, infection) Epidural abscess requiring surgical decompression Postoperative wound infection	**Do not postpone** the procedure/ treatment
Urgent (Quickly to better the prognosis or health)	Patients with pathologies like intracranial tumors/ bleed with mass effect or with progressive neurological deficit, without deterioration of consciousness Cervical or thoracic myelopathy due to spinal stenosis, with recent progression Spinal infection (e.g., discitis, osteomyelitis, epidural abscess) that fails to respond to medical management Persistent significant neurologic deficit due to neurologic compression with or without deformity (distinguished from "severe neurologic deficit" that is listed under emergent) Congenital defect surgery Open peripheral nerve injuries Spinal conditions causing intractable pain that result in ED presentation, severe functional limitations and/or excessive opioid use despite non- procedural attempts at management (e.g., painful disc herniation, painful fracture, progressive fracture related deformity). Battery change for spinal/deep brain/ epilepsy stimulators/pumps Symptomatic carotid disease	Proceed with procedure/ treatment **if the local situation and resources allow**

Elective surgeries should ideally be postponed before it seems necessary, to conserve the critical resources and to avoid unnecessary exposure of patients and health care workers to risk of infections. This would also avoid crowding inside hospital premises.

Procedures for Final Disinfection (After the Procedure is over)

- Medical waste should be disposed of as COVID-19 related medical waste
- Reusable medical devices should be disinfected according to the disinfection procedures of SARS-CoV-2 related reusable medical devices
- Medical fabrics should be disinfected and disposed of according to the disinfection procedures for SARS-CoV-2 related infectious fabrics
- Surfaces of objects (instruments and devices including device table, operating table, operating bed, etc.)
  - Visible blood/ bodily fluid pollutants should be completely removed before dis-infection (handled in accordance with disposal procedures of blood and bodily fluid spills)
  - All surfaces should be wiped with a disinfectant containing 1000 mg/L active chlorine and allowed to sit for 30 minutes with the disinfectant.
- Floors and walls:
  - Visible blood/bodily fluid pollutants should be completely removed before disinfection (handled in accordance with disposal procedures of blood and bodily fluid spills)
  - All surfaces should be wiped with a disinfectant containing 1000 mg/L active chlorine and allowed to sit for 30 minutes with the disinfectant.
- Indoor air: Turn off the fan filter unit (FFU). Disinfect the air by irradiation by ultraviolet lamp for at least 1 hour (Ideal). Turn on the FFU to purify the air automatically for at least 2 hours.

Operating Room Flow Chart

	Nurse in Charge	Floor Nurse (FN)	Scrub Nurse (SN)	Anesthesiologist and Anesthesia Nurse (A)	OR technician (ORT)	Surgical Team	Remarks
Transfer Phase	Activates team and security and clear passage for shifting	Prepares the COVID- OR Arrange equipment, trolley, consumable and PPE in Ante-room	Prepares trolley Wear Cat 1 PPE+/- PAPR Prepare OR Scrub and prepare trolley	Ensure adequate PAPR Wear Cat 1 PPE+ PAPR Keep required consumables, drugs, intubation set	Wear Cat 1 PPE and prepare OR Assist in patient positioning and setting up equipment	Surgeon to scrub and wear sterile Cat 1 PPE after checking equipment, confirming patient "SIGN IN" (surgical safety checklist)	Allow 30 minutes Keep to-be required consumables in Ante-room
OR: Preparation Phase	Handover to FN	Receives and identifies patients. Starts surgical safety checklist (SSS)		After performing "SIGN IN", Intubate in OR			Refrain other team members to enter OR, unless absolutely necessary
OR: Intra-operative Phase		keeps any requested items on a trolley into Ante room	Starts OR after "TIME OUT"		Wipe patient trolley (siderails). Stays inside OR through-out	Starts OR after "TIME OUT"	Only FN is allowed to move through OR
OR: Post-operative Phase	Activate security for transfer	Activate security for transfer	Throws all consumables used Specimen handling	Extubate in OR if possible Designate where to shift (Isolation or ICU) Throws all used consumables Finishes all entries before patient leaves OR		Performs "SIGN OUT" Finishes all documents before patient leaves OR	
			Follow Disinfection protocol				ANTE ROOM: Remove gowns, gloves, Cap and shoe cover Outside ANTE ROOM: remove N95, goggles, Cap and PAPR Wear new cap and gloves outside ANTE ROOM
Follow up Phase	Take over from FN	Enter Records and inform Nurse in Charge	Clean and packs instruments for SSD	Keep used PAPR for proper designation and charge batteries			
Supplement all used supplies and prepare OR. All staff involved MUST SHOWER after case							

Table 1: Operating room flow chart. SSS: Surgical Safety Checklist, PPE: Personal Protective Equipment, PAPR: Powered Air Purifying Respirator, FN: Floor Nurse, SN: Scrub Nurse, SSD: Sterile Services Department

References

1. Handbook of COVID-19 Prevention and Treatment. The First Affiliated Hospital, Zhejiang University School of Medicine. https://wfns.org/WFNSData/Uploads/files/Handbook-COVID19-GlobalMediXChange.pdf

2. **Nepal Medical Council**. Guidelines for use of personal protective equipment in relation to COVID-19. [Internet]. Nepal Medical Council. [2020

March 23; Cited 2020 April 1]. Available from: https://www.nmc.org.np

3. Ti LK et al. What we do when a COVID-19 patient needs an operation: operating room preparation and guidance. **Can J Anesth/J Can Anesth.** [Internet] [Published 2020 March 6, Cited 2020 March 10]. Available from: https://doi.org/10.1007/s12630-020-01617-4

4. **American Association of Neurosurgeons.** COVID-19 Information Hub. [Internet] Rolling Meadows, IL [Updated 2020 March 31; Cited 2020 April 1]. Available from: https://www.aans.org/COVID-19-Update/COVID-19-Information-Hub

5. **Congress of Neurological Surgeon.** COVID-19 Neurosurgical Information Hub. [Internet] Schaumburg, IL. [Cited 2020 April 1]. Available from: https://www.cns.org/covid-19

6. The **Society of British Neurological Surgeons**. SBNS Covid-19 Bulletins / Guidance Documents. [Cited 2020 April 19]. Available from: https://www.sbns.org.uk/index.php/policies-and-publications/covid/

7. **American Society of Health Care Engineering**. COVID-19 Resources for Health Care Facilities. [Cited 2020 April 19]. Available from: https://www.ashe.org/COVID19resources

8. **Centres for Disease Control and Prevention.** Coronavirus (COVID-19). [Cited 2020 April 19]. Available from: https://www.cdc.gov/coronavirus/2019-ncov/index.html

9. The **European Association of Neurosurgical Societies**. COVID-19 in Neurosurgery. [Cited 2020 April 19]. Available from: https://www.eans.org/page/covid-19