Rhinology Online

REVIEW

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Safe practice guidance: a review for otorhinolaryngologists during COVID-19 pandemic and after reopen process*

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Abstract

COVID-19's rapid sweep across the world has caused an extraordinary disruption to the otorhinolaryngology (ORL) profession and its subspecialties including the rhinology section. The present pandemic forced our specialty practitioners to make quick clinical and practice management decisions. Staff safety must receive the highest prioritization along with strategies to provide

the highest quality care. The purpose of the present manuscript is to provide a narrative review of the current knowledge and committee practices regarding ORL (including rhinology) professionals' safe practice during COVID-19 pandemic and after reopen process. The present review findings will allow the clinical practitioners to understand the factors involved in reducing the risk of transmission of COVID-19 in the ORL and rhinology settings, personal protective equipment (PPE) for different ORL and rhinology practices and criteria of practice in outpatient clinic (OPC), emergency operations and ORL surgeries.
The emerging evidence based on COVID-19 is rapidly changing. Further updates may be needed to this review as new details or evidence emerge. ORL including rhinology doctors should consider the specific conditions of each individual place of work and comply with all applicable legislations.

Key words: COVID-19, pandemic, reopen process, personal protective equipment, safe practice, SARS-CoV-2, otorhinolarygology practice

Introduction

The 2019 Novel Corona Virus (2019-nCoV) has caused an ongoing outbreak of lower respiratory tract disease initially called novel coronavirus pneumonia (NCP) by the Chinese government. The disease was subsequently named as Corona Virus Disease 2019 (COVID-19) by the World Health Organization (WHO) [1,2]. Meanwhile, the International Committee on Taxonomy of Viruses renamed 2019-nCoV as Severe Acute Respiratory Syndrome caused by Corona Virus-2 (SARS-CoV-2). The WHO has declared this as a global health emergency by the end of January 2020 [1,2].

As on July 13, 2020, the coronavirus SARS-CoV-2 has been affecting 210 countries and territories around the world with 13,049,106 cases and 571,807 deaths. Globally, about 4.38% of reported COVID-19 cases have died [1-3]. After the reopening process, the coronavirus pandemic continues unabated with some countries still face increasing cases of COVID-19 while others are striving to flatten their curves.

Evidence related to transmissibility and mortality inform the clinical community of the importance of vigilance, preparation, active management, and protection [4].

On 15 April 2020, a Google search publication [5] identified 278 physicians (with or without full data) who died with COVID-19 infection. This number is significantly higher because of underreporting. On average 7% of all COVID-19, cases worldwide are among health care workers (HCWs). Extrapolating the 7% figure to cover all countries of the entire world means that around 450,000 of the world's over six million cases could be among HCWs.

Otolaryngologists are at great risk of infection with SARS-CoV-2 as they cope with upper respiratory tract (URT). A survey performed amongst members of the European Rhinologic Society (ERS) (in relation to COVID-19) acknowledged a limited percentage of the respondents used/could use adequate personal protection equipment (PPE). In the respondents who were tested for SARS-CoV-2, none with a positive test reported adequate protection 75-100% of the time and 69% had no adequate protection at all [6]. In our region, the circumstances of ORL and rhinology practices are different from other parts of the world. Otolaryngologists (including rhinologists) not only in our region but also worldwide need consistent instructions to reinstitute diagnostic and therapeutic interventions in a safe mode during the reopening process and in future waves of the disease. Therefore, the aim of the present review is to provide a precise review of the current knowledge obtained during the COVID-19 pandemic and after the reopening progression to allow safe ORL practice in general and rhinology practice in particular.

Transmission characteristics and principles of infection prevention and control

1.1 Routes of transmission [2-4]

A. Droplet transmission:

- Via respiratory droplets during breathing, speaking, coughing or sneezing (>5µm in size) [2].
- From the respiratory tract of infected persons directly onto a mucosal surface or conjunctivae of another individual [3].
- Droplets can penetrate the respiratory system to above the alveolar level [2].
- The maximum distance for cross transmission has been a distance of approximately 2 meters (6 feet) around the infected individual [3].

B. Contact transmission:

- Directly, by touching an infected person, and then touching his/her mouth, nose or eyes [2].
- Indirectly, (because of gravity and airflow) most virus droplets fall to the ground or any surface. The virus could spread if any person touches an infected surface then, touches his/her mouth, nose or eyes [3].
- The rate of positivity was relatively high for floor swab samples. Also, viable SARS-CoV-2 persist from hours to days on different materials [3].

C. Airborne transmission:

- Aerosols transmission via droplet nuclei (≤ 5µm) [3].
- This droplet nucleus can float in the air (law gravity). The

virus spreads from the contaminated air directly onto a mucosal surface or conjunctivae of another individual [2].
- Aerosols can penetrate the respiratory system to the alveolar level [3].
- Virus can remain viable "in aerosols up to 3 hours" [4].

D. Initial research has identified the presence of SARS-CoV-2 virus in the stools and conjunctivae secretions of confirmed cases [4]. Therefore, all secretions (except sweat) from patients with known or possible COVID-19, should be regarded as potentially infectious.

1.2 Incubation and infectious period

- The current official estimated incubation period for the novel coronavirus, SARS-COV-2 is 2-14 days (average 5 days) [7-10].
- The period can vary greatly among patients [10].
- In most cases, individuals are usually considered infectious while they have symptoms; how infectious individuals are, depends on the severity of their symptoms and stage of their illness [8].
- There have been case reports that suggest possible infectivity prior to the onset of symptoms [9, 10].
- The reproductive rate of the virus, or R0, measures the average number of secondary infections caused by a single case. the basic R0 is 3.28 and the median R0 is 2.79 [8-10].

1.3 Infection prevention and control precautions

Standard infection control precautions (SICPs) and transmission-based precautions (TBPs) must be used when managing patients with suspected or confirmed COVID-19 [10,11].

A. Standard infection control precautions (SICP) [10,11]

- Measures necessary to reduce the risk of transmission of infectious agents from both recognized and unrecognized sources.
- All staff, in all care settings, at all times, for all patients, should use SICP.

B. Transmission Based Precautions (TBP) definition [10,11]

- TBPs are additional infection control precautions required when caring for a patient with a known or suspected infectious agent e.g. SARS-CoV-2.
- The main routes of transmission of the COVID-19 infectious agent e.g. contact; droplet and airborne precautions categorize TBP.

N.B. If an aerosol generating medical procedure (AGMP) is being undertaken then airborne precautions are required in addition to contact precautions.

1.4 The principals of control measures are [10-11]

A. Early recognition or reporting of cases

B. Early assessment or triaging of cases

C. Implementing control measures, including:

- Maintaining separation in space and or time between suspected and confirmed COVID-19 patients
- Educating staff, patients and visitors about SICP and TBP
- Prompt implementation of TBP to limit transmission
- Staff members precautions:
  a) Staff with symptoms to stay at home and should not come to work until symptoms resolve.
  b) All staff should be screened for COVID-19 symptoms and undergo temperature checks on a routine basis.
  c) Staff should wear appropriate PPE during patient interactions.
- Restricting access of ill visitors to the facility

D. Planning and implementation of strategies for gush capacity

Reducing the risk of transmission of COVID-19 in the ORL and rhinology settings

2.1 Standard precautions [11-14]

- Hand hygiene: Perform hand hygiene by means of hand rubbing or hand washing [11].
- Respiratory and cough hygiene – 'Catch it, bin it, kill it' [12].
- Patient use of face masks [13].
- Adequate disinfection (at least two times/day): the following disinfectants and defined concentrations can be used on environmental surfaces to achieve a >3 log10 reduction of human coronavirus, and they are also effective against other clinically relevant pathogens in the health-care setting [1-11]:
  - Ethanol 70-90%
  - Chlorine-based products (e.g., hypochlorite) at 0.1% (1000 ppm) for general environmental disinfection or 0.5% (5000 ppm) for blood and body fluids large spills
  - Hydrogen peroxide >0.5%.

2.2 High risk outpatient procedures and aerosol generating medical procedure (AGMP) in ORL and related practice [11-14]

Aerosol generating procedures can usefully be separated into respiratory (respiratory or upper airway secretions) and surgical (blood and tissue fluids). Respiratory aerosol generating procedures is the critical form that generate more airborne viral particles and subsequently more airborne transmission of infection [13]. Aerosol generating procedures increase the risk of healthcare workers infection and should only be undertaken when necessary. Techniques that reduce coughing, positive pressure ventilation via an unsealed airway and contact exposure to respiratory secretions will reduce risk [13]. Where possible, aerosol-generating procedures should be undertaken in a single well-ventilated negative-pressure room with the doors shut [11-14]. In many settings, negative pressure is unachievable. Then rapid air turnover in the room is the ideal practice [13]. Rooms with a low rate of air exchange or with ventilation turned off should be avoided [11-14].

A. High risk outpatient procedures in ORL [11-14]

- Examination of the upper aerodigestive tract (nasal cavities, sinuses, oral cavity, pharynx, larynx).
- Interventional outpatient procedures on the upper aerodigestive tract, e.g. all endoscopies, nasal cautery, foreign body removal, biopsies, microbiology sampling.
- Any intervention to patients with airway modifications e.g. tracheostomy tube and laryngectomy patient's management.
- Emergency care to ENT patients: acute tonsillitis, quinsy, epistaxis, foreign bodies, complications of acute sinusitis, other airway emergencies.
- Otologic presentations do not involve the need for direct airway instrumentation but involve close proximity to patients and may provoke aerosol generation, e.g. coughing during micro-suction of ears.

B. Procedures currently considered potentially infectious (AGMPs) in COVID-19 patients [13] during ORL and rhinology surgical interference [11-14].

Nose and paranasal sinus procedures including endoscopic sinus and skull base surgery, airway procedures e.g. laryngotracheo bronchoscopy (LTB) and tracheotomy, ear surgery e.g. mastoid surgery, pharyngeal surgery e.g. adenotonsillectomy and neck surgery e.g. mucosal surgery (salivary glands surgeries).

C. Aerosol generating medical procedure (AGMP) in related practice [11-14]

- Intubation, extubation and related procedures, for example, manual ventilation and open suctioning of the respiratory tract
- Some maxillofacial and dental procedures (for example, high-speed drilling)
- Non-invasive ventilation (NIV); Bi-level Positive Airway Pressure Ventilation (BiPAP) and Continuous Positive Airway Pressure Ventilation (CPAP)
- High flow nasal oxygen (HFNO)

COVID-19 personal protection equipment (PPE)

3.1 Influencing factors

The interpretation for applying PPE is based on prevalence of COVID-19 in the community; availability and timeliness of COVID-19 testing; accuracy of COVID-19 test results; availability of PPE including N95 (or N99) masks, negative pressure rooms and powered air-purifying respirator (PAPRs) [14].

3.2 PPE components [14-21]

The following are the component of PPE:

A. Masks and Respirators [14-16]:

Surgical masks differ from respirators and classified by different governments based on their percentage of filtration and air leakage

- Surgical masks [14-16]:
  - Protect the wearer from their environment, essentially droplet precautions. Risk reduction by at least 80% is estimated [13].
  - They do not protect against airborne infectious [14].
  - Not generally reusable [15].
- A respirator [14-16]:

A respirator will be marked with its approval rating (e.g., N95, N100, etc.)

  - Fit testing necessary to guarantee appropriate sizing among available respirators [14]
  - Generally designed to prevent two-way transmission – filtering both inflow and outflow of air [15-16]
  - Protects against both droplets and aerosols [14-16]
  - For COVID-19, the most commonly used respirators are N95 and filtering face piece 2 (FFP 2) [16]
  - Respirators are generally reusable with a small degradation in efficacy, if sanitized appropriately [16]
- Powered air-purifying respirator (PAPR) [14-21]:
  - Actively circulates and filters air around an individual's face [14-21].
  - The most widely available PAPR hoods have variable protection for the neck and attach loosely beneath the chin, possibly requiring a secondary surgical mask / N95 respirator beneath the hood [21].
  - PAPR is indicated if available N95/FFP2 respirators do not provide complete seal during individual fit testing [21]

B. Fluid resistant gowns [14-21]:

If you are unsure about whether your gown is fluid resistant please wear a plastic surgical apron underneath.

C. Disposable gloves [15]

D. Eye protection [14-20]:

- Goggles:
  - Corrective eyeglasses and surgical loupes may not provide adequate protection from droplets [20]
  - Safety glasses with/without side protections may provide more droplet protection [14-21].
- Shield/Visor: Face shields may decrease contamination to masks and can be worn over eyewear [14-21]

E. Hood [16]

Offers head covering but does not offer respiratory protection.

3.3 Recommended PPE levels and scope of applications for ORL health care [11-22]

The scope of application each level of PPE can be determined (Figure 1). In addition, the needed component for each level of PPE can be shown in (Table 1) [11-22].

3.4 Best practice in use of PPE (Donning and Doffing) and hand hygiene [11-22]

- The procedure for putting on (Donning) and removing (Doffing) PPE should be tailored according to the specific

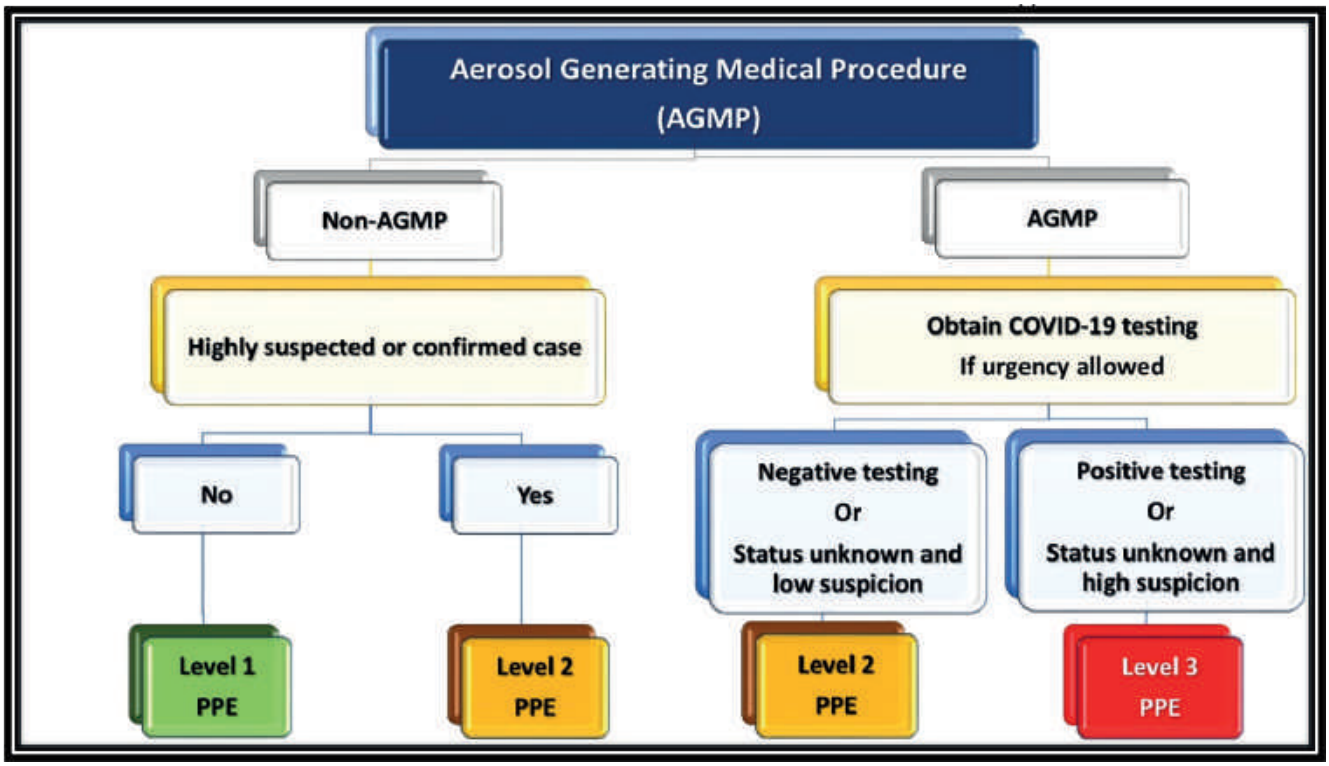

Figure 1. Indications algorithm of PPE level in ORL clinical practice: Suspected case: any of the following: Symptomatic Known exposure, Positive CT and laboratory investigations, Confirmed case: Positive COVID-19 testing.

level of PPE [22].

- Donning sequences are as followed [14-22]: hand hygiene (HH), followed by wearing gown then applying mask or respirator followed by goggles or face shield and lastly the gloves.
- Doffing sequences [14-22]: Remove all PPE before exiting the patient room except for the respirator. The following two examples show the order of PPE removal:
  - First example: Gloves- HH-goggles or face shield-HH-gown-HH-mask or respirator then HH.
  - Second example: Gown-gloves-HH- goggles or face shield-HH- mask or respirator then HH.

Practice in Outpatient Clinic (OPC)

4.1 Criteria of practice [11-22]

- Management before office attendance [11-22]:
  - Depends mainly on virtual clinics, which provide a direct contact to a named surgeon by video link, email or telephone.
  - When the patient is asking for an appointment, apply screening questions e.g. exposure to contacts with COVID-19 infection and symptoms of COVID-19. If positive, ask him for home quarantine for 14 days.
  - When the patient attends the clinic, screen the patients at the reception. Fever screening, screening questionnaire include exposure to contacts with COVID-19 infection and symptoms of COVID-19 using FTOCC criteria: Fever, Travel history, Occupational exposure, Contact history and Clustering phenomenon) ± pulse oximetry.
  - If a case of COVID-19 is suspected or confirmed, tell the patient to stay home, separate himself from other people, monitor his/her symptoms, look for emergency warning signs (trouble breathing, persistent chest pressure, confusion and bluish face and lips) and to seek emergency COVID-19 medical care. If no suspicious in COVID-19, the patient can proceed to OPC.
  - All health workers must wear adequate PPE.
- Outpatient room settings [11-22]:
  - The doctor's office will be relieved of everything lying around and unnecessary e.g. Excess paper products, supplies, and equipment.
  - Only the necessary staff should be present.
  - Develop and follow equipment and room cleaning protocols.
- Management at OPC Office [11-22]:
  - The patient's seat should be placed at a distance from the practitioner beyond 2 meters.
  - Avoid all unnecessary examinations or procedures.
  - Consultant input should be sought to determine the need for any examination, procedure or intervention.
  - Consider risk procedures:
    - Limit atomizer and nebulizer, ear suction or wash use

Table 1. PPE levels and its components during protection from COVID-19 in ORL practice.

Level 1 PPE	Level 2 PPE	Level 3 PPE
- Surgical mask - Isolation gown - Eye protection - Gloves	- N95 respirator - Eye protection (Face shield or googles) - Head cover including the neck - Double gloves - Disposable fluid repellent gown	- PAPR if available - If not available: N99 mask Or N95 with 2nd surgical mask - Face shield & goggles - Hood - Double gloves - Double disposable fluid repellent gowns

as much as possible as they make AGMP
- In high risk procedures and AGMP consider higher PPE precautions and safety instructions

- In all the practice of OPC in ORL, audiovestibular medicine or phonetics:
  - It is necessary to change high touch options to alternative low- or no-touch options for delivering care.
  - A less controlled environment with fewer tests could suffice
  - If a distance for the service is less than 2 meters e.g. otoscopy:
    - Contact time and appointment is minimized
    - Maximize distance as possible
    - Essential components only to be done
- Instructions for patients [11-22]:
  - Patients and accompanying persons must wear a surgical mask.
  - Consider limiting individuals accompanying the patient.
  - At registration and waiting area, a line with 2-meters distance.
  - Sterilize the patient's hands.
- Instructions for the rhinology doctors [11-22]:
  - Level 1 PPE (If appropriate PPE is not available then examination is not performed irrespective of the acuity of the situation).
  - Even during the history taking, doctors should wash either hands with soap between each consultation and disinfect the hands with alcohol.
  - After the clinical examination of each patient, he/she must remove at least his/her gloves.

4.2 When to suspect a case of COVID-19

WHO updates the Global Surveillance for human infection with coronavirus disease (COVID-19) document which includes case definitions [1, 24].

Suspect case [1,24,26,27,28]:

A. A patient with acute respiratory illness (fever and at least one sign/symptom of respiratory disease, e.g., cough, shortness of breath), AND a history of travel to or residence in a location reporting community transmission of COVID-19 disease during the 14 days prior to symptom onset.

OR

B. A patient with any acute respiratory illness AND having been in contact with a confirmed or probable COVID-19 case in the last 14 days prior to symptom onset;

OR

C. A patient with severe acute respiratory illness (fever and at least one sign/symptom of respiratory disease, e.g., cough, shortness of breath; AND requiring hospitalization) AND in the absence of an alternative diagnosis that fully explains the clinical presentation.

OR

D. Any case that have at least two of the following clinical features [25-35]:

- Fever and/or acute respiratory symptoms and/or hyposmia
- Imaging characteristics CT (if not available) plain x-ray (ground glass appearance of lower lobes of both lungs)
- Total leucocytic count (which had leucopenia or normal count) with lymphocytopenia.

Confirmed case [1, 24]

A person with laboratory confirmation of COVID-19 infection, irrespective of clinical signs and symptoms.

4.3 Hyposmia and hypogausia in COVID 19 cases [6,30-35]

- Post-viral anosmia is one of the leading causes of loss of sense of smell in adults, accounting for up to 40% cases of anosmia [30].
- Viruses that give rise to the common cold are well known to cause post-infectious loss, and over 200 different viruses are known to cause upper respiratory tract infections [32].
- In Europe 85% patients with mild to moderate symptoms reported olfactory and gustatory dysfunction [6-34].
- Patients with hypogeusia, hyposmia, and no history of ENT disorders had the highest sensitivity (42%) and specificity (95%) for COVID-19 [34].
- Given the potential for COVID-19 to present with anosmia and recent studies with beneficial effect of dexamethasone in COVID-19: using corticosteroids is a matter for clinical judgment [35].
- There is potential that if any adult with anosmia (but no other symptoms) to be asked to self-isolate for seven days, in addition to the current symptom criteria used to trigger quarantine [6,30-36].

4.4. Pre-existing medical conditions (comorbidities)

Patients who reported no pre-existing ("comorbid") medical conditions had a case fatality rate of 0.9% [8,27]. The death rate

Table 2. Comorbidities in COVID-19 and its related death rate.

Pre-existing condition	Death rate confirmed cases	Death rate all cases
Cardiovascular disease	13.2%	10.5%
Diabetes	9.2%	7.3%
Chronic respiratory disease	8.0%	6.3%
Hypertension	8.4%	6.0%
Cancer	7.6%	5.6%
no pre-existing conditions		0.9%

with comorbidities is shown in (Table 2) [25,27].

4.5 Practicing outpatient flexible/rigid upper airway endoscopy in COVID 19 pandemics

- Indications:
  - Delay the procedure until COVID testing is undertaken and status known. If test is not available consider it as COVID-19 positive [26].
  - Office-based biopsy, injection, laser, or other procedures should be delayed if possible [22].
- Circumstances [22,26]:
  - Follow PPE guidance [22,26,37-40].
  - Few staff to be present as possible [22].
  - It should be undertaken in a dedicated room [26,37- 39].
  - We can use disposable sheath cover, disposable endoscopes when available. In addition, we can use one-way endoscopic port retrofitted to a surgical mask to help in reducing droplet dispersion during nasal endoscopy. Therefore, any coughs or sneezes because of the endoscopy will be within the mask. In addition, we can undertake the procedure from behind the patient.
- Procedural guidelines [14,22,26,37-39]:
  - Patient's nasal cavity and pharyngeal mucosa should be anesthetized to reduce the cough and sneezing reflexes [22, 40].
  - Gel type topical anesthetics and/or soaked cotton pledges rather than sprays should be used to minimize aerosol production.
  - The smallest diameter scope should be used to reduce the likelihood of coughing and sneezing [26].
  - Endoscopy should be carried out utilizing a video monitor [26,40].

4.6 Drug prescription in ORL related diseases in COVID 19 suspected /confirmed cases

Table 3 shows different types of drugs used in ORL practice [41-43] and the related recommendations.

Practice in emergency sittings

- Determine the urgency and related circumstances to the procedure [30]:
  - The urgency of a specific surgical interventions is determined by [26-30]:
    - The clinical presentation
    - Potential morbidity
    - Independent surgical judgments
    - The availability of appropriate resources
  - Related circumstances should be determined [26-30]:

Table 3. Recommendations for drugs prescription in ORL related diseases in COVID 19 suspected /confirmed cases.

Drug name	Recommendations	Remarks
Inhaled (nasal, bronchial) corticosteroids	• Can be continued in allergic rhinitis at the recommended dose. • Stopping local corticosteroid is not advised.	Paucity of data professional opinions [40]
Non steroidal anti-inflammatory drugs (NSAID) e.g. Ibuobrofen	WHO does not recommend against use A total of 73 studies were included Effects of NSAIDs on the risk for ischemic and haemorrhagic stroke and myocardial infarction in adults with acute respiratory infections are unclear. Most studies report that no severe adverse events occurred, or that only mild or moderate adverse events were observed. There was no evidence regarding the effects of NSAID use on acute health care utilization, explicit quality of life measures, or long-term survival.	WHO scientific brief 19 April 2020 [41,42]
Systemic corticosteroids	Some evidence that corticosteroids may be beneficial if utilised in the early acute phase of infection, however, conflicting evidence from the World Health Organisation surrounding corticosteroid use in certain viral infections means this evidence is not conclusive. Better to determine the exact phase of the disease • Stage I: Administration of steroid during the early infection could increase viral replication and perhaps delay development of adaptive immunity. • Stage II: Low-dose steroid administration during the pulmonary phase might be expected to be beneficial (by blunting the severity of inflammation). • Stage III: For those patients who develop a marked hyper-inflammation phase, low-dose steroid might be inadequate to treat this. Higher doses of steroid or targeted immunosuppressives (e.g. tocilizumab) could be necessary to treat established hyper- inflammation.	Review article [42,43]

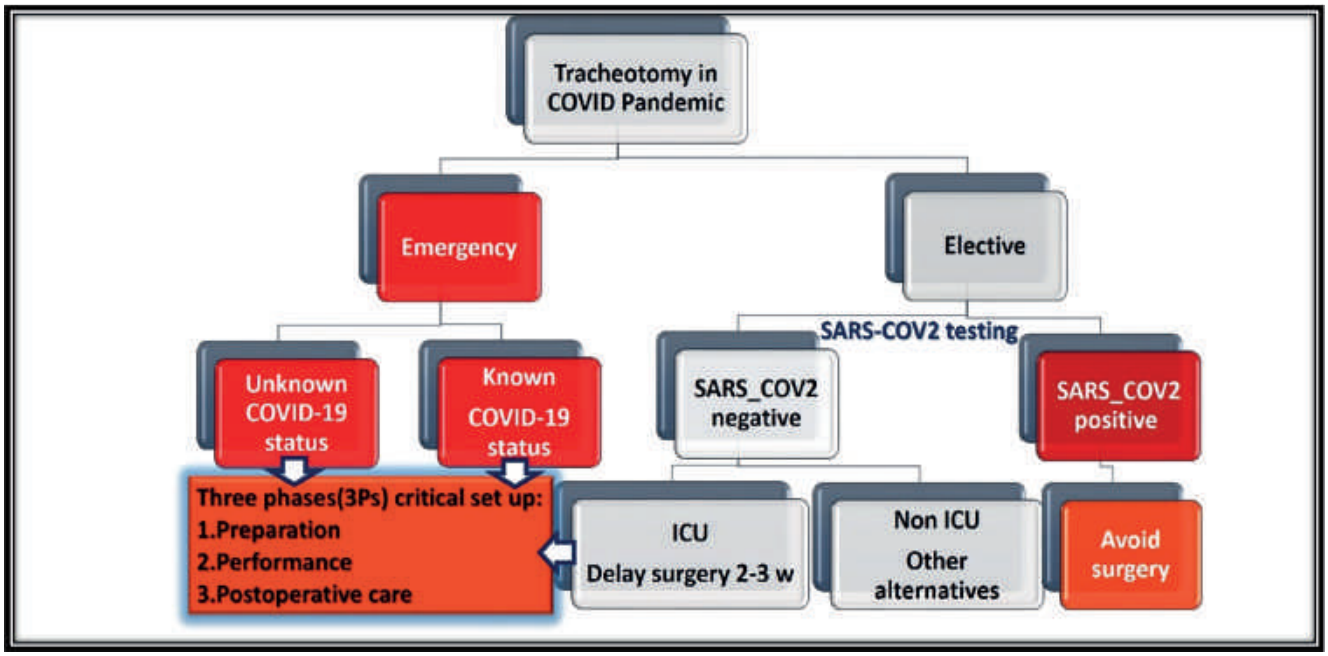

Figure 2. Tracheotomy decision making during COVID-19 pandemie. ETI: Endotracheal intubation, ICU: Intensive care unit.

- Institutional policies
- Regional COVID-19 prevalence
- Facility capacity issues
- PPE availability
- COVID-19 testing availability

- Emergency surgery should be led by the most experienced member of the surgical team available [26].
- The decision must be made jointly with the anesthetic team taking into account the likely need for intensive care unit (ICU) and its availability [26].
- PCR testing is mandatory preoperatively. If not available consider it as Covid-19 positive in all its dealing with full Type 3 PPE [30].

5.1 Tracheostomy [44-46]

- A tracheostomy is a high-risk procedure and most certainly is an (AGMP).
- Decisions regarding the requirement for tracheostomy (Figure 2) in critically ill COVID-19 patients should not be taken lightly, balancing the risks and burdens to both patients and staff [26].
- Whether a percutaneous tracheostomy is less aerosol generating than a controlled open tracheostomy is debatable and the evidence is limited.
- When considering tracheostomy three phases (3P) critical set up is important [45,46]:
  - 1. Preparation phase [44-46]: with adequate levels of PPE and adequate size non fenestrated cuffed tracheostomy tube and negative pressure OR.
  - 2. Performance: [44-46]
    - Anesthesia checkup: Inform anesthetist of readiness to open trachea, confirm paralysis and pre-oxygenate with Positive end-expiratory pressure (PEEP) then stop ventilation and turn off flows.
    - Tube advancement: Consider clamping endotracheal tube (ETT), then advance cuff beyond proposed tracheal window and hyperinflate the ETT cuff.
    - Tracheal Fenestra: Create tracheal window, turn off flows with open APL valve, consider clamping ETT, deflate ETT cuff and draw it back proximal to the tracheal window under direct vision. Ensure sufficient window size to allow easy insertion of cuffed, non-fenestrated tracheostomy tube without injury to cuff.
    - Secure connection: Immediately inflate tracheostomy tube cuff and make heat and moisture exchanger (HME) circuit.
  - Postoperative tracheostomy care [44-46]: HME, closed suction circuit, do not deflate the cuff, do not change tube and delay change of dressing.

5.2 Epistaxis [47]:

- PPE: same level used for nasal endoscopy e.g. level 2: gown, gloves, FFP3 mask, visor, hat [26].
- Surgical Intervention: Avoid intervention unless necessary. Manage all patients as if COVID-19 positive [26].
- Start by inserting unilateral bioresorbable dressing (e.g. Nasopore or FloSeal) [47].
- If bleeding continues use silver nitrate cautery ± alternative non-packing technique [47].
- If bleeding persists use unilateral non-absorbable nasal

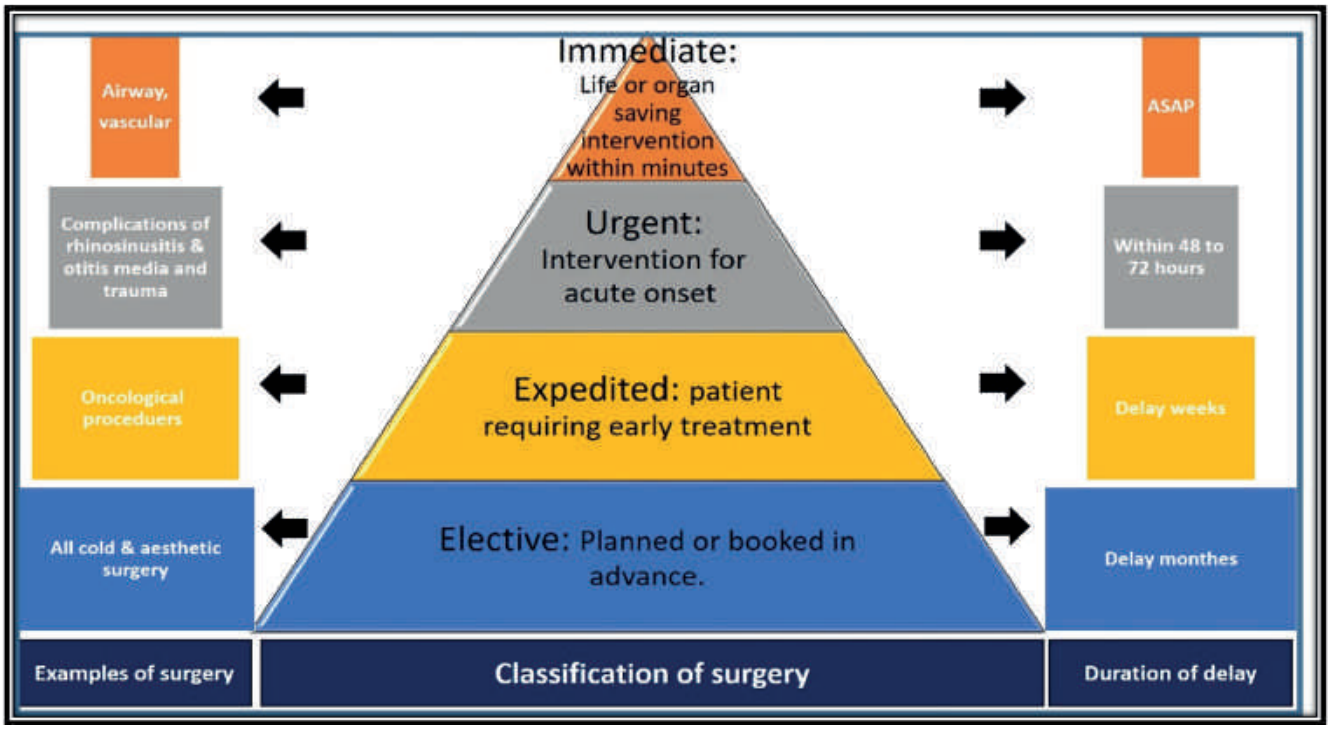

Figure 3: Classification of different types of ORL surgery according to its urgency (National Confidential Enquiry into Patient Outcome and Death (NCEPOD) classification) and its possible delay time with examples.

packing (e.g. Rapid Rhino) [47].

- Do not admit except in posterior epistaxis with posterior nasal packing
- Decrease follow up visits [47].

5.3 Microlaryngoscopy and bronchoscopy (MLB) and oesophagoscopy [48]

- Important considerations
  - Fifteen percent of pediatrics COVID positive cases are asymptomatic while 25% can present with features of an upper respiratory tract infection [48]. Also, special syndrome like Kawasaki disease can be present in positive cases.
  - Asymptomatic pediatrics patients have high viral load [48].
  - Both procedures are high-risk and AGMP [48].
- Recommendations
  - Only urgent cases should be performed e.g. foreign bodies with witness and CT chest must be done before the decision to operate [48].
  - All patients should be treated as COVID-19 positive with Level 3 PPE or Powered Air Purifying Respirator (PAPR) if fit test of the respirator is not achievable [26].
  - Jet ventilation procedures pose a particularly high risk and should be performed only under absolute necessity and with appropriate PPE, preferably in a negative-pressure room [26].
  - Procedural time should be kept to a bare minimum with an expert provider performing the case [48].

Practice of surgery during COVID 19 pandemic

6.1 General surgical rules [49]

- Schedule the procedure:
  - Shift inpatient diagnostic and surgical procedures to outpatient settings, when feasible [11].
  - When it comes to defining surgical emergencies, it would be useful to bear in mind the (National Confidential Enquiry into Patient Outcome and Death (NCEPOD) classification of [49]:
    - Immediate: Life or organ saving intervention within minutes of decision to operate
    - Urgent: Intervention for acute onset or a clinical deterioration of potentially life-threatening conditions within hours of decision
    - Expedited: patient requiring early treatment not immediate threat to life or organ: within days of decision to operate.
    - Elective: Planned or booked in advance. Timing to suit patient, hospital and staff.
- Review all scheduled elective procedures with a plan to minimize, postpone or cancel scheduled operations according to NCEPOD (Figure 3), endoscopies and other invasive procedures as necessary.
- Reducing the number of personnel in the OR with ade-

quate degree of PPE [11]

- If an operative procedure involving the mucosa of the head and neck is planned, the following considerations are recommended [11-24]:
  - COVID-19 Status: If possible, determine the COVID-19 status of the patient beforehand [11-24].
  - Operative procedures:
    - All elective procedures especially for COVID-19 test positive should be postponed to minimize this theoretical risk as much as possible [11-24].
  - Operating room setting:
    - It should be performed in a designated operating room with negative pressures [13].
    - It should be carried out in a single room [11].
    - Room ventilation will clear the viral aerosols quickly. Each 'air exchange' removes approximately 63% of the virus. After two exchanges, there is 14% and after five air exchanges <1% of the original viral load in the room, respectively [13].
    - Possible or confirmed cases of COVID-19 should be placed at the end of the list where feasible [24].
    - Limit the number of personnel in OR [13].
  - Needed level of PPE: Determine the exact needed level of PPE for all staff [11-24].
  - Anesthesia:
    - Intubation and extubation need coordination with the anesthesia team [11,13].
    - It is advisable that during intubation and extubation that all nonessential staff to leave the room and only return after the airway is secured [11,13].
  - Patient transport protocol [26].

6.2 Rhinology and skull base surgery

Circumstances:

- Endonasal AGMPs theoretically present a higher risk of viral exposure than intubation due to the aggressive disruption of potentially virus-containing mucosa [11].
- The duration of exposure for these procedures is also longer than during intubation [50].

Recommendations [50]:

- Classifications of the rhinology surgery operations according to (NCEPOD) classification can allow limiting unnecessary surgery (Figure 3).
- Informal UK and US advisories have recommended the use of powered, air-purifying respirators (PAPRs) for all operating room staff while conducting high-risk AGPs, and have suggested that an N95 mask and eye protection may not offer full protection [50].
- High risk powered devices better to be not used (e.g., drills, microdebriders, saws) or ultrasonic shears, such as the Harmonic scalpel (Ethicon) or Thunderbeat scalpel (Olympus) [26].
- Avoid the use of nasal packing, because removal in the postoperative phase may induce coughing or gagging [50].
- Treat neurosurgical patients who cannot be safely delayed through a transcranial approach as possible, or through the head or skull, instead of approaching through the nose [26,50].

6.3 Otology

- A mastoid as a part of respiratory mucosa has SARS-CoV-2 viral particles. Therefore, classic suction and mastoidectomy with a drill presents a great danger for aerosol¬izing particles in the operating theatre [26.51].
- Classifications of the operations according to (NCEPOD) classification can allow limiting unnecessary surgery with the same principles as in Figure 3 [51]:
  - Immediate: As Soon As Possible (ASAP)
    - Life threatening complications of ear disease
  - Urgent: Within 48 to 72 hours
    - Complications of cholsteatoma
    - Barotrauma with evident perilymph fistula and SNHL
    - Trauma to Facial nerve, Pinna
  - Expedited: Delay up to 4 weeks
    - Otologic Neoplasia; shared decision of multidisciplinary teams
  - Elective: Delay up to 12 weeks
    - Chronic suppurative otitis media without complications
    - Hearing restorative operations
- Set up of operating equipment:
  - Drilling should be kept to a minimum. If possible, the surgeon should continue to wear eye protection and full level 3 PPE [26].
  - A rigid otoscopy with camera may be used instead of the microscope, accepting the limitations of single-handed surgery if the PPE equipment makes use of the microscope difficult [26].
  - For acute mastoiditis with friable bones, curettage should be carried out rather than mastoid drilling, if possible [51].
  - If drilling is required, slowing drill speed, reducing irrigation volume and using effective suction [26,51].

6.4 Head & neck surgery

Local contingency plans should be made immediately for prioritization of surgical and non-surgical treatment [52-53]:

- Cessation of all but the most urgent thyroid cancer surgery [52-53].
- Prioritize day case surgery where feasible (e.g. wide local excision without reconstruction) [52].
- Restriction/cessation of surgical procedures requiring post-

operative ICU care [53].
- Give consideration to reducing the length of surgery when possible e.g. use of local/pedicled flaps rather than free flaps [52].

Non-surgical examples
- Restriction/cessation of chemoradiotherapy in favor of radiotherapy alone [52-53].
- Consideration of hypo-fractionated radiotherapy courses in appropriate patients [53].
- Delay commencement of palliative chemotherapy in asymptomatic individuals [52].

Reopen process after the pandemic [54-56]

- Pre-opening planning will be vitally important and ensure the followings [54-56]:
  - Sustained evidence of a downward trend in new cases and fatalities
  - Well supplied testing network
  - A public health system for surveillance and contact tracing
  - Well-resourced health care workforce
- Use a staged tactic based on COVID-19 area of practice circumstances [54,55] with the following considerations:
  - Number of infections, by population and there should be a sustained reduction in the rate of new COVID-19 cases in the relevant geographic area for at least 14 days.
  - Trends in hospitalization and ICU beds
  - Demographics of the local population
  - Local health system capacity
- COVID-19 testing within a facility [56]:
  - Facilities should use available testing to protect staff and patient whenever possible and should implement a policy addressing requirements and frequency for patient and staff testing.
- Safety precautions for practices and facilities [54,56]:
  - Educate patients about your safety protocols and motivate them to help and limit individuals accompanying patients
  - Physician office space and workflow should be structured to encourage physical distancing: check in by phone, limit numbers, schedule patient's attendance by time
  - Shift to the use of tele-health and a tele-triage program
  - Facilities should not resume elective surgical procedures until they have adequate PPE and medical surgical supplies appropriate to the number and type of procedures to be performed.
  - Practices should require everyone who enters the practice – both patients and staff – to wear an appropriate face covering.
  - Pre-screen patients for possible COVID-19 symptoms.
  - Practices should follow guidelines for extended use and reuse of PPE.
  - Practices should have extra attention for signs of depression and stress in the medical team and staff.
  - A policy for workers who have contracted COVID-19 with 14-day quarantine.
  - Implement strict sterilization procedures and disinfections.
  - Consider completing a risk management self-assessment.
- Case Prioritization and Scheduling [55]: establish a prioritization policy committee to develop a prioritization strategy for surgery.
- Anticipate changes in patient expectations [54].
- Reevaluate and reassess policies and procedures frequently [56].
- Establish confidentiality/privacy for all patients information [54].
- Understand new medico-legal aspects related to COVID-19 clinical practice [55].

Conclusions

The present review and clinical experiences will be useful to ORL professionals in general and rhinologists in particular regarding safe practice during the COVID-19 pandemic and after the reopening process. Adequate adherence to safety measures can maintain the least morbidity and mortality in ORL teams. Adequate steps for reopening can prevent a second wave of the epidemic that can affect ORL specialty medical teams.

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