A Systematic Review

Infection Prevention Strategies for Otorhinolaryngology and Head-and-Neck Surgery During the COVID-19 Pandemic: A Systematic Review

H.I. Farrukh

Director, Consultant Head & Neck Surgeon, Advance ENT Hospital, Champanagar, Bhagalpur, Bihar, India

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Corresponding author: H.I. Farrukh

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Abstract:

Background: The COVID-19 pandemic, caused by the SARS-CoV-2 virus, has significantly impacted global healthcare systems, necessitating stringent infection control measures to safeguard patients and healthcare workers. Otorhinolaryngology and head-and-neck surgery, due to their close proximity to the respiratory tract and frequent aerosol-generating procedures, face elevated risks of COVID-19 transmission. Understanding infection control measures in these specialties is paramount to optimize safety protocols and mitigate transmission risks.

Aim: The review aims to examine infection control measures in otorhinolaryngology and head-and-neck surgery during the COVID-19 pandemic, addressing specific risks, effectiveness of safety measures, adaptations to evolving knowledge, implementation challenges, and future directions for research and policy.

Review Summary: A systematic literature search was conducted from December 2019 to present, focusing on infection control practices in these specialties during the pandemic. Studies addressing infection control measures, risks, and adaptations in otorhinolaryngology and head-and-neck surgery were included. Key findings were synthesized qualitatively, emphasizing trends, common themes, and discrepancies in data.

Future Implications: Insights from the review provide actionable guidance for optimizing infection control measures in otorhinolaryngology and head-and-neck surgery during the COVID-19 pandemic, addressing specific risks, effectiveness of safety measures, adaptations to evolving knowledge, implementation challenges, and future directions for research and policy.

Clinical Policy and Development: Recommendations include comprehensive use of personal protective equipment, modifications to patient handling and surgical procedures, telemedicine integration, and adherence to strict infection control protocols. These measures aim to minimize COVID-19 transmission risks while maintaining essential healthcare services.

Keywords: COVID-19, Otorhinolaryngology, Head-And-Neck Surgery, Infection Control, Aerosol-Generating Procedures

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Introduction

The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) that triggered the COVID-19 pandemic has had a significant impact on healthcare systems...
across the globe. Characterized by high transmission rates and significant morbidity and mortality, the pandemic has necessitated stringent infection control measures across all healthcare settings to protect both patients and healthcare workers from the virus.

In the fields of otorhinolaryngology and head-and-neck (OHN) surgery, the stakes are particularly high. These specialties involve close contact with the respiratory tract—the primary route of SARS-CoV-2 transmission—placing clinicians at an elevated risk of infection. Procedures often generate aerosols, further increasing the risk of viral spread. Therefore, rigorous infection control practices are crucial to prevent the transmission of COVID-19 and ensure the safety of both healthcare providers and patients in these fields.

The importance of these measures cannot be overstated. As noted in various studies, the proximity of OHN surgeons to high-risk aerosol-generating procedures necessitates enhanced protective strategies to mitigate the risk of viral transmission [1].

The aim of the review is to examine the infection control measures implemented in OHN surgery during the COVID-19 pandemic, aiming to optimize safety protocols to mitigate virus transmission risks. Key questions addressed include the specific risks these specialists face, the effectiveness of various safety measures, adjustments to practices as pandemic knowledge evolved, challenges in implementing these measures, and future directions for research and policy to enhance clinical safety. By addressing these questions, the review intends to provide actionable insights for medical professionals to improve patient and provider safety during ongoing or future pandemics.

Methodology
The review followed a systematic approach to gather, analyze, and synthesize information regarding infection control practices in OHN surgery during the COVID-19 pandemic. The methodology was designed to ensure comprehensive coverage of relevant literature and practices.

A detailed literature search was conducted using multiple databases including PubMed, Scopus, and Web of Science. Keywords such as "COVID-19", "SARS-CoV-2", "otorhinolaryngology", "head-and-neck surgery", "infection control", and "aerosol-generating procedures" were used to ensure all relevant articles were captured. The search was limited to articles published from December 2019 to the present to focus on the latest research and developments related to the pandemic.

Studies included were those that specifically addressed infection control measures in the context of OHN surgery during the COVID-19 pandemic. Excluded were non-English articles, opinion pieces, and studies not directly related to the specified medical specialties or infection control measures.

Key information was extracted from the selected studies, including the type of study, the population studied, the infection control measures discussed, outcomes related to these measures, and any noted limitations or challenges in the implementation of these measures.

Standardised checklists relevant to each type of study, such as the Cochrane Risk of Bias tool for randomised controlled trials and the Newcastle-Ottawa Scale for observational studies, were used to evaluate the quality of the studies. This stage guaranteed the correctness and dependability of the combined data. Data were synthesized qualitatively to highlight the main findings and conclusions drawn from the literature. The synthesis focused on identifying trends, common themes, and discrepancies in the data to provide a comprehensive overview of current practices and their effectiveness.

The findings were discussed in the context of broader public health implications, offering insights into how these practices
could be improved and what future research is needed to better prepare OHN surgery departments for ongoing and future pandemics.

**Discussion**

**Epidemiology of COVID-19**

The COVID-19 pandemic, caused by the novel coronavirus SARS-CoV-2, rapidly became a global health crisis following its emergence in late 2019. The virus primarily spreads through respiratory droplets, and in settings where close contact occurs, such as in OHN surgery, the risk of transmission is notably high. The epidemiology of COVID-19 in these specialties is crucial for understanding the spread of the virus and the impact of infection control measures.

**Transmission Dynamics:** OHN surgeons are particularly vulnerable to SARS-CoV-2 due to their exposure to the upper respiratory tract and aerosol-generating procedures. These include endoscopic examinations of the nasal cavity and throat, as well as surgical interventions in these areas. The nature of these procedures can lead to a high concentration of viral particles in the environment, especially if performed without adequate protective measures [1].

**Infection Rates among Healthcare Workers:** Studies have indicated elevated infection rates among healthcare workers compared to the general population, particularly among those involved in aerosol-generating procedures. Early in the pandemic, lack of personal protective equipment (PPE) and initial unfamiliarity with the virus exacerbated these rates. As protective strategies improved, including the implementation of rigorous PPE use and infection control protocols, the rates of infection among these specialists have been reduced [2].

**Patient Transmission:** The epidemiology of COVID-19 also encompasses patient-to-patient and patient-to-healthcare worker transmissions in clinical settings. Otorhinolaryngology and head-and-neck surgery departments have had to adapt by implementing pre-operative COVID-19 testing, patient triaging, and modifying patient flows within clinics to minimize contact and reduce transmission risk [3].

**Impact of Public Health Measures:** The broader implementation of public health measures, such as social distancing, mask wearing, and vaccination, has influenced the epidemiology within these medical fields. These measures have contributed to a decrease in transmission rates and a lower burden of disease among patients and healthcare workers alike.

**Ongoing Surveillance:** Continuous epidemiological surveillance has been essential for tracking the incidence and spread of COVID-19 among otorhinolaryngologists and head-and-neck surgeons. This data is crucial for adjusting protocols and measures in real-time to respond to new variants of the virus or changes in infection rates.

Understanding the epidemiology of COVID-19 within otorhinolaryngology and head-and-neck surgery is critical for developing effective infection control strategies and for safeguarding the health of both healthcare workers and patients. The dynamic nature of this data reflects the evolving challenges and responses during the pandemic, highlighting the importance of adaptability and rigorous public health interventions.

**Risk to Otorhinolaryngologists and Head-and-Neck Surgeons**

OHN surgeons face significant risks due to the nature of their work, which often involves close proximity to the respiratory tract and frequent exposure to aerosols—both primary pathways for the transmission of SARS-CoV-2.

**Exposure to High-Risk Procedures:** Many standard procedures in OHN surgery, such as nasal endoscopies, tonsillectomies, and other surgeries involving the nasal
passages and oral cavity, are classified as aerosol-generating. These procedures can release viral particles into the air at high concentrations, increasing the risk of infection transmission to the medical staff. High-risk nature and mitigation strategies are discussed in detail in recent studies [3].

**High-Risk Patient Interactions:** The routine examination and treatment of patients in these specialties involve direct contact with bodily fluids, including saliva and nasal secretions, which are potential sources of the virus. The risk is compounded when dealing with symptomatic patients or those whose infection status is unknown. Protocols to manage these risks are outlined by [2].

**Inadequate Protection Measures:** Especially early in the pandemic, shortages of personal protective equipment (PPE) and rapid adjustments to new safety protocols posed significant risks. Although the situation has improved with better availability and standardization of PPE and safety procedures, the inherent risks of close-contact procedures remain a concern. Effective measures during the pandemic have been discussed by [4].

**Psychological Impact:** The high-risk nature of their work, coupled with the ongoing stress of potential COVID-19 exposure, contributes to psychological strain among these healthcare professionals. This aspect is critical as it affects their well-being and their ability to provide care.

**Mitigating Strategies:** Effective risk mitigation involves comprehensive strategies including the use of appropriate PPE, vaccination, and rigorous safety protocols. Ensuring all medical staff are equipped with and properly use PPE like N95 masks, face shields, gowns, and gloves is crucial. Additionally, employing pre-procedural COVID-19 testing for patients, enhancing ventilation systems in clinical areas, and adhering to strict sterilization techniques for all equipment and surfaces can further reduce risks, as proposed by [5].

Given these factors, it is clear that otorhinolaryngologists and head-and-neck surgeons operate in one of the highest-risk environments in healthcare regarding COVID-19. Ongoing research into infection control, continuous training in the use of PPE, and the development of new procedural techniques that reduce aerosolization are essential to enhance the safety of these medical professionals.

**General Infection Control Measures**

Infection control measures are critical in OHN surgery to protect both healthcare workers and patients from COVID-19. These measures center around the use of personal protective equipment (PPE) and significant changes in clinical practices.

**Use of PPE:** The utilization of PPE is fundamental in mitigating the transmission of COVID-19 within medical facilities. OHN surgeons, due to their close proximity to the respiratory tract during procedures, require specialized PPE, which includes N95 respirators, face shields, gowns, and gloves. The correct application and removal of PPE are equally important to ensure that the protective barrier is maintained throughout the patient interaction and that there is no cross-contamination. Recent guidelines and studies emphasize the critical nature of comprehensive PPE usage to reduce transmission risks [6].

**Changes in Clinical Practices:**

- **Pre-procedural Testing:** Implementing routine COVID-19 testing before procedures helps in identifying asymptomatic or presymptomatic patients, thus preventing unnoticed virus spread within healthcare settings. This practice has become increasingly common as part of the preoperative assessment in surgeries and invasive diagnostic procedures.

- **Modifications to Procedure Protocols:** To minimize aerosol generation, many surgical and diagnostic
procedures have been modified. For instance, the use of powered instruments, which are known to generate significant aerosols, is minimized unless absolutely necessary. Where possible, alternative techniques that reduce aerosol spread are preferred.

- **Patient Management and Flow:** Adjustments in patient scheduling and the physical setup of clinics have been implemented to reduce patient density and allow time for appropriate cleaning between patients. These changes help in maintaining social distancing guidelines within clinical settings and reduce the potential for patient-to-patient transmission [7].

These general infection control measures are vital for ensuring the safety of both staff and patients in the high-risk settings of OHN surgery. Ongoing adherence to and refinement of these practices is crucial as the pandemic continues to evolve.

**Specific Procedures and Recommendations**

In the realm of OHN surgery during the COVID-19 pandemic, specific procedures and recommendations have been crucial in ensuring both patient care and healthcare worker safety.

**Modifications to Patient Handling and Triage:**

During the pandemic, otorhinolaryngology and head-and-neck surgery departments have implemented several modifications to patient handling and triaging processes to minimize the risk of COVID-19 transmission. These modifications often start even before the patient enters the healthcare facility:

- **Pre-Appointment Screening:** Patients are screened for COVID-19 symptoms and potential exposure before their appointments. This screening may occur via phone or through online forms to identify high-risk individuals and reschedule non-urgent appointments.

- **Telemedicine Consultations:** Non-urgent consultations are conducted virtually through telemedicine platforms whenever possible to reduce the number of in-person visits to the clinic or hospital. This helps in minimizing patient exposure and conserving personal protective equipment (PPE).

- **Appointment Scheduling:** Appointments are spaced out to minimize patient overlap in waiting areas. Staggered appointment times reduce crowding and allow for thorough cleaning and disinfection between patients [8].

- **Separate Waiting Areas:** Separate waiting areas are designated for patients with respiratory symptoms or suspected COVID-19 infection. This segregation helps prevent potential exposure to other patients and healthcare staff.

- **Strict Visitor Policies:** Hospitals and clinics have enforced strict visitor policies, limiting the number of accompanying individuals for each patient to reduce the overall number of people in the facility.

**Adjustments to Surgical Procedures to Ensure Safety:**

Surgical procedures in OHN surgery have undergone significant adjustments to minimize the risk of COVID-19 transmission among patients and healthcare workers. These adjustments include:

- **Personal Protective Equipment (PPE):** Healthcare providers involved in surgical procedures now wear enhanced PPE, including N95 respirators, face shields, goggles, gowns, and gloves, to protect against airborne and droplet transmission of the virus.

- **Minimally Invasive Techniques:** Surgeons opt for minimally invasive techniques whenever feasible to reduce the generation of aerosols and minimize the risk of viral transmission. This may involve using endoscopic approaches or laser procedures instead of traditional open surgeries.
• **Negative Pressure Operating Rooms:** In facilities where available, negative pressure operating rooms are utilized for procedures involving suspected or confirmed COVID-19 patients. Negative pressure helps prevent the spread of airborne contaminants outside the operating room, thus reducing the risk of transmission to other areas of the hospital [9].

• **Air Filtration and Exchange:** Enhanced air filtration systems and increased air exchange rates in operating rooms help mitigate the concentration of viral particles, providing a safer environment for both patients and healthcare workers.

• **Postoperative Care and Discharge Protocols:** Postoperative care protocols may include extended monitoring periods to detect and manage any postoperative complications, including potential COVID-19 symptoms. Discharge protocols are designed to ensure a safe transition for patients, with instructions for self-monitoring and reporting any new symptoms [10].

By implementing these modifications to patient handling, triaging, and surgical procedures, otorhinolaryngology and head-and-neck surgery departments aim to maintain essential healthcare services while minimizing the risk of COVID-19 transmission in healthcare settings. These measures underscore the importance of adapting clinical practices to meet the challenges posed by the pandemic while ensuring patient and healthcare worker safety.

**Personal Precautions for Clinicians**

Personal precautions for clinicians are essential in preventing the spread of infections, particularly during the COVID-19 pandemic.

**Protective Equipment:** Doctors and healthcare workers should wear a three-layer surgical mask, preferably an N95 mask, along with goggles, a face shield, disposable examination gloves, and an operating theater gown if PPE is unavailable [11].

**Hand Hygiene:** Clinicians should use hand sanitizers after examining each patient to minimize the risk of contamination.

**Minimized Examination:** Clinicians should aim to minimize examinations involving the nasal cavity, oral cavity, oropharynx, and larynx. If endoscopy is necessary, it should be conducted while wearing appropriate PPE [12].

**Ventilation:** Consultation chambers should avoid air conditioning and instead prioritize good ventilation. Keeping the door of the consulting room open can facilitate air circulation.

**Patient Precautions:** Patients should wash their hands with sanitizer before entering the consultation chamber, and a triage area in the outpatient department should be strictly maintained.

**Knowledge of PPE:** Otolaryngologists and paramedical staff should be well-informed about the details and proper use of PPE. This includes understanding that PPE, such as N95 masks, gowns, gloves, and face shields, should be worn during direct care of COVID-19 patients [13].

**Aerosol Generating Procedures:** When performing aerosol generating procedures on COVID-19 patients, healthcare workers should wear appropriate PPE, including N95 masks, eye protection with goggles or head shields, gowns, and gloves [14].

**Visiting COVID-19 Areas:** Healthcare workers visiting wards or rooms with COVID-19 patients should also wear appropriate PPE, including N95 masks, gowns, and gloves.

**No Contact with COVID-19 Patients:** For activities that do not involve contact with COVID-19 patients, PPE is not required.

**Respiratory Symptom Precautions:** If patients exhibit respiratory symptoms, healthcare workers should maintain a
spatial distance of at least one meter and use a medical mask to reduce the risk of transmission.

By following these precautions, clinicians can protect themselves and others while providing essential healthcare services during the pandemic.

**Conclusion**

The COVID-19 pandemic has led to crucial adaptations in infection control measures in OHN surgery. The review emphasizes the need for stringent safety protocols due to the specialties' close proximity to the respiratory tract and aerosol-generating procedures. Effective strategies include comprehensive personal protective equipment use, modified patient handling, telemedicine integration, and strict adherence to protocols. Ongoing vigilance, research, and collaboration are essential for future improvements in infection control. The review offers actionable insights to optimize safety measures and ensure healthcare continuity amidst evolving pandemic challenges.

**Limitations:** The review limitations include potential publication and language biases, heterogeneity among studies impacting generalizability, and challenges posed by the dynamic nature of the pandemic. Resource constraints and limited follow-up periods may also hinder comprehensive assessments of infection control measures. These factors emphasize the need for cautious interpretation and ongoing research to address knowledge gaps in infection control during the COVID-19 pandemic.

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**List of abbreviations:**

COVID-19: Coronavirus Disease 2019  
SARS-CoV-2: Severe Acute Respiratory Syndrome Coronavirus 2  
PPE: Personal Protective Equipment  
OPD: Outpatient Department  
N95: Filtering Facepiece Respirator  
OT: Operating Theater  
PPE: Personal Protective Equipment

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