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Pediatric Otolaryngology Divisional and Institutional Preparatory Response at Seattle Children's Hospital after COVID-19 Regional Exposure

Sanjay R. Parikh, MD[1,2], Randall A. Bly, MD[1,2], Juliana Bonilla-Velez, MD[1,2], John P. Dahl, MD, PhD, MBA[1,2], Sean S. Evans, MD[1,2], David L. Horn, MD, MS[1,2], Kaalan E. Johnson, MD[1,2], Scott C. Manning, MD[1,2], Henry C. Ou, MD, MA[1,2], Prasanth Pattisapu, MD[1,2], Jonathan A. Perkins, DO[1,2], and Kathleen C. Y. Sie, MD[1,2]

Abstract

Coronavirus disease 2019 (COVID-19) is a novel coronavirus resulting in high mortality in the adult population but low mortality in the pediatric population. The role children and adolescents play in COVID-19 transmission is unclear, and it is possible that healthy pediatric patients serve as a reservoir for the virus. This article serves as a summary of a single pediatric institution's response to COVID-19 with the goal of protecting both patients and health care providers while providing ongoing care to critically ill patients who require urgent interventions. A significant limitation of this commentary is that it reflects a single institution's joint effort at a moment in time but does not take into consideration future circumstances that could change practice patterns. We still hope dissemination of our overall response at this moment, approximately 8 weeks after our region's first adult case, may benefit other pediatric institutions preparing for COVID-19.

Keywords

pediatric otolaryngology, COVID-19, preparatory response, endoscopy

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Methods

Retrospective assessment of a quaternary children's hospital surgical division's response to coronavirus disease 2019 (COVID-19).

Setting

Established in 1908, Seattle Children's Hospital is a 400-bed freestanding academic teaching and research hospital located in Seattle, Washington. It serves as a quaternary referral center to the states of Washington, Wyoming, Alaska, Montana, and Idaho, serving an estimated combined population of 11 million and a pediatric population (<18 years) of 2.6 million. For this entire region, there are 16 fellowship-trained pediatric otolaryngologists, 10 of whom practice full-time at Seattle Children's Hospital.

COVID-2019 Context and Exposures

COVID-19 is an acute respiratory disease caused by the newly identified β-coronavirus SARS-CoV-2, or 2019 novel coronavirus. The COVID-19 pandemic has been recognized by the World Health Organization as an international public health emergency.[1] COVID-19 spreads primarily through the respiratory tract by droplets, secretions, and direct contact.[2] There is emerging evidence that procedures and examinations involving the upper aerodigestive tract are extremely high risk for transmission, making otolaryngologists a particularly vulnerable population.[3]

The first case of COVID-19 in the United States was announced on January 21, 2020, in the state of Washington. The first death in the United States was in Washington State on February 29, 2020. The earliest infections and deaths affected residents and workers in a senior living facility 12 miles east of Seattle. COVID-19 was declared a pandemic by the World Health Organization on March 11, 2020. However, the limited availability of testing affects our ability to determine the overall prevalence of COVID-19 infections. On March 4, 2020, the first public school system in the state was closed as a response strategy to mitigate exposures, and on March 11, 2020, almost all school systems

[1]Department of Otolaryngology–Head & Neck Surgery, University of Washington School of Medicine, Seattle, Washington, USA
[2]Division of Pediatric Otolaryngology–Head & Neck Surgery, Seattle Children's Hospital, Seattle, Washington, USA

Corresponding Author:
Sanjay R. Parikh, MD, Division of Pediatric Otolaryngology–Head & Neck Surgery, Seattle Children's Hospital, PO Box 5371, Seattle, WA 98145-5005, USA.
Email: sanjay.parikh@seattlechildrens.org

Table 1. Washington State COVID-19 Exposures and Deaths as of March 23, 2020, 3:07 PM.

Number of Individuals Tested		
Result	Number of Individuals Tested	Percentage of Tests
Negative	31,712	93
Positive	2221	7
Confirmed Cases/Deaths by Age		
Age Group	Percentage of Cases	Percentage of Deaths
<19	2	0
20-29	9	0
30-39	14	0
40-49	13	2
50-59	17	5
60-69	16	12
70-79	15	30
80+	14	50

Source: Washington State Department of Health.

were closed. Currently, there are greater than 2000 regional positive cases, but only 2% of these cases are in the pediatric population (**Table 1**).

Cumulative Response

There were several factors considered in determining the response to this pandemic. Initially, the response was directed at mitigating exposure to patients and their families. As the infection spread, it became clear that children were less likely to become severely ill from the infection. Hence, for pediatric caregivers, the focus shifted to protection of the health care workforce. This is particularly important in otolaryngology, where many procedures involve the upper aerodigestive tract, resulting in caregiver risk for exposure. Conservation of personal protective equipment (PPE) was also a significant strategic factor in decision making.

Hospital Traffic

All patients and providers are screened with COVID-19–related symptom questions and temperature assessment at all entry sites. Multiple sites of entry into the medical center were limited to permit screening at dedicated entrances. Our institution expanded its intensive care unit (ICU) criteria from 18 to 21 with the goal of level-loading care of younger adults from adult institutions to ours.

Triage of Surgical Cases

Elective surgical cases have been postponed. Only emergent and urgent cases are being performed. Examples of emergent otolaryngologic cases include management of severe airway obstruction, aerodigestive foreign body removal, soft tissue abscess drainage, complications of rhinosinusitis or otitis media, and posttonsillectomy hemorrhage. Cases are deemed urgent when postponement of surgery could negatively affect a child's overall health or developmental outcomes and a delay of 6 weeks could result in those outcomes being measurably worse. Examples of urgent cases include malignancies and complicated cholesteatoma. For nonemergent cases, all children are tested for COVID-19 to reduce the use of unnecessary personal protective equipment for COVID-negative cases.

Triage of Ambulatory Visits

Patients are individually screened by providers and categorized into 3 tiers:

Tier 1: Must be seen in person, clinical issue is urgent, and physical examination is essential
Tier 2: Appropriate for a telephone or telemedicine visit
Tier 3: Visit should be rescheduled

Telemedicine capabilities exist at our institution after being credentialed. We observed that in many instances, a phone call, coupled with photographs that the family sent in ahead of time, was effective for making an assessment and to determine accurate timing of if/when that patient needed to be seen in person. Multidisciplinary clinics such as craniofacial, hearing loss, thyroid, and vascular anomalies have continued to hold conference discussions (virtually) about patients previously seen. There is a wide variety of subspecialization within our group, and some diagnoses are more amenable to a telephone call than others. Taking that into account, a review of clinic tier categorization data across all providers showed that of 314 planned clinic visits over 10 days, 24% were kept as in-person visits (tier 1), 16% were converted to telephone (tier 2), and 60% were postponed (tier 3).

Provider Deployment

Our standard inpatient team consists of 1 attending physician, 2 fellows, 2 residents, and 1 nurse practitioner. In an effort to mitigate the risk, trainees were placed on a partial deployment schedule such that each trainee could be in the hospital 2 to 3 days per week.

In response to the COVID-19 pandemic, our current inpatient team consists of 1 attending physician, 1 fellow, 1 resident, and 2 nurse practitioners. Given the reduction in ambulatory clinic volume and surgical cases, we had the ability to identify a backup attending who is available to support the inpatient team (available within 30 minutes). All other teammates are available to be in the hospital within 60 minutes. In addition, 4 attending physicians reside less than a mile from the hospital and could readily mobilize to assist with acute emergencies. Twice-a-day teleconferenced huddles are carried out so teammates in the hospital and at home can review cases and provide input.

Trainees, nurse practitioners, or attending surgeons who develop any symptoms suggestive of viral infection are required to self-quarantine and obtain testing for COVID-19, following institutional policy.

Inpatient Operative and Endoscopy Procedures

Given the uncertainty of potential provider exposure to unknown carrier status of children with COVID-19, particularly in procedures associated with upper airway aerosolization, certain safety measures have been implemented. All operating room (OR) cases are currently being screened for COVID-19 with a turnaround time of less than 24 hours, using a drive-through testing process. In the event the urgency of a case does not allow for timely testing, the patient will be considered COVID-19 positive and the procedure will be performed in a negative-pressure room with strict isolation precautions that include N95 masks or a controlled air-purifying respirator (CAPR). Due to the potential high risk of viral transmission in certain procedures (eg, aerodigestive or rhinologic surgery) and to account for false-negative results, these are being done in negative-pressure rooms with full PPE to minimize risk to care team, regardless of COVID-19 status. CAPR is preferred unless it is required for the surgeon to use loupes, a headlight, or a microscope, in which case, N95 masks and eye protection are used. Preferential use of the CAPR system is based not only on the increased effectiveness (99% filtration vs 95% rate with the N95 masks) but also due to the ability to wipe down the face shields (each provider reuses his or her own) and reuse this system to preserve overall PPE supply.

During the COVID-19 pandemic, we are only performing nasal and upper airway endoscopy procedures when the findings will have a significant impact on patient management decisions. For inpatient endoscopy, precautions are in effect similar to those for operative cases. This determination for urgent need is made via collaboration of the attending surgeon and the consulting primary team.

Outpatient Endoscopy Procedures

Similar to inpatient care, outpatient endoscopy is only being performed when a patient is deemed as having a critical clinical issue where information gathered on endoscopy will affect patient management decisions. In such a scenario, endoscopy will be performed in a negative-pressure isolation room (clinic isolation room, emergency department isolation room, or operating room). We are not performing endoscopy at any of our ambulatory care facilities. Providers performing endoscopy wear full PPE.

Impact on Otolaryngology Resident and Fellow Training

While the above measures are designed to optimize patient care and mitigate the risk of exposure to COVID-19, they will have a negative impact on both resident and fellow training in otolaryngology–head and neck surgery. The reduction in ambulatory clinic and operative case volumes significantly limits trainee clinical educational opportunities. One strategy we have taken to address this issue is to involve our residents and fellows in discussions and planning sessions related to COVID-19 preparation and response. We feel this is a unique opportunity for them to gain knowledge in systems-based care as it relates to crisis and disaster planning. In addition, we are working to develop additional learning opportunities that include simulation (with appropriate social distancing), video-based instruction, didactic lectures, directed discussions on research projects and methodologies, and providing time to participate in national otolaryngology educational opportunities.

Conclusion

Our divisional and institutional COVID-19 response is dynamic and rapidly changing. Our communication with all surgical specialties and our incident command center allows for rapid process improvement. This document represents our cumulative work at 8 weeks after initial regional exposure. The main interventions include (1) reduced staff presence at the hospital when not on call; (2) backup call system with redundancy; (3) postponement of all elective cases, clinic visits, and procedures; (4) conversion to telephone/telemedicine clinic visits when possible; (5) the use of COVID-19 testing and full PPE for all high-risk procedures; and (6) creating new educational content for trainees to supplement the loss of clinical activity.

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Author Contributions

Sanjay R. Parikh, originated idea, cowrote and edited manuscript; **Randall A. Bly**, cowrote and edited manuscript; **Juliana Bonilla-Velez**, cowrote and edited manuscript; **John P. Dahl**, cowrote and edited manuscript; **Sean S. Evans**, cowrote and edited manuscript; **David L. Horn**, cowrote and edited manuscript;

Kaalan E. Johnson, cowrote and edited manuscript; **Scott C. Manning**, cowrote and edited manuscript; **Henry C. Ou**, cowrote and edited manuscript; **Prasanth Pattisapu**, cowrote and edited manuscript; **Jonathan A. Perkins**, cowrote and edited manuscript; **Kathleen C. Y. Sie**, cowrote and edited manuscript.

Disclosures

Competing interests: Randall A. Bly, consultant and stockholder, Spiway, LLC.; cofounder, Edus Health, Inc. Randall A. Bly holds a financial interest of ownership equity with Edus Health, Inc; cofounder, EigenHealth, Inc. Randall A. Bly holds a financial interest of ownership equity with EigenHealth, Inc.

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