

Title: Pediatric otolaryngology divisional and institutional preparatory response at Seattle Children’s Hospital after COVID-19 regional exposure

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1 **Abstract**

2 COVID-19 is a novel coronavirus resulting in high mortality in the adult population but
3 low mortality in the pediatric population. The role children and adolescents play in
4 COVID-19 transmission is unclear and it is possible that healthy pediatric patients serve
5 as a reservoir for the virus. This article serves as a summary of a single pediatric
6 institution's response to COVID-19 with the goal of protecting both patients and
7 healthcare providers while providing ongoing care to critically ill patients who require
8 urgent interventions. A significant limitation of this commentary is that it reflects a single
9 institution's joint effort at a moment in time but does not take into consideration future

10 circumstances which could change practice patterns. We still hope dissemination of our
11 overall response at this moment approximately 8 weeks after our region’s first adult
12 case may benefit other pediatric institutions preparing for COVID-19.

13

14 **Methods**

15 Retrospective assessment of a quaternary children’s hospital surgical division’s
16 response to COVID-19.

17

18 **Setting**

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

25

26 **Coronavirus Disease 2019 Context and Exposures**

27 Coronavirus disease 2019 (COVID-19) is an acute respiratory disease caused by the
28 newly identified β -coronavirus SARS-CoV-2, or 2019 Novel Coronavirus. The COVID-19
29 pandemic has been recognized by the World Health Organization as an international
30 public health emergency.¹ COVID-19 spreads primarily through the respiratory tract by
31 droplets, secretions, and direct contact.² There is emerging evidence that procedures

32 and exams involving the upper aerodigestive tract are extremely high risk for
33 transmission, making otolaryngologists a particularly vulnerable population.³

34

35 The first case of COVID-19 in the United States was announced on January 21st, 2020
36 in the State of Washington. The first death in the United States was in Washington
37 State on February 29th. The earliest infections and deaths affected residents and
38 workers in a senior living facility 12 miles east of Seattle. COVID-19 was declared a
39 pandemic by the World Health Organization on March 11, 2020. Washington is
40 currently the state with the second largest number of test-positive COVID-19 patients,
41 after New York. However, the limited availability of testing affects our ability to
42 determine the overall prevalence of COVID-19 infections. On March 4th, the first public
43 school system in the state was closed as a response strategy to mitigate exposures and
44 on March 11th, almost all school systems were closed. Currently, there are greater
45 than 2,000 regional positive cases but only 2% of these cases are in the pediatric
46 population (Table 1).

47

48 **Cumulative Response**

49 There were several factors considered in determining the response to this pandemic.
50 Initially, the response was directed at mitigating exposure to patients and their families.
51 As the infection spread, it became clear that children were less likely to become
52 severely ill from the infection. Hence, for pediatric caregivers, the focus shifted to
53 protection of the healthcare workforce. This is particularly important in otolaryngology
54 where many procedures involve the upper aerodigestive tract resulting in caregiver risk

55 for exposure. Conservation of personal protective equipment (PPE) was also a
56 significant strategic factor in decision making.

57

58 *Hospital traffic*

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

64

65 *Triage of surgical cases*

66 Elective surgical cases have been postponed. Only emergent and urgent cases are
67 being performed. Examples of emergent otolaryngologic cases include management of
68 severe airway obstruction, aerodigestive foreign body removal, soft tissue abscess
69 drainage, complications of rhinosinusitis or otitis media, and post-tonsillectomy
70 hemorrhage. Cases are deemed urgent when postponement of surgery could
71 negatively impact a child's overall health or developmental outcomes, and a delay of 6
72 weeks could result in those outcomes being measurably worse. Examples of urgent
73 cases include malignancies and complicated cholesteatoma.

74

75 *Triage of ambulatory visits*

76 Patients are individually screened by providers and categorized into three tiers:

77 Tier 1: Must be seen in person, clinical issue is urgent, and physical exam essential

78 Tier 2: Appropriate for a telephone or telemedicine visit

79 Tier 3: Visit should be rescheduled

80

81 Telemedicine capabilities exist at our institution after being credentialed. We observed

82 that in many instances, a phone call, coupled with photographs that the family sends in

83 ahead of time were effective for making an assessment and to determine accurate

84 timing of if/when that patient needs to be seen in-person. Multidisciplinary clinics such

85 as Craniofacial, Hearing Loss, Thyroid, and Vascular Anomalies Clinic have continued

86 to hold conference discussions (virtually) about patients previously seen. There is a

87 wide variety of sub-specialization within our group and some diagnoses are more

88 amenable to telephone call than others. Taking that into account, a review of clinic tier

89 categorization data across all providers showed that of 314 planned clinic visits over 10

90 days, 24% were kept as in-person visits (Tier 1), 16% were converted to telephone (Tier

91 2), and 60% were postponed (Tier 3).

92

93 *Provider deployment*

94 Our standard inpatient team consists of one attending physician, two fellows, two

95 residents, and one nurse practitioner. In an effort to mitigate the risk to trainees, they

96 were placed on a partial deployment schedule such that each trainee could be in the

97 hospital two to three days per week.

98

99 In response to the COVID-19 pandemic, our current inpatient team consists of one

100 attending physician, one fellow, one resident, and two nurse practitioners. Given the

101 reduction in ambulatory clinic volume and surgical cases, we had the ability to identify a
102 back-up attending who is available to support the inpatient team (available within 30
103 minutes). All other teammates are available to be in hospital within 60 minutes. In
104 addition, four attending physicians reside less than a mile from the hospital and could
105 readily mobilize to assist with acute emergencies. Twice a day tele-conferenced
106 huddles are carried out so teammates in hospital and home can review cases and
107 provide input.

108

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

112

113 *Inpatient Operative and Endoscopy Procedures*

114 Given the uncertainty of potential provider exposure to unknown carrier status of
115 children with COVID-19, particularly in procedures associated with upper airway
116 aerosolization, certain safety measures have been implemented. All OR cases are
117 currently being screened for COVID-19 with a turn-around time of less than 24 hours,
118 using a drive through testing process. In the event the urgency of a case does not allow
119 for timely testing, the patient will be considered as COVID-19 positive and the
120 procedure will be performed in a negative pressure room with strict isolation precautions
121 that include N-95 masks or a Controlled Air Purifying Respirator (CAPR). Due to the
122 potential high risk of viral transmission in certain procedures (e.g. Aerodigestive or
123 rhinologic surgery) and to account for false negative results, these are being done in

124 negative pressure rooms with full PPE to minimize risk to care team, regardless of
125 COVID-19 status. CAPR is preferred unless it is required for the surgeon to use loupes,
126 a headlight or a microscope, in which case N-95 masks and eye protection are used.
127 Preferential use of the CAPR system is based not only on the increased effectiveness
128 (99% filtration vs. 95% rate with the N-95 masks), but also due to the ability to wipe
129 down the face shields (each provider reuses their own) and re-use this system to
130 preserve overall PPE supply.

131
132 During the COVID-19 pandemic we are only performing nasal and upper airway
133 endoscopy procedures when the findings will have a significant impact on patient
134 management decisions. For inpatient endoscopy, precautions are in effect similar to
135 those for operative cases. This determination for urgent need is made via collaboration
136 of the attending surgeon and the consulting primary team.

137 138 *Outpatient Endoscopy Procedures*

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

145

146 *Impact on Otolaryngology Resident and Fellow Training*

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

159

160

161 **Conclusion**

162
163 Our divisional and institutional COVID-19 response is dynamic and rapidly changing.
164 Our communication with all surgical specialties and our incident command center allows
165 for rapid process improvement. This document represents our cumulative work at 8
166 weeks after initial regional exposure. The main interventions include (1) reduced staff
167 presence at the hospital when not on call, (2) backup call system with redundancy, (3)
168 postponement of all elective cases, clinic visits, and procedures, (4) conversion to
169 telephone/telemedicine clinic visits when possible, (5) the use of COVID-19 testing and
170 full PPE for all high risk procedures and (6) creating new educational content for
171 trainees to supplement the loss of clinical activity.

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Number of Individuals Tested		
Result	Number of Individuals Tested	Percent of Tests
Negative	31,712	93%
Positive	2,221	7%
Confirmed Cases/Deaths by Age		
Age Group	Percent of Cases	Percent 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%

187

188

189 **Table 1.** Washington state COVID-19 exposures and deaths as of March 23rd, 2020,

190 3:07 pm. (Source: Washington State Department of Health)