

**UCSF Benioff Children's Hospitals**  
**Perioperative and Periprocedural Personal Protective Equipment and Workflow**  
**Guidance During the COVID-19 Pandemic - Updates on Use of the Abbott ID**  
**NOW Platform and Universal Airborne Precautions for Aerosol-Generating**  
**Procedures**

Last updated: 9/15/20

**Universal N95/PAPR recommendation for Aerosol-Generating Procedures (AGPs):** As of 9/17/20, it is **recommended** that providers don an N95 respirator + face shield or PAPR for all AGPs, regardless of pre-procedure COVID-19 PCR test results. This change to the perioperative and periprocedural PPE guidance is based on the following:

- This change is aimed at protecting healthcare personnel from possible exposure events that can result in increased infection risks and staff quarantines
- Though in the setting of universal testing any one procedure carries a tiny risk of undetected infection, because UCSF performs thousands of procedures a year, the cumulative risk of having patients with undetected infections come through the perioperative area rises

Patients will continue to be clinically screened and tested for COVID-19 before their procedure – this remains a requirement for all elective surgeries.

- **For emergency cases in non-PUI patients (no clinical suspicion of COVID-19) whose COVID RT-PCR test is pending (or who only have a negative Abbott Rapid test – see below), providers MUST don N95 respirator + face shield or PAPR for all aerosol-generating procedures and portions of the case (see Scenario Pedi4)**
- **Currently, the Abbott Rapid Test is NOT being used at MB or Oakland. For outside transfers, please be sure to check the type of COVID test performed.**

The time recommended for providers to remain in N95-level PPE during and after an AGP is based on the number of air changes per hour (ACHs) in the procedure room needed for ≥99% efficiency in airborne contaminant removal. For most O.R.s at MB and Oakland, this equates to 15 minutes but varies significantly in most NORA locations (see Table below). After that time period has elapsed, providers may choose to don standard PPE.

- In addition to AGPs (e.g., intubation/extubation, positive pressure ventilation without a closed airway circuit), for surgical procedures that might pose higher risks for transmission if the patient has COVID-19 (see “High-Risk Surgeries” below), it is recommended that providers continue to wear N95 respirators or PAPRs for the entirety of the case (Scenario Pedi2)
- When AGPs are performed, appropriate signage must be left on the entrances to the procedure room/area indicating what time providers may enter with standard PPE

- Persons with standard PPE (i.e., not wearing an N95 respirator or PAPR) should remain outside the procedure room during the AGP and for the appropriate period of time after the AGP
- It is our consensus that a smooth inhalation or IV induction and emergence with LMA placement or nasal cannula use is NOT an aerosol-generating procedure. However, aerosol may be generated should a complication arise during induction or emergence, or bag mask/positive pressure ventilation be required, i.e. laryngospasm, bronchospasm, etc.
- **Importantly, providers do NOT need to wait in a given location with the patient after the termination of an AGP before transport. However, signage must be left on the entrance to the location indicating the time at which providers may enter with standard PPE**
  - It is recommended that any healthcare worker (e.g., Hospitality staff, anesthesia technicians) entering the room before the air clearance time period is complete don an N95 respirator + face shield or PAPR prior to procedure room entry
  - Room turnover should proceed on schedule in appropriate PPE

**For high-turnover locations or NORA areas with slower ACHs, patients WILL be allowed to enter rooms after AGPs in test-negative patients even before the 99% turnover occurs so that the pace of cases can continue as usual. However, it is recommended that providers still don N95-level PPE if entering within the previous AGP time window.**

The original perioperative Scenarios have been updated below to reflect this new guidance

- Patients who are COVID-19 positive or PUIs will continue to be managed according to protocol (Scenario Pedi1)

**Operational Principles:** This document provides guidance around the perioperative and periprocedural management of pediatric patients receiving anesthesia. It reflects the evolving understanding of COVID-19 transmission, the need for responsible use of personal protective equipment (PPE), the importance of ensuring the protection of healthcare personnel, and expanding access to COVID-19 RT-PCR testing.

- All perioperative and periprocedural patients will continue to be clinically screened for symptoms of and risk factors for COVID-19 infection.
- Patients with COVID-19 infection can shed SARS-CoV2 in their nasopharynx prior to onset of symptoms and may present an infection risk, particularly during aerosol generating procedures.
- COVID-19 RT-PCR testing should be performed for all asymptomatic pediatric patients within 4 days prior to surgical and other invasive procedures involving general anesthesia or other potentially aerosol-generating procedures. Emergency procedures should proceed with testing done during or after the procedure.
- For pediatric patients requiring multiple anesthetics, COVID-19 testing is recommended within 14 days of the repeat anesthetic.
  - If pediatric patients develop COVID-19 symptoms or exposures after testing but before the planned anesthetic, repeat COVID-19 testing is warranted.

- Every effort will be made to meet these guidelines, but exceptions may be made for extenuating clinical/social circumstances.
- This document provides guidance around the use of PPE and surgical workflows based on clinical suspicion for COVID-19 infection, level of procedural risk, and availability of COVID-19 test results.
- A note about the **Abbott ID NOW RAPID POCT Test**: The Abbott Rapid Test is NOT being used at MB or Oakland. For outside transfers, please be sure to check the type of COVID test performed. This platform provides results within 15 minutes. Currently, it can only be used to “rule in” infection, must always be confirmed with a standard RT-PCR test and is mostly being used by the UCSF ED at ML and by some outside institutions (often labelled “Rapid” or “POCT” in Apex). **At all times, providers should attempt to wait for the results of a standard RT-PCR test before proceeding to the O.R.** However, in an emergency, this test can be used to guide initial PPE and workflow. Therefore, if a patient tests **positive**, treat as COVID+/PUI and follow Pedi1 scenario. If the test is **negative** and the patient is asymptomatic with no high-risk exposures (i.e. not a PUI), treat as though they are “untested” and follow the appropriate scenario noting that N95/PAPR **MUST** be worn in these situations (Pedi2, 3).

#### Definitions:

- **High-Risk Surgeries:**
  - Any procedures on the airway, throat, mouth or sinuses (bronchoscopy, tonsillectomy, tracheostomy, glossectomy, mastoidectomy, laryngoscopy procedure...etc)
  - Endoscopy/ERCP, TEE, ECT
  - Surgery under regional anesthetic with high likelihood of requiring GA
  - Active CPR
  - Thoracic surgery/procedures
- **Symptomatic or High-Risk Patient:**
  - Any of the following *new acute* symptoms:
    - Fever (objective or subjective)
    - Myalgias
    - Respiratory symptoms (dyspnea or cough)
    - URI symptoms (headache, rhinorrhea, sore throat)
    - GI symptoms (diarrhea, nausea, vomiting)
    - ENT symptoms (loss of taste or smell)
    - Eye symptoms (conjunctivitis)
    - Other clinical concern for COVID-19
  - Chest imaging findings suggestive of COVID-19 (bilateral, ground glass, peripheral distribution)
  - Sustained close contact (e.g. household contact) with a known case of COVID-19
  - Unable to provide history and no collateral regarding symptoms available
  - Newborns born to mothers with known COVID-19

- **Asymptomatic patient:**
  - Meets none of the Symptomatic or High-Risk patient criteria

**Guidance (also see Summary Table):**

Please note that in addition to the guidance below, providers should don **face shield** and **surgical mask** for any encounter with patients in the pre-operative and post-operative settings.

Pedi 1-For patients with suspected or confirmed COVID-19 infection, follow the principles outline in the [Anesthesia Perioperative Adult, Pediatric and Obstetric Guidelines for the Care of Patients with Known/Suspected COVID-19](#). Also see [BCH Perioperative Care of Suspected/Confirmed COVID-19 Patients](#).

Pedi 2-For **asymptomatic** patients **with a confirmed negative COVID-19 RT-PCR test** undergoing **high-risk** procedures ([Scenario Pedi2](#)), it is recommended that all team members don full N95 respirator with face shield or PAPR for the **entire duration of the case**. Any provider entering the room during the case should wear an N95 respirator with face shield/goggles or PAPR in addition to other appropriate PPE. When the case is finished, providers may leave with the patient when clinically appropriate but a sign **MUST** be placed at the room entrance indicating what time providers may enter without the recommendation for N95-level PPE. This refers to the time required following completion of the last AGP event to ensure 99% air clearance as determined by the number of air changes per hour (ACH) in that location. For main ORs at MB and Oakland, 15 minutes is required. Please note the modifications required in most **NORA** settings (table below). In these cases, N95 respirators, face shields or PAPR shields may be re-used and stored in accordance with UCSF PPE reuse policies.

Pedi 3-For **asymptomatic** patients **with a confirmed negative COVID-19 RT-PCR test NOT undergoing a high-risk** procedure, but requiring **general anesthesia** ([Scenario Pedi3](#)), it is recommended that providers don full N95 respirator with face shield or PAPR when present for airway placement, manipulation (if necessary), removal or any other AGP portions of the case. Any providers present during an AGP as well as the designated time after completion of the AGP to ensure 99% air clearance should also wear an N95 respirator with face shield or PAPR in addition to other appropriate PPE. For main ORs at MB and Oakland, 15 minutes is required. Please note the modifications required in most NORA settings (table below). Afterwards, **team members can choose to don standard PPE (surgical mask, face shield, gloves)**. If an LMA is used for airway management and no AGP occurs, standard PPE can be transitioned to immediately. If a mask or nasal canulae is planned, standard PPE is acceptable for all providers. When the case is finished, providers may leave with the patient when clinically appropriate. If an AGP event occurs during emergence, a sign **MUST** be placed at the room entrance indicating what time providers may enter without the recommendation for N95-level PPE. In these cases, N95 respirators, face shields or PAPR shields may be re-used and stored in accordance with UCSF PPE reuse policies.

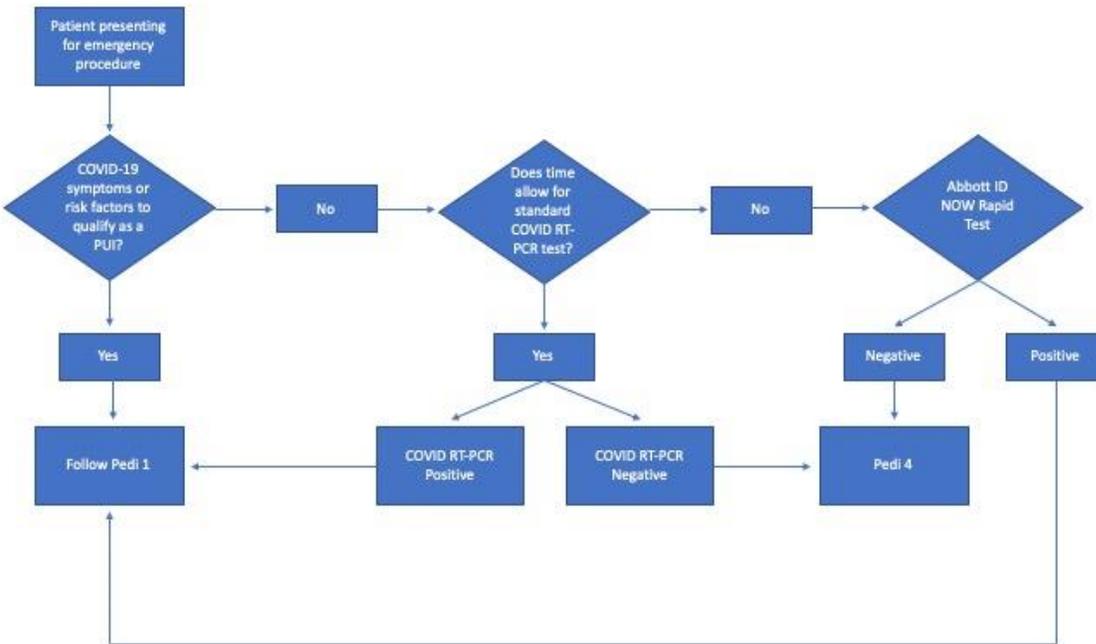
Pedi 4- For **asymptomatic/non-exposed/non-PUI** patients requiring **emergency** surgery where standard COVID-19 RT-PCR testing is **pending**, the **Abbott ID NOW** platform can be used to provide preliminary information. **The result should appear as “Rapid” or “POCT” in Apex.** If the test is **negative**, treat patient as “asymptomatic with testing” and follow Pedi2-3 scenarios depending on the type of surgery **except** that N95/PAPR **MUST** be worn in these situations (Pedi2, 3). If the test is **positive**, treat as a confirmed positive, and follow Pedi1 scenario. In either case, ensure that a standard confirmatory COVID-19 RT-PCR test has been sent – if not, consider collecting the specimen in the O.R. while donning appropriate **airborne PPE**.

### Summary Table

Scenario	Anesthesia Provider PPE	Surgery/ Nursing/ Scrub PPE	Workflow
<b>Pedi 1 – COVID-19 PUI/ Confirmed for ANY surgery/procedure</b>	<ul style="list-style-type: none"> <li>● N95 + face shield or PAPR</li> <li>● Gown</li> <li>● Double gloves</li> </ul>	<ul style="list-style-type: none"> <li>● N95 + face shield or PAPR</li> <li>● Gown</li> <li>● Double gloves</li> </ul>	<ul style="list-style-type: none"> <li>● <a href="#">BCH Perioperative Care of Suspected/Confirmed COVID-19 Patients.</a></li> <li>● <a href="#">Anesthesia Perioperative Adult, Pediatric and Obstetric Guidelines for the Care of Patients with Known/Suspected COVID-19.</a></li> </ul>
<b>Pedi 2 – Asymptomatic patient WITH TESTING for HIGH RISK surgery/procedure</b>	<ul style="list-style-type: none"> <li>● <u>Reusable</u> N95 + face shield or PAPR</li> </ul>	<ul style="list-style-type: none"> <li>● <u>Reusable</u> N95 + face shield or PAPR</li> </ul>	<ul style="list-style-type: none"> <li>● See Pedi2 details above</li> </ul>
<b>Pedi 3 – Asymptomatic patient WITH TESTING for LOW RISK surgery/procedure</b>	<ul style="list-style-type: none"> <li>● <u>Reusable</u> N95 + face shield or PAPR for AGP events</li> <li>● Standard PPE can be worn outside of AGP events and corresponding time afterwards for 99% air clearance*</li> </ul>	<ul style="list-style-type: none"> <li>● <u>Reusable</u> N95 + face shield or PAPR for AGP events</li> <li>● Standard PPE can be worn outside of AGP events and corresponding time afterwards for 99% air clearance*</li> </ul>	<ul style="list-style-type: none"> <li>● N95 + face shield for induction and emergence, regardless of airway type.</li> <li>● If LMA, transition to standard PPE up to discretion of provider based on LMA seating and AGP potential.</li> <li>● Mask or NC is used:                             <ul style="list-style-type: none"> <li>○ Standard PPE*</li> </ul> </li> </ul>
<b>Pedi 4 – EMERGENCY case in ASYMPTOMATIC/NON-PUI patient with NEGATIVE Abbott ID NOW TEST and pending confirmatory test</b>	<ul style="list-style-type: none"> <li>● <u>See Pedi4 details in Guidance section above</u></li> <li>● Treat as “Asymptomatic with Testing” and follow Pedi 2-3 but providers <b>MUST</b> don N95 respirator + face shield or PAPR for all aerosol-generating procedures and portions of the case.</li> <li>● Ensure a confirmatory standard COVID RT-PCR has been sent. If not, send from O.R. (Airborne PPE for specimen collection)</li> </ul>		

\*Providers may elect to don N95/PAPR as long as they are re-used and stored in accordance with UCSF PPE reuse policies.

**Figure 1: Flowchart for Emergency Procedures and Abbott ID Now Testing**



\*Please note that in a non-PUI patient with only a negative Abbott ID Now Rapid test (pending confirmatory RT-PCR test), providers **MUST** don N95 respirator + face shield or PAPR for all aerosol-generating procedures and portions of the case according to Scenario Pedi4.

### Appendix A: Waiting Times After Aerosol-Generating Procedures (AGPs)

#### A Note on Waiting Times after AGPs:

- These times are derived from airflow characteristics in different O.R.s/procedural areas needed to achieve a 99% air turnover. After this time, most airborne contaminants should be cleared. If anyone is present in the location during/after an AGP in test-negative patients in this waiting time period, it is recommended that they don N-95 level respiratory protection
- The most efficient way to achieve this process in a positive pressure environment is to keep the doors closed to avoid interrupting the airflow.
- **However, if a provider needs to leave the location during that time, they may do so as long as they leave quickly and minimize the amount and time the door is opened.**
- For high-turnover locations or NORA areas with slower ACHs, patients **WILL** be allowed to enter rooms after AGPs in test-negative patients even before the 99% turnover occurs so that the pace of cases can continue as usual. However, it is recommended that providers still don N95-level PPE if entering within the previous AGP time window.

Parnassus			Mission Bay		
Room Number	Radiology Name	Room Downtime	Room Number	Radiology Name	Room Downtime
M365	IR Room 8	30 minutes	C2675	IR Hybrid/OR23	15 minutes
M375	IR Room 9	45 minutes	A2683	IR/OR24	30 minutes
M337	IR Room 4	15 minutes	C1769	MBCT1	30 minutes
L367	NIR Z	30 minutes	C1716	MBCT2	30 minutes
L382	NIR S	15 minutes	C1714	MBCT3	30 minutes
L389	NIR Q	30 minutes	C1755	MRI Induction Room	15 minutes
L361	CT 2	15 minutes	C1729	Nuclear Medicine	45 minutes
L363	CT 4	30 minutes	C1721	PET/CT	45 minutes
L300	MRLP	45 minutes	C1778	Fluoro 1	45 minutes
L314	MR4	30 minutes	C1782	Fluoro 2	45 minutes
M345	Room 5	30 minutes	C1758A	RN Holding 1	45 minutes
M347	Room 6	30 minutes	C1758B	RN Holding 2	45 minutes
M337	ERCPC	15 minutes	C1758Q	US1	45 minutes
L376	US Room 2	15 minutes	C1758V	US4	60 minutes
			C2721	2 <sup>nd</sup> Floor MRI Induction	60 minutes
			<b>PCMB</b>		
			<b>Room Number</b>	<b>Radiology Name</b>	<b>Room Downtime</b>
			L2141-A	PCMB1	30 minutes
			L2141-B	PCMB2	30 minutes
			L2171	PCCT1	15 minutes
			L2131	Holding Room 3	45 minutes
			L2131	Holding Room 4	45 minutes
			L3180E	Breast Biopsy	45 minutes
			L2128	US Room 2	45 minutes

**Please note:**

- **Please keep in mind that if circuit disconnects are necessary (flipping, turning 180 degrees), it is best to place a second filter directly at the airway before the circuit is disconnected. Ensure the ventilator and flows are paused before and during any disconnect. If feasible, the airway can also be briefly clamped during this time.**
- **For reuse PPE guidelines see**  
[https://infectioncontrol.ucsfmedicalcenter.org/sites/g/files/tksra4681/f/Reuse\\_Guidelines\\_PPE.pdf](https://infectioncontrol.ucsfmedicalcenter.org/sites/g/files/tksra4681/f/Reuse_Guidelines_PPE.pdf)

<sup>1</sup> <https://www.asahq.org/about-asa/newsroom/news-releases/2020/03/update-the-use-of-personal-protective-equipment-by-anesthesia-professionals-during-the-covid-19-pandemic>

<sup>2</sup> 15 min interval based on air changes/hour data in UCSF OR rooms and CDC guidelines on airborne contaminant removal <https://www.cdc.gov/infectioncontrol/guidelines/environmental/appendix/air.html>

## **Appendix B: Performance of the COVID-19 RT-PCR test**

### **COVID-19 Diagnostic Testing in Perioperative Setting:**

**Reverse transcriptase PCR (RT-PCR) testing** for COVID-19 detects RNA from SARS-Coronavirus-2 and is the primary test used for diagnosis of acute infection. Analytical sensitivity of PCR testing is very high at >98%<sup>1</sup>.

**Clinical sensitivity of RT-PCR** varies by site of sampling, likely due to variation in quality of sampling technique, time of sampling with respect to disease course (viral titers are highest early in infection<sup>2</sup>), and variation in the distribution of virus in the lower versus upper respiratory tract. Our understanding of clinical sensitivity of RT-PCR is based on a) prior studies using RT-PCR to detect respiratory viruses, and b) limited data on SARS-CoV-2<sup>2,3</sup>. Prior studies of respiratory viruses have found that sampling by nasopharyngeal (NP) swab may be more sensitive than oropharyngeal (OP) swab sampling, and that a combination of NP + OP may increase sensitivity, although variation by virus was observed<sup>3-5</sup>. Two limited studies of SARS-CoV-2 have compared percent test positivity based on sampling site but were not done in a way that allowed accurate calculation of sensitivity. The larger study (213 patients, not-yet peer reviewed) found that test positivity in the first 14 days of symptom onset was higher in NP swabs (72%) versus OP swabs (61%)<sup>2</sup>. The smaller study (9 patients) found 100% test positivity during the first five days of symptoms and 46% test positivity after the first five days, independent of swab type<sup>6</sup>. Additional studies suggest that sputum and lower respiratory specimens (endotracheal aspirate) may have higher viral loads and thus possibly higher sensitivity when tested compared to the nasopharynx or oropharynx, especially earlier during disease course<sup>2,7,8</sup>.

**What does a negative RT-PCR test mean?** The negative predictive value [(true negatives)/(true negatives + false negatives)] allows us to understand the significance of a negative test, which differs depending on the prevalence of disease in the population being tested. In asymptomatic patients, the prevalence of SARS-CoV-2 in the Bay Area and in the U.S. is not yet known, but based on data in other countries<sup>9</sup>, is estimated to be approximately 1%. Given that the estimated prevalence of asymptomatic patients in the Bay Area is very low, the negative predictive value for a test in an asymptomatic patient prior to surgery is very high. For example, if the COVID-19 prevalence is assumed to be 1% and the sensitivity/specificity of a NP swab test is estimated at 75%/98%, then the negative predictive value of the test is 99.7%. Even in circumstances where the prevalence is higher, as it is in Oakland pediatric population (around 5%), the negative predictive value remains high (98.7%).

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