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Commentary

SHEA Pediatric Leadership Council commentary: Supporting well child care during the coronavirus disease 2019 (COVID-19) pandemic with personal protective equipment in the ambulatory setting

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The coronavirus disease 2019 (COVID-19) pandemic, with its shutdowns and resurgences, has negatively affected pediatric well and preventive care. Children of all ages have not been seen for routine check-ups to screen for growth and development; to assess diet, screen time, and exercise; and perhaps most importantly, to be vaccinated against infections that, despite COVID-19, continue to be a threat to their well-being.[1,2] The cause of missed care is likely multifactorial and includes ambulatory service ramping down early on and as cases surged and ongoing parent and patient apprehension in seeking care during the pandemic.[3] Primary care and ambulatory healthcare personnel (HCP) are faced with an ongoing effort to help their patients catch up and keep up with well child care.

Two of the challenges ambulatory HCP face are conflicting personal protective equipment (PPE) guidance from health authorities and professional societies and anxiety on the part of HCP and families alike. In this commentary, we provide some basic guidance to help primary care and other ambulatory HCP decide what PPE is most appropriate for their setting and justify those decisions to their stakeholders. Local practice varies, and clinics and HCP should consult their health system and local health authorities to ensure choices do not deviate from existing recommendations or requirements, such as previsit screening for COVID-19 symptoms.

Recommendations

1. Aerosol-generating procedures (AGPs) should be avoided in ambulatory clinic settings whenever possible
   a.. Respiratory therapies should be given through alternative routes such as multidose inhaler (MDI) plus spacer or subcutaneous injection.
2. Routine N95 respirator fit testing and use is not recommended for most ambulatory and primary care settings
   a.. Few, if any, practices have airborne-infection isolation (AII) rooms. In the absence of engineering controls, the utility of N95 respirator (or powered air purifying respirator, PAPR) use for care of patients with COVID-19 is unclear.
3. Adherence to standard precautions should be reinforced and ensured at all times
   a.. A child with any type of symptoms should be placed in the appropriate precautions (eg, a draining wound requires contact precautions)
   b.. Clear standards for PPE use in the absence of symptoms should be established (eg, universal masking with eye protection worn by the HCP)
4. Strategies to conserve PPE should be employed whenever possible
   a.. Policies such as extended wear for masking and eye protection could help maintain a safe environment, reduce waste, and preserve PPE supplies.

Aerosol-generating procedures

Severe acute respiratory coronavirus virus 2 (SARS-CoV-2) is transmitted primary through respiratory droplets that contact a mucous membrane directly or that land on a surface and are transferred by touch to mucous membranes.[4] The term aerosol-generating procedures (AGPs) has become a common topic of discussion in healthcare circles during the COVID-19 pandemic. At its core, an AGP is a procedure that could generate small particle

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(<0.5 μm) respiratory aerosols from patient secretions when performed. If those secretions are contaminated with a pathogen, it could present a different mode of transmission for the pathogen that may require a change in PPE and/or environmental controls to protect HCP.[5] However, whether the aerosol generated is as infectious as nuclei generated in known airborne diseases like varicella, measles, or tuberculosis is unclear.[5] Although it is unlikely that aerosols from patients with COVID-19 can travel long distances, factors such as persistence in air, reversion to large droplets when contacting a surface or other nuclei, and effectiveness of higher level PPE, such as N95 respirators, are not well understood. Furthermore, it is unclear whether all aerosols are created equal. Is the risk different for intubation or bronchoscopy compared to a nebulized treatment or spirometry?[6]

Risk from AGPs became prominent during the SARS-CoV-1 outbreaks of the early 2000s and subsequent MERS-CoV outbreaks in the 2010s. Studies consistently showed that prolonged exposure, especially during intubation, extubation, and bronchoscopy, was a significant risk factor for patient-to-HCP transmission and that protection from airborne transmission reduced the risk.[6,7] This evidence is the rationale for the World Health Organization (WHO) and CDC recommendations to use N95 respirators and AII rooms while performing AGPs on patients with COVID-19.[4]

A continued challenge during this pandemic is defining an AGP. There is no universal list, although all seem to agree that intubation and extubation, bronchoscopy, and CPR should be included.[4,6,8] Controversies, in part fueled by professional societies publishing lists unique to their area, have emerged around pulmonary function tests, colonoscopy, nebulized treatments, nasogastric tube placement, and simple crying or coughing.[9,10] A full discussion of why a procedure is or is not an AGP is beyond the scope of this commentary, and the question of how infectious any of these aerosols truly are has not yet been answered. However, a few observations from this pandemic may help ambulatory providers assess risk.

The first observation is that large droplets are the primary respiratory secretions produced during cough or crying. Past studies have shown that a medical face mask and eye protection are not inferior to N95 respirators when caring for patients with laboratory-confirmed viral respiratory infections including coronaviruses.[11] To date, the use of surgical masks has not been identified as a risk factor for healthcare-associated occupational transmission of COVID-19, with no reported increased incidence among providers who perform procedures, such as NG tube placement, or providers who care for children who are coughing or crying. If anything, universal masking appears to reduce the risk of nosocomial transmission.[12] The second observation is from other respiratory viruses, such as influenza. Influenza is known to be present in aerosols generated during specific care, and airborne transmission has been hypothesized.[13] But such transmission has not been proven,[14,15] and AGPs are not noted to be a particular risk needing higher level protection for influenza, respiratory syncytial virus, or other respiratory viruses.[16]

Despite a lack of evidence, many organizations and authorities have established that certain procedures constitute an AGP that poses significant risk. Nebulized medications are an excellent example of this inconsistency. No specific evidence has shown that nebulized therapy generates infectious aerosols sufficient to lead to transmission. However, The Joint Commission has listed nebulizer treatments as an AGP,[17] as have some local public health authorities. The CDC is equivocal on the subject due to limited evidence and cites a theoretical association of proximity and the result of nebulized treatments.[18] The WHO does not include nebulized treatments in its March 19, 2020, infection control guidance[19] or its April 6, 2020, PPE use guidance,[8] but it does list nebulized treatments in its March 19 HCP exposure risk assessment instrument.[20] Many institutions have chosen to not classify nebulized treatments as an AGP due to a lack of evidence. Practitioners may be left to decide for themselves how to handle nebulized treatments. As relevant, they should first verify what is required by their umbrella organization and/or health authorities. In the absence of such mandates, they could consult facilities to which they refer patients in order to align with local practice.

One way to address the uncertainty around interventions that are possible but not confirmed to be AGPs is to not perform these procedures in the ambulatory setting. For example, due to uncertainty around nebulized treatments, practices may elect to convert to other delivery modes. Albuterol for reactive airways could be given by metered dose inhaler, which is as effective as, if not more effective than, a nebulizer.[21] Oral or intramuscular dexamethasone is effective for croup of any severity and may be more effective than nebulized racemic epinephrine.[22,23] Patients with tracheostomies requiring suction could have filters placed in their circuits, or suction could be made in-line to avoid possible plumes. Additionally, to optimize physical distancing and prevent potential exposure of well patients and families to patients and/or families potentially exposed to SARS-CoV-2, additional routine strategies can be employed by ambulatory settings. These include prescreening patients and household members for signs or symptoms of COVID-19, and if symptoms are present, scheduling ill patients at the end of the day. Additional screening should occur at the point of care, and if symptoms of or recent exposure to COVID-19 has been identified, families should be promptly escorted to a private examination room to reduce risk of exposure to others.

N95 fit testing

In general, ambulatory and primary care clinic staff typically do not need routine respirator fit testing prior to, during, or likely after the COVID-19 pandemic. The use of an appropriately fitted N95 respirator for airborne isolation is not sufficient on its own. The use of fitted respirators is meant to be bundled in a comprehensive, Occupational Safety and Health Administration (OSHA)–mandated respiratory protection program,[24] which few practices are likely to be able to support. Such a program, typically implemented for tuberculosis prevention, includes an annual risk assessment and documented systems for administrative, engineering, and practice controls. Fit testing, education, practicing donning and doffing, and availability of N95 respirators and PAPRs are significant practice controls, and they involve considerable time and financial investment.[25] Anecdotally, some providers choose to wear an unfitted N95 respirator due to a belief of greater efficacy. However, this is not recommended because no clear evidence has shown that using an N95 offers more protection than a standard, well-fitting surgical or procedure mask.[26,27]

A key engineering control is AII rooms. Many refer to these rooms as "negative pressure," but AII rooms involve more than air-pressure gradient. Regulations require AII rooms to be balanced negative to the adjacent area, to have a dedicated exhaust system to the outside, and to have a minimum of 12 air changes per hour (ACH).[28] The ACH is important to consider because it is a measure of how often air in the room is replaced, or 'scrubbed,' and there are requirements for all areas of a healthcare facility. The

minimum ACH in an operating room is 20; it is 15 in a procedure room or trauma bay; 10 in a bathroom; and 6 in an exam room or patient room. The difference can be measured in the time required to replace 99% of the air: in an AII (12 ACH), it takes about 23 minutes, while in an exam room (6 ACH) it takes twice as long.[17] In contrast, no standard ACH has been established for outpatient areas. Many ambulatory clinics may not measure air-pressure balance, and air may be recirculated without filtration.

PPE conservation

Not only is PPE to be prioritized for critically ill patients; it is in short supply because of COVID-19–related worldwide demands. Availability is lower, cost is higher, and supply chains are less reliable. This places ambulatory clinics, especially those independent of large health systems, at a disadvantage to procure PPE for regular use. It therefore pragmatic for clinics to consider ways to conserve and extend the life of the PPE they are able to procure.

Eye protection is perhaps the most straightforward PPE to conserve. The 2007 HICPAC Guidance for Isolation Precautions does not routinely require eye protection for droplet precautions.[16] Some institutions have added an eye protection requirement during the COVID-19 pandemic. Others have maintained standard precautions, where eye protection is recommended for situations where risk of exposure is increased, particularly if caring for patients who cannot tolerate a mask (due to developmental or age issues). Most goggles and face shields are approved for multiple uses and can be cleaned and disinfected regularly without compromising function. Some clinics may institute a requirement to don eye protection throughout a clinical shift, both to ensure that healthcare personnel (HCP) are protected and to avoid waste. Healthcare workers may reuse masks for multiple different patient encounters provided the mask is not soiled or damaged. Care needs to be taken to ensure no HCP self-contamination during donning or doffing the mask. For example, a mask worn during a well child check could likely be used for the next patient encounter, while one worn during an ill visit for cough should generally not. Crying alone need not be a reason for changing a mask. Alternatively, donning a reusable face shield over a regular mask could prevent soiling and could preclude the need to change. Cloth masks have not been proven effective in a healthcare setting and should not be used for providers.[29] However, cloth masks will likely provide adequate protection for families and patients, and they may be received more readily than a medical mask.[30] By encouraging families to bring their own, or by providing clean, reusable cloth masks for them, clinics can reserve medical-grade face masks for providers.

Future directions

This document is targeted primarily toward ambulatory, primary, well child visits. Similar questions exist for ambulatory subspecialty and surgical settings. Future guidance will be needed to address issues such as the use of air-cleaning machines (ie, portable high-efficiency particulate air filters) to reduce the risk of aerosols in certain contexts; air flow in clinics with an open-bay design; and the care of ill and post–hospital-discharge patients who may or may not be suspected of COVID-19. For all settings, resolution of controversies like AGPs and the utility of universal PPE would enable providers to feel reassured they are protected adequately so they can focus on patient care.

In conclusion, basic preventive care can be safely delivered in ambulatory settings without higher-level respiratory protection. Medical-grade face masks and eye protection are adequate protection. To be safe, clinics can avoid performing procedures that may generate aerosols such as nebulized therapy. N95 respirator fit testing and managing a respiratory protection program is impractical and likely not indicated in most settings. Ambulatory sites should implement PPE conservation and reuse when possible.

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