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Review Article

The Reopening of Schools and Adoption of Universal Wearing of Face Masks in Anticipation of Sustained Transmission or the Second Wave of COVID-19 with the Influenza Virus

Cameron Y. S. Lee [1*]

[1] Private Practice. Oral, Maxillofacial and Reconstructive Surgery, Aiea, Hawaii. 96701, Professor of Surgery, Temple University, Kornberg School of Dentistry, Philadelphia, PA. 19140

*** Correspondence:** Cameron Y. S. Lee (DMD, MD, PhD, MPH, MSEd), Private Practice. Oral, Maxillofacial and Reconstructive Surgery, Aiea, Hawaii. 96701, Professor of Surgery, Temple University, Kornberg School of Dentistry, Philadelphia, PA. 19140.

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Abstract

The Covid-19 pandemic has swept rapidly from Wuhan, China to the entire globe in less than six months, infecting over 8 million people and claiming the lives of over 500,000. In the United States, greater than 2 million individuals have become infected and over 120,000 people have been killed. With no evidence of slowing of the coronavirus that causes Covid-19, public health authorities must prepare for possible sustained transmission of Covid-19, or a second wave into the Fall 2020, but with the presence of the influenza A virus. In the Fall 2020, schools will reopen from kindergarten to 12th grade. Dual pandemics or epidemics will result in high morbidity and mortality not observed when either virus was solely active. Community leaders, educational administrators and public health systems must be prepared for simultaneous outbreaks of both Covid-19 and influenza. Although there are no clinical studies that have evaluated the benefits of the use of face masks during an epidemic or pandemic, public health non-pharmaceutical intervention (NPIs) measures should include the routine use of face masks during school sessions. Using face masks with other NPI may interrupt viral transmission as it has been established that respiratory viruses, such as Covid-19 and the influenza virus, are transmitted via respiratory droplets, aerosols, and environmental surface contact.

Keywords:
Covid-19; Influenza; Universal; Face Masks; Pandemic; Schools

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Introduction

In December 2019, the Health Commission of Hubei province, China, reported a cluster of new cases of viral pneumonia later identified as a highly infectious novel human coronavirus that causes the severe acute respiratory syndrome (SARS-CoV-2), renamed Covid-19. [1],[2] As of this writing, Covid-19 has spread to over 200 countries, killed over 500,000 individuals, and infected over 8 million people around the world in just over 6 months. The United States is now the epicenter, with over 2 million reported cases and greater than 120,000 deaths.[3] The Covid-19 pandemic has emerged as an unprecedented global crisis overwhelming healthcare systems around the world. Public health mitigation policies have been implemented to slow down the spread of the coronavirus including antibody testing for the coronavirus, social distancing, contact tracing, isolation, quarantine and the sudden abrupt closure of schools that has extended into the Summer of 2020.[4],[5],[6] Little did the entire world know that life would dramatically change immediately.

In the Fall 2020, schools will reopen from kindergarten to 12th grade, which is a top priority. Schools not only provide an education for students, but social interaction and childcare that many parents are dependent on so they can return to work.[7] However, the reopening of schools is not without health risk for students, their parents, teachers, educational support staff and the entire community. Anxiety remains high regarding the possible sustained transmission of the first wave of the Covid-19 pandemic, or a second wave with a simultaneous outbreak of the influenza A virus as Fall is the time when the seasonal influenza virus appears and infects thousands of adults and children.[8] It is estimated that influenza has resulted between 9 million to 45 million reported illnesses and 12,000 to 61,000 deaths annually since 2010. Dual pandemics or epidemics will result in high morbidity and mortality. Communities, public health systems and schools must be prepared for simultaneous outbreaks of both Covid-19 and influenza.

The potential for airborne spread of Covid-19 and the influenza A virus via airborne respiratory droplets and aerosols is no longer questionable. Students, teachers and educational support staff will be exposed to not one, but two respiratory viruses with high viral load and transmission rates that can be easily spread to the entire community when schools reopen in Fall 2020.[8],[9] Similar to places of employment, the author recommends face masks be universally worn by everyone during school sessions to protect themselves and prevent the spread of both infectious diseases to each other.

Public health systems, community leaders and educational administrators must plan well in advance of what must be done to protect students from becoming infected as both viruses are primarily transmitted via the respiratory route and direct contact with surfaces.[9],[10],[11]

Aerosol and fomite transmission is possible as the coronavirus can remain viable and infectious in aerosols for hours and on different surface tops.[9],[12],[13] Environmental cleaning of surface tops and objects is recommended as it proved effective in controlling the spread of the H1N1 influenza pandemic of 2009 along with good respiratory etiquette and hand hygiene measures.[6],[14]

Although there is no vaccine for Covid-19, to get students back safely into the classroom, preparedness plans should include influenza vaccination as it can significantly decrease morbidity and mortality.[8] In addition to the use of non-pharmaceutical intervention (NPI) measures, personal and environmental protective measures such as hand washing with soap and water (or alcohol-based hand sanitizers) and respiratory etiquette (covering your mouth and nose when coughing or sneezing) have been shown to decrease viral spread and should be constantly reinforced in class.[5],[6]

A common characteristic of both viruses is sustained transmission between individuals in the community that can spread over a short time causing serious illness. Globally, 1% to 6% of all coronavirus positive cases have been children.[15],[16] In the United States, it is estimated children comprise 1.7% of all tested positive cases. However, the number of children that are asymptomatic is not known.[17] Further, the low percentage of reported cases may be due to underreporting as the ability to perform broad community antibody testing has been hampered by the shortage of available antibody testing kits.

Studies on coronavirus transmission dynamics between adults and children are limited. Improved understanding of human to human viral transmission is extremely important when schools reopen. In a review of 72,314 cases by the Chinese Center for Disease Control and Prevention, less than 1% of the total cases were children under 10 years of age.[18] A recent study by Li et al suggested that coronavirus transmission from infected adults to children is less likely as observed in family households.[19] Although information is sparse regarding transmission of Covid-19 outside of households, in two recent studies it was determined that children do not efficiently spread the coronavirus.[20],[21] Therefore, children appear to be infected far less than adults and with milder symptoms. [17],[22]

However, children are at great risk of contacting the influenza virus and capable of transmitting the disease rapidly to other children and have been responsible for school closures as a means of social distancing.[23],[24],[25] What remains unclear is to what extent children are capable of transmitting the coronavirus that causes Covid-19 to others in the community. It has recently been demonstrated that the coronavirus sheds at high concentrations from the nasal cavity 2-3 days before the onset of symptoms and continues for at least one week after symptom onset.[26],[27]

Coronavirus transmission is spread like other respiratory viruses to the eyes, nose and mouth via respiratory droplets and direct surface contact.[9],[10],[11]

It has also been shown that normal breathing, sneezes and coughs consist of mucosalivary droplets containing a multiphase turbulent gas cloud (puff) that traps and transports clusters of pathogenic respiratory droplets that can travel up to 27 feet in the air.[28],[29],[30] The trajectory of the respiratory droplets are capable of contaminating surface tops when they land. Respiratory droplets that remain within the cloud will evaporate producing residues or droplet nuclei suspended in air for many hours that are able to mix with airflow patterns of ventilation or climate control systems. As the turbulent gas cloud can remain in the air for hours, and air sampling has detected both coronavirus and influenza RNA particles, the use of face mask are imperative for source control (decreasing the spread of infectious pathogens) and protecting the user (preventing the spread to others nearby).[31]

An additional question that remains unanswered is if the use of face masks provides protection against infectious disease transmission when combined with social distancing measures, good hand hygiene and respiratory etiquette. There are no clinical studies that have evaluated the benefits of the use of face masks during an epidemic or pandemic. Such controversy and confusion of wearing face masks are fueled by the WHO recommending against the wearing of face masks because of the lack of evidence of protection against the coronavirus.[32] Further, there are several inconclusive studies on the efficacy of face mask use and the ability to prevent transmission of infectious disease from respiratory droplets and aerosols. In a meta-analysis, Xiao and colleagues concluded that there is no significant reduction in laboratory influenza transmission.[33] Aiello et al showed that there is limited evidence that wearing a face mask in households, in the presence of an individual suffering from the influenza virus, or in mass social gatherings will prevent the spread of the influenza virus.[34] In a systematic review by

Brainard et al examining whether wearing a face mask with other protective measures would prevent the transmission of respiratory illness such as coronavirus, influenza and tuberculosis, the authors concluded that the evidence is not sufficiently strong to support the widespread use of face masks as a protective measure against Covid-19.[35] Booth and colleagues demonstrated that use of surgical face masks resulted in a six-fold reduction in exposure to the influenza virus in aerosols and recommends the use of face masks.[36] Lastly, in a study by Leung et al use of surgical face masks prevented the transmission of both the coronavirus and influenza from individuals who are symptomatic.[37]

Although reports of children acquiring and contacting the coronavirus appears low and are not the primary carriers of transmitting the coronavirus, the reopening of schools places teachers and their educational staff at risk of contacting the coronavirus that causes Covid-19, as they are older with many existing comorbidities.[20],[21] Therefore, asymptomatic or presymptomatic children and adults could be potential super spreaders of the stealth coronavirus as they are indistinguishable from healthy individuals.[10],[11] Universal masking may protect individuals from acquiring both viruses from others that are asymptomatic or mildly symptomatic and come to school.

Conclusion

Based on the current published literature, it appears that children are at less risk of contacting the coronavirus compared to adults, while the burden of influenza in children appears greater. It is therefore imperative that public health preventive measures of acquiring and spreading both viruses are ongoing, including the universal use of face masks. It should be emphasized that not only are students at risk of contacting both respiratory viruses, but teachers, the educational support staff at schools and family members of students are all at risk of contacting the coronavirus that causes Covid-19 and the seasonal influenza. Simultaneous exposure to both viruses may lead to unprecedented high rates of morbidity and mortality not observed when either virus affected a population by itself. Therefore, as a public health intervention measure, the universal adoption of face masks in school is recommended to prevent the spread and acquisition of both infectious diseases.

Competing Interests

The author declares no conflict of interest.

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