ISPID Physiology Working Group

Factsheet

Nb. No more than 3 pages in length plus references (please use Vancouver style)

Question to be addressed: Should infants and young children wear a face mask to protect against COVID-19?		
Date submitted:		
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Pubmed search terms: infants, children, face masks, COVID-19		
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Pubmed search findings:		

Background:

Face masks for adults and children have become a crucial part of everyday life across the globe since COVID-19 was declared a pandemic by the World Heath Organisation (WHO) in March 2020. Multi-layered masks are recommended by international and national institutions in order to prevent the spread of the virus that causes COVID-19 (1, 2).

In many countries, masks are supported by government regulations. There is increasing evidence that wearing masks has produced additional benefits, including the reduction in other viral diseases, such as influenza. Advice on children wearing masks is more variable and the evidence of benefits and harm more limited. It is generally recommended that infants do not wear masks, although this has not prevented sporadic commercial promotion of such a practice.

There has been general concern that covering the nose and mouth with a face mask may alter breathing leading to an increase in blood levels of carbon dioxide (hypercapnia) and a decrease in oxygen levels (hypoxaemia), particularly during exercise. A recent review of studies in adults reported that the available data suggest that face masks, including N95 respirators, surgical masks, and cloth face masks, may increase difficulty in breathing but have only small and often difficult-to-detect effects on work of breathing, blood gases, and other physiological parameters during physical activity, even with heavy/maximal exercise (3). A review of eight studies in adults and two small studies in school-aged children reported similar findings (4). There have been limited studies on the effects of mask wearing on breathing in young

children. One small Italian study of 47 children, 22 of whom were aged 2 years or under and 25 were aged 2 to 12 years compared respiratory parameters when wearing a surgical face mask for 30 minutes to when not wearing the mask for 30 minutes. There were no differences in end tidal carbon dioxide, oxygen saturation, heart rate or respiratory rate in either the children under or over 2 years of age. The study was limited by the short duration of mask wearing and the small sample size. It is also important to note that surgical face masks were used in this study, and the results may not be applicable to fabric face masks. In addition 2 children were excluded because they could not tolerate wearing the mask (5).

Recommendations on the age at which face masks can be safely worn differ between countries and organisations.

This Fact Sheet outlines the recommendations and evidence for wearing face masks safely in young children and why infants should not wear them.

Positions taken by different organisations and countries:

The World Health Organisation (WHO) and the United Nations Children's Fund (UNICEF) report that the 1-7% of cases of COVID-19 have been reported in children, with a relatively low risk of death compared to other age groups. The majority of cases have been acquired from transmission within households (6). However, more children have been affected in the second wave, with increased hospital admissions (7).

Evidence on the benefits and harms of children wearing masks to mitigate transmission of COVID-19 and other coronaviruses is limited. **Advice from WHO is that children aged up to 5 years should not wear masks to prevent the spread of COVID-19.** This approach considers childhood developmental milestones, compliance challenges and autonomy required to use a mask properly – the approach is to "do no harm – the best interest, health and well-being of the child should be prioritised."
Other public health strategies should be prioritised to minimise risk of transmission including maintaining physical distancing, educating children to maintain frequent hand hygiene and limiting group/class sizes.
Children with severe cognitive or respiratory impairments who have difficulties tolerating a mask should, under no circumstances, be required to wear masks (6).

Recommendations differ between countries.
The American Academy of Pediatrics (AAP) (8) and The Centers for Disease Control and Prevention (CDC) (9) instead recommend that face masks can be safely worn by all children 2 years of age and older, including most children with special health conditions. The AAP recommends face masks should be worn by children 2 years and older when attending childcare, school and other group activities or when social distancing (2 metres) is not possible both indoors and outdoors. There may be only rare exceptions to this guideline.

In Australia (10) and New Zealand (11) masks are not recommended to be worn by children under 12 years of age.

In the United Kingdom (12, 13) masks are not recommended for children under 3 years of age and are not compulsory for children 3-11 years of age.

Discussion

Although there is not international consensus on the age to start wearing a face mask, there is consensus that masks should not be used on infants and children younger than 2 years of age. It is important to note that cloth masks are made of a variety of fabrics and caution should be exercised when purchasing or making these. Factors influencing filtration ability include the material, structure (e.g., knit, woven or fused), number of layers, shape (surgical style, conical, or duckbill), and facial fit (14). Although Hopkins et al., (3) in their review found that masks had only a small effect on cardiorespiratory parameters even during exercise in adults, they note that there are important differences in respiratory physiology in infants and young children.

Infants and young children have underdeveloped respiratory muscles and largely rely on increasing respiratory rate when more oxygen is required, and thus the diaphragm can become fatigued more quickly than in adults. Children under the age of 6 years have a larger ratio of head size to body size, which means proportionally more extrathoracic anatomical dead space which reduces the efficiency of respiration (15). These anatomical differences combined with an inherently higher basal metabolic rate place infants and young children at greater risk of respiratory failure than adults. These differences decrease as children age, but children younger than 2 years have significant differences in respiratory physiology compared to adults. In addition, studies in infants have shown that carbon dioxide can accumulate under a single layer of material, such as a cotton sheet (16).

Infants are even more vulnerable. There is conclusive evidence from many countries that covering of a baby's head or face significantly increases the risk of Sudden Unexpected Death in Infancy (SUDI), including Sudden Infant Death Syndrome (SIDS) and fatal sleeping accidents (17, 18). Face masks should NEVER be worn by children under 2 years of age. Additionally, face masks should never be worn during sleep or when children are not being closely observed by an adult.

Conclusions:

Current WHO reccomendations are that masks should not be worn by children younger than 5 years of age. Recommendations vary between different countries, although all agree that masks should not be worn by children aged 2 years or younger. It is critically important that young children are supervised by a responsable adult whilst wearing a mask.

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