

COVID-19 infection in children

With rates of hospitalisation and mortality from novel coronavirus disease 2019 (COVID-19) increasing, there is understandable concern across the UK for medical professionals and the general public. We hope to highlight the challenges faced by children and health-care professionals involved in their care, and propose key strategies to address these challenges.

Severe COVID-19 in children is rare. To date, the largest review of children with COVID-19 included 2143 children in China. Only 112 (5.6%) of 2143 children had severe disease (defined as hypoxia) and 13 (0.6%) children developed respiratory or multiorgan failure or acute respiratory distress syndrome (ARDS). At the time of writing, there have been two reported deaths in children testing positive for COVID-19 in China, and no deaths in Italy. We are waiting for formal reports of outcomes in children from other countries but to date, no deaths have been reported in the published literature. These figures are in stark contrast to the 4% global mortality rate in adults with COVID-19. Although the death rate from COVID-19 in children is low, medical professionals and parents are concerned about the health of children in the UK.

One concern is that even though most infected children in the UK will have mild symptoms, some might become severely unwell. Although it is unlikely that the proportion of children with severe infection will be substantially worse than in children in China or Italy, there might be some differences in clinical characteristics, disease progression, and outcome. Outcomes for childhood respiratory illnesses are consistently worse in the UK than other countries, and levels of obesity and antenatal smoking (both associated with severe viral infection) are comparatively high. Adults with cardiorespiratory comorbidities are at increased risk of mortality from COVID-19; therefore, children with pre-existing conditions are of specific concern to health-care professionals. While it is necessary to highlight this risk, many parents of and children with pre-existing conditions are worried, not least because they hear terms like vulnerable and high-risk.

For children with an underlying chest condition (eg, cystic fibrosis or severe asthma), parental concern is heightened. Children with chronic chest conditions, and their families, have invested years of hard work to maintain good respiratory health; to hear constantly that people with underlying conditions are at increased risk can therefore be alarming. No comprehensive data are available on the impact of COVID-19 on children who are well, with an underlying condition, but it is reasonable to consider they might be at increased risk of severe disease. Statements by organisations, such as charities, Royal Colleges, and parent groups, have tried to achieve a difficult balance between providing reassurance but also clear direction. Essentially,

families with children with chronic respiratory illness have been encouraged to be more proactive with measures that reduce the chances of acquiring COVID-19, but decisions to undertake social distancing are complex and difficult with profound implications for the family (employment) and the young person if they are removed from education unnecessarily.

Parents and health-care professionals are rightly concerned because COVID-19 is a novel disease, with a weak evidence-base on which to formulate clinical decisions. Most literature relates to adult disease, but these findings are not always transferrable to children. For example, in adults, certain findings are associated with severe illness, such as high serum ferritin and bilateral abnormalities on chest CT. It is hard to determine common clinical characteristics in children with severe disease, and it is unclear whether there is a common biomarker, due to the small number of cases. Treatment recommendations to date are based on observations, rather than evidence from clinical trials. Sharing or publishing papers online before peer-review it is unclear whether there is a common biomarker, and universal use of social media, enables sharing of data quicker than ever before, which carries a risk of propagating invalid conclusions on a large scale. Some developments, however, have been heartening. International collaboration and robust forward planning has led to rapid development of randomised controlled trials with harmonised protocols, and the first report of a high-quality trial has already been published. Furthermore, the world's leading medical publishing groups have made COVID-19-related manuscripts free to access, enabling people globally to access information that would usually not be available to everyone. Constant updates on the status of the pandemic, available through Public Health England and WHO, enable people to keep abreast of developments and offer other excellent educational resources. Additionally, the Royal College of Paediatrics and Child Health, in association with partner organisations, are linking guidelines and resources with NHS England to provide clear, unambiguous advice and support based on the best available evidence.

Mainstream and social media are important for sharing information and uniting people during difficult times of social distancing and isolation. There are huge advantages to being able to spread information throughout a population at an unprecedented rate, including public health messages, morale-boosting stories, and tips and ideas generated by members of the public. With this rapid spread of information, however, comes the risk of misinformation. The pressure to keep up with breaking news has led to a reduction in checking of integrity of facts before reports are published, and due to the nature of social media, political and personal viewpoints can drive



Lancet Respir Med 2020

Published Online
March 27, 2020
[https://doi.org/10.1016/S2213-2600\(20\)30152-1](https://doi.org/10.1016/S2213-2600(20)30152-1)

For the **review** see *Pediatrics* 2020; published online March 1. DOI:10.1542/peds.2020-0702

For **reports on child deaths due to COVID-19** see review (above) and *N Engl J Med* 2020; published online March 18. DOI:10.1056/NEJMc2005073

For **child deaths in Italy** see *JAMA* 2020; published online March 17. DOI:10.1001/jama.2020.4344

For the **latest WHO report on COVID-19** see https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200316-sitrep-56-covid-19.pdf?sfvrsn=9fda7db2_2

For **child health comparisons** see *BMJ* 2019; 3 (suppl 1): A1-A34

For **clinical characteristics of adults with COVID-19** see **Articles** *Lancet* 2020; 395: 507-13

For **characteristics of adults with severe infection** see **Comment** *Lancet* 2020; published online March 17. [https://doi.org/10.1016/S0140-6736\(20\)30633-4](https://doi.org/10.1016/S0140-6736(20)30633-4)

For the **first randomised trial** see *N Engl J Med* 2020; published online March 18. DOI:10.1056/NEJMoa2001282

For the **PHE programme** see <https://www.england.nhs.uk/coronavirus/publication/letter-covid-19-hospitalisation-in-england-surveillance-system-chess-daily-reporting/>

For the **Clinical Characterisation Protocol** see <https://isarc.tghn.org/UK-CCP/>

For the **National Child Mortality Database** see <https://www.ncmd.info/>

For the **NHS England webtool** see <https://www.covidinchildren.co.uk>

For the **RCPC national guidelines** see <https://www.rcpch.ac.uk/resources/covid-19-guidance-paediatric-services>

a narrative that undermines public health efforts or cause confusion.

So how do we move forward over the coming months, with all the uncertainty, change, and difficulties for children and families? How do we ensure that we do not overtreat children with self-limiting illness or miss the handful of children with severe or life-threatening disease? The answer is we need to get the basics right—thankfully, mechanisms are in place to enable this.

As a community we need to learn, rapidly, how to manage COVID-19; we need to use data, from the right sources, in the right way, at the right time. There are four ongoing data collection processes: the Public Health England programme uses detailed information for crucial surveillance purposes. In the Clinical Characterisation Protocol, funded by the National Institute of Health Research, data from all adults and children admitted to hospital with proven COVID-19 are collected, to enable rapid and robust understanding of the disease. The National Child Mortality Database are working to analyse possible emerging patterns of child deaths that might be linked to COVID-19. Finally, NHS England have funded and developed a secure webtool for collecting minimal granular data from children admitted with suspected and proven COVID-19, to feed this into a real-time dashboard for paediatricians on the front-line, and to enable clinically relevant understanding of disease progression. All these endeavours are important if we are to learn how to manage COVID-19.

We must try and manage children in an evidence-based way, despite having very little evidence at our disposal. A national guideline for the management of children with COVID-19 is hosted and maintained by the Royal College of Paediatrics and Child Health. These guidelines will be updated as we learn more about the epidemiology and treatment of COVID-19 in children. The challenge will be to strike the right balance between doing this in a pragmatic,

timely way and yet maintaining scientific rigour to ensure the most evidence-based approach to care.

We need to communicate well with children and families in hospital. Personal Protective Equipment will look strange to us, but it will be absolutely terrifying for children, many of whom will have heard about COVID-19 in the news or might even know of an adult with the disease. We need to be compassionate and precise with our language and move from classifying children as high-risk to children with pre-existing conditions, in guidelines, the media, or in scientific publications. Parents may believe that there is no treatment for COVID-19, but we must help them understand that supportive therapy is likely to be all that is needed. We also need to communicate well at a wider level. Policy makers and leaders will need to be honest when communicating the huge societal and health-care changes about to unfold. The media, and scientific researchers, will need to be responsible with their reporting. Transparency in these situations prevents misinformation and misinterpretation, and their associated dangers. At a time of such great uncertainty and anxiety, the truth is one of the most effective tools we have.

MGS reports grants from DHSC National Institute of Health Research UK, Health Protection Research Unit in Emerging and Zoonotic Infections, and Medical Research Council UK, outside of the submitted work. All other authors declare no competing interests.

**Jan P Sinha, Rachel Harwood, Malcolm G Semple, Daniel B Hawcutt, Rebecca Thursfield, Omendra Narayan, Simon E Kenny, Russell Viner, Simon Langton Hewer, Kevin W Southern*
iansinha@liv.ac.uk

Alder Hey Children's Hospital, Liverpool L14 5AP, UK (IPS, RH, MGS, RT, SEK); Division of Child Health (IPS, DBH KWS), and Health Protection Research Unit in Emerging and Zoonotic Infections, Faculty of Health and Life Science (MGS), University of Liverpool, Liverpool, UK; Royal Manchester Children's Hospital, Manchester, UK (ON); NHS England, London, UK (SEK); Royal College of Paediatrics and Child Health, London, UK (RV); British Paediatric Respiratory Society, London, UK (SLH)