Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Toward a clinically based classification of disease severity for paediatric COVID-19

Published Online
May 15, 2020
https://doi.org/10.1016/
S1473-3099(20)30396-0

See Online for appendix

In their Article, Haiyan Qiu and colleagues[1] described 36 children with coronavirus disease 2019 (COVID-19) using the Chinese classification for paediatric COVID-19 severity: asymptomatic infection, mild disease, moderate disease, severe disease, and critical illness.[2] Herein, we focus on the definition of moderate disease. This definition is based on clinical criteria (pneumonia with fever and cough in the absence of signs of hypoxaemia), radiological criteria (because "some cases may have no clinical signs and symptoms, but chest CT shows lung lesions, which are subclinical"), or both.[2] In another study of COVID-19 in children, Lu and colleagues[3] also used CT scans to identify lung lesions and classify the severity of COVID-19.

Since the study by Qiu and colleagues,[1] we have evaluated 59 children with suspected COVID-19 in our paediatric emergency department. None of these 59 children had a CT scan; 14 (24%) had a chest x-ray. COVID-19 was confirmed by nasopharyngeal RT-PCR in a child aged 13 years who was exposed to a family member with COVID-19 and who later presented to our emergency department with a fever and dry cough. Blood tests, including inflammatory markers, were within normal ranges. Because the child appeared reasonably well, we did not do an x-ray or a CT scan, but did a lung ultrasound using a procedure we have previously described.[4] The lung ultrasound showed a small, subcentimetric subpleural consolidation with vertical artefacts. The child recovered without treatment and the case of COVID-19 was classified as mild. However, we cannot know whether the CT scan would have showed subclinical lung lesions and thus allowed a classification of moderate disease.

Published Online
May 15, 2020
https://doi.org/10.1016/
S1473-3099(20)30397-2

Although chest CT scans improve diagnostic accuracy, doing these scans in children comes with disadvantages, such as high costs, the need for sedation, and radiation exposure. Therefore, a classification of severity that includes the radiological diagnosis of pneumonia is not appropriate for children. Guidelines[5] state that medical history and examination are the determinants of pneumonia severity and appropriate levels of care, and that clinicians should reserve imaging to compromised children needing admission to hospital. Moreover, the high reported number of paediatric patients with asymptomatic and mild COVID-19 suggests that imaging should not be routinely used.[1,3]

Therefore, we propose the definition of moderate disease in the paediatric classification of COVID-19 severity should be changed to a clinical diagnosis of pneumonia, frequent fever and cough (mostly dry cough, followed by productive cough), presence or absence of wheezing but no obvious signs of hypoxaemia (eg, shortness of breath), abnormal breath sounds on auscultation, and dry or wet snoring. The section "some cases may have no clinical signs and symptoms, but chest CT shows lung lesions, which are subclinical"[2] should be removed because these asymptomatic or paucisymptomatic children should not have imaging scans done and should be classified as having mild COVID-19.

Qiu and colleagues[1] and others[3] should provide a new description of their patients using the clinically based classification we have suggested, showing how the mild and moderate classes would change. This description would provide a more appropriate clinical picture of the disease to paediatricians looking after children with suspected COVID-19. Reclassifying these data will also help clinicians to properly allocate resources.

We declare no competing interests. Members of the Gemelli-pediatric COVID-19 team are listed in the appendix.

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Authors' reply

We thank Danilo Buonsenso and colleagues for their excellent suggestion in response to our observational cohort study.[1] We think that defining the moderate clinical type of coronavirus disease 2019 (COVID-19) severity should be based on what the presence of pneumonia means in the progression of COVID-19 and what classifying measures are more practical for clinicians. COVID-19 was initially understood as pneumonia caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Now, after the reporting of a great number of mild and asymptomatic

cases of COVID-19 (the so-called iceberg phenomenon that is common for most infectious diseases) and the institution of RT-PCR as a diagnostic standard, radiological examination seems less important as a diagnostic tool than it used to be. Pneumonia is often considered a leading life-threatening risk for children.[2] Radiological evidence is crucial in assessing organ damage, as indicated by the presence of pneumonia when COVID-19 progresses from mild or asymptomatic to severe. This potential for rapid disease progression justifies the definition of the moderate clinical type, which is mainly defined by the presence of mild pneumonia.

Therefore, we used the same definitions of disease severity for our follow-up study (unpublished) as used in our previous cohort study.[1] After analysing the prognostic value of the chest CT scans from 127 paediatric patients with COVID-19 in our follow-up study, we found that length of hospitalisation and body temperature were significantly higher for children with pneumonia than for those without pneumonia. Bilateral pneumonia was often associated with a higher white blood cell count, suggesting mixed infections. Right-lobe pneumonia persisted after 1 month of follow-up, but left-lobe pneumonia did not. Although only a small proportion of paediatric patients progress to severe illness or become critically ill, and COVID-19 pneumonia seems milder than H1N1 pneumonia,[3] the outcome is often serious once patients with COVID-19 enter a severe condition. Among the three patients in our follow-up cohort who had severe disease, one patient died and one became critically ill.

Because of the paucity of long-term follow-up data from the COVID-19 pandemic, more time is required to fully understand the value of radiological examinations. Additionally, from the onset of SARS-CoV-2 infection to the diagnosis of COVID-19, the sensitivity of chest CT scans appears to be higher than that of RT-PCR.[4] Digital radiology might be a suitable choice to reduce the amount of radiation exposure to children. We agree that radiological examinations might not be necessary when looking after a large number of patients, where radiological examinations are not available, or when patients can be diagnosed with mild COVID-19 by an experienced clinician. Nevertheless, using CT scans to diagnose pneumonia helps to define moderate disease severity, provides valuable information about outcome, and increases the accuracy and sensitivity of screening.

The proposition by Buonsenso and colleagues to define moderate disease by a combination of symptoms might produce ambiguous results compared with the direct and objective evidence gained from radiological scans. Patients with COVID-19 often have lung lesions detectable by CT scanning before they exhibit symptoms. Furthermore, a more clinically based diagnosis of pneumonia requires experienced clinicians, and the wheezing, abnormal breath sounds, and snoring in Buonsenso's definition might result from mixed infections or be present intermittently.

We declare no competing interests. DC and FT contributed equally to this Correspondence.

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COVID-19 screening of health-care workers in a London maternity hospital

Published **Online** May 18, 2020 https://doi.org/10.1016/S1473-3099(20)30403-5

There have been increasing calls for universal screening of health-care workers for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).[1] We have been screening health-care workers at The Portland Hospital for Women and Children (London, UK) since March 17, 2020. By April 16, 2020, we had tested nasopharyngeal swabs taken from 266 staff members (>50% of the workforce) using SARS-CoV-2 RT-PCR, and 47 (18%) were found to be positive. Of these positive cases, 31 (66%) were symptomatic and 16 (34%) were asymptomatic (figure). Overall, 28 (48%) staff members remained positive at 7 days after the initial test was taken, 16 (34%) at 10 days, and four (9%) at 14 days, with one health-care worker remaining positive until 26 days. Of 25 symptomatic staff members who initially tested negative and were retested, only one (4%) became positive after 7 days. Potential factors associated with SARS-CoV-2 positivity are summarised in the figure.

There are several potential benefits of universal staff testing.[1] Importantly, it would ameliorate current workforce depletion due to symptomatic staff self-isolating, because a substantial proportion do not have COVID-19.[2] For example, of 76 symptomatic health-care workers in our analysis, 45 (59%) tested negative for SARS-CoV-2. These health-care workers could, therefore, have returned to work (assuming they were not unwell) as soon as they received their result. Had these