Research Highlights: COVID-19 and Pediatric Populations

Summary Compiled by American Academy of Pediatrics
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Critical Updates on COVID-19 from AAP

Visit the [AAP Critical Updates site](#) for daily updates, resources, and guidance on COVID-19
COVID-19 Data Tools

Follow the links below to data tools that track trends and statistics on COVID-19

- Johns Hopkins COVID-19 Map
- NYT County Level Map
- The COVID Tracking Project
- Financial Times – Coronavirus Tracked
- Our World in Data – Coronavirus
- Tableau – COVID-19 Cases
- Worldometer – Coronavirus
- Institute for Health Metrics and Evaluation
COVID-19 Research Resources

Follow the links below to research resources on COVID-19

- **National Institutes of Health – LitCovid**
  - LitCovid is a curated literature hub for tracking up-to-date scientific information about the 2019 novel Coronavirus

- **World Health Organization – Global Research on Coronavirus**
  - WHO is gathering the latest scientific findings and knowledge on coronavirus disease (COVID-19) and compiling it in a database
Google Search and COVID-19
Highlight: Popularity of search terms related to ‘coronavirus’ and ‘kids’ surged in March 2020 and have remained elevated

A value of 1 indicates when the terms were least popular, while 100 indicates when they were most popular

Source: Google Trends
COVID-19 Testing by Age: United States

Highlight: Children 0-17 years make up a very small share of all COVID-19 tests reported to CDC

Source: CDC, COVIDView: A Weekly Surveillance Summary of U.S. COVID-19 Activity
COVID-19 Confirmed Cases by Age: United States

Highlights: 1) Children 0-17 years represented 1.7% of all confirmed cases reported to CDC
2) Over 2500 confirmed child cases reported to CDC as of 4/2/20

Source: CDC, Coronavirus Disease 2019 in Children, 4/6
Child Hospitalizations from COVID-19: United States

Highlights: 1) Hospitalization for children is lower than for adults
2) Percent of child cases resulting in hospitalization: 5.7%-20%*
3) Hospitalization rate per 100,000 is 0.6 or lower for age groups ≤ 17 years

* Note: Some CDC estimates were provided in ranges due to extensive missing data for hospitalization outcomes

Source: CDC, Coronavirus Disease 2019 in Children, 4/6
Children experience a lower rate of COVID-19 infection and less severe symptoms

1. **Screening and Severity of Coronavirus in Children in Spain, Tagarro et al, JAMA Peds**
   - By March 16, 2020, 41 of the 4695 confirmed cases (0.8%) in Madrid region were children younger than 18 years; no patients died

2. **Epidemiology of COVID-19 Among Children in China, Dong et al, Pediatrics**
   - Over 90% of all patients were asymptomatic, mild, or moderate cases; 13% asymptomatic
   - Clinical manifestations of children’s COVID-19 cases were less severe than those of adults
   - However, infections among infants may be more likely to be severe or critical than for older children

3. **SARS-CoV-2 Infection in Children, Lu et al, NEJM**
   - In contrast with infected adults, most infected children appear to have a milder clinical course; 16% asymptomatic

4. **Coronavirus Disease 2019 in Italy, Livingston and Bucher, JAMA**
   - Of the 22k cases in Italy as of 3/15, only 1.2% were ages 0-18 years; no deaths of children occurred
Symptoms among Child Patients with COVID-19: United States

Highlight: Common symptoms among children include fever, cough and shortness of breath, but are less commonly reported than among adults.

Source: CDC, Coronavirus Disease 2019 in Children, 4/6

<table>
<thead>
<tr>
<th>Sign/Symptom</th>
<th>Pediatric (N=291)</th>
<th>Adult (N=10,944)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever, cough, or shortness of breath</td>
<td>213 (73)</td>
<td>10,167 (93)</td>
</tr>
<tr>
<td>Fever†</td>
<td>163 (56)</td>
<td>7,794 (71)</td>
</tr>
<tr>
<td>Cough</td>
<td>158 (54)</td>
<td>8,775 (80)</td>
</tr>
<tr>
<td>Shortness of breath</td>
<td>39 (13)</td>
<td>4,674 (43)</td>
</tr>
<tr>
<td>Myalgia</td>
<td>66 (23)</td>
<td>6,713 (61)</td>
</tr>
<tr>
<td>Runny nose‡</td>
<td>21 (7.2)</td>
<td>757 (6.9)</td>
</tr>
<tr>
<td>Sore throat</td>
<td>71 (24)</td>
<td>3,795 (35)</td>
</tr>
<tr>
<td>Headache</td>
<td>81 (28)</td>
<td>6,335 (58)</td>
</tr>
<tr>
<td>Nausea/Vomiting</td>
<td>31 (11)</td>
<td>1,746 (16)</td>
</tr>
<tr>
<td>Abdominal pain§</td>
<td>17 (5.8)</td>
<td>1,329 (12)</td>
</tr>
<tr>
<td>Diarrhea</td>
<td>37 (13)</td>
<td>3,353 (31)</td>
</tr>
</tbody>
</table>

* Cases were included in the denominator if they had a known symptom status for fever, cough, shortness of breath, nausea/vomiting, and diarrhea. Total number of patients by age group: <18 years (N = 2,572), 18–64 years (N = 113,985).
† Includes all cases with one or more of these symptoms.
‡ Patients were included if they had information for either measured or subjective fever variables and were considered to have a fever if “yes” was indicated for either variable.
§ Runny nose and abdominal pain were less frequently completed than other symptoms; therefore, percentages with these symptoms are likely underestimates.
Symptoms among Child Patients with COVID-19: International Research

Highlight: Common symptoms among children include fever and cough

• **SARS-CoV-2 Infection in Children, Lu et al, NEJM**
  – Symptoms of child patients included: cough (49%), pharyngeal erythema (46%), fever (42%; median duration = 3 days)

• **Clinical Characteristics of Coronavirus, Hong et al, Pediatrics and Neonatology**
  – Of 9 infants hospitalized with COVID-19, 4 had fever, two mild upper respiratory symptoms, one asymptomatic

• **A Case Series of Children with Coronavirus, Cai et al, Clinical Infectious Diseases**
  – Children present with mild respiratory symptoms, as compared to adults
  – Fever and mild cough are common at disease onset in children

• **Insight into COVID-2019 for Pediatricians, Li et al, Pediatric Pulmonology**
  – Clinical manifestations: fever, fatigue, dry cough; few patients have upper respiratory tract symptoms
  – Most cases mild, with no fever or pneumonia
Transmission of COVID-19 to Children

Highlights: 1) Children are primarily infected via infected family members
   2) Mixed evidence on vertical transmission from mother to fetus

- Clinical Characteristics of Coronavirus, Hong et al, Pediatrics and Neonatology
  - Pediatric cases are mainly family cluster cases, and most have epidemiological links to adult patients

  - The main infection route was close contact within the family

- Clinical analysis of 10 neonates born to mothers with 2019-nCov, Zhu et al, Translational Pediatrics
  - No evidence of intrauterine infection caused by vertical transmission from mother to child

- Characteristics and intrauterine vertical transmission potential of COVID-19 in pregnant women, Chen et al, The Lancet
  - Currently no evidence for intrauterine infection caused by vertical transmission in women who develop COVID-19 pneumonia in late pregnancy

- Possible Vertical Transmission of SARS-CoV-2 From an Infected Mother to Her Newborn, Dong et al, JAMA
  - Neonate born to a mother with COVID-19 had elevated antibody levels and abnormal cytokine test results 2 hours after birth; the elevated IgM antibody level suggests that the neonate was infected with the virus in utero

- AAP: Management of Infants Born to Mothers with COVID-19
  - Interim guidance for the management of infants born to mothers with confirmed and suspected COVID-19
COVID-19 and Breastfeeding

Highlight: No evidence COVID-19 virus is transmitted through breastfeeding

- CDC – Pregnancy and Breastfeeding: Information about Coronavirus
  - Research has not shown that COVID-19 positive or suspected COVID-19 positive mothers transmit the virus through breastmilk
  - COVID-19 positive mothers take all infection control precautions when interacting with their infant: washing hands before contact with the infant and wearing a mask while breastfeeding

- WHO – Caring for infants and mothers with COVID-19: IPC and breastfeeding
  - Recommends mothers who have COVID-19 or are suspected of having the virus breastfeed their infants
  - Standard infant feeding guidelines should still be followed but with infection control and prevention measures in place

- Clinical characteristics and intrauterine vertical transmission potential of COVID-19 infection in nine pregnant women, Chen et al, The Lancet
  - Breastmilk of 6 of the 9 women was tested for presence of COVID-19 and none of the samples were positive for the virus, indicating that COVID-19 is not transmitted through breast milk
COVID-19 and Ibuprofen Use

Highlight: No evidence that ibuprofen use has negative effects on COVID-19 patients

- **WHO – Tweet on ibuprofen use and COVID-19**
  - WHO does not recommend against use of ibuprofen
  - Infant: washing hands before contact with the infant and wearing a mask while breastfeeding

- **European Medicines Agency – EMA gives advice on the use of non-steroidal anti-inflammatory for COVID-19**
  - There is currently no scientific evidence to support that medicines such as ibuprofen increase the risk of COVID-19 infection
  - Healthcare providers and patients should continue to include NSAIDs (such as ibuprofen) as a treatment option and understand the benefits and risks of all medication usage