COVID-19 Epidemiology in Children
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Outline
• What is a coronavirus?
• Where did SARS-CoV-2 come from?
• What is the epidemiology of COVID-19 disease?
• What are the symptoms of COVID-19 in children?
• What is happening with COVID-19 variants?
• What is the epidemiology of MIS-C?

What is a coronavirus?

Terminology
• CoV: Coronavirus
• SARS: Severe Acute Respiratory Syndrome
• SARS-CoV-2: The virus causing COVID-19
• COVID-19 (coronavirus disease 2019): The disease caused by SARS-CoV-2

Coronavirus
• Largest group of viruses causing respiratory and GI illness
• Enveloped, single-stranded RNA virus
• 4 distinct genera
• Named after crown-like projections
• Host specific, infecting humans and animals
Common coronaviruses

- 4 most common HCoV - NL63, 229E, OC43, HKU1
- Winter-spring respiratory disease
- Infection early in childhood
- Re-infection can occur
- Spread via droplets and direct/indirect contact
- GI symptoms less common

Where did SARS-CoV-2 come from?

Emerging coronaviruses

SARS-CoV
MERS-CoV
SARS-CoV-2

Emerging coronaviruses

SARS-CoV
MERS-CoV
SARS-CoV-2

First reported
November 2002
September 2012 (April)
December 2019 (Nov)

Initial location
Southern China
Saudi Arabia (Jordan)
Wuhan, China

Cases/deaths
8,096/774 (9.5%)
1,733/678 (34.4%)
31,764,062 / 568,104 (1.8%)
31,764,062 / 568,104 (1.8%)
142,378,883 / 3,041,841 (2.1%)

What is the epidemiology of COVID-19 disease?
R0 - a measure of infectivity

Children represent a small proportion of COVID-19 cases and deaths nationally

Black, Hispanic/Latino, and AI/AN cases are disproportionately high

COVID-19 Weekly Cases US

COVID-19 Cases by State

Children can transmit SARS-CoV-2
Clusters of SARS-CoV-2 Infection Among Elementary School Educators and Students in One School District — Georgia, December 2020–January 2021

- 9 clusters of 13 educators and 32 students
- 2 clusters with educator-to-educator transmission
- Resulted in half of cases
- All clusters with "less than ideal distancing" (<3 feet)
- 5/9 clusters with inadequate mask usage by students

What are the symptoms of COVID-19 in children?

Symptoms are different than adults

Teenagers’ symptoms are similar to adults

COVID-19 Severity in Children

- Most children have mild or asymptomatic infection
- Hospitalization is uncommon ~12%
- 20-30% of hospitalized children required ICU care
- No difference in hospitalization by race/ethnicity
- Death is rare 0.01% of infected children
### Identifying high-risk children

**Characteristics**

- **Serious acute respiratory illness or death (SAIRD):**
  - Age
  - Sex
  - Race
  - Hispanic/Latino ethnicity
- **Morbidity or mortality only:**
  - Age
  - Sex
  - Race
  - Hispanic/Latino ethnicity

**Clinical parameters:**

- Age
- Sex
- Race
- Hispanic/Latino ethnicity
- Morbidity or mortality only
- Age
- Sex
- Race
- Hispanic/Latino ethnicity

**Overlap of COVID-19 and allergies**

- Symptoms more common with COVID-19
- Symptoms more common with seasonal allergies
- Symptoms may overlap
- Symptoms may not overlap

**Variant classifications & definitions**

- Variants of interest
- Variants of concern
- Variants of high consequence

**Variant classifications & definitions**

- SARS-CoV-2 variants:
  - Alpha (B.1.1.7)
  - Beta (B.1.351)
  - Gamma (B.1.1.28, B.1.529)
  - Delta (B.1.617.1)
  - Lambda (P.1)
  - Mu (B.1.617.2)
  - Omicron (B.1.1.529)

**Older children and children of color have higher mortality rates**


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What is the epidemiology of MIS-C?

Most children do not have a preceding history of COVID-19

Table 1: Characteristics of Patients with MIS-C by Age Group, United States, March 2020 to January 2021

<table>
<thead>
<tr>
<th>Variable</th>
<th>All MIS-C Cases</th>
<th>Male, n (%)</th>
<th>Female, n (%)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>1-4</td>
<td>5-9</td>
<td>10-14</td>
<td>15-19</td>
</tr>
<tr>
<td>Male</td>
<td>269 (24.2)</td>
<td>67 (40.3)</td>
<td>75 (44.4)</td>
<td>101 (55.5)</td>
</tr>
<tr>
<td>Female</td>
<td>264 (24.1)</td>
<td>62 (38.5)</td>
<td>77 (46.4)</td>
<td>100 (55)</td>
</tr>
<tr>
<td>Prevalence of COVID-19</td>
<td>2.1</td>
<td>2.3</td>
<td>2.9</td>
<td>2.2</td>
</tr>
<tr>
<td>Incidence per 100,000</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

MIS-C cases across the U.S.
Most children are school-aged and Hispanic/Latino or Black

Differentiating between MIS-C and severe acute COVID-19

GI symptoms are common

Most children with MIS-C recover

Conclusions

- CoV can infect animals and humans
- Children can transmit the virus that causes COVID-19
- Children less commonly infected than adults; are often mild or asymptomatic
- Variant viruses develop with ongoing virus replication
- A small proportion of children get severe acute COVID-19
- Children who get MIS-C may not have had significant COVID-19 infection