COVID-19: Prevention and Management in Children

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Corona

Spike Protein

RNA

Lipid Envelope
Well-known viruses by $R_0$ value

- Ebola: 1.5-2
- SARS: 2-3
- Zika: 2-5
- Polio: 4-7
- Measles: 5-7
- Viral outbreak limited
- Pandemic Flu: 2-3
- HIV: 2-5
- Mumps: 5-7
- Smallpox: 12-18
- Viral outbreak widespread

Source: Centers for Disease Control, World Health Organization
The number of people that one sick person will infect (on average) is called $R_0$. Here are the maximum $R_0$ values for a few viruses:

- Hepatitis C (2)
- Ebola (2)
- HIV (4)
- SARS (4)
- Mumps (10)
- Measles (18)
Seasonal flu
$R_0 = 1.3$

Zika
$R_0 = 3-6.6$

Covid-19
$R_0 = 2-2.5$

Measles
$R_0 = 12-18$
Hospitalization rate

Flu: 2%

Covid-19: 20-31%
Fatality rate

Covid-19
1-3%

Flu
0.1%
20-60% of the world could become infected
The Math Behind Social Distancing

<table>
<thead>
<tr>
<th>Now</th>
<th>5 Days</th>
<th>30 Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 person</td>
<td>2.5 people</td>
<td>406 people</td>
</tr>
<tr>
<td>50% less exposure</td>
<td>1.25 people</td>
<td>15 people</td>
</tr>
<tr>
<td>75% less exposure</td>
<td>.625 people</td>
<td>2.5 people</td>
</tr>
</tbody>
</table>
Social distancing
Survival of the Virus in the Environment

- Viable up to 72 hours after being placed on stainless steel and plastic.
- Viable up to four hours after being placed on copper, and up to 24 hours after being put on cardboard.
- Remained viable for three hours in aerosols.

The Science of Soap

Cracking the Virus Envelope

Virus

Skin

Soap Detergent

Clean Surface
Flattening the curve

Number of cases

Capacity of health care system

Days after initial outbreak

Without measures to slow the spread of infection

With measures to slow the spread of infection

SOURCE: CDC
Seasonal Frequencies of Human Coronavirus strains, Seattle Children’s Hospital, 2012–2016
Clinical presentation of patients with CoVID-19

- Fever/Headache
- Hemoptysis
- Cough
- Shortness of breath
- Pneumonia
- Septic shock
- Renal failure
- Myalgia
- Diarrhea
## Clinical Presentation

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever</td>
<td>99</td>
</tr>
<tr>
<td>Fatigue</td>
<td>70</td>
</tr>
<tr>
<td>Dry cough</td>
<td>59</td>
</tr>
<tr>
<td>Anorexia</td>
<td>40</td>
</tr>
<tr>
<td>Myalgias</td>
<td>35</td>
</tr>
<tr>
<td>Dyspnea</td>
<td>31</td>
</tr>
<tr>
<td>Sputum production</td>
<td>27</td>
</tr>
</tbody>
</table>
Regular Coronaviruses: Risk Factors for Severe Disease in Children

- Younger age
- Underlying pulmonary pathology*
- Immunocompromising conditions
- Respiratory co-pathogens
- RSV co-infection*

RSV - > 5X increased risk of severe lower tract disease
# Severity of COVID-19 Illness by Age Group

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Asymptomatic</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
<th>Critical</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1</td>
<td>7.4</td>
<td>18.8</td>
<td>15.3</td>
<td>29.5</td>
<td>53.8</td>
<td>379 (17.7)</td>
</tr>
<tr>
<td>1-5</td>
<td>16.0</td>
<td>22.5</td>
<td>23.7</td>
<td>30.4</td>
<td>15.4</td>
<td>493 (23.0)</td>
</tr>
<tr>
<td>6-10</td>
<td>31.9</td>
<td>23.5</td>
<td>23.0</td>
<td>19.6</td>
<td>0</td>
<td>521 (24.3)</td>
</tr>
<tr>
<td>11-15</td>
<td>28.7</td>
<td>18.2</td>
<td>20.5</td>
<td>125</td>
<td>23.1</td>
<td>413 (19.3)</td>
</tr>
<tr>
<td>&gt; 15</td>
<td>16.0</td>
<td>15.0</td>
<td>17.5</td>
<td>8.0</td>
<td>7.7</td>
<td>335 (15.7)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>94</strong></td>
<td><strong>1091</strong></td>
<td><strong>831</strong></td>
<td><strong>112</strong></td>
<td><strong>13</strong></td>
<td><strong>2141 (100)</strong></td>
</tr>
</tbody>
</table>

20-60% of the world could become infected
THANK YOU