COVID19 Pandemic & Pediatric Vaccine Improvement Health Information Technology Perspective Part 2
Key Points and Objectives

- SARS-CoV2 & COVID-19 Clinical / Public Health Experience
  - Observations from the Past Year
  - Epidemic/Pandemic Disease
    - Progression
    - Treatments
  - Infection
    - Prevention

Detection
Infection & Disease

Treatment
Secondary Prevention
Hospital/Death

Primary Prevention
Prevent Infection & Spread
Early Observations

2020 Calendar

January

Business as usual, breaking news

January 9  WHO
Mysterious Coronavirus-Related Pneumonia in Wuhan, China

January 20  CDC
SFO, LAX, JFK Airports Begin Screening

January 21  CDC
Confirms 1st US COVID Case
In Wuhan < 200 sick, 4 dead

January 23  Wuhan Quarantine
300 more sick, 13 dead in 2 days

January 31  WHO Issues Global Health Emergency
> 9,800 sick, 200 dead

February

Business as usual, yet . . .

February 2  US, NZ, Australia, Italy & Germany restrict Air Travel

February 3  US Declares Public Health Emergency

February 10  China
COVID-19 deaths 908 exceed 774 SARS (17 years ago)

February 25  CDC
COVID-19 moving toward Pandemic Status

March

Impacting USA Daily Lives

March 11  WHO
Declares COVID-19 a Pandemic

March 13  Trump
 Declares National Emergency

March 17  West Virginia
=> ALL 50 US states

March 19  California
Issues Stay-at-Home Order

March 26  Senate
Passes CARES Act $2 Trillion
Early Observations—National Summary

Influenza Positive Tests Reported to CDC by U.S. Public Health Laboratories, National Summary, 2019-2020 Season

Influenza Positive Tests Reported to CDC by U.S. Clinical Laboratories, National Summary, September 27, 2020 – July 10, 2021

20 Weeks
Early Observations—Daily Report Trends

Flu & COVID-19
- Timing
- Numbers
- Deaths

Flu Disease
Weekly peak >3,500

COVID-19
HUGE numbers
more contagious
more deadly for all ages
## Early Observations—Positive Cases

### 2020 Calendar

<table>
<thead>
<tr>
<th>IHS Area</th>
<th>Tested</th>
<th>Positive</th>
<th>% Positive</th>
<th>Negative</th>
<th>Pending</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alaska</td>
<td>1,767</td>
<td>12</td>
<td>1.0%</td>
<td>1,146</td>
<td>609</td>
</tr>
<tr>
<td>Albuquerque</td>
<td>1,996</td>
<td>215</td>
<td>18.9%</td>
<td>924</td>
<td>857</td>
</tr>
<tr>
<td>Bemidji</td>
<td>150</td>
<td>17</td>
<td>12.4%</td>
<td>120</td>
<td>13</td>
</tr>
<tr>
<td>Billings</td>
<td>1,902</td>
<td>21</td>
<td>1.2%</td>
<td>1,748</td>
<td>133</td>
</tr>
<tr>
<td>California</td>
<td>779</td>
<td>45</td>
<td>7.1%</td>
<td>587</td>
<td>147</td>
</tr>
<tr>
<td>Great Plains</td>
<td>353</td>
<td>24</td>
<td>7.4%</td>
<td>300</td>
<td>29</td>
</tr>
<tr>
<td>Nashville</td>
<td>1,214</td>
<td>60</td>
<td>6.0%</td>
<td>947</td>
<td>207</td>
</tr>
<tr>
<td>Navajo</td>
<td>5,225</td>
<td>1,045</td>
<td>22.8%</td>
<td>3,547</td>
<td>633</td>
</tr>
<tr>
<td>Oklahoma City</td>
<td>2,758</td>
<td>101</td>
<td>4.4%</td>
<td>2,203</td>
<td>454</td>
</tr>
<tr>
<td>Phoenix</td>
<td>909</td>
<td>153</td>
<td>19.8%</td>
<td>620</td>
<td>136</td>
</tr>
<tr>
<td>Portland</td>
<td>786</td>
<td>77</td>
<td>10.3%</td>
<td>674</td>
<td>35</td>
</tr>
<tr>
<td>Tucson</td>
<td>552</td>
<td>11</td>
<td>2.4%</td>
<td>449</td>
<td>92</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>18,391</td>
<td>1,781</td>
<td><strong>11.8%</strong></td>
<td><strong>13,265</strong></td>
<td><strong>3,345</strong></td>
</tr>
</tbody>
</table>

6 weeks after April:

- **Positive**: 13,165
- **8.3%**
Early on COVID-19 Pandemic—Few Sick Kids
Idea “Spared Children” “Children are Safe”

- Wuhan: Initially no children, suggested no disease
- By March 90,870 confirmed cases
- 3112 deaths > 900 confirmed pediatric cases
  - 0 deaths in children < 10 years of age
  - 1 teen death 10–19 years of age
  - 1 infant severe disease
  - Most children infected from a household adult
Early Data—Few Sick Kids

<table>
<thead>
<tr>
<th>Country</th>
<th>Percentage</th>
<th>Age Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>1%</td>
<td>&lt; 10 yo.</td>
</tr>
<tr>
<td>Korea</td>
<td>6.3%</td>
<td>&lt; 19 yo.</td>
</tr>
<tr>
<td>Italy</td>
<td>1.2%</td>
<td></td>
</tr>
<tr>
<td>Spain</td>
<td>0.8%</td>
<td>&lt; 18 yo.</td>
</tr>
<tr>
<td>USA</td>
<td>1.7%</td>
<td></td>
</tr>
</tbody>
</table>
Children ===> Not Infected? Not Sick?
Rationale includes . . .

1. **ACE2 receptors**
   immature and fewer

2. **Innate immune response (Key Factor)**
   more robust in children

3. **Comorbidity**
   fewer with underlying or chronic conditions
SARS-CoV-2: Angiotensin-converting Enzyme 2

ACE2 is present everywhere: attached to the cell membrane of mainly
- enterocytes of the small intestine
- arterial and venous endothelial cells
- arterial smooth muscle cells
- lung type II alveolar cells
- cortical neurons and glia

As a transmembrane protein ACE2 serves as the main entry point into cells
Human Immune System—2 Parts

**Innate - General**
- Macrophage
- Dendritic cell
- Neutrophil
- Monocyte
- Eosinophil
- Mast cell
- Basophil
- Myeloid progenitor

**Adaptive - Specific**
- Cytotoxic T cell
- Helper T cell
- Memory T cell
- T cell progenitor
- Plasma cell
- B cell progenitor
- Natural Killer cell
- Lymphoid progenitor
- Memory B cell
Timeline: After Infection . . . or Vaccination

- INNATE ALONE
  - First Time Infection
  - Viral load
  - Infectious
  - Symptoms
  - Recovery

- INNATE + SPECIFIC
  - Exposure
  - Lower & Shorter

2nd time or post Vaccination
Immune System—Innate

**WEAKER with**
1. Age
2. Overweight/Obese
3. Chronic Conditions
4. Stress
5. Poor Sleep
6. Poor Nutrition
   a) Vitamin D deficient
   b) High Fructose Corn Syrup

**STRONGER with**
1. Sleep 7-9 hours
2. Fitness
3. Good Nutrition
   (30/day & color)
   a) Vitamin D
   b) Zinc
   c) Quercetin
   d) N-Acetyl-Cysteine
   e) Vitamin C
Pediatric COVID-19 Disease

1. Asymptomatic Infection
   • Contagious ==> Transmit to adults / elders

2. Classic COVID-19 – fever, cough, URI, pneumonia

3. Multisystem Inflammatory Syndrome (MIS-C)
   • ACE2 Receptors present everywhere blood goes
COVID-19 Treatments

Different Stages

- Stage I (Early Infection)
- Stage II (Pulmonary Phase)
  - IIA
  - IIB
- Stage III (Hyperinflammation Phase)

Severity of Illness

Time Course

Viral Response Phase

Host Inflammatory Response Phase

Monoclonal Antibodies

Convalescent Serum

Antivirals

Oxygen

Steroids
Young & Poor Avoid Care for COVID-19 Symptoms

• Pandemic focus ==> “deferred care” in health care circles
  = FACT: Many avoid a doctor/hospital for anything that could wait
    *Important* Preventive Care – Vaccines & Screenings
• Gallup poll ==> darker side for the classic symptoms of COVID-19
  1 in 7 Americans report would not seek care for a fever or dry cough
• Most likely
  • younger than age 30
  • income less than $40,000 a year
Pandemic Delays—IMM Reports

- 3-6 mo. delay – Adults (50–65 yr.) & Teens (11–16 yr.) – easy catch up

- 19-35 mo. – Two-Year-Old Report
  - July 2020 (24–35 mo. All Past Due), in July 2021 (aged out of Report)
  - July 2020 (19–23 mo. also Past Due = > July 2021 31–35 mo. **in Report/catch up
  - The largest “Impact” / Decrease will be seen in Sept and Dec NIRS Reports

- 3-18 mo. (youngest part of 3–27 mo.)
  - July 2021 = > 15-30 mo.
  - MOST CHALLENGING Group in 2020
  - More vaccines Due --- More vaccines missed
  - Higher number Past Due

**WEEKLY**

#1 3–27 mo. Not Current
#2 LLS - PAST DUE
Recommended Books

Questions & Discussion