Presentation and care of COVID-19 in children and young persons admitted with moderate to severe COVID-19

Presented by: Jeané Cloete
Agenda

1. Epidemiology of disease in South Africa
2. Severity of illness
3. Disease presentation
4. Severe COVID vs Multisystem inflammatory syndrome
5. Management
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Epidemiology paediatric COVID 19 - Rate of SARS-CoV-2 % testing positive in South Africa

Used with permission DATCOV Hospital surveillance data - prepress Dr Waasila Jassat et al
Agenda

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Severity of illness

Mild or moderate disease
- No new
- Increased supplemental oxygen
- Other supportive treatment

Severe disease
- Supplemental oxygen
- Increased requirement from baseline
- Additional care and management

Critical disease
- Noninvasive or invasive mechanical ventilation
- Sepsis, multiorgan failure
- Rapidly worsening clinical trajectory
COVID-19 admissions, severe disease, and in-hospital deaths among children, in D614G, Beta, Delta and Omicron waves, South Africa *p<0.001; **p>0.05

<table>
<thead>
<tr>
<th>Variant wave</th>
<th>n with outcome</th>
<th>% (n) received oxygen</th>
<th>% (n) treated in ICU</th>
<th>% (n) severe</th>
<th>% (n) died</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>&lt;1 year</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D614G</td>
<td>581</td>
<td>15.3 (89) *</td>
<td>9.5 (55) *</td>
<td>27.4 (159) *</td>
<td>6.7 (39) *</td>
</tr>
<tr>
<td>Beta</td>
<td>955</td>
<td>22.8 (218) *</td>
<td>8.3 (79) *</td>
<td>30.9 (295) *</td>
<td>4.8 (46) *</td>
</tr>
<tr>
<td>Delta</td>
<td>1988</td>
<td>20.0 (397) *</td>
<td>8.0 (160) *</td>
<td>30.8 (613) *</td>
<td>5.2 (104) *</td>
</tr>
<tr>
<td>Omicron</td>
<td><strong>2389</strong></td>
<td><strong>14.8 (353)</strong></td>
<td><strong>4.4 (106)</strong></td>
<td><strong>21.2 (507)</strong></td>
<td>2.4 (58)</td>
</tr>
<tr>
<td><strong>1-4 years</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D614G</td>
<td>217</td>
<td>10.6 (23) *</td>
<td>8.3 (18) *</td>
<td>18.0 (39) *</td>
<td>0.9 (2) **</td>
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<tr>
<td>Beta</td>
<td>294</td>
<td>15.3 (45) *</td>
<td>6.1 (18) *</td>
<td>22.8 (67) *</td>
<td>3.4 (10) *</td>
</tr>
<tr>
<td>Delta</td>
<td>744</td>
<td>15.1 (112) *</td>
<td>3.2 (24) **</td>
<td>20.7 (154) *</td>
<td>0.7 (5) **</td>
</tr>
<tr>
<td>Omicron</td>
<td>853</td>
<td>9.3 (79)</td>
<td>2.5 (21)</td>
<td>14.1 (120)</td>
<td>0.9 (8)</td>
</tr>
<tr>
<td><strong>5-19 years</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D614G</td>
<td>1529</td>
<td>13.1 (200) *</td>
<td>7.1 (108) *</td>
<td>20.8 (318) *</td>
<td>3.9 (59) *</td>
</tr>
<tr>
<td>Beta</td>
<td>1471</td>
<td>20.9 (308) *</td>
<td>5.4 (80) *</td>
<td>29.0 (427) *</td>
<td>4.8 (70) *</td>
</tr>
<tr>
<td>Delta</td>
<td>4212</td>
<td>18.2 (768) *</td>
<td>4.9 (206) *</td>
<td>25.1 (1056)</td>
<td>2.9 (121) *</td>
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<tr>
<td>Omicron</td>
<td>3503</td>
<td>11.0 (384)</td>
<td>3.4 (118)</td>
<td>16.9 (593)</td>
<td>1.8 (62)</td>
</tr>
</tbody>
</table>

Used with permission from Presentation: DATCOV: Hospital surveillance for COVID-19 Omicron-dominated fourth wave – 4/02/2022
Compiled by Lovelyn Uzoma Ozougwu, Dr Waasila Jassat, Prof Lucille Blumberg, Richard Welch and DATCOV team
COVID-19 admissions, severe disease, and in-hospital deaths amongst individuals <20 years, in D614G, Beta, Delta and Omicron waves, South Africa

"Severe" defined as respiratory distress, oxygen, mechanical ventilation, high care / ICU care or death. * p<0.05; ** p>0.05

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Pediatric hospitalisations due to COVID-19 during the first SARS-CoV-2 omicron (B.1.1.529) variant wave in South Africa: a multicentre observational study - Jeané Cloete, Annelet Kruger, Maureen Masha et al. Lancet Child and Adolescent Health 2022

COVID 19 Diagnosis (N=138)

- Combine Primary + Contributory: 64%
- Incidental accounted for 1/3 of patients admitted
- Mainly surgical patients that were swabbed for emergency or elective procedures
- Mainly asymptomatic for COVID 19

- Primary clinical diagnosis: 36%
- Contributory diagnosis: 20%
- Incidental diagnosis: 44%
Co morbid diseases

- Obesity
- Diabetic patients
- Asthma
- Cardiac disease
- Renal disease
- Immune deficiency

Co morbid diseases

- Obesity
- Immune deficiency
- Diabetic patients
- Renal disease
- Cardiac disease
- Asthma
- Co morbid conditions

Ex premature infants
Summary

- More children < 19 years admitted during Omicron wave
- Severity of illness was not worse
- Deaths were less
- Confounding factors: Other viral pathogens impact the numbers
- South African Children > 12 years were eligible to vaccinate as of October 2021
Agenda

1. Epidemiology of disease in South Africa

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Disease presentation

- Respiratory illness
- Gastro-intestinal illness
- Neurological manifestation
- Other
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### Symptoms (N=125)

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Count (Percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever</td>
<td>58 (46%)</td>
</tr>
<tr>
<td>Cough</td>
<td>50 (40%)</td>
</tr>
<tr>
<td>Vomiting</td>
<td>30 (24%)</td>
</tr>
<tr>
<td>Difficulty in breathing</td>
<td>28 (22%)</td>
</tr>
<tr>
<td>Diarrhoea</td>
<td>25 (20%)</td>
</tr>
<tr>
<td>Seizures</td>
<td>25 (20%)</td>
</tr>
<tr>
<td>Headache</td>
<td>7 (6%)</td>
</tr>
<tr>
<td>Skin rash</td>
<td>4 (3%)</td>
</tr>
<tr>
<td>Other</td>
<td>4 (3%)</td>
</tr>
</tbody>
</table>

- Most common symptom was fever
- 1/5 of patients had gastro-intestinal symptoms
- 1/5 of patients had seizures
Respiratory illness

- Mild to moderate respiratory distress
- Needing oxygen support if needed
- Co-infection with other respiratory viruses
- High risk infants – ex premature infants
Gastro-intestinal

- Presenting with Abdominal pain
- Vomiting and diarrhoea
- Omicron: Not MIS-C but COVID 19
- Moderate disease – needing supportive management
Neurological

- Marked increase in seizure presentation with Omicron
- High fever + febrile seizures
- Patients < 1 year and older than 5 years that presented with seizures
- Other pathology was excluded
Other

- Skin and joint manifestations – rare
- Self limiting
- No need for admission
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Multisystem inflammatory syndrome in children

Child or adolescent < 19 years of age
Fever 38,5 C > 3days

And

At least 2
1. Rash, conjunctivitis or muco-cutaneous inflammation.
2. Hypotension or shock.
3. Features of myocardial dysfunction, pericarditis, valvulitis, or coronary abnormalities
4. Evidence of coagulopathy
5. Acute gastrointestinal problems

And

Elevated inflammatory markers: ESR, CRP, PCT

And

No other obvious microbiological cause

And

Evidence of COVID 19 infection and/or contact or Antibody positive

## Characteristics and Outcomes of US Children and Adolescents With Multisystem Inflammatory Syndrome in Children (MIS-C) Compared With Severe Acute COVID-19

<table>
<thead>
<tr>
<th>Age group</th>
<th>MIS-C</th>
<th>Severe COVID 19</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mostly older children &gt;6yrs Post omicron increase younger patients with MIS-C</td>
<td>Younger infants</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Underlying pathology</th>
<th>MIS-C</th>
<th>Severe COVID 19</th>
</tr>
</thead>
<tbody>
<tr>
<td>Previously Healthy</td>
<td>Co morbid diseases</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Clinical presentation</th>
<th>MIS-C</th>
<th>Severe COVID 19</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gastrointestinal symptoms – more severe</td>
<td>Gastro-intestinal symptoms – often milder</td>
<td></td>
</tr>
<tr>
<td>Mucocutaneous symptoms – more common</td>
<td>Cardiovascular abnormalities: Can have myocarditis – less frequent</td>
<td></td>
</tr>
<tr>
<td>Cardiovascular abnormalities: More common Hypotension and shock</td>
<td>Respiratory symptoms – Present more often with absence of Cardiovascular disease</td>
<td></td>
</tr>
<tr>
<td>Severe Cardiac dysfunction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respiratory symptoms – Present with cardiovascular disease</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Laboratory findings</th>
<th>MIS-C</th>
<th>Severe COVID 19</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extreme inflammation</td>
<td>Mildly raised Inflammatory markers</td>
<td></td>
</tr>
<tr>
<td>White cell count: Raised Neutrophil count, mild lymphopaenia</td>
<td>White cell count: Lymphopaenia</td>
<td></td>
</tr>
<tr>
<td>Lower Platelet count</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coagulopathy: more abnormal</td>
<td>Coagulopathy: might abnormal</td>
<td></td>
</tr>
<tr>
<td>Cardiac enzymes often higher</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Characteristics and Outcomes of US Children and Adolescents With Multisystem Inflammatory Syndrome in Children (MIS-C) Compared With Severe Acute COVID-19 – L Feldstein et al JAMA 24/02/2021

Spectrum of MIS-C and Severe COVID 19

MIS-C ↔ Severe COVID 19
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Principles of management

- It is a virus
- Basic management principles
<table>
<thead>
<tr>
<th>Supportive Management</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Respiratory illness</strong></td>
</tr>
<tr>
<td>Admission for moderate to severe cases</td>
</tr>
<tr>
<td>Oxygen therapy – nasal prongs</td>
</tr>
<tr>
<td>β2 agonist if wheezing - given with spacer</td>
</tr>
<tr>
<td><strong>Gastro-intestinal illness</strong></td>
</tr>
<tr>
<td>Intravenous fluids</td>
</tr>
<tr>
<td>Continue normal feeds</td>
</tr>
<tr>
<td>Anti-emetics if needed</td>
</tr>
<tr>
<td><strong>Neurological manifestation</strong></td>
</tr>
<tr>
<td>Standard Care for seizures</td>
</tr>
<tr>
<td>Complex febrile seizures</td>
</tr>
<tr>
<td><strong>Other</strong></td>
</tr>
<tr>
<td>Fever – Paracetamol/Acetaminophen/Ibuprofen</td>
</tr>
</tbody>
</table>
Management of children and young persons with COVID-19

- No place for routine antibiotics
  - Indications for antibiotics
  - Except
    - If a secondary bacterial infection
    - Atypical bacterial infection is suspected
- Severe and critically ill patients transferred to a center with paediatric intensive care unit
- Remember atypical presentation of patients with MIS-C that may need earlier referral
Drug treatments for children and young persons with severe COVID-19

- Steroid
  - Patients that need high flow or ventilatory support
    - Dexamethasone
  - MIS-C
    - Hydrocortisone - early

- Immune modulation therapies
  - Intravenous immunoglobulins – MIS-C
  - Anti - IL-10 monoclonal/polyclonal antibodies
Thank you for your attention
Acknowledgements

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- Ameena Goga
- Maria Karsas
- Paediatric Department SBAH
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- Tshwane District Clinical Specialist Team members R Skhosana, A Kruger, M Tshukudu, T Monyane, L Komane, M van der Westhuizen, M Moshime-Shabangu
- DATCOV team at the NICD
- SAMRC research team
- Laboratory team:
  - Zoonotic arbo and Respiratory virus research group
  - Department of Medical Virology, University of Pretoria
  - National Health Laboratory Service Tshwane Academic division Department Medical Virology
References

1. South African Department of Health COVID 19 dashboard
6. Up to date – Management of children with COVID 19 disease