NETEC COVID-19 Webinar Series:
Caring for Pediatric COVID-19 Patients
Welcome: Ted Cieslak, MD, MPH

National & Atlanta Experience: Andi Shane, MD, MPH, MSc

Critical Care Patient Zero: Mimi Kao, MD and Preeti Jaggi, MD

The Nursing and Operations Perspective: Amanda Grindle, MSN, RN, CNL, CPN, CCRN

NETEC Resources: Ted Cieslak, MD, MPH

Questions and Answers with NETEC
Welcome

National Emerging Special Pathogens Training and Education Center

Mission statement
To increase the capability of the United States public health and health care systems to safely and effectively manage individuals with suspected and confirmed special pathogens

For more information
Please visit us at www.netec.org or email us at info@netec.org
NETEC Overview

**Assessment**
- Empower hospitals to gauge their readiness using **Self-Assessment**
- Measure facility and healthcare worker readiness using **Metrics**
- Provide direct feedback to hospitals via **On-Site Assessment**

**Education**
- Provide self-paced education through **Online Trainings**
- Deliver didactic and hands-on simulation training via **In-Person Courses**
- **Webinars**

**Technical Assistance**
- **Onsite & Remote Guidance**
- Compile **Online Repository** of tools and resources
- Develop customizable **Exercise Templates** based on the HSEEP model
- Provide **Emergency On-Call Mobilization**

**Research Network**
- **Online Repository** Built for rapid implementation of clinical research protocols
- **Develop Policies, Procedures and Data Capture Tools** to facilitate research
- Create infrastructure for a **Specimen Biorepository**

**Cross-Cutting, Supportive Activities**
- **Research Network Webinars**
National and Local Atlanta Experience

Andi Shane, MD, MPH, MSc
Despite the pediatric predisposition to viral infections, Children represent a small number of COVID-19 infections

- 1.2% in Italy, 2% in China, 5% in the United States

Median age of presentation 6-7 years of age

Incubation period 2-14 days (average 3-7 days)

Viral shedding up to 22 days; PCR positive from stools up to 30 days

- ? Shedding = transmission

Human-to-human transmission in select family members
Pediatric COVID-19 Infection Epidemiology

- Infants and neonates – described and largely asymptomatic: many have positive/symptomatic adult contacts

- Case reports of fatalities (One in China, none in Italy, three confirmed in the U.S.)
  - Both with underlying medical conditions

- Both deaths occurred in children with underlying diseases

- Males > Females
National & Atlanta Experience

Pediatric COVID-19 Infection Epidemiology

COVID-19 Confirmed Cases by Age Group

- 0-17 = 1%
- 18-59 = 60%
- 60+ = 35%
- UNK = 4%

Georgia Department of Public Health COVID-19 Daily Status Report for:

04/09/2020

These data represent confirmed cases of COVID-19 reported to the Georgia Department of Public Health as of 04/09/2020 18:28:28. A confirmed case is defined as a person who has tested positive for 2019 novel coronavirus.
Children represent 22% of the US population

Among 149,082 cases in the US, 1.7% are in children

0.58% - 2% are in the ICU

Three deaths among ~2,500 cases
As of April 9, 2020, 12 children (8 weeks-18 years of age) with laboratory confirmed SARS-CoV-2 in our healthcare system

- 3 with known underlying medical conditions
- 9 (75%) male
- 3 cared for in PICU, 1 in CICU
- PCR tested 110; 9 positive, 3 referred
Critical Care Patient Zero

Mimi Kao, MD
Preeti Jaggi, MD
12 Year-Old Previously Healthy Girl

Day 2 of illness: Came to ED with fevers, vomiting

Day 3 of illness: Returned to ED with persistent fevers, new cough, hematuria

Day 5 of illness: Returned to ED with fevers, SOB
  - 39.6°C HR 129 BP 108/63 RR 26-40 89% O2 saturation
  - Due to increased distress on HFNC 15L 100%, transferred to PICU for BiPAP

✓ Moved here from South Africa 8 months ago, lives with mom, sibling
✓ Attends 6th grade
✓ No known sick contacts or +COVID contact
✓ No travel outside Georgia
12 Year-Old Previously Healthy Girl

AST 37 (17-33 U/L)
ALT 25 (11-33 U/L)
Total bilirubin 0.8 (0.2-1.0 mg/dL)
Albumin 3.2 (3.7-4.7 g/dL)
INR 1.2  PT 15.3 (12.6-15.9 s)  PTT 53.6 (26-38 s)
BNP 70.2 (<100 pg/mL)  D-dimer 432 (<220 ng/mL)

Neutrophils 70% Bands 13% Lymphocytes 13%
Absolute lymphocyte count 711 (1485-6480/uL)
C-reactive protein 11.5 (<1.0 mg/dL)
Procalcitonin 0.83 (<0.10 ng/mL)
Ferritin 481 (14-79 ng/mL)
IL-6 34 (<5 pg/mL)  IL-2 1486 (<1033 pg/mL)
IFN-γ 10 (<5 pg/mL)  CXCL9 248 (<121 pg/mL)
12 Year-Old Previously Healthy Girl

HD #1

HD #3
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<th><strong>Timeline</strong></th>
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| **HD #2 (Day of illness 7):**  
  Intubated, iNO @ 20ppm  
  IVIG, solumedrol, platelet transfusion  
  Norepinephrine for hypotension  
  Vancomycin, ceftriaxone and azithromycin |
| **HD #5:**  
  COVID-19 infection testing positive  
  Stopped azithromycin, started hydroxychloroquine  
  Plt >100, no other cytopenias |
| **HD #6:**  
  Adrenal insufficiency dose of corticosteroids, Tmax 38.3 |

**12 Year-Old Previously Healthy Girl**
Clinical Questions

Should we administer antiviral agents to a child with COVID-19?

Which antiviral agent(s) should be considered?

Should other agents (e.g. biologics) be considered?
Should antiviral agents be administered to children with COVID-19?

- Pediatric deaths are rare (1 of 2,143)
- ICU admissions - ~ 1%, 94% of illness considered mild, to moderate
  - More descriptions in otherwise ill
- Patient is otherwise healthy but critically ill

## Which Antiviral?

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<th>Drug</th>
<th>Considerations</th>
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| **Remdesivir**     | **Adult and children >40 kg:** Day 1: 200 mg x1 dose; days 2-10 100 mg daily  
                                                                                       **Children<40 kg:** Day 1: 5 mg/kg/dose IV x1 dose (200 mg maximum dose); days 2-10: 2.5 mg/kg/dose IV Q24 hours (100 mg maximum dose) infused over 30 to 60 minutes  
                                                                                       Available only through individual expanded access requests for children (as of 4/1/2020)  
                                                                                       Ability to accrue data to understand effectiveness  
                                                                                       No hepatitis or renal failure in this patient                                                                                                                  |
| **Hydroxy-chloroquine** | 1) 13 mg/kg/dose x 1, followed by 6.5 mg/kg/dose 6 hours later on day 1, followed by 6.5 mg/kg/dose on days for a total of 3-5 days OR  
                                                                                       2) 6.5 mg/kg/dose BID on day 1, followed by 3.25 mg/kg/dose BID for up to 5 days  
                                                                                       Data only small observational trials, small trials.                                                                                                             |
|                    | **Not considered:** favipiravir, nitazoxanide, lopinivir/ritonavir, azithromycin, ribavirin                                                                                                       |
12 Year-Old Previously Healthy Girl

HD #8: Remdisivir, tocilizumab evening, Tmax 38.1°C
Hospital Day

Medical Interventions

- iNO
- IVIG
- Methylprednisolone
- Azithromycin
- Hydroxychloroquine
- Tocilizumab
- Remdesivir

SARS-CoV-2
RT-PCR +
IL-6 Inhibition

- IL-6 Inhibitor
- Subset of patients
  - Secondary hemophagocytosis
- Fever, cytopenia, hyperferritenemia with ARDS
- Some patients may have high IL-2, IL-7, interferon gamma
- Predictors of mortality have included hyperferritenemia
- Our patent had IL-6 elevation, ferritin, severe thrombocytopenia

COVID-19: consider cytokine storm syndromes and immunosuppression

Lancet, March 13, 2020, Xu
Weaned off of iNO ~ 36 hours after drugs administered
Extubated on HD 15
Inpatient rehabilitation
LFTs increased, only 5 days of remdisivir given

Challenges in pediatrics
- Limited patients, limited trials
- Dose considerations
- Children may just recover on their own
  - Day 12 of illness
  - Do no harm
The Nursing and Operations Perspective

Amanda Grindle, MSN, RN, CNL, CPN, CCRN
The Nursing and Operations Perspective

Hierarchy of Controls

ELIMINATION
- Physically remove the hazard

SUBSTITUTION
- Replace the hazard

ENGINEERING CONTROLS
- Isolate people from the hazard

ADMINISTRATIVE CONTROLS
- Change the way people work

PPE
- Protect the worker with personal protective equipment

Most Effective to Least Effective

https://www.cdc.gov/niosh/topics/hierarchy/default.html
Visitation guidelines

- No visitors other than legal guardians – 2 guardians - 1 essential well guardian

Visitor and staff screening

Permissive masking within the healthcare facility where social distancing is not feasible

- Vulnerable population – mandatory. 
  masking

Limiting who goes in the patient room:

- Child life/music therapy/canine companion
- Social work/case management
- Care conference virtual requests
The Nursing and Operations Perspective

Workflow

- Community communication about not coming to the hospital for testing
  - Testing challenges within pediatrics
- COVID-19 hotline
  - Use for staff and community
- COVID-19 pediatric assessment tool
- ED workflow
  - Sick versus Well
  - Behavioral health, abuse, trafficking and families with loss of resources
- Cohorting lab confirmed and PUIs
  - Limiting essential guardian movement with hospital

Children’s COVID-19 resources for Georgia’s families:

Online assessment tool
Helps parents answer two questions:
- What should I do if my child has a fever and/or cough?
- What should I do if my child has been around someone with COVID-19, but my child has no symptoms?

Hotline
Our team of experts is standing by and ready to answer your questions from 7 a.m. to 7 p.m., seven days a week.
The Nursing and Operations Perspective

PPE and Communication

**Personal Protective Equipment**
- PPE taskforce
- Reuse strategies
  - UV disinfection
  - 3D printers for face shields

**Communication**
- Twice daily system calls with all clinical and non-clinical leaders
- Daily update sent to nurses and physicians
- Community physician webinars
- COVID-19 Hub
  - Email assistance
  - Several times a week CNO Facebook Live
Allowing Clinicians to Help Elsewhere:

- Redeployment within system
- Adult partners in our state
- Out of state travel assignment
NETEC Resources

Ted Cieslak, MD, MPH
NETEC will continue to build resources, develop online education, and deliver technical training to meet the needs of our partners.

Ask for help!

Send questions to info@netec.org - they will be answered by NETEC SMEs.

Submit a Technical Assistance request at Netec.org.
Questions and Answers