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- PCICS Webinar: Pediatric Inflammatory Multisystem Syndrome (PIMS) 5/12/20

Articles reviewed:

- Characteristics and Outcomes of Children with Coronavirus Disease 2019 (COVID-19) Infection Admitted to US and Canadian Pediatric Intensive Care Units
- Severe COVID-19 in Children and Young Adults in the Washington, DC Metropolitan Region



PCICS Webinar: Pediatric Inflammatory Multisystem Syndrome (PIMS) 5/12/20

- Two centers from Italy discussed congenital heart disease care in the setting of COVID-19 surges
 - No COVID-related deaths in CHD patients
 - Large portion of nursing and anesthesia staff deployed for COVID care
 - Surgical volume decreased by ~50% - all elective cases stopped, urgent/emergent cases continued
 - Continued excellent surgical outcomes
 - Patients tested pre- and postop for COVID-19
 - Surgery not performed until resulted
 - 3/263 became positive after surgery in one system
 - Parent visitation – 30min daily
 - Healthcare teams had daily temp checks, weekly COVID swabs
- Bergamo, Italy experience with PIMS (16 patients – 10 KD-like, 6 non-KD)
 - Majority male (12/16)
 - Average age 7.5 (range 2-16)
 - Younger patients more likely to have more Kawasaki-like presentation
 - 100% had fever and abdominal pain
 - Non-KD lab findings: markedly elevated CRP, ferritin, D-dimer
 - Troponin, BNP also elevated
 - Platelets low
 - Patients with presentations/labs less like typical KD were more likely to need ICU care, inotropic support
 - All were given IVIg, steroids, antibiotics
 - KD-like received ASA, most non-KD like received therapeutic anticoagulation
 - Overall – suspect cytokine storm with autoimmune mediated myocarditis
 - Non-KD patients had rapid myocardial recovery with therapy
- Washington DC experience with COVID and PIMS (data published in second article below)
 - Bimodal age peak for kid with COVID-19 (<1, >15) with older children more likely to have severe disease
 - 3 PIMS patients
 - 4y previously healthy M – classic KD shock presentation (COVID neg x2, 3rd test +)
 - Tx: IVIg, ASA, anakinra, pressors, milrinone
 - Excellent response – quickly weaned
 - No coronary involvement to date
 - 8y previously healthy M presented with fever, abdominal pain, mild resp sx, mild drash, mild conjunctival injection (COVID neg x1, 2nd test +)
 - CT AP – mesenteric adenitis
 - Echo – moderately depressed LV function, mildly dilated LMC and RCA
 - Tx: IVIg, ASA, anakinra
 - 16y M with microcephaly, seizures, GDD – presented with fever, increased seizures
 - COVID+ one month ago (prior to PIMS description)
 - Septic shock, lobar PNA
 - Tx: milrinone, pressors, steroids, FFP
 - Had VT from QTc prolongation from HCQ so stopped
 - Prolonged hospital stay with multisystem organ failure, but now out of ICU and improving

Article Title:	Characteristics and Outcomes of Children with Coronavirus Disease 2019 (COVID-19) Infection Admitted to US and Canadian Pediatric Intensive Care Units
Authors:	Shekerdemian LS, Mahmood NR, Wolfe KK et al.
Full Citation:	Shekerdemian LS, Mahmood NR, Wolfe KK et al. (2020). Characteristics and Outcomes of Children with Coronavirus Disease 2019 (COVID-19) Infection Admitted to US and Canadian Pediatric Intensive Care Units. <i>JAMA Pediatrics</i> . Available online 11 May 2020. http://doi.org/10.1001/jamapediatrics.2020.1948

Study aim:

To describe and characterize children admitted to PICUs in the USA and Canada and their clinical trajectory and early outcomes

Methods:

Cross-sectional, retrospective cohort study of COVID-19 PCR+ children admitted to 46 North American PICUs and special pathogen units 3/14/20-4/3/20 with follow up through 4/10/20.

Results:

- 48 patients under 21y at 14 US centers were included – other centers had no patients during study period
- 52% of patients were male
- Median age was 13 (range 4.2-16.6y)
- 3/48 (6%) had congenital heart disease – overall 40/48 (83%) had at least one comorbidity (40% medically complex, 23% immune-suppressed/malignancy, 15% obese) and 20% had at least 3 comorbidities
- 73% had respiratory symptoms, but only 18 (38%) needed intubation
- Mortality low (n=2) in children aged 12 and 17, both of whom had underlying medical conditions

Table 2. Clinical Course and Outcomes of 48 Children With Coronavirus Disease 2019 (COVID-19) Treated in Pediatric Intensive Care Units (PICUs)

Characteristic	No. (%)
Severity of illness	
Asymptomatic/mild	14 (29)
Moderate	1 (2)
Severe	16 (33)
Critical	17 (35)
Vasoactive support	
	12 (25)
Organ system failure	
0	6 (13)
1	30 (63)
2	7 (15)
≥3	4 (8)
Maximum respiratory support	
None	9 (19)
Oxygen only	6 (13)
HFNC	11 (23)
CPAP or BiPAP	4 (8)
Intubation/tracheostomy ventilation	18 (38)
Duration of respiratory support, median (IQR), h^a	
Intubation	216 (138-282)
Total respiratory support	120 (40-240)

Advanced therapies	
None	41 (85)
iNO	3 (6)
ECMO	1 (2)
Plasma exchange	1 (2)
Prone ventilation	2 (4)
Pharmacotherapy	
None	20 (42)
Hydroxychloroquine	21 (44)
Azithromycin	8 (17)
Remdisivir or other antiviral therapy	8 (17)
Tocilizumab	5 (10)
2 agents	10 (21)
3 or more agents	3 (7)
Length of stay, median (IQR), d^b	
PICU	5 (3-9)
Hospital	7 (4-13)
Outcome at follow-up^c	
Discharged	31 (65)
Died	2 (4)
Still hospitalized	
Severe or critical condition	9 (19)
Mild or moderate condition	6 (13)

Conclusions:

- Overall, the majority of children who required ICU care for COVID-19 had at least one underlying condition – medically complex children appear to be at highest risk
- Clinical course is much milder than in adults, and even those who require intubation appears to have better outcomes
- At this time, it appears that COVID-19 is less dangerous for children than seasonal influenza – 2020 deaths to date are 81 for flu, 8 for COVID-19

Perspective:

While this adds to the early descriptive literature of COVID-19 in children and supports the building evidence that they are much less severely affected than adults, the small population was quite heterogenous with ~1/3 of children having moderate or milder illness that otherwise would not have needed ICU care – it would be helpful to see the data separated out for the severely and critically ill children. It is reassuring at this time that mortality in children appears to be less than for seasonal influenza. Ongoing review from this collaborative multicenter effort including the newly described PIMS will be helpful.

Summary written by: Katherine B. Saliccioli MD

Topic Areas: COVID-19, pediatrics, intensive care outcomes

Article Title:	Severe COVID-19 in Children and Young Adults in the Washington, DC Metropolitan Region
Authors:	DeBiasi RL, Song X, Delaney M et al.
Full Citation:	DeBiasi RL, Song X, Delaney M et al. (2020). Severe COVID-19 in Children and Young Adults in the Washington, DC Metropolitan Region. <i>J Pediatrics</i> . Available online 11 May 2020. https://doi.org/10.1016/j.jpeds.2020.05.007

Study Question:

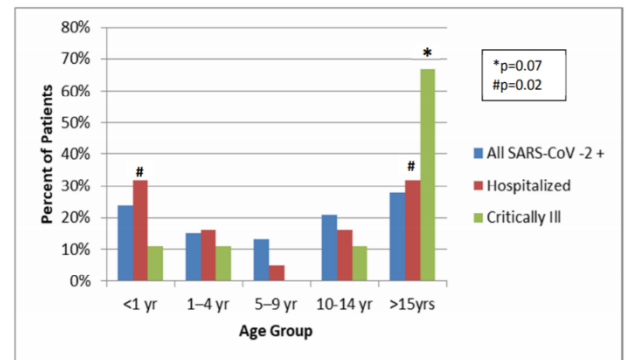
Are there epidemiologic or patient characteristics that predict the need for hospitalization or critical illness in children and young adults with COVID-19?

Methods:

Observational, retrospective cohort study at single center for children with PCR confirmed COVID-19 comparing hospitalized vs non-hospitalized children and within the hospitalized group, non-ICU vs ICU.

Results:

- Most children came to attention due to respiratory symptoms or fever, but only 48% had both
- 6% of n=63 patients tested for coinfection had rhinovirus, enterovirus, RSV, or another coronavirus in addition to COVID-19
- N=177 children and young adults (9.8% of those tested) were positive for COVID-19, with 44 needing hospitalization and 9 requiring ICU care (case descriptions of 9 ICU patients detailed in a table within the paper)
- Factors associated with requiring hospitalization: underlying medical condition (neuro, CV, heme/onc), shortness of breath
- Of those hospitalized, factors associated with needing ICU care: older age (mean 17.3 for ICU, 3.6 for hospitalized non-ICU)



Conclusions:

- 25% of patients required hospitalization – they were more likely to be very young or older, with older children the most likely to require ICU care
- 37% of hospitalized and 22% of critically ill patients had no underlying conditions
- Coinfection with other respiratory viruses was uncommon

Perspective:

This single center review suggests a slightly higher risk of severe illness for children with no underlying medical conditions, although the N is low and patients up to age 34 were included in the study.

Summary written by: Katherine B. Saliccioli MD

Topic Areas: COVID-19, pediatrics