

Evidence Update on COVID-19
Paediatrics

This is not a clinical guideline or SOP. This is a summary of the latest evidence available internationally on the management, treatment and science underlying COVID-19 disease.

Risk to children

- **Children appear to have milder symptoms and are less likely to be diagnosed** [RIVM](#)
- Children make up small number diagnosed cases
 - In the UK (25849 cases)
 - 0-9 years = 195 cases (0.7%) - of which 2 died
 - 10-19 years = 137 cases (0.5%) - of which 4 died
 - China (2%), Italy (1.2%) Japan (2.4%), South Korea (6.5%), Iceland (9.5%), USA (1.7%) Spain (2%) [Ludvigsson, Lu, Mizumoto, CDC, COVID-IS, USA, Tagarro, Gudbjartsson](#)

Severity of disease in children [Dong, Italy, Parri](#)

- Asymptomatic 4-21% of diagnosed cases (**undiagnosed likely missed from this**)
- Mild 46-58%
- Moderate 19-40%
- Severe 1-5%
- Critical 0.6-5%
- In UK children, respiratory support consisted of (198 cases [RCPCH](#)):
 - No support needed - 156
 - Low flow oxygen - 28
 - High flow oxygen - 7
 - Ventilation - 5
 - CPAP/BiPAP - 4

Comorbidities

- In UK 198 patients [RCPCH](#)
 - None 98 (49%)
 - Respiratory 21 (10%)
 - Neurological 24 (11%)
 - Genetic 15 (7%)
 - Cancer 22 (10.5%)
 - Haematological 13 (6%)
 - Liver/ GI 11 (5%)
 - Other 12 (6%)
- In US, cases of comorbidities range from 23% to 77% [MMWR](#)

Risk of late and more severe presentation of other childhood illnesses due to changes in behavior around seeking healthcare.

Symptoms in 0-18 year olds (meta-analysis see

Castagnoli)

| Symptom % (n) | Fever | Cough | Fatigue | Rhinorrhea | Myalgia | Diarrhoea | Vomiting | Dyspnea | Anosmia | Rash | None |
|------------------------------|--------------|-------------|--------------|-------------|---------|------------|-----------|-------------|----------|-------------|-------------|
| UK 198 | 69% (142) | 39% (80) | 32% (51) | 30% (48) | 4% (6) | 7% (11) | 19% (30) | 26% (54) | 1.2% (2) | 10% (15) | 13% (21) |
| Lu 1391 | 41% (71) | 48% (83) | 7.5% (13) | 7.5% (13) | | 9% (15) | 6.5% (11) | | | | 16% (27) |
| MMWR 291 | 56% | 54% | | 7.2% | 23% | 13% | 11% | 13% | | | |
| Parri 100 | 54% | 44% | 9% | 22% | | 9% | 10% | 11% | | | 21% |

PIM-TS - Paediatric inflammatory multisystem syndrome

- Similar to Kawasaki's disease - Rare acute paediatric vasculitis - thought to be due to viral infection
- London
 - 8 children aged 4-14 years presented with Kawasaki like disease
 - Fever, rash, conjunctivitis, peripheral odema, extremity pain, GI symptoms
 - All developed vasoplegic shock and needed inotropic support
 - 7 needed mechanical ventilation
 - 7 recovered, 1 died from cerebrovascular infarct
 - Only 2 tested positive for COVID - no causative pathogen identified (but antibody test not performed - so may still be COVID-19) [Riphagen](#)
- UK
 - 58 children from 8 hospitals in England meetings PIMS-TS symptoms
 - 15 (25%) PCR positive, 40 of 46 (87%) IgG positive - shows 45/58 patients had evidence of SARS-CoV2.
 - 29 developed shock, of which 23 needed IMV. 8 developed coronary artery dilatation or aneurysm
 - Compared to Kawaskis, patients were older (9 years vs 2.7 years) and had greater inflammatory markers (CRP) [Whittaker](#)
- Birmingham (1st reported n=8 [Perez-Toledo](#), updated with n=15 [Ramcharan](#))
 - 15 children with PIMS-TS symptoms with only 2 PCR positive for COVID-19
 - All had significant IgG and IgA responses to COVID-19 spike protein (of the 12 where data available)
 - IgG1 and IgG3 were found - similar to adult COVID-19 patients (no IgG2 or IgG4 found in children or adults)
 - IgM not found in children (is in adults) - shows infection was from weeks previously and **syndrome onset occurs well after infection**
- Italy
 - 10 children aged 7.5 (3.5) years - 8 had IgG or IgM for COVID
 - All had full or incomplete Kawasaki's diagnosis and a high rate of cardiac involvement and features of MAS [Verdoni](#)

- France
 - 17 children admitted over 11 days (large increase - normally 1 case every 2 weeks)
 - Mean age 7.5, 60% were black ethnicity
 - 11 needed intensive care with Kawasaki Disease Shock Syndrome, and 12 had myocarditis. All had GI symptoms, and 14 had recent COVID infection - all recovered - shows increased incidence linked to COVID [Toubiana](#)

Note: New PIMS-TS data is coming in rapidly and will likely be updated in the coming weeks

Pregnancy

- Meta-analysis of neonates born to COVID-19 positive mothers [Walker](#)
 - Included 49 studies: total of 666 neonates and 655 women where information was provided on the mode of delivery and the infant's infection status
 - Reported a total of 28 neonates with confirmed COVID-19
 - Concluded transmission was uncommon and not impacted by mode of delivery (vaginal/cesarean section)
- UK ISARIC data on 16,000 patients:
 - 55 patients were pregnant
- UK 427 pregnant women with SARS-CoV2 (694 negative as comparison) - most were in second-third trimester, suggesting social distancing necessary in pregnancy [Knight](#)
 - No increased risk to pregnant women - risk factors matched general population - BAME, older maternal age, overweight and obesity, or comorbidities increased risk of COVID-19
 - 247 women gave birth or lost pregnancy during study, of which 12% delivered preterm due to maternal respiratory compromise
 - 40 (9%) required respiratory support
 - 12 (5%) infants tested positive, 6 in the first 12 hours after birth but all had mild disease. Unclear if vertical transmission
 - No increased risk of maternal death

Breastfeeding

- 15 milk samples from COVID-19 positive mothers taken 14-30 days after symptom ended (plus 10 control samples from negative mothers)
 - Tested for antibodies against SARS-CoV2 spike protein
 - 80% contained IgA and secretory IgA, 45% IgG, 33% IgM (normally human milk contains 90% IgA, 8% IgM and low IgG)
 - Suggests breastmilk passes SARS-CoV2 antibodies to baby (some mothers not PCR positive, only suspected- so may skew results) [Fox](#)