

## Putting risk of COVID-19 and transmission by children in context.

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Children are consistently reported to make up a small proportion of diagnosed cases, with 2.4% of reported cases in China [1] and 1.2% in Italy [2]. Their disease is also mild, with no reported deaths in Italy as of March 17<sup>th</sup> [2] and few (2) in China [4][6]. Immunocompromised children do not appear to be at increased risk of complications [5] and there are also few reports of problems in children with chronic respiratory disease or other co-morbidities.

Data from China is comprehensive and detailed. The most extensive current data comes from the Report of the WHO-China Joint Mission on Coronavirus Disease 2019 (COVID-19), analysing a cumulative total of 75,465 COVID-19 infections. China has a policy of meticulous case and contact identification for COVID-19. For example, in Wuhan more than 1800 teams of epidemiologists, with a minimum of 5 people/team, are tracing tens of thousands of contacts a day. Contact follow up is painstaking, with a high percentage of identified close contacts completing medical observation.

### What proportion of all contacts become infected?

- Between 1% and 5% of overall contacts were subsequently laboratory confirmed cases of COVID-19, depending on location [1].

### What proportion of households become infected?

- Preliminary household transmission studies ongoing in Guangdong estimate the secondary attack rate in households ranges from 3-10% [1] and 12.3% (171/1391) in child contacts [4]

### What are the most frequent transmission groups?

- In China, human-to-human transmission of the COVID-19 virus is largely within families. Among 344 clusters involving 1308 cases most clusters (78%-85%) were in families.
- Infected children have largely been identified through contact tracing in households of adults. Of note, people interviewed by the WHO Joint Mission Team could not recall episodes in which transmission occurred from a child to an adult.[1]. This will occur within case reports in time but appears to be infrequent.

### How do we know that undetected community infections were not significant?

- Community ILI surveillance (non contacts) in China detected no children positive in Wuhan, Guangdong, or Beijing and 5 adults, despite more than 17000 ILI/SARI samples being tested.
- In children the attack rate at the epicentre was very low. Only 2% (8/366) children admitted with significant respiratory disease to hospital in Wuhan were infected.

### How common are asymptomatic infections?

- 16% of children with COVID19 in China [4] were reported to be asymptomatic and in Italy 6.7% overall. [2]
- Of symptomatic and asymptomatic contacts (adult and children) who were COVID19 positive in Lomardy, Italy, 4.7% (17/380) were asymptomatic [7].
- 2% (27/1391) of high risk children tested (ie contacts) had asymptomatic infection. [4]
- PCR detectable in similar quantities to symptomatic cases.
- So far no reports identified of transmission from an asymptomatic child.

### What about HCWs?

- As of 20 February 2020, there were 2,055 COVID-19 laboratory-confirmed cases reported among HCW from 476 hospitals across China.
  - In China, investigations among HCW suggest that many may have been infected within the household rather than in a health care setting [1].
- HCW infections are now reported in all countries with sustained community transmission. As well as household and community exposure HCW have additional risks which include:
  - Unprotected contact with infected patients
  - Close working conditions with other HCWs and difficulty in social distancing in busy and crowded healthcare environments.
  - Unfamiliar PPE and inadequate attention to HH and environmental contamination.
  - Breakdown of correct PPE use under extremely stressful working conditions.

### Is Europe / UK epidemiology substantially different to China?

- The trends in the 14-day truncated cumulative incidence of COVID-19 cases in EU/EEA countries and the UK generally followed that of Hubei Province (China) [3] suggesting transmission dynamics remain the same for Europe as they had for China.
- No epidemiological evidence of difference in transmission vectors.
- Additionally, Italian proportions of ages affected and severity are also the same, though the proportion of children infected is much lower [2].

### Key Points

- Epidemiological data from China documents adults as primarily the index cases, that clusters occur in households and that asymptomatic infection even in high risk child contacts is rare (2% of contacts).
- Current Italian data identifies proportionately fewer children infected than in China, no difference in the cumulative incidence and thus no signal of difference in transmission mechanisms.
- Anecdotal child and school data so far in Australia shows no evidence of child to adult (or other child) transmission.
- Transmission from asymptomatic children is not yet described.

### Summary

- **While we by no means dispute or dismiss the concerns around acquiring infections from our child patients, the evidence for hierarchy of transmission remains with symptomatic adults and households. There are a limited number asymptomatic contacts detected in both China and Italy.**
- **There is no actual evidence that asymptomatic transmission by children plays a significant role. However, if asymptomatic transmission were to occur, the route would be unlikely to droplet but primarily contact (see *ID position Statement on Respiratory Virus Transmission*), reinforcing the requirement for rigorous, exemplary attendance to HH.**
- **HCWs should consider the most likely route within our working environment is other adults, and seriously undertake social distancing, respiratory etiquette, hand hygiene, remembering this in non clinical areas also.**
- **We must ensure do not put our colleagues at risk by attending work if unwell with fever or acute respiratory symptoms. Symptomatic HCW's should have COVID-19 testing and rigorous contact tracing should they be positive.**

### References

1. <https://www.who.int/docs/default-source/coronaviruse/who-china-joint-mission-on-covid-19-final-report.pdf>
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3. <https://www.eurosurveillance.org/content/10.2807/1560-7917.ES.2020.25.11.2000285>
4. Lu et al. SARS-CoV-2 Infection in Children. NEJM. Mar 18 2020
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6. Dong Y et al. Epidemiological Characteristics of 2143 Pediatric Patients With 2019 Coronavirus Disease in China. Peds. 2020. DOI: 10.1542/peds.2020-0702
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