

Asymptomatic Transmission of COVID-19

Question

What is contribution of asymptomatic or pre-symptomatic transmission of COVID-19?

Answer

There is not enough high-quality data available to answer this question. There is accumulating and sound evidence from multiple settings, indicating that a substantial fraction of SARS-CoV-2 infected individuals are asymptomatic at diagnoses and even throughout the illness (asymptomatic proportion). Case reports have shown that asymptomatic individuals are able to transmit infection to others and this is biologically plausible as viral load is high in early infection (see viral dynamics brief). However, the contribution of asymptomatic cases to overall transmission is unknown. If it does play a significant role, critical interventions to contain the epidemic will involve (1) community-wide screening or (2) social/physical distancing measures. Ongoing research is needed through surveillance and prospective studies in each epidemic to answer this question.

Background

The understanding of asymptomatic or pre-symptomatic transmission of COVID-19 is critical to inform clinical and public health responses. Current guidelines are based on symptom screening. The clinical spectrum of disease ranges from asymptomatic, to mild disease, to pneumonia and severe ARDS. The majority (80%) of cases are milder infections. The contribution of asymptomatic or pre-symptomatic transmission is a key knowledge gap in our understanding of SARS-CoV-2 and responses to COVID.

Incubation period	Time from infection to symptoms
Latent period	Time from infection to infectiousness
Serial interval	Time between the index case developing symptoms and their contact (who becomes infected) developing symptoms

The incubation period for COVID-19 is thought to be within 14 days following exposure, with most cases occurring 4-5 days after exposure.ⁱ Asymptomatic infections have been described during active case detection e.g. contact tracing and screening (health facilities, cruise-ships, schools). Asymptomatic infection in SARS (2004) was uncommon, however, this does not seem to be the case for SARS-COV-2.

The interval during which an individual with COVID-19 is infectious is uncertain. Viral RNA studies have the limitation that detection of RNA does not necessarily mean infectious (or viable) virus. The duration of viral shedding is variable with a wide range. The time between transmission and symptoms can range from 2-14 days. A recent study using data from China that investigated incubation time concludes that the median for developing symptoms is 5.1 days and 97.5% of those developing symptoms do so within 11.5 days.ⁱⁱ

Modelling based on clusters in Singapore estimated that infection was transmitted on average 2.5-2.9 days before symptom onset.ⁱⁱⁱ



Literature Review

This Nature news article from March 20, provides a good summary of the current knowledge pertaining to asymptomatic transmission of COVID-19.^{iv}

Modelling studies of Wuhan using clinical data as inputs

- This study estimates that 37,400 people (or 59% of the total burden) were undetected, explaining the rapid transmission of the virus. The model may be a slight overestimate, as it assumes homogeneous mixing, but several other modelling groups agree.^v (preprint)
- An estimated 86% of all infections were undocumented (95% CI: [82%–90%]) prior to 23 January 2020 travel restrictions. Per person, the transmission rate of undocumented infections was 55% of documented infections ([46%–62%]), yet, due to their greater numbers, undocumented infections were the infection source for 79% of documented cases. These findings explain the rapid geographic spread of SARS-CoV2 and indicate containment of this virus will be particularly challenging.^{vi}

Review of 450 case reports from 93 Chinese cities (in press EID)^{vii}

- Estimate that asymptomatic people contributed to 10% of cases
- Estimate the serial interval at 4 days

China CDC Report^{viii} - largest cohort published

- 1.2% (889/72,314) asymptomatic patients from China

Children

- China CDC^{ix}
 - 2134 paediatric patients (731 confirmed)
 - 12.9% (94) of confirmed cases were asymptomatic
- Wuhan Children's Hospital^x
 - Of 171 with COVID-19, 27 (15.8%) were asymptomatic.
 - There are several case reports of asymptomatic children with positive CT features – 12 in this study

WHO China Report

- the proportion of truly asymptomatic infections is unclear but appears to be relatively rare and does not appear to be a major driver of transmission

Diamond Princess^{xi}

- 17.1% (634/3,711) people positive for COVID-19. Among them, 51.7% (328) were asymptomatic at the time of diagnosis. The estimated the asymptomatic proportion (those who remain as such) as 17.9% (95%CI 15.5-20.2)
- 33.3% (95% confidence interval: 8.3–58.3%) from data of Japanese citizens evacuated from Wuhan



King County, Washington Aged-care Facility Outbreak^{xii}

- 56.5% (13/25) were asymptomatic at diagnosis with 3/13 (23.1%) remaining asymptomatic at 1 week.
- No sig difference in the viral load (Ct) values between the groups (symptomatic, vs pre symptomatic, vs asymptomatic)

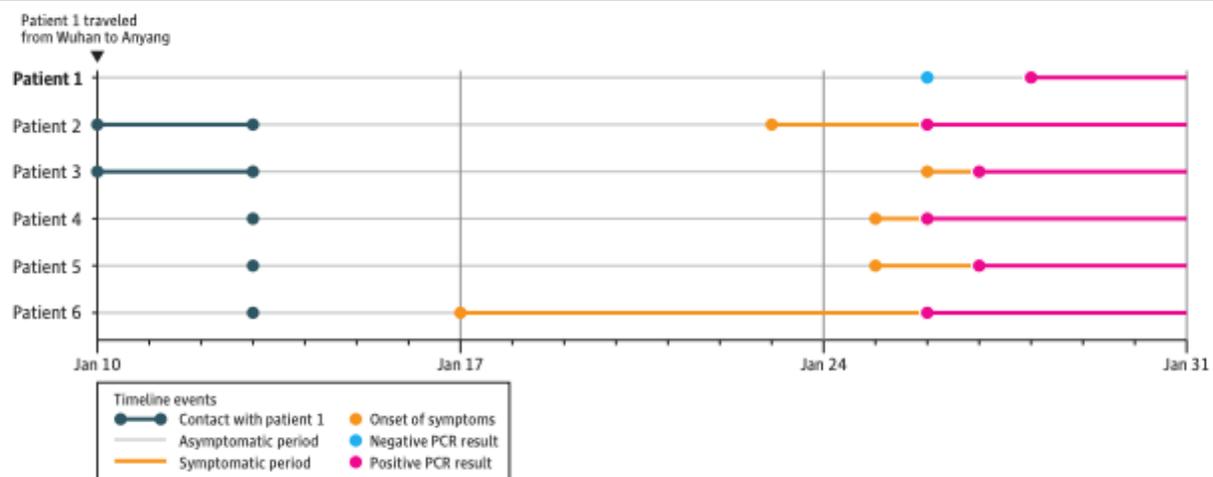
Screening in an Italian Village^{xiii}

- Mass screening of a village (Vo'Euganeo) of 3000 people, 50-75% wre asymptomatic and notably in young people

Case reports of asymptomatic transmission

- German case to 4 contacts^{xiv}
- Wuhan case to 5 contacts^{xv}

Figure. Timeline of Exposure to the Asymptomatic Carrier of the Novel Coronavirus That Causes COVID-19 in a Familial Cluster



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