

## ABSTRACT

We report temporal patterns of viral shedding in 94 laboratory-confirmed COVID-19 patients and modelled COVID-19 infectiousness profile from a separate sample of 77 infector-infectee transmission pairs. We observed the highest viral load in throat swabs at the time of symptom onset, and inferred that infectiousness peaked on or before symptom onset. We estimated that 44% of transmission could occur before first symptoms of the index. Disease control measures should be adjusted to account for probable substantial pre-symptomatic transmission.

## MAIN TEXT

The disease now called COVID-19 was first identified in December 2019 in a cluster of cases of viral pneumonia linked to a wet market in Wuhan.<sup>1</sup> SARS-CoV-2 infection spreads efficiently between people with a basic reproductive number in the range 2.0 to 2.5 in Wuhan.<sup>2-4</sup> The modes of transmission have not been determined, but infection is presumed to spread mainly through respiratory droplets and fomites, similar to other respiratory viruses. The World Health Organization declared COVID-19 a global pandemic on 11 March 2020.

The effectiveness of control measures depends on several key epidemiological parameters (Figure 1a). The serial interval is defined as the duration between symptom onsets of successive cases in a transmission chain. The incubation period is defined as the time between infection and onset of symptoms. The incubation period can differ from individual to individual, and the serial intervals can vary between transmission chains, and this