

The Psychology of the Virus Super-Spreader

Can the first documented 'super-spreader' in history reveal the true causes of modern pandemics?

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COVID-19 can produce such mild symptoms in some that they don't realise they are infected; they then spread the contagion without realising it. This means that COVID-19 may be particularly prone to the disturbing phenomenon of the 'super-spreader'.

These theories are not currently widely discussed, perhaps to prevent the general public shirking personal responsibility for contagion; which may happen if they can blame a few 'super-spreaders' instead.

But maybe the opposite is true. If the public better grasped the concept of the 'super-spreader' would they better adhere to public health restrictions?

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'Super-spreading' refers to the frightening spectacle when just a single patient infects such a huge number of contacts that the usual or average rate of spread from more typical individuals becomes dwarfed.

There is a strand of thinking in epidemiology that 'super-spreaders' need to be better understood to improve epidemic modelling and official government response.

— Role of super-spreaders in past epidemics: what have we learned?

The authors of the study 'MERS, SARS, and Ebola: The Role of Super-Spreaders in Infectious Disease' highlight the role of 'super-spreaders' in past epidemics:

— MERS

Published in the academic journal 'Cell Host & Microbe', the study references the 2015 MERS-CoV outbreak in South Korea which began from a single case who had travelled from the Middle East. Middle East Respiratory Syndrome coronavirus (MERS-CoV) emerged as a new virus resulting in severe respiratory disease plus renal failure. The case fatality rate was up to 38%.

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According to this study, the MERS-CoV outbreak in South Korea was driven primarily by three infected individuals, and approximately 75% of cases can be traced back to three super-spreaders who each infected a disproportionately high number of contacts.

This MERS-CoV outbreak in South Korea killed 36 of the 186 confirmed cases. Twenty-nine secondary infections in South Korea have been traced to a single index patient who travelled from the Middle East. Two of these secondary cases were apparently responsible for 106 subsequent infections, out of 166 known cases at the time.

– SARS

This study also documented ‘super-spreading’ during the SARS-CoV outbreak in 2003. The index patient of the Hong Kong epidemic was associated with at least 125 secondary cases.

– EBOLA

According to the study similar events were observed with the 2014-15 Ebola outbreak, centred in Western Africa. In Sierra Leone, the funeral of a traditional healer that died from EBOV directly infected 13 others and was ultimately linked to more than 300 cases. ‘Super-spreading’ has also been documented in measles and TB outbreaks.

In another study entitled ‘Spatial and temporal dynamics of superspreading events in the 2014–2015 West Africa Ebola epidemic’ the authors argue that, had the super-spreaders been identified and quarantined promptly, around 61% of the Ebola infections could have been prevented. The authors argue their findings highlight the key role of super-spreaders in driving epidemic growth.

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Initial stages of all of the outbreaks mentioned above involved at least one super-spreading event. Super-spreaders, the authors argue, may become the key difference between an infection cluster and an epidemic.

– COVID-19

Authors of the study ‘Transmission potential of COVID-19 in South Korea’ point to Daegu, the epicentre of the South Korean COVID-19 outbreak, where the rapid spread has been attributed to one super-spreading event that has led to at least 40 secondary cases.

How does individual behaviour explain the phenomenon of super-spreading?

While there are many factors that may explain the still mysterious phenomenon of ‘super-spreading’, individual behaviour might play a key role.

Privatised healthcare lends itself to so-called “doctor shopping” where an individual patient can consult as many different physicians as they can afford. Indeed, in non-pandemic times this advantage may be used to promote fee-for-service systems.

A centralised state-controlled system, like the NHS, is better equipped to prevent this. In the NHS you can’t very easily consult a practice beyond the one you are registered with. You also can’t see specialist practitioners without a formal referral from your GP.

During normal times these limitations might be irritating, but in a pandemic these restrictions may curtail ‘super-spreading’.

Case study: ‘Typhoid Mary’, the first super-spreader

The first documented ‘super-spreader’ in history was Mary Mallon, famously known as ‘Typhoid Mary’.

Her story is important as it may be a prophetic foretelling of our own future. There could be many recalcitrant spreaders who refuse to conform to public health advice and threaten public health.

Between 1900 and 1907, Mallon moved as cook from household to household, infecting some 22 people with typhoid fever. At this time this was a disease with a 10% mortality rate. She represented such a threat to public health that she had to be incarcerated.

Despite her release being conditional on complying with restrictions, she was discovered 5 years later cooking at the Sloane Maternity Hospital in New York City, where 25 new typhoid fever cases had just been reported.

Could this personality type identify behavioural super-spreaders today?

Author Susan Campbell Bartoletti points out in her biography of Mary Mallon, *Terrible Typhoid Mary – The Deadliest Cook in America*, that she could have been let out of her imprisonment much earlier had she agreed to the terms the authorities demanded from the beginning. Mary Mallon could seemingly not grasp the concept of being a ‘healthy carrier’.

She may have associated Typhoid with being ‘dirty’ and resented the implication she carried it as she was a proud ‘clean’ cook. Perhaps the doctors failed in their attempt to explain the science to a scarcely educated kitchen worker because of the cultural and class divide between them?

Maybe they are failing again to bridge the gap in understanding between epidemiologists and the public?

The story of possibly the first documented ‘super-spreader’ in history suggests that, even today, a failure to grasp the science behind infections and disease, by just one person, could prove deadly to society.

Dr Raj Persaud interviewed Susan Campbell Bartoletti about her biography of Typhoid Mary, you can listen to it here: <https://bit.ly/33Sce4n>

References

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