Twitter Thread by Jose-Luis Jimenez

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1/ TIME FOR SOME AIRBORNE + DROPLET HISTORY

Now that @WHO and @CDCgov have finally accepted *after a year of denial and delays* that airborne transmission is a major mode for COVID-19, it is time to review the history to try to understand why this response was so poor.

2/ Remember, the evidence is overwhelming that airborne transmission (1 to 1 in close proximity, and 1 to many in shared room air = superspreading) is the dominant mode of transmission.

https://t.co/L68LLvbOzk

> 1/ TEN SCIENTIFIC REASONS IN SUPPORT OF AIRBORNE TRANSMISSION OF SARS-CoV-2
>
> Peer-reviewed publication in @TheLancet
>
> An honor to have collaborated in multidisciplinary team across medicine, infectious diseases, epidemiology, aerosol science, sociology
> https://t.co/93NL6GhAPm
>
> — Jose-Luis Jimenez (@jljcolorado) April 17, 2021

3/ And probably we are being charitable by saying only "dominant." Can't find any real evidence that airborne is not 99%. Airborne can explain all the epidemiological patterns, while large droplets and fomites can't, and they are pathetically lacking ev.

https://t.co/UzF3RXJ9a9

> Serious question: do we have any evidence to suggest that airborne is not ~100% of SARS-CoV-2 transmission?
>
> Plausibly there are likely small contributions from droplets (if someone coughs on someone's face) or surfaces (rare cases).
>
> But is there evidence? Pls include in replies

— Jose-Luis Jimenez (@jljcolorado) May 7, 2021

4/ @zeynep published an outstanding article yesterday in the @nytimes where she explains the context, the implications, and some of the history.

I wanted to give some more historical detail, without the word limits that she faced in @nytimes.

https://t.co/NfeGxxZiqd

5/ Why does this matter? bc we still face resistance. We have seen how @WHO and others do the changes too quietly, and they don't communicate how the mitigations need to change. And in many countries they report that mssg doesn't arrive, still focusing on disinfection + plexiglas

6/ We have written an article on history. Started by trying to figure out where 5 micron error for droplet / aerosol boundary came from, since physics tells us it is ~100 um. E.g. see this video of 50 micron particles, ain't falling to the ground quickly:

https://t.co/YnmMOBLkAn

> Much discussion lately in aerosol/disease transmission communities about the \u201c5 micron cutoff\u201d where droplets supposedly fall to ground w/in 1-2 m. @jljcolorado and @linseymarr has suggested ~50 microns.
>
> Here\u2019s some video evidence for that. 50 micron droplets wafting in lab... pic.twitter.com/5SrE7GeKDF
>
> — Ryan Davis (@MicroLevitator) July 16, 2020

7/ But as we investigated the origins of the 5 micron error, we learned a lot more about the history of infectious disease transmission, which is the root of the resistance and delays of @WHO and @CDCGov. As we'll see, the creation of the @CDCgov is deeply embedded in the errors!

8/ Our preprint on the history can be read here. Written by @katierandall, @EThomasEwing, @linseymarr, Lydia Bourouiba and yours truly.

https://t.co/fEI98MwI2S

9/ We need to go back to the origins of theories about the transmission of diseases. Hippocrates (https://t.co/eArBV2laZ6) in ancient Greece proposed that diseases were transmitted through the air.

[I think doctors still do the Hippocratic Oath: https://t.co/F0PZA4vS4F]

The Hippocratic text "On the Nature of Man" reads:

"Whenever many men are attacked by one disease at the same time, the cause should be assigned to that which is most common, and which we all use most. This it is which we breathe in."

https://t.co/IRAiB9LENH

11/ Throughout much of human history, belief persisted that diseases were transported through the air. Coming from putrid matter, traveling long distances (e.g. a person infected by the flu in Boston could infect someone in UK)

This was miasma theory:

https://t.co/pVFyWSRO6m

12/ The idea of person-to-person transmission, which now seems obvious (e.g. we get COVID-19, the flu, or tuberculosis from another person) wasn't seriously considered till Italian physician Girolamo Fracastoro proposed it in 1546:

https://t.co/jSCCNVE5Iy

13/ The debate ensued for centuries between the miasmatists and the contagionists.

https://t.co/Ojd6vJywgF

14/ A middle ground was devised, "Contingent Contagionism"

https://t.co/MsW256i1rx

15/ CC was "a qualified way of rejecting application of term "contagious disease" for a particular infection. E.g. it could be stated that cholera, or typhus, was not contagious in a "healthy atmosphere", but might be contagious in an "impure atmosphere"

https://t.co/MsW256i1rx

16/ Eerie how that applies to COVID-19. Highly contagious under some low ventilation conditions, much less so under well ventilated or outdoor conditions.

E.g. our preprint, where we reproduce indoor superspreading quantitatively with an airborne model:

https://t.co/hyBWqnnjLJ

> 1/ A SIMPLE WAY TO ESTIMATE THE RISK OF INDOOR SUPERSPREADING
>
> Our preprint using the airborne transmission model
>
> Captures the literature outbreaks well. So we can use it to see whether an activity is at risk of superspreading
>
> Also to compare diseaseshttps://t.co/hFkBxbhMJB
>
> — Jose-Luis Jimenez (@jljcolorado) May 2, 2021

17/ Florence Nightingale was a contingent contagionist.

During the Crimean war in the 1850s, she greatly reduced infection rates with social distance & ventilation.

https://t.co/Yb8hBMSkU5

18/ In 1854, there is a cholera epidemic in London. The public health established believed it to be caused by a miasma (bad air).

John Snow (https://t.co/eSovlcGHNs) shows that it is transmitted through water!