COVID-19 Testing and Epidemiological Modelling: *Controversies*

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Why is there controversy?

Inappropriate use and application of a diagnostic test

Application of principles in infectious diseases

When there is limited knowledge of a new infectious disease entity we must use basic principles to guide our understanding and remain rooted in existing knowledge of similar entities. As new evidence unfolds we apply it to this framework to improve understanding and guide our approach.

1. Respiratory virus (coronavirus): viral dynamics and transmission
2. PCR testing: its greatest attribute is also its biggest drawback in ID

The hour glass analogy

JAMA Intern Med.
doi:10.1001/jamainternmed.2020.2020
Nature Med.
doi.org/10.1038/s41591-020-0869-5
Ann Intern Med.
doi:10.7326/M20-0504
Nature
doi.org/10.1038/s41586-020-2196-x

The hour glass analogy

1. Time-dependent
2. Sampling-dependent
3. Patient variability – no 2 hour glass are the same

DAYS FROM SYMPTOM ONSET

Day 0

Day 7

Low VIRAL LOAD High

Why the controversy?

Not seeing the wood for the trees…

If we use our diagnostic tests haphazardly, without applying the fundamentals & clinical relevance we will see conflicting results:

1. Pre-test probability
   - Random testing in clinical and community environment
   - Screening test: asymptomatics; admission & post-exposure screening

The real controversy is how to apply the diagnostics in a rational, clinically relevant manner

Epidemiological modelling - transmissibility

1. Models are built on the understanding of viral dynamics and appropriate use of diagnostics.
2. Issue of transmissibility of this virus and how it impacts on modelling studies…
   - Maintaining $R_t < 1$ is often dependent on factors beyond control of the individual/community
   - Amplification events (super-spreader) mess them up!

JAMA Intern Med.
doi:10.1001/jama.2020.6130

THANK YOU!