About Time varying Reproduction Time

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The following is the introduction of reproduction number in (Cori et al. 2013).

Definition of reproduction number (R)

An average number of secondary cases of disease caused by a single infected individual over his or her infectious period. time and situation specific. indicatiing pathogen transmissibility during an epidemic.

Why need to monitor R

It provides feedback on the effectiveness of interventions and on the need of additional controlling efforts. The goal of epidemic control is to reduce R below 1 and make it as close to 0 as possible.

Methods to estimate R

- Transmission modeling to incidence data: model assumption dependent (e.g., presence/absence of a latency period or size of the population studied)

- Statistical modeling by (Wallinga and Teunis 2004): taking 1) incidence data and 2) the distribution of the serial interval (the time between the onset of symptoms in a primary case and the onset of symptoms of secondary cases).

- (Cori et al. 2013) tried to make the estimate more generic and robust.

The estimate of R at time t requires incidence data from times later than t, thus data are right censored. Improving the accuracy of R estimate, either using a short data collection time or applying smoothing, which demand substantial knowledge and efforts.

Reference

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