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Following epidemic spread: how epidemics travel and trim their network of infectious contacts

Epidemics of infectious diseases are ubiquitous, however, their patterns vary depending on the course of disease and the transmission network established by infectious contacts. Therefore, strategies to maintain public health cannot be applied uniformly but have to be adjusted to the specific epidemic scenario. Network models have proven to be a helpful tool to infer time scales of epidemic expansion and prevalence from the structure and dynamics of the underlying transmission network. We extend the existing mathematical framework to also quantify the reverse effect: epidemics impact on the way contacts are made among susceptible and infected hosts. A set of partial differential equations links the structure and dynamics of the transmission network to the epidemic process. It allows to study epidemics on dynamic transmission networks with arbitrary degree distributions and under demographic change [1,2]. The framework will be used in epidemic case studies including multi-staged HIV epidemics. These studies show how epidemics do not only travel but also trim their transmission networks and allow for an exploration of intervention strategies.

References

[1] C. Kamp *Untangling the Interplay between Epidemic Spread and Transmission Network Dynamics* PLoS Comput Biol **6(11)**: e1000984.
[2] C. Kamp *Demographic and behavioural change during epidemics* Proc Comp Sci **1**: 2247–2253.