Marco Ajelli

Fondazione Bruno Kessler, Trento, Italy
ajelli@fbk.eu

Different approaches for modeling the spatiotemporal dynamics of a new pandemic Influenza.

Facing the potentially devastating impact of a new influenza pandemic is a major concern of public health agencies. Individual-based models have become a valuable tool for describing the spatiotemporal dynamics of epidemic outbreaks and for the evaluation of realistic, individually targeted, public health intervention strategies (e.g., antiviral treatment and prophylaxis of household or school/workplace contacts of index cases, social distancing measures).

While specific contacts among individuals into diverse environments (family, school/workplace) can be modeled in a standard way by employing available socio-demographic data, all the other (unstructured) contacts can be dealt with by adopting very different approaches (e.g., by employing distance-based models or defining random contacts in the local or extended communities).

Here we show how diverse modeling choices on this unstructured contact component can lead to different spatiotemporal pattern of the simulated epidemics and thus to a different evaluation of the effectiveness of the containment/mitigation measures. Among the different considered models, significant differences were observed in terms of the attack rates, the peak days, the speed and the pattern of the spatial diffusion.

To reduce uncertainty in the models it is thus important to employ data, which start being available, on contacts on neglected but important activities (leisure time, sport mall, restaurants, etc.) and time-use data for improving the characterization of the unstructured contacts. Finally, all the possible effects of different assumptions should be considered for taking public health decisions.

This is a joint work with Stefano Merler from Fondazione Bruno Kessler, Trento, Italy.