Subramanian, He & Pascual (2021).

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Impact

- Cited 270 times.
- Many COVID data analysis papers were published in 2021.
- This one is unusual for incorporating stochastic transmission dynamics, time-varying testing, hospital case and serology data, and formal statistical inference.

The model

- Fig 1 (overall flow) elaborated as a set of differential equations in Sec. S1.
- Actual model code is at https://github.com/pascualgroup/COVID_NYC_Epi_Model
- The actual model has equidispersed multinomial dynamics (i.e., no overdispersion).
- It is not unusual to write equations for a deterministic model and implement a stochastic one.
    - What are the advantages/disadvantages/risks of doing this?

The data

- Syndrome surveillance data from NYC hospital emergency departments and observed influenza cases in NYC in previous years.
- Early in the epidemic, it is critical to estimate the non-COVID background of influenza-like illness that obscured the initial growth of COVID.
- The COVID test allocation protocol is modeled.

Inference

- A very large number of starting values (25×10^3) are used for global optimization.
- Parameter sets with comparable likelihood to the maximum (within 2 log units) were compared against an independent NYC serology survey. The final model was therefore required to be consistent with both.
    - How does this compare with alternative approaches to incorporating cross-sectional data with time series data?