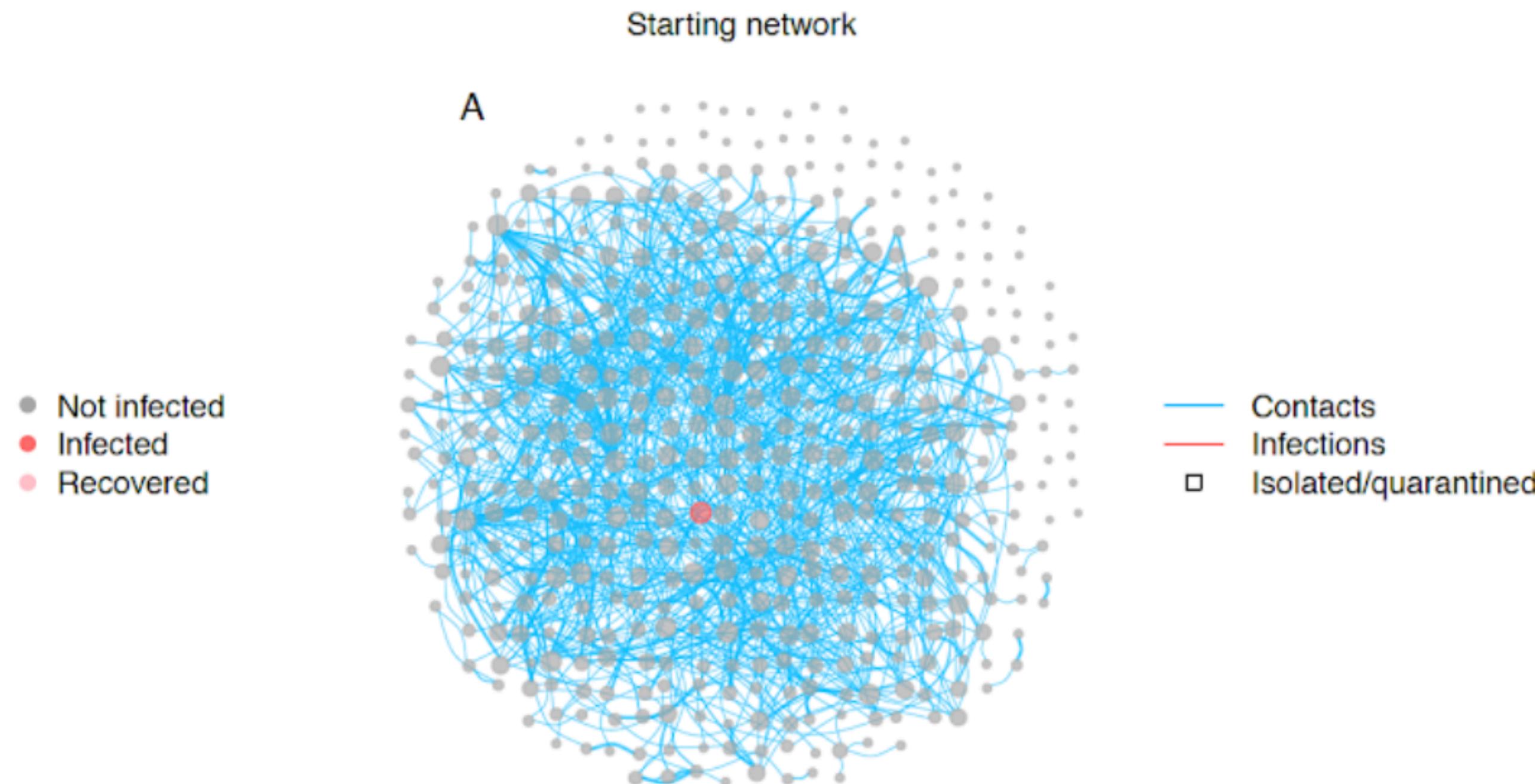


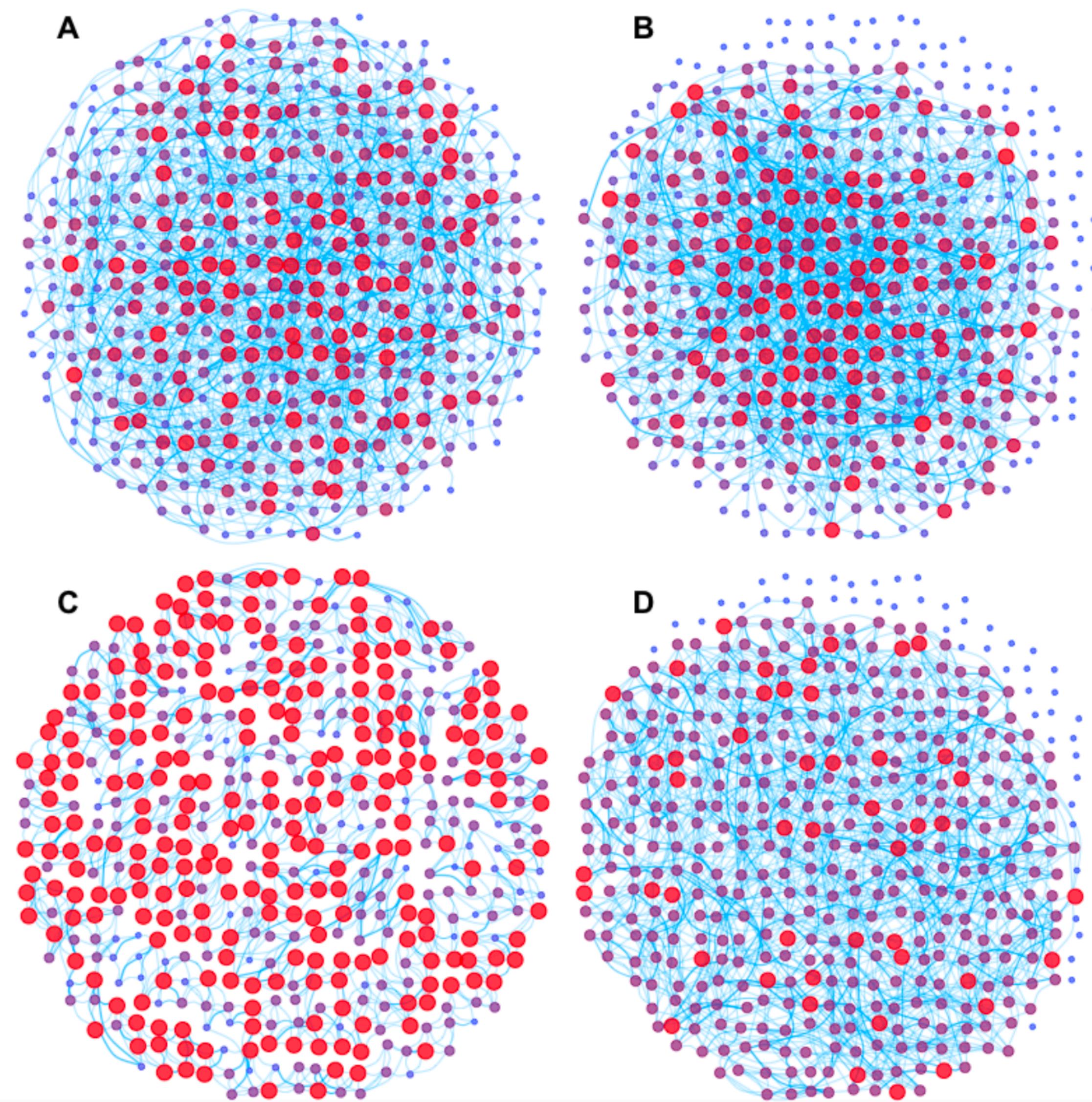
Combining fine-scale social contact data with epidemic modelling reveals interactions between contact tracing, quarantine, testing and physical distancing for controlling COVID-19

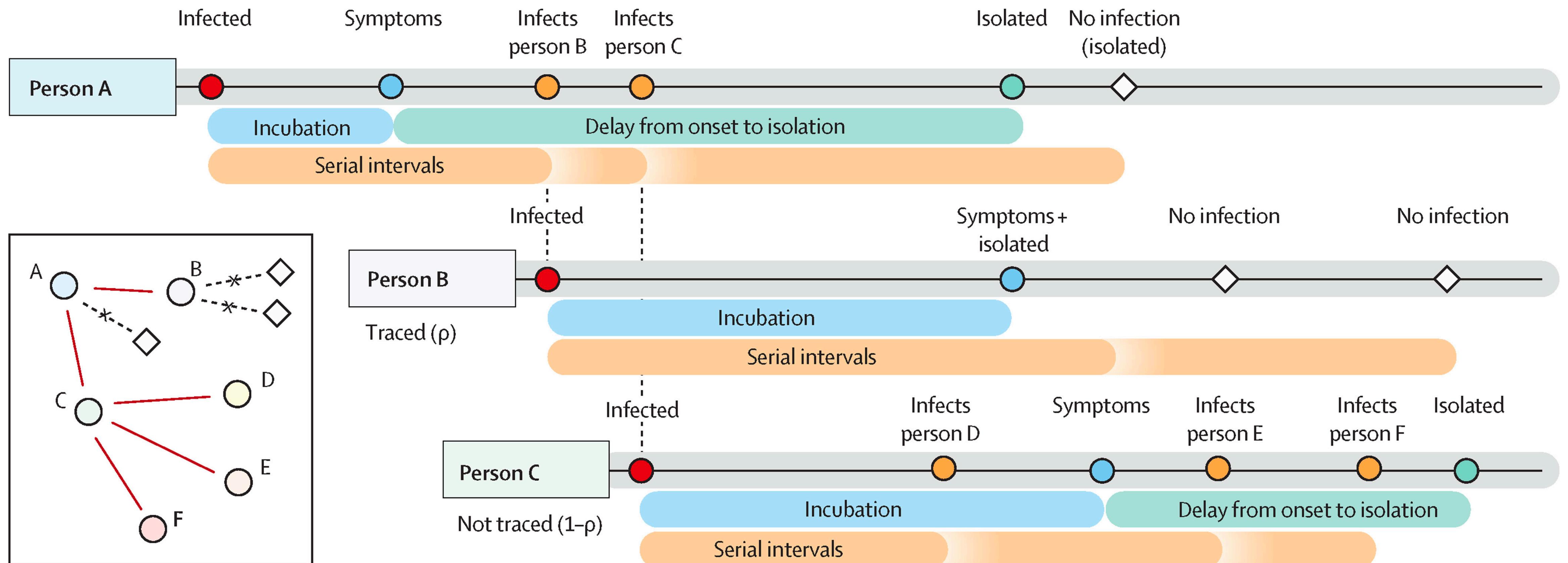
Haslemere network



- The social network of 468 individuals (grey nodes) with 1257 social links (blue edges) weighted by 1616 daily contacts (edge thickness) and a single starting infector (red)

Null models



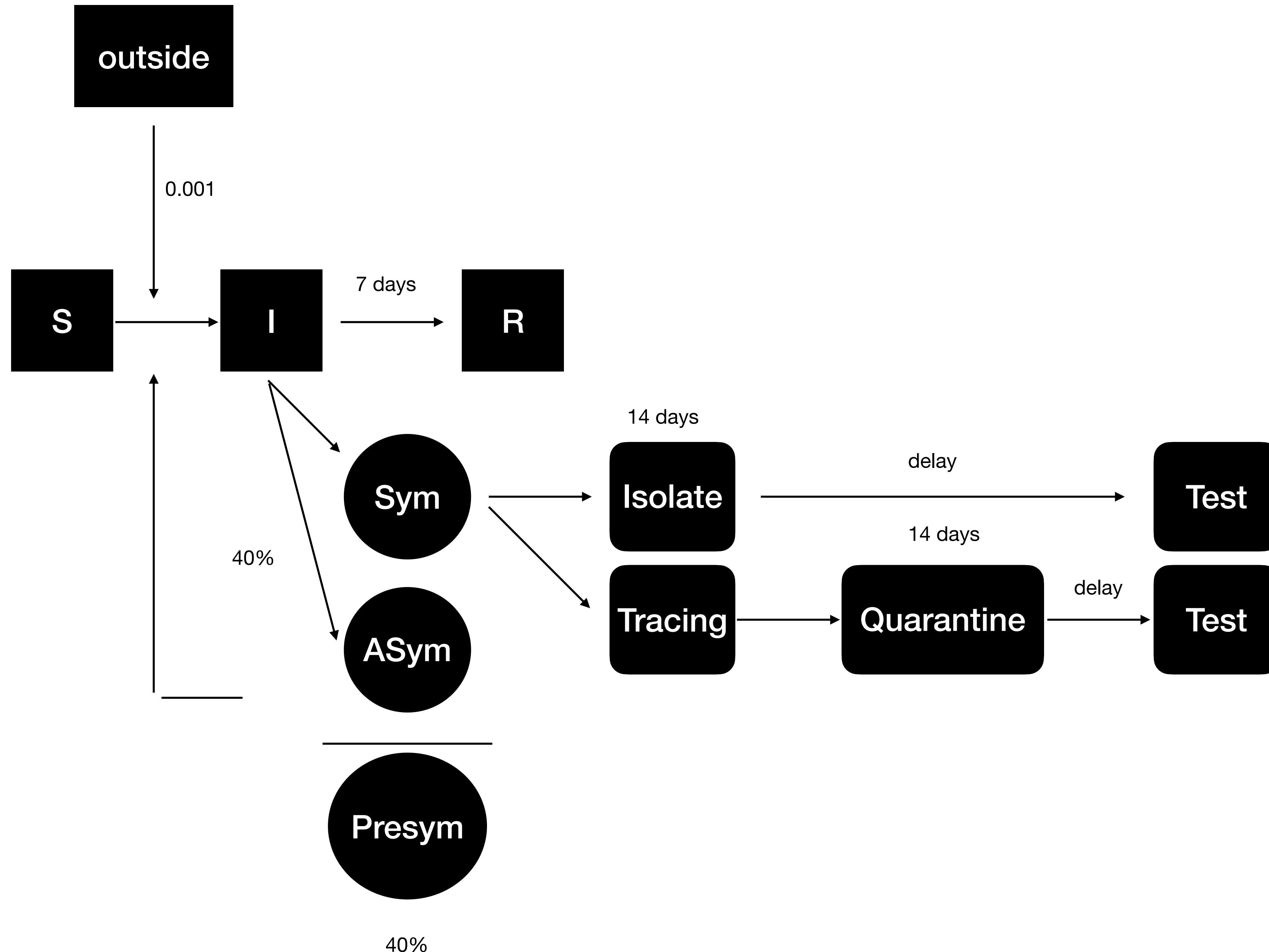


- transmission rate for a given pair of contacts

$$\lambda(t, s_i, p_i) = A_{s_i} I_{ei} \int_{t-1}^t f(u; \mu_i, \alpha_{p_i}, \omega_{p_i}) du$$

- the probability of infection between a susceptible-infected pair of individuals t days after the infector's exposure time

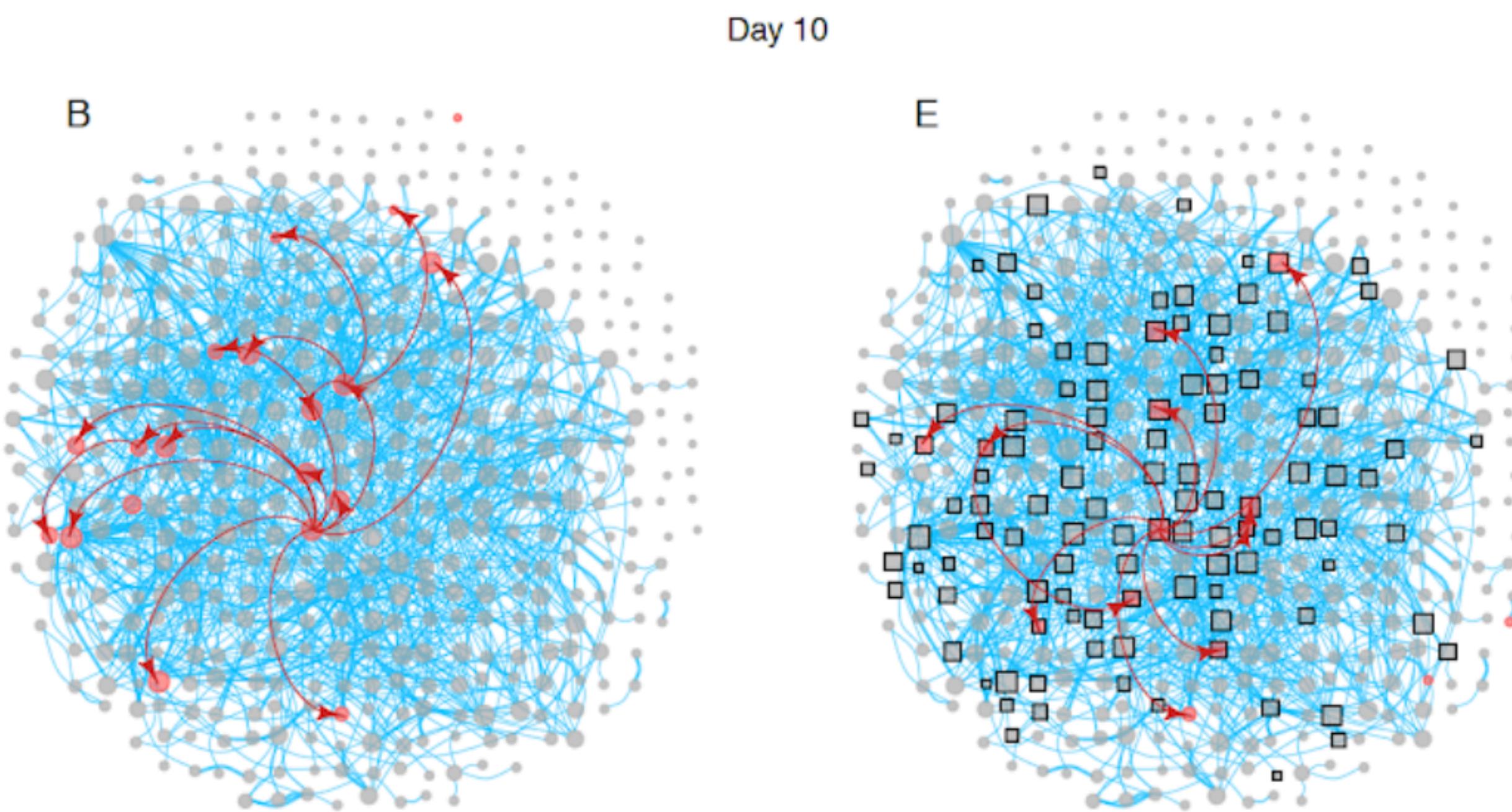
$$P(t, s_i, p_i) = 1 - e^{-\lambda(t, s_i, p_i)}$$



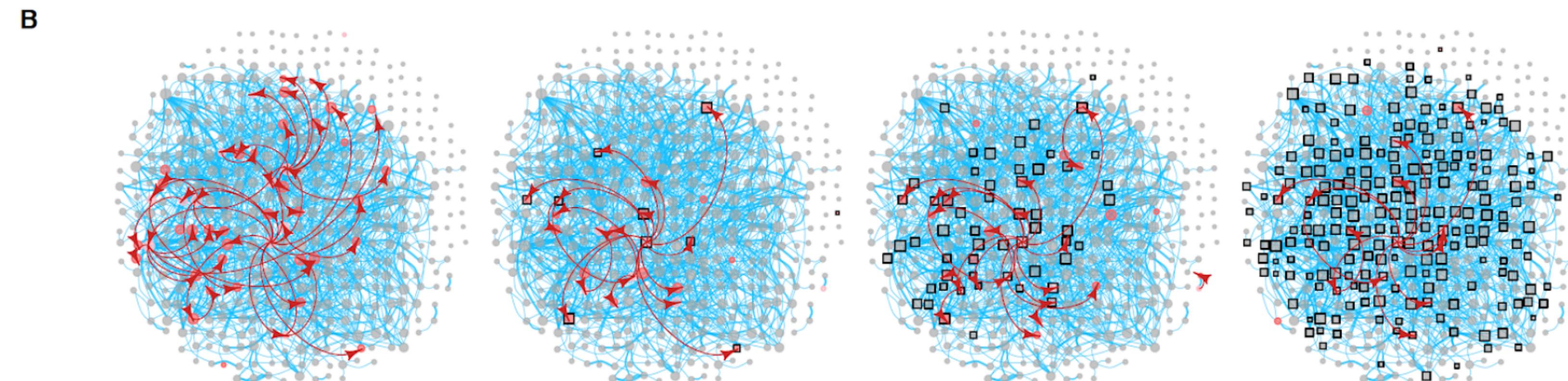
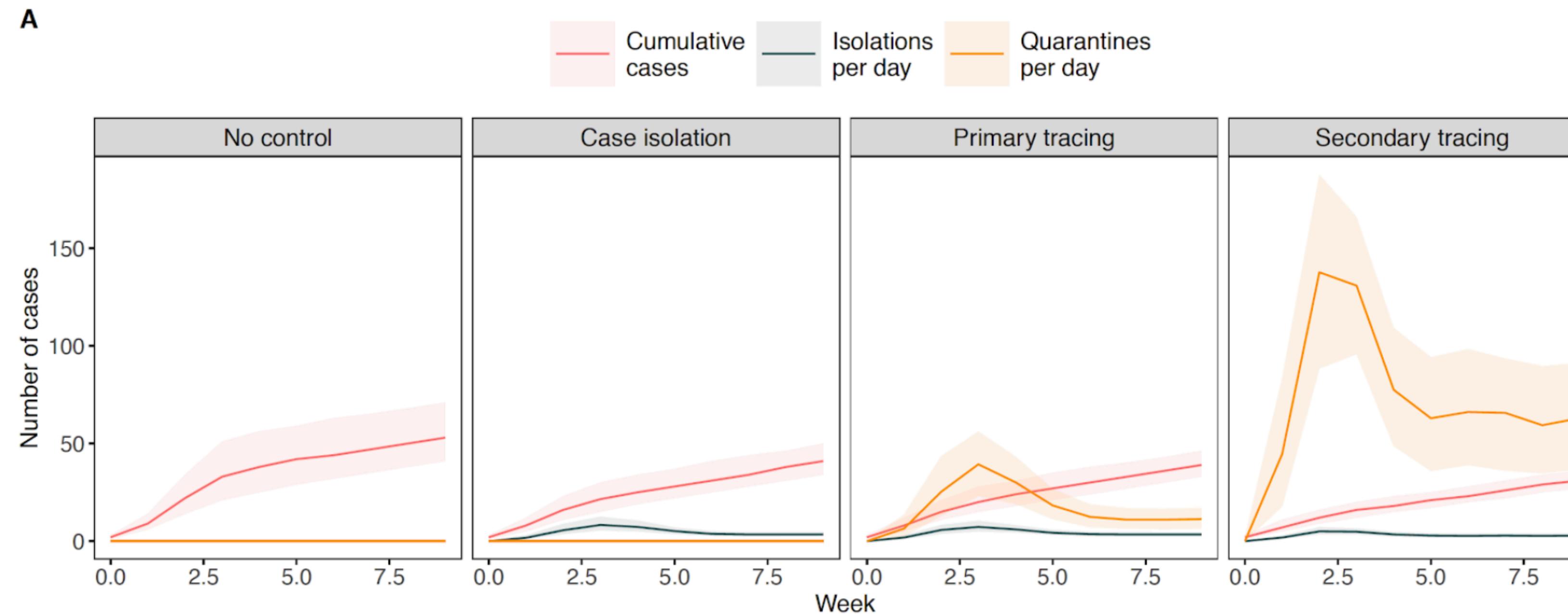
Parameters

Parameter	Assumed value(s)	Details and references
<i>Sampled</i>		
Incubation period	5.8 days (2.6)	^{9,29}
Serial interval	Location = incubation period For post-symptomatic transmission, slant = ∞ , scale = 2 For presymptomatic transmission, slant = $-\infty$, scale = incubation period.	Based on data in ⁹
Delay from onset/tracing to isolation, and from isolation to testing	1 day (0.4-1.9) days ('short') 3.5 days (2.8-5.2) days ('medium')	Assumed (short) and ³⁰ (medium)
<i>Fixed</i>		
Initial cases	1, 5	Assumed
Scaling parameter (and corresponding empirical estimate of the reproduction number R_0)	1 (2.8), 2 (3.5)	³¹
Percentage asymptomatic individuals	20%, 40%	¹²
Infectiousness of asymptomatic individuals	50% (relative, to symptomatic)	Assumed
Percentage individuals infectious pre-onset	20%, 40%	^{9,32}
Outside infection rate	0.0001, 0.001 , 0.005, 0.01	Assumed
Percentage of contacts traced	40%, 60%, 80%	Assumed
Maximum number of tests	0, 5, 25, 50	Tested
Test false positive rate	0.02	²⁴
Test false negative rate	0.1 (symptomatic patients) 0.5 (asymptomatic patients)	Based data from early infection stages in ²³

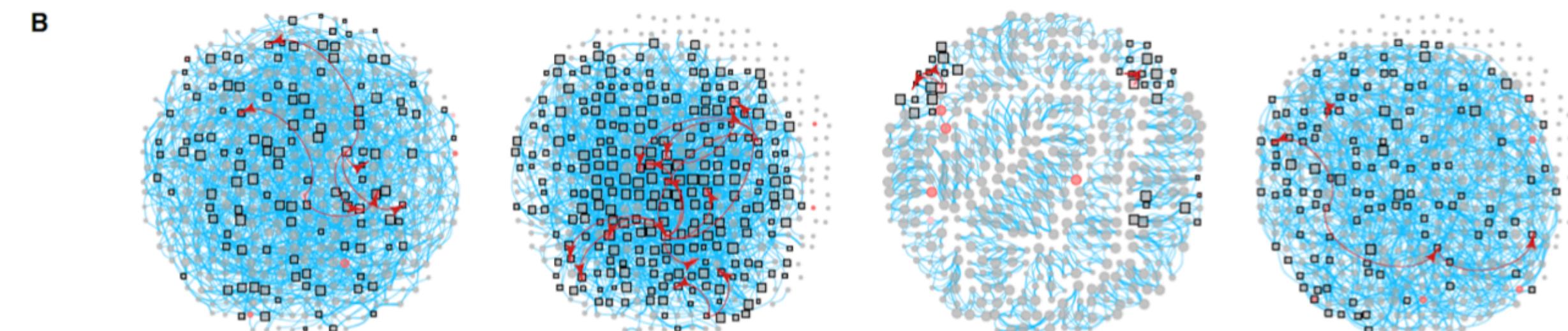
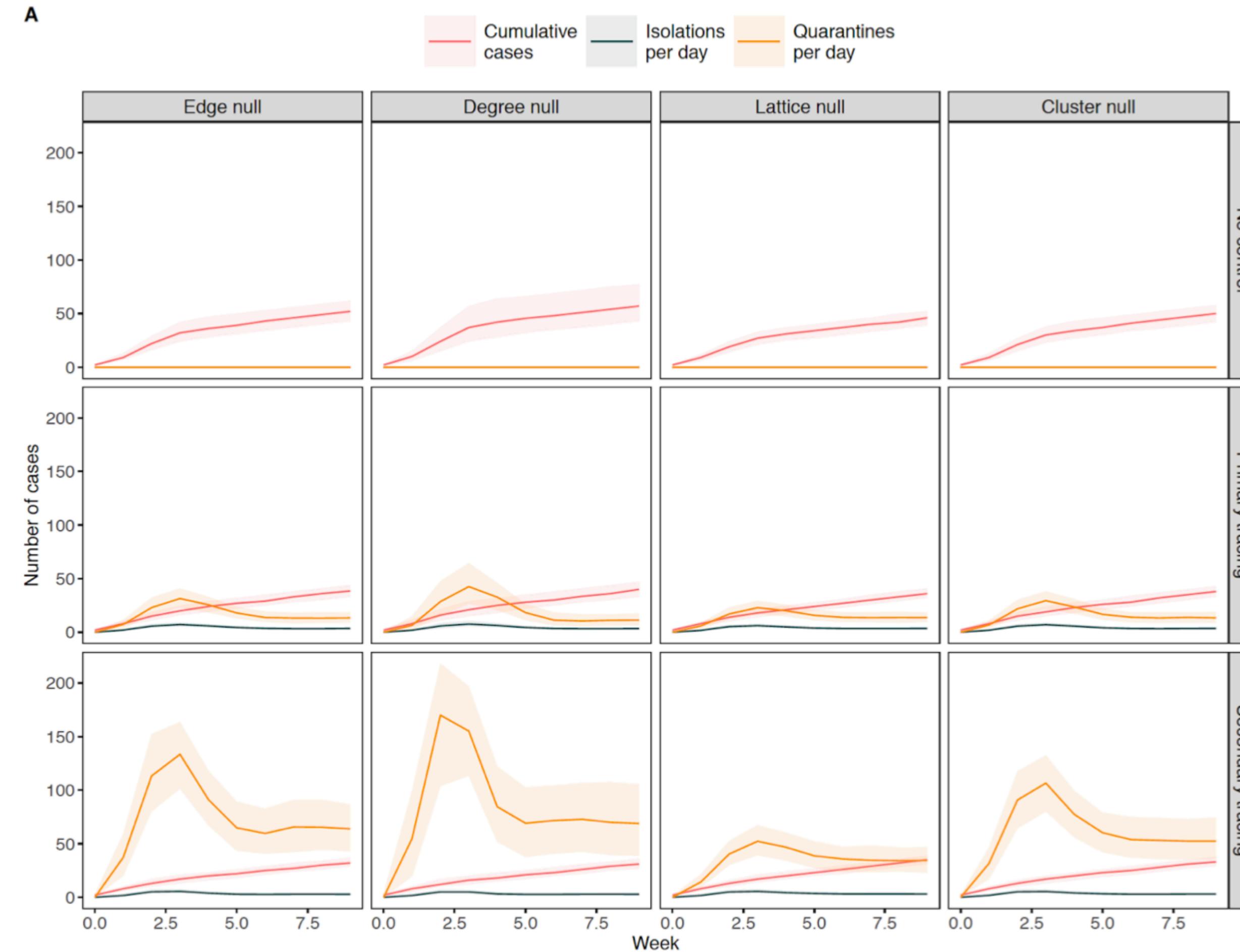
- B: nothing
- E: secondary contact tracing



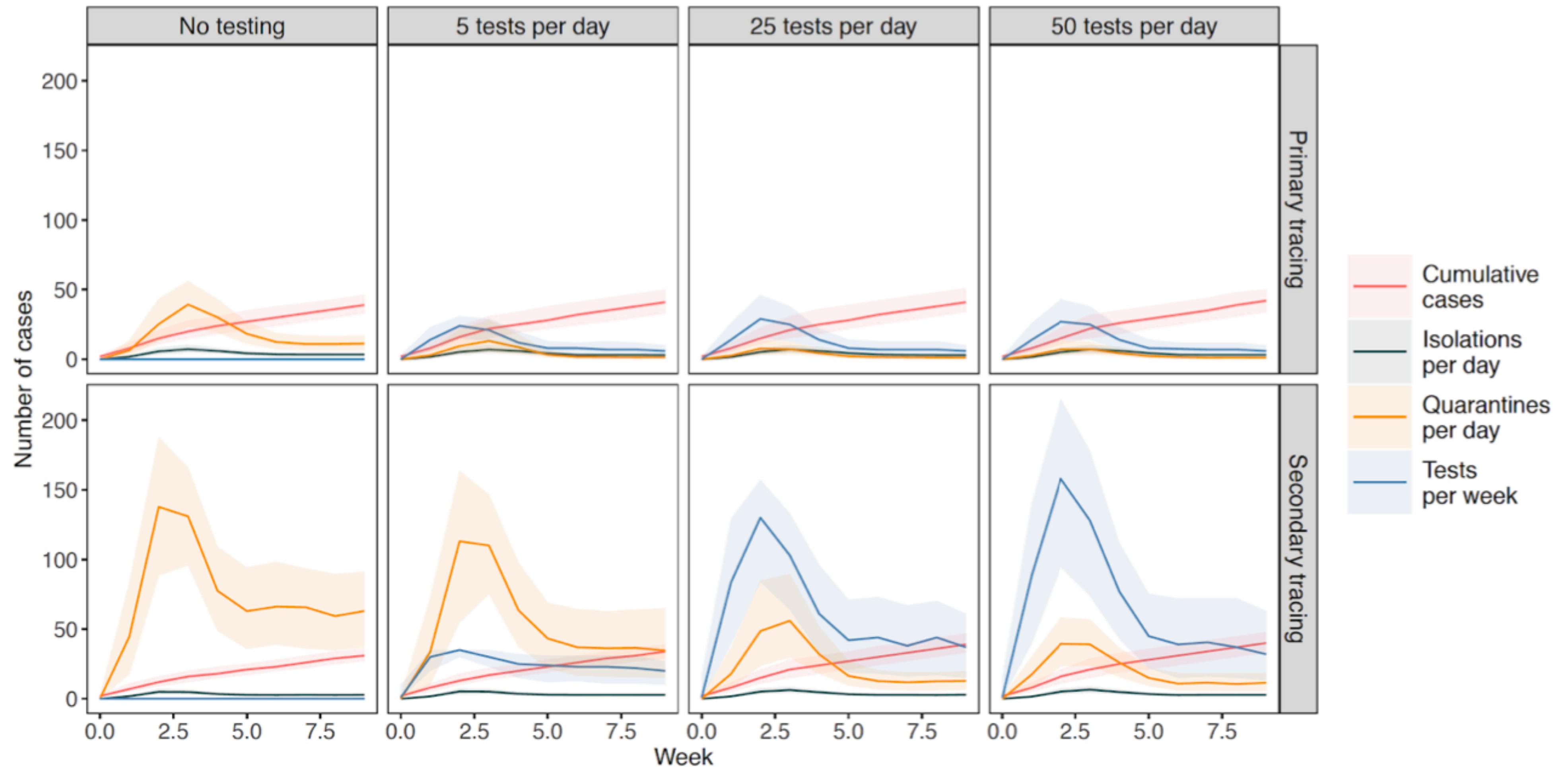
Epidemic model predictions of outbreak size and number of people isolated/quarantined under different non-pharmaceutical intervention scenarios in the Haslemere network.



Epidemic model simulations of outbreak size and number of people isolated/quarantined under different null-network permutations based on the Haslemere network

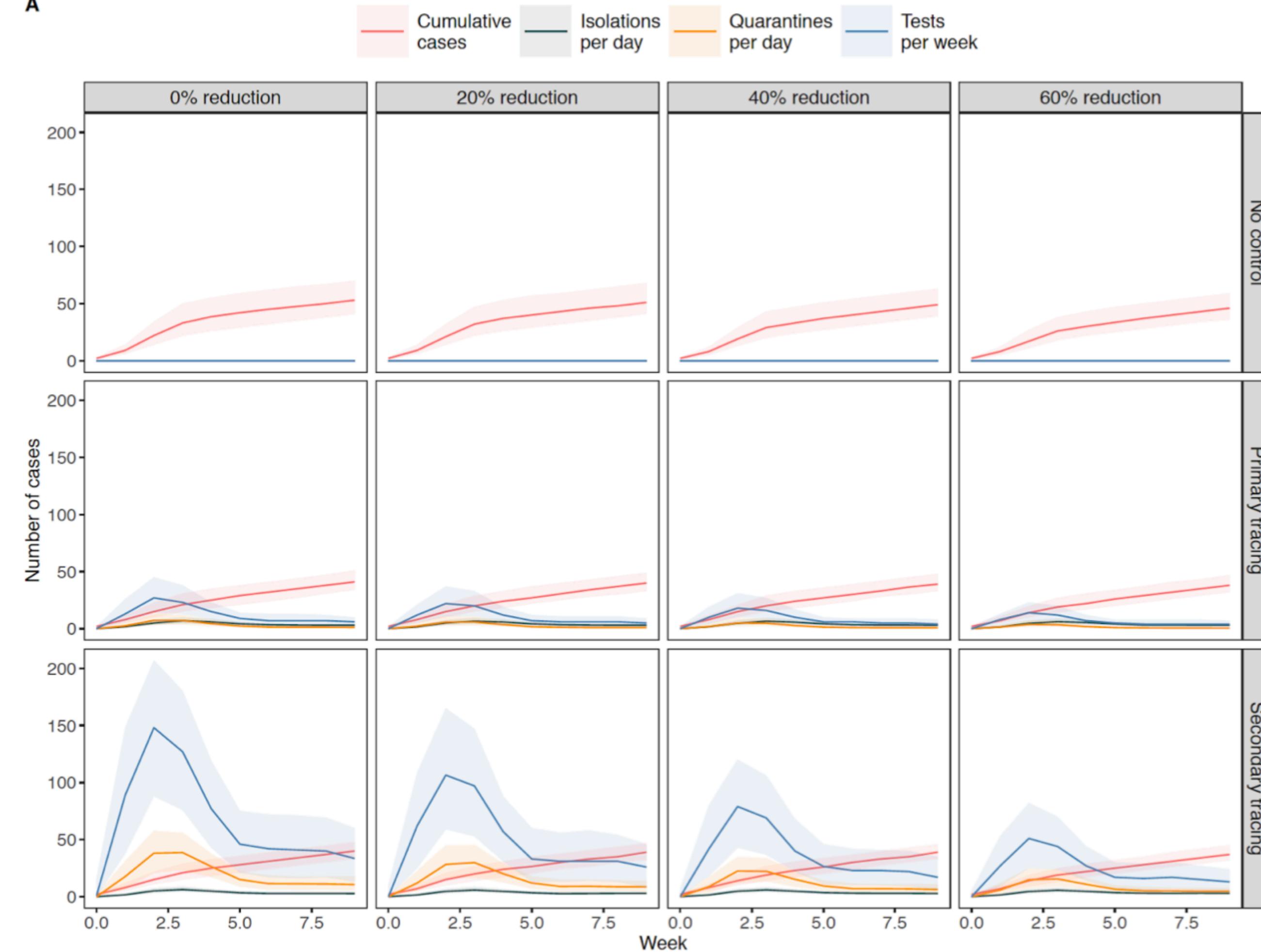


Epidemic model predictions of outbreak size and number of people isolated, quarantined and tested under different testing rates in the Haslemere network



Epidemic model simulations of outbreak size and number of people isolated, quarantined and tested under different levels of physical distancing in the Haslemere network

A



B

