Epidemics in carehomes – impact of "cocooning"

Model setup:

- Background SEIR epidemic in the population
  - No spatial structure
- Carehomes:
  - Real data (~15k carehomes; ~450k people; size range: 1 – 215, median 24 – Fig. 2)
  - Get infected at random times, concentrated around peak of background epidemic
  - Experience a deterministic epidemic (baseline R_0 in carehomes: $R_0^{ch} = 3$)
  - Are sinks (no transm back in the community nor to each other), so are independent
  - Tuned probability p of introduction in median-sized carehome (range: 0.1 – 0.99)

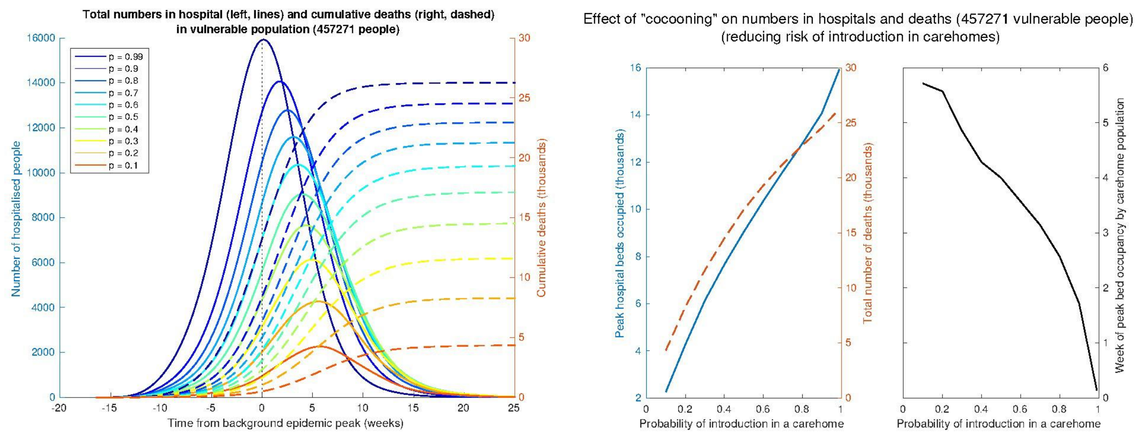

Fig. 1: Effect of cocooning (reduction in probability p of introduction in carehomes) on bed occupancy (peak height and time) and deaths.
Left: Solid lines (left axis) are numbers of hospital beds occupied by patients from carehomes over time (relative to peak of background epidemic). Dashed lines (right axis) are cumulative deaths. Different colours refer to different probabilities of introduction in carehomes.
Right: Summary of left graph, with peak hospital beds occupied by patients from carehomes (solid blue, left axis), total deaths (dashed red, right axis) and time of peak hospital bed usage (solid black – assuming no shortage of beds), as a function of the probability of introduction in carehomes.

Policy implications:

For baseline scenario of explosive uncontrolled outbreaks in carehomes ($R_0^{ch} = 3$) and assuming 1 week hospitalisation stay, we expect:

Probability of introduction in median carehome	Effective fraction of carehomes infected*	Number of beds occupied** at the peak***	Timing peak*** relative to peak in general population	Deaths toll in carehomes
99%	86%	16 000	0 wks	26 000
70%	58%	12 000	3 wks	21 000
40%	36%	8 000	4 wks	15 000
10%	10%	2 000	6 wks	4 000

* Due to the variable risk of introduction in carehomes, fewer carehomes are infected in total, but they are more likely to be the larger ones.

** By carehome population only (in addition to rest of population)

*** Peak in carehome population