CORONA

Disease model(s)

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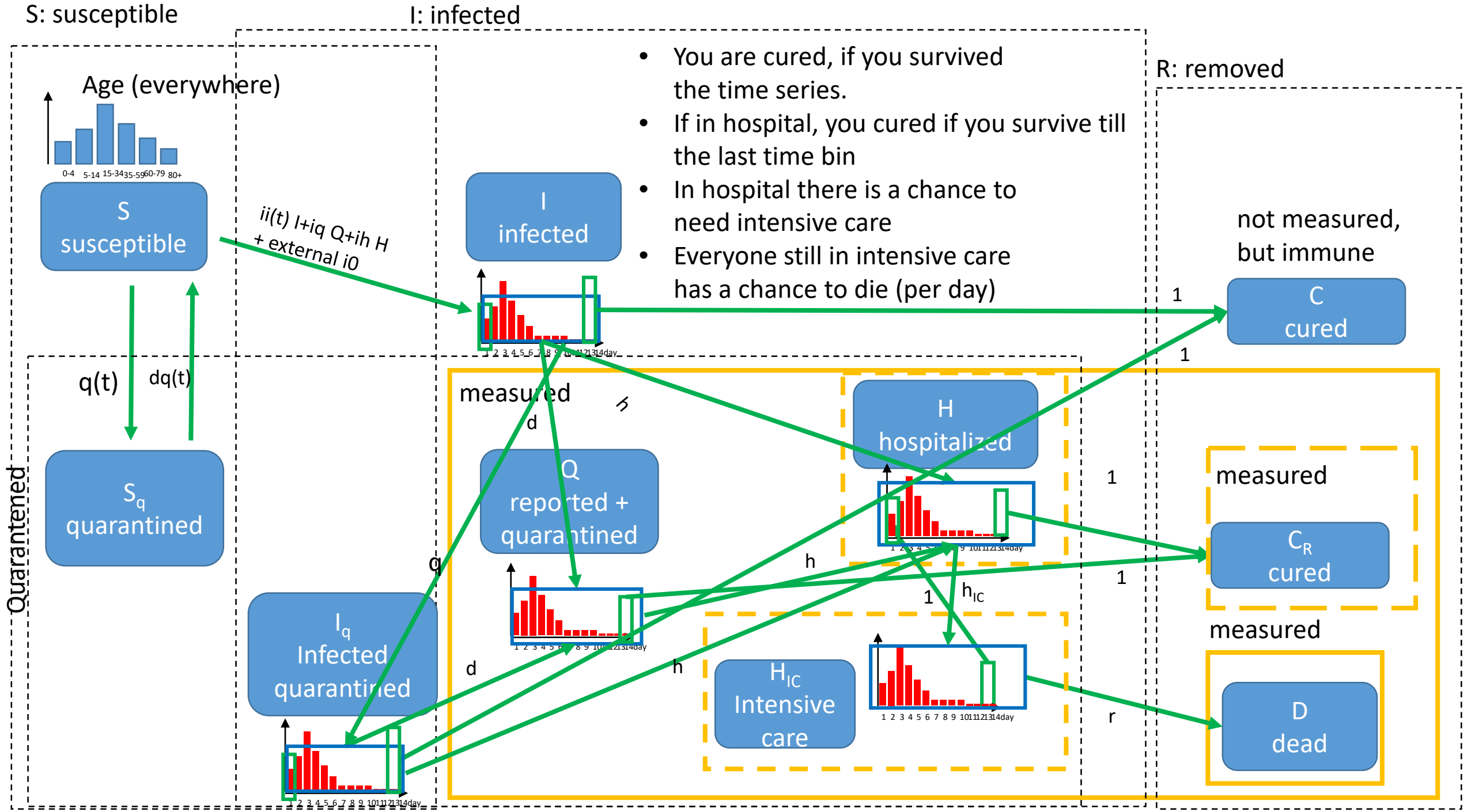
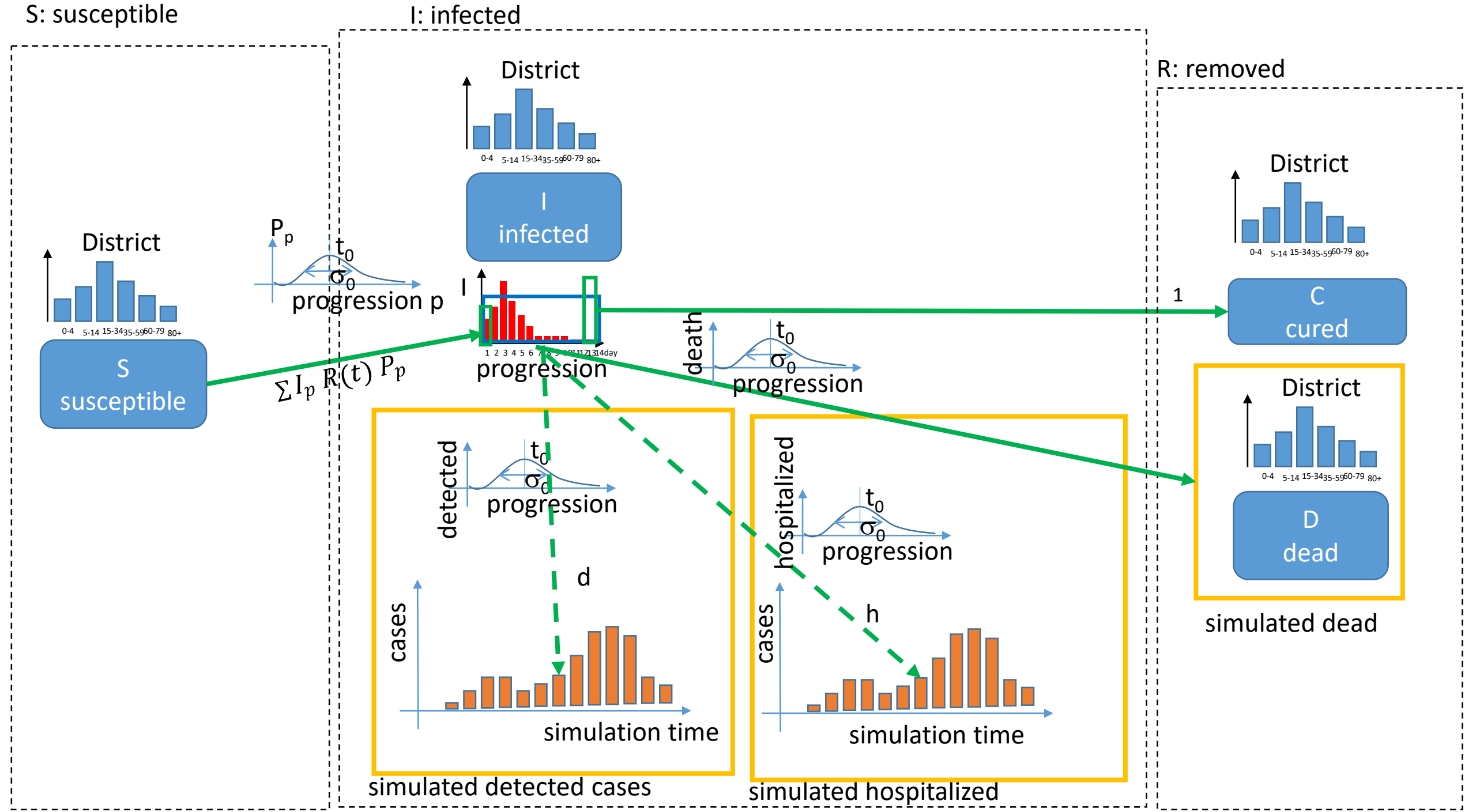


- You are cured, if you survived the time series.
- If in hospital, you cured if you survive till the last time bin
- In hospital there is a chance to need intensive care
- Everyone still in intensive care has a chance to die (per day)


S: susceptible
I: infected
R: removed
District
0-4 5-14 15-34 35-59 60-79 80+
S
susceptible
P_p
t_0
σ_0
progression p
$\sum I_p R_i(t) P_p$
District
0-4 5-14 15-34 35-59 60-79 80+
I
infected
I
1 2 3 4 5 6 7 8 9 10 11 12 13 14day
progression
1
District
0-4 5-14 15-34 35-59 60-79 80+
C
cured
death
t_0
σ_0
progression
District
0-4 5-14 15-34 35-59 60-79 80+
D
dead
simulated dead
detected
t_0
σ_0
progression
d
cases
simulation time
simulated detected cases
hospitalized
t_0
σ_0
progression
h
cases
simulation time
simulated hospitalized

External Parameters:

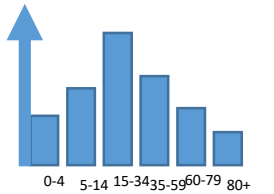
- Influx of infected ppl. (travel data influencing the infection rate)
- Contact awareness (decreasing the infection rate)
    - Model: sigmoidal curve (midpoint, width, offset)

Steerable (political) Parameters (should be available as time traces):

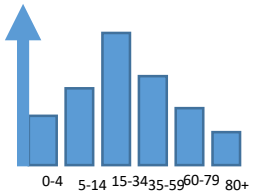
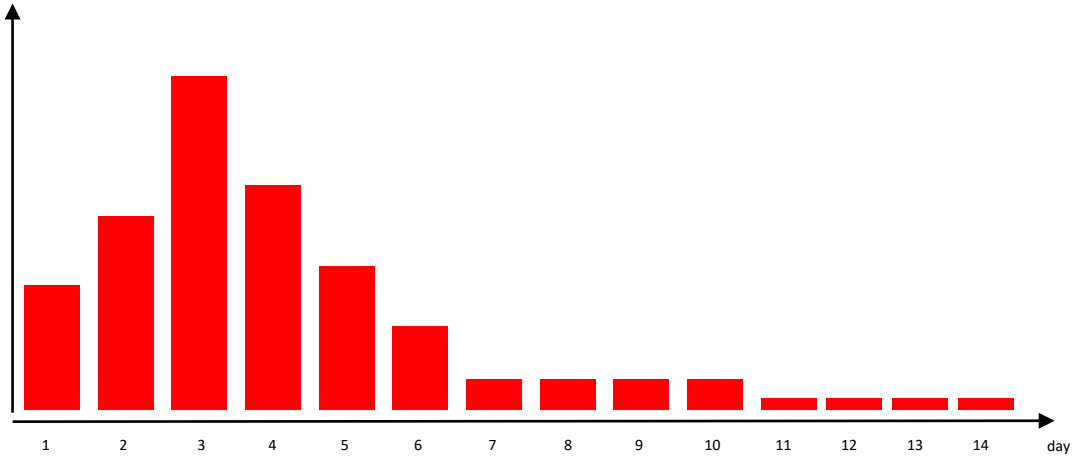
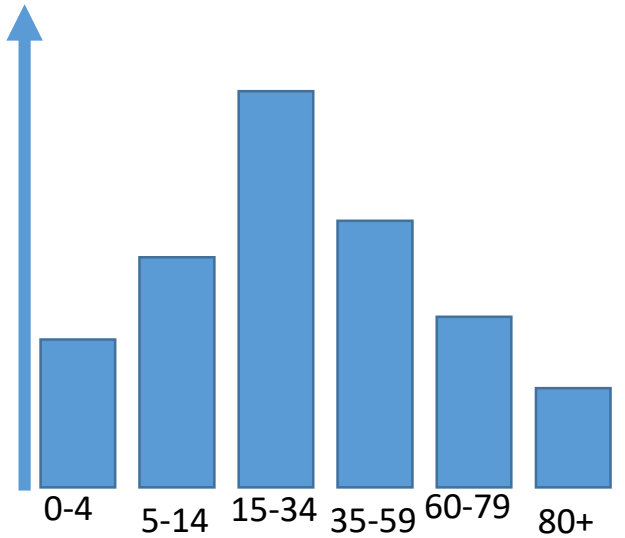
- Quarantine: influencing q, modelled as delta peaks and time span
    - Model: unknown effectiveness of measure (e.g. Δq)
- Travel restrictions (changing the infection rate from external)
    - Model: unknown effectiveness of measure (e.g. Δr_0)
- Performing more testing (changing the detection and therefore quarantine rate d)

Axes (each state splits into sub-states according to these axes):

- Age groups (is there a standard? How to deal with different standards? Base data (local age distribution)
    - Model: Sigmoidal rates (midpoint, width, offset)
- Virus strain migration (see http://nextstrain.org)
- District, Region, Country
    - Model: Individual t_0 event with unknown t_0 and I_0 (how to make this differentiable?)
- Gender
    - Model: separate rates (M/F)
- Disease Progression (works like a queue with progression-dependent transition rates)



S
suceptible



I
infected