Shelter in Place Triggers

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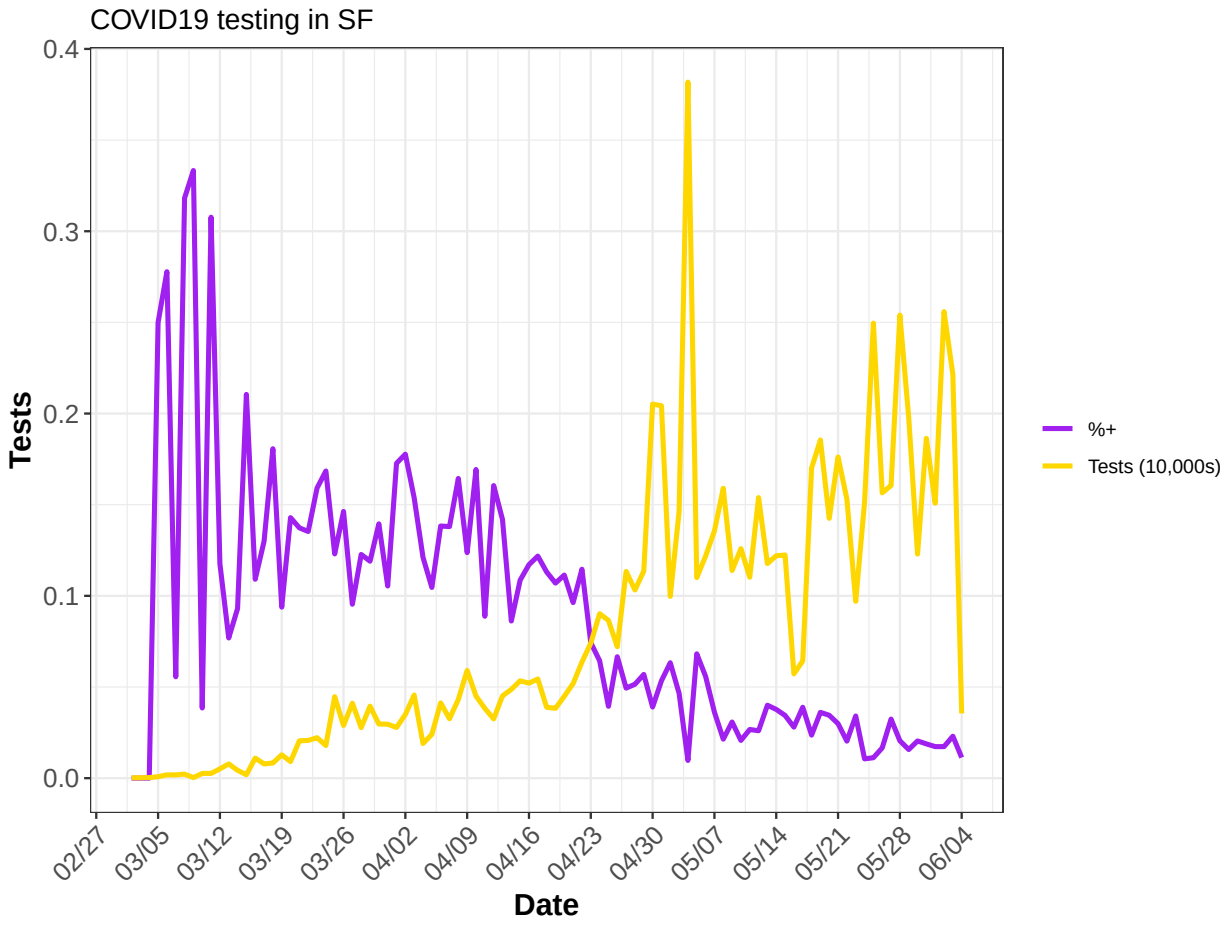
Purpose

Evaluate potential triggers to intervene on COVID transmission (e.g. shelter in place or other method to reduce contact and transmission) from signals in testing data.

Testing



Model

We use a slight tweak to LEMMA to add an explicit deaths compartment in order to fit to deaths data in addition to hospitalizations

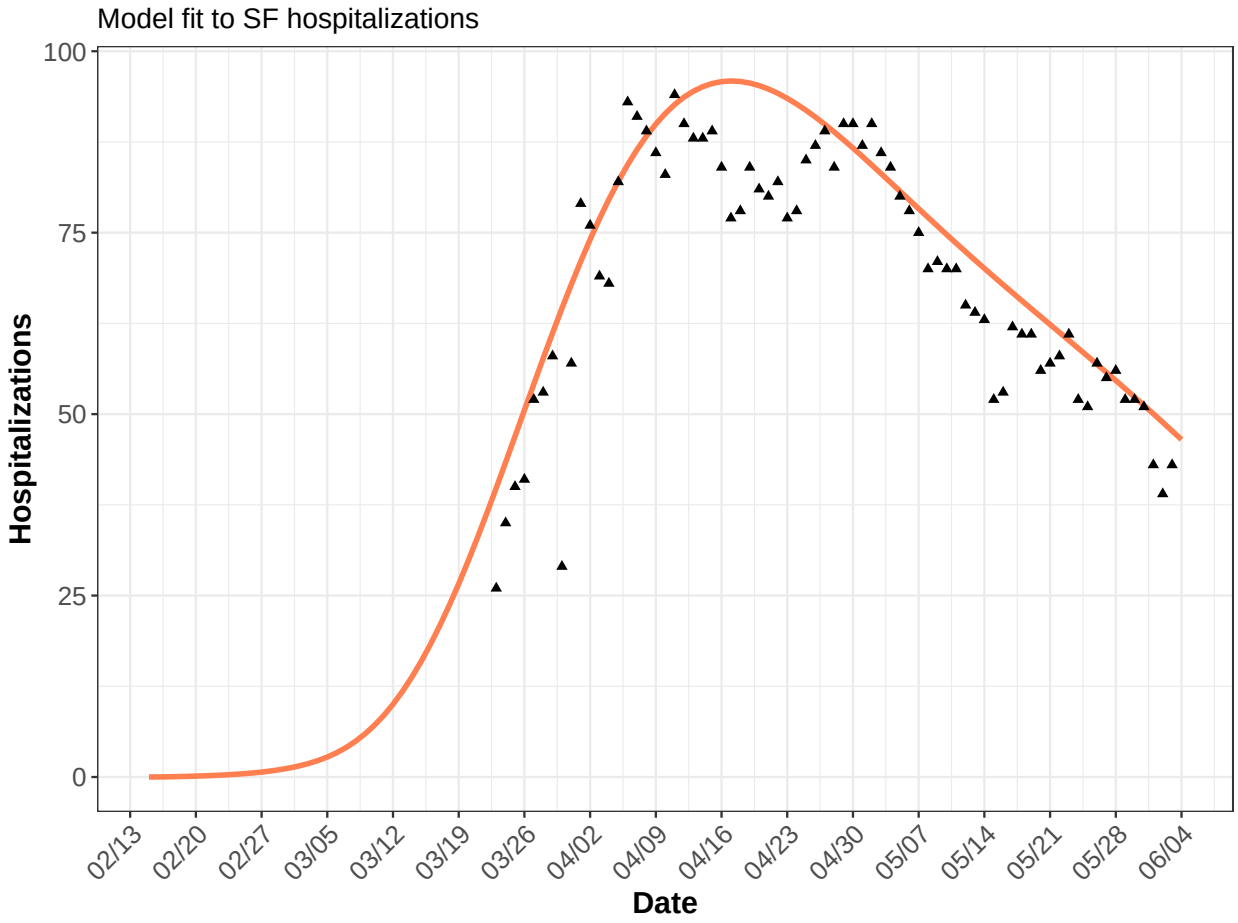
Table 1: Best fit model parameters

	Value	Definition
N	883305	population size
t.sim	111	time to run simulation
E_0	5.952	starting number of exposed
c_r	1	Relative contact rate between S and Ir
c_h	1	Relative contact rate between S and Ih
σ	0.333	1/serial interval
α	0.04	proportion severely symptomatic (will be hospitalized)
ρ	0.25	time between symptom onset and hospitalization
γ_r	0.2	1/time to recovery (non-infectiousness) for mildly symptomatic
γ_h	0.083	1/time hospitalized
μ	0.113	proportion of hospitalized cases who die

$$
\begin{aligned}
\dot{S} &= -\beta S(I_R + I_H)/N \\
\dot{E} &= \beta S(I_R + I_H)/N - \sigma E \\
\dot{I_R} &= \sigma(1-\alpha)E - \gamma_R I_R \\
\dot{I_H} &= \sigma\alpha E - \rho I_H \\
\dot{H} &= \rho I_H - \gamma_H H \\
\dot{D} &= \gamma_H \mu H \\
\dot{R} &= \gamma_R I_R \gamma_H (1-\mu) H
\end{aligned}
$$

Model fit

```
## Warning: Removed 22 rows containing missing values (geom_point).
```

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## Warning: Removed 7 rows containing missing values (geom_point).
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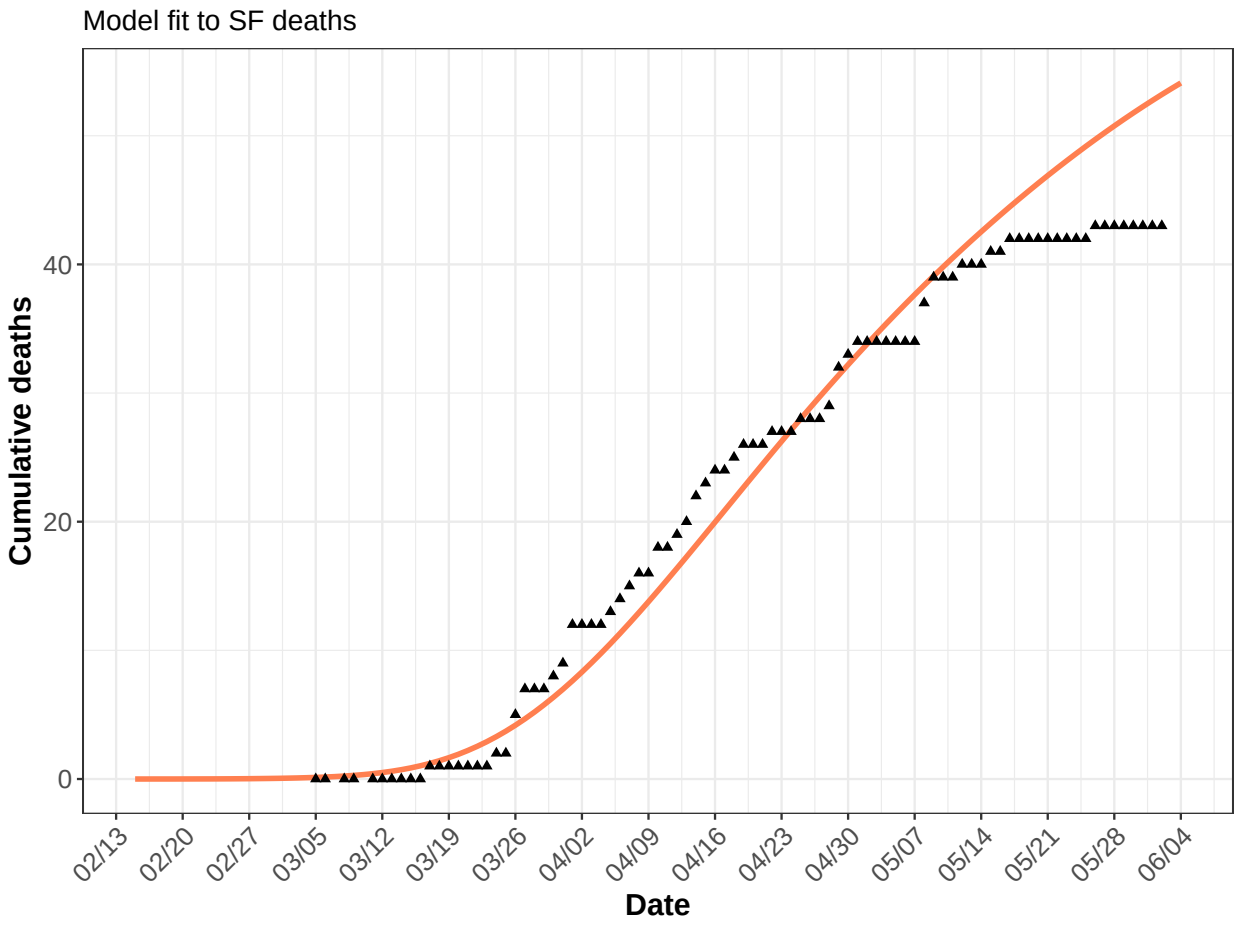
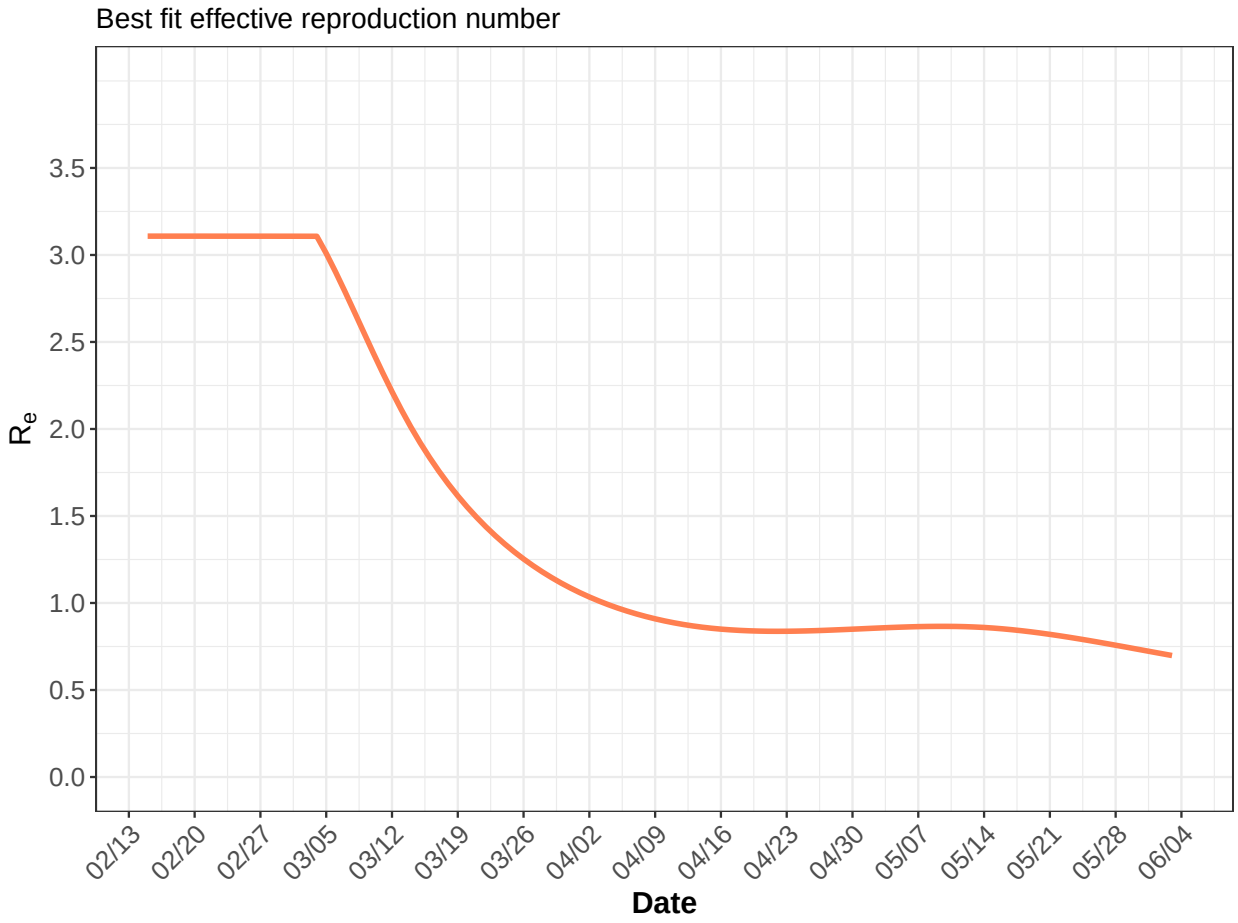



```
## Warning: Removed 1 rows containing missing values (geom_path).
```



Comparison to testing data

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## Warning: Removed 1 rows containing missing values (geom_path).
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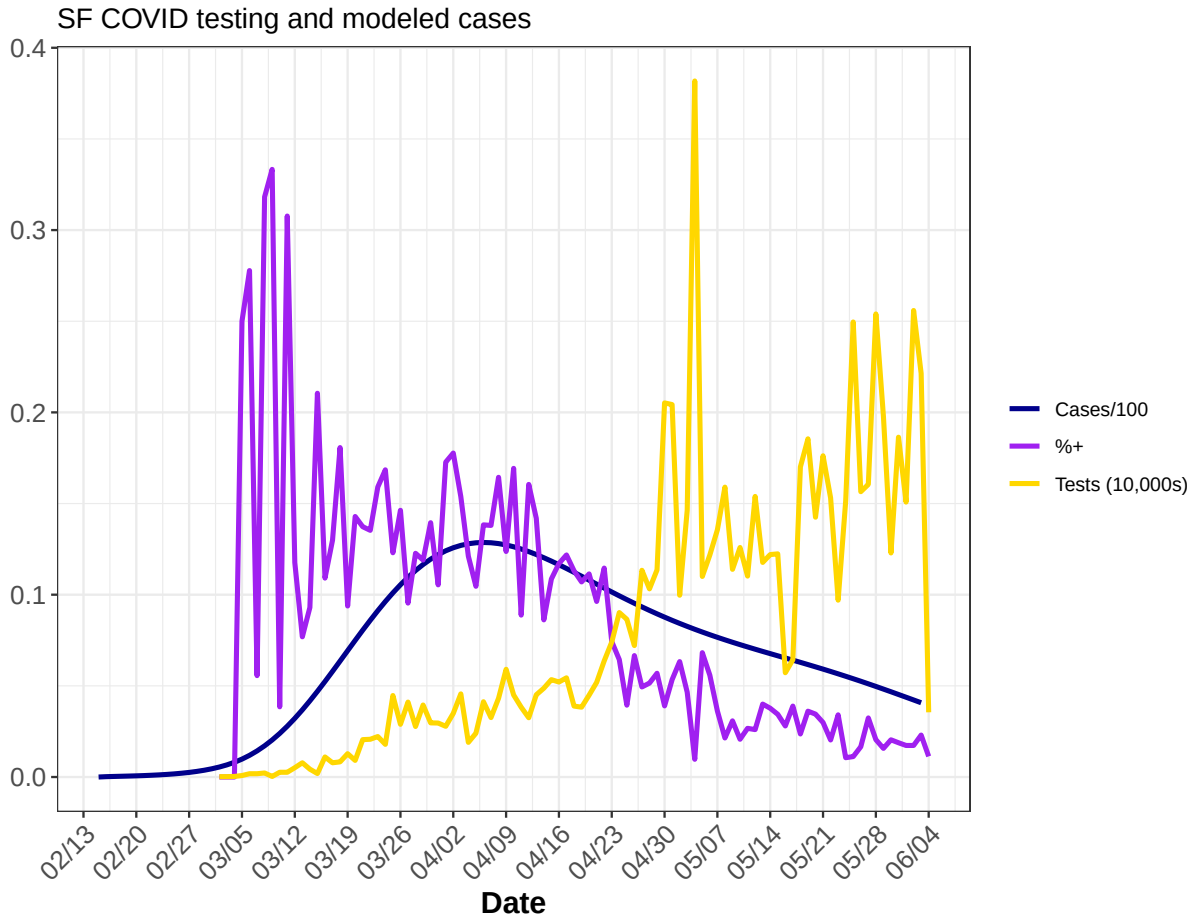


```
## Warning: Removed 34 rows containing non-finite values (stat_smooth).
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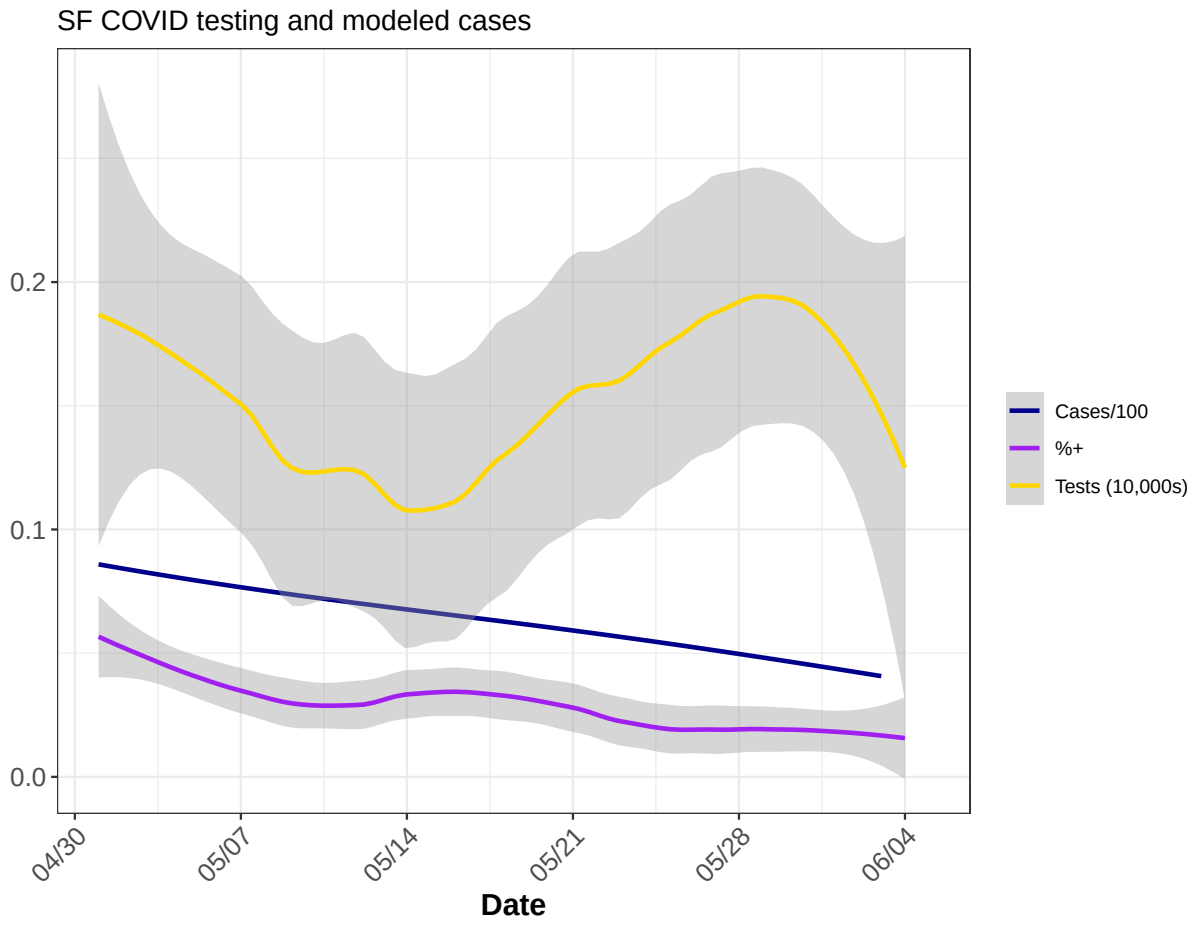
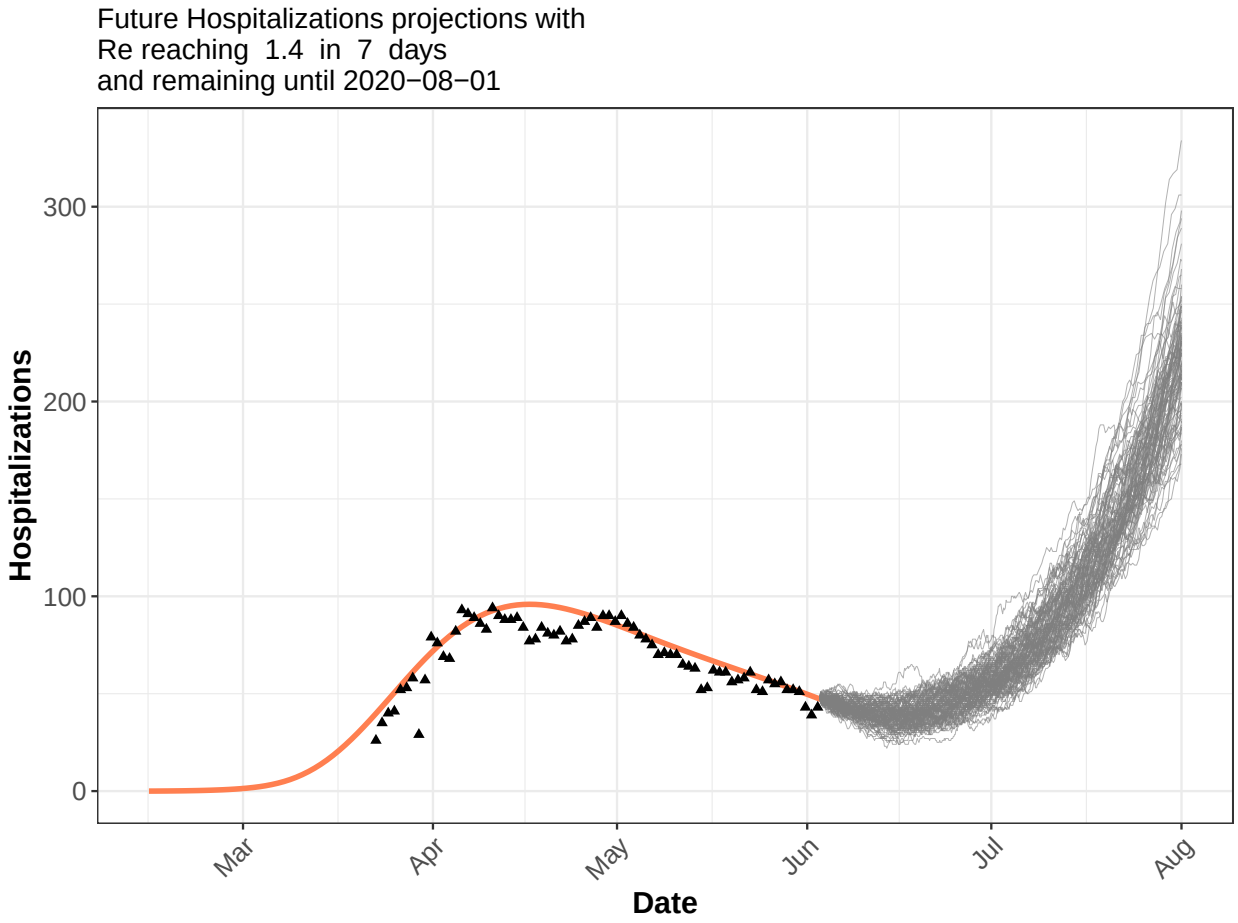


Model forecast

```
## Warning: Removed 22 rows containing missing values (geom_point).
```


Future Hospitalizations projections with
Re reaching 1.4 in 7 days
and remaining until 2020−08−01
Hospitalizations
300
200
100
0
Mar
Apr
May
Jun
Jul
Aug
Date