

CEACOV RSA - Hospital Transition Rates

August 12, 2020

1 Manuscript

	Path 1	Path 2	Path 3	Path 4
Pre-infectious	2.6	2.6	2.6	2.6
Asymptomatic	9.5	2.0	2.0	2.0
Mild/Moderate	–	10.0	6.5	3.0
Severe	–	–	10.5	7.1
Critical	–	–	–	11.9
Recuperation	–	–	–	5.7

2 Model

	Path 1	Path 2	Path 3	Path 4
Pre-infectious	2.6	2.6	2.6	2.6
Asymptomatic	9.5	2.0	2.0	2.0
Mild/Moderate	–	10.0	6.5	3.0
Severe	–	–	10.5	9.0
Critical	–	–	–	20.0
Recuperation	–	–	–	5.7

```
[2]: import numpy as np
```

```
[13]: # Mean duration spent in the hospital for each path
durations = np.array([[2.6,2.6,2.6,2.6],
                      [9.5,2.0,2.0,2.0],
                      [np.nan,10.0,6.5,3.0],
                      [np.nan,np.nan,10.5,7.1],
                      [np.nan,np.nan,np.nan,11.9],
                      [np.nan,np.nan,np.nan,5.7]])

# Transition rate constant
rates = 1/durations

# Daily probability of transitions
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```
daily_prob = 1-np.exp(-rates)
```

```
[18]: P1 = np.array([[0.322580645,0.322580645,0.322580645,0.322580645],  
                    [0.0999,0.3935,0.3935,0.3935],  
                    [np.nan,0.0952,0.1426,0.2835],  
                    [np.nan,np.nan,0.0908,0.1049],  
                    [np.nan,np.nan,np.nan,0.0487],  
                    [np.nan,np.nan,np.nan,0.1609]])
```

```
[19]: k = -1*np.log(1 - P1)
```

```
[23]: implied_duration = 1/k  
      np.round(implied_duration,1)
```

```
[23]: array([[ 2.6,  2.6,  2.6,  2.6],  
            [ 9.5,  2. ,  2. ,  2. ],  
            [ nan, 10. ,  6.5,  3. ],  
            [ nan,  nan, 10.5,  9. ],  
            [ nan,  nan,  nan, 20. ],  
            [ nan,  nan,  nan,  5.7]])
```

```
[ ]:
```