## Parameter estimates and model fit – 10/12/2020

Based on Colorado COVID-19 hospitalization data through 10/12/2020

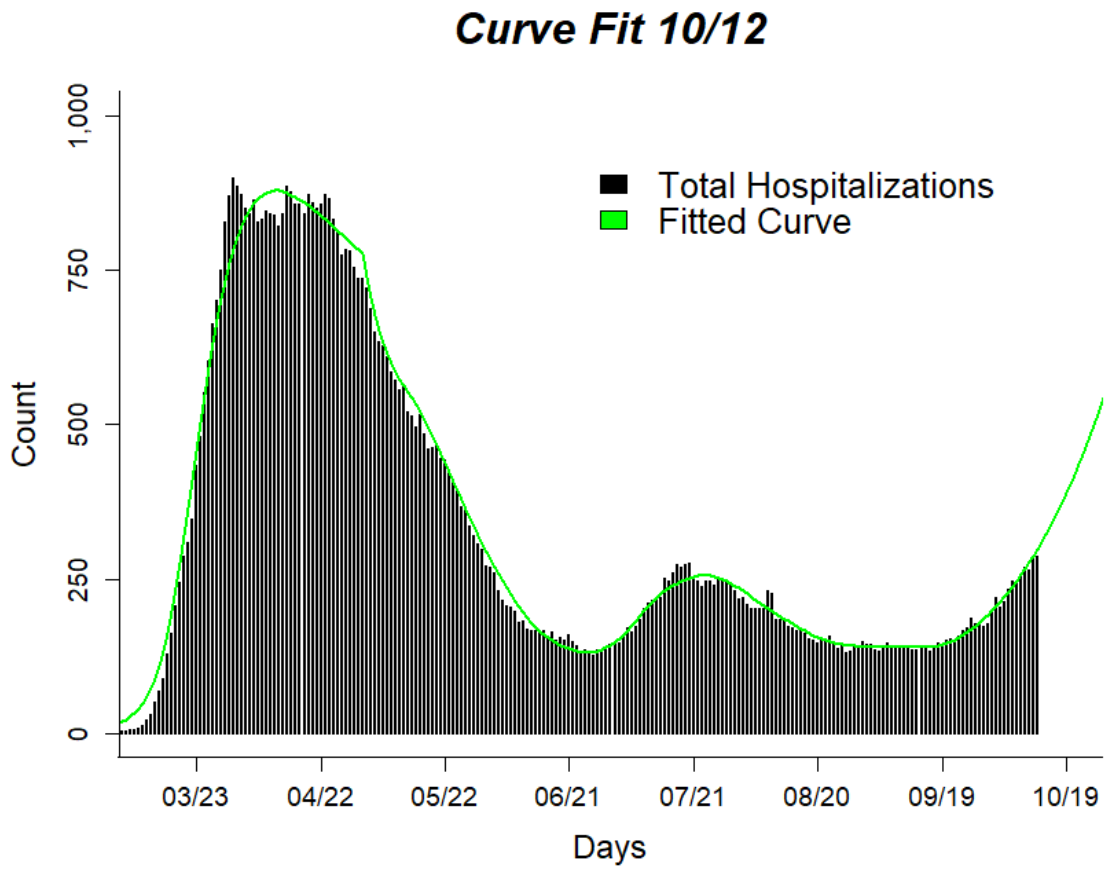


**Figure 1.** Current model fit (green line) to hospitalized COVID-19 cases (black lines) using the age-structured SEIR model. Hospitalized COVID-19 cases are from CDPHE reported COVID-19 hospitalizations and EMResource (EMR) hospital census data provided by CDPHE.

**Table 1.** Current and prior estimates of the effective reproductive number (Re) in Colorado.

| | Current Estimate (10/12) | Estimate one week ago (10/05) | Estimate two weeks ago (09/28) |
|---|---|---|---|
| Estimate of Re, approach 1, TR model* | 1.51 | 1.49 | 1.21 |
| Estimate of Re, approach 2, TR model* | 1.59 | 1.27 | 1.27 |
| Estimate from RT-Live | 1.06 | 1.00 | 1.10 |
| covid-19-projections.com | 1.04 | 1.04 | 1.03 |

*Our estimates are based on hospitalization data through the date listed. Estimates from the external sites are extracted on the day listed. Because of the 13-day lag between infection and hospitalization, on average, our current estimate reflects transmission up to approximately September 29. Approach 1 uses model output to estimate the average number of new cases generated by existing cases, accounting for the latent period and

duration of infectiousness. The second method uses the model structure to estimate the dominant eigenvalue for a matrix describing population flows across the model compartments.

**Table 2.** Estimated model parameters based on fitting our model output of total hospitalizations to reported hospitalizations in Colorado. The new "TR" model includes a single transmission reduction parameter that accounts for all reduction in effective contacts as a result of all policy and behavior changes to reduce transmission.

| | Range of possible values | Fitted value, TR model | Fit using data through |
|---|---|---|---|
| **Transmission Reduction**† | | | |
| Estimated transmission reduction level over past four weeks, 08/31 – 09/29 | 0-99% | 72% | 10/12 |
| Estimated current transmission reduction level, 09/13 – 09/29 | 0-99% | 66% | 10/12 |
| **Transmission parameters** | | | |
| The rate of infection (beta) | 0.2 - 0.6†† | 0.48 | 06/24 |
| Ratio of infectiousness for symptomatic vs. asymptomatic individuals (lambda) | 1.0 - 4.0†† | 1.39 | 06/24 |

†Two-week transmission reduction parameters are estimated weekly and averaged over time period of interest.
††The range of potential parameter values for the rate of infectiousness for symptomatic vs. asymptomatic individuals [1, 2] are based on the literature, and for the rate of infection, were obtained from the MIDAS Online COVID-19 compilation of parameter estimates [3].

# References


1. Li R, Pei S, Chen B, Song Y, Zhang T, Yang W, et al. Substantial undocumented infection facilitates the rapid dissemination of novel coronavirus (SARS-CoV-2). Science. 2020;368(6490):489-93. Epub 2020/03/18. doi: 10.1126/science.abb3221. PubMed PMID: 32179701; PubMed Central PMCID: PMCPMC7164387.

2. Zou L, Ruan F, Huang M, Liang L, Huang H, Hong Z, et al. SARS-CoV-2 Viral Load in Upper Respiratory Specimens of Infected Patients. The New England journal of medicine. 2020;382(12):1177-9. Epub 2020/02/20. doi: 10.1056/NEJMc2001737. PubMed PMID: 32074444; PubMed Central PMCID: PMCPMC7121626.

3. MIDAS. MIDAS Online COVID-19 Portal 2020. Available from: https://github.com/midas-network/COVID-19/tree/master/parameter_estimates/2019_novel_coronavirus.