06 Apr 2021: EpiGrid modeling

- NM daily incidence is rising slowly.
- NM deaths are now slightly below the model.
  - Model does not yet account for vaccination of cohorts with higher death rates.
A look at the raw incidence data

- Sunday, Monday
- Tuesday
- Wednesday/Thursday
- Friday
- Saturday

Cases appear to be rising, currently slowly.

The 190 cases in the Lea county correctional facility are removed from data reported on the March 26th. The 1/3 of reported cases that were > 2 weeks prior were removed from March 24th.
06 April 2021 Model (Mechanistic) – more details and information

- See Figure for historical first-dose vaccinations.
  - Some Federal doses are uniformly distributed around the state, the rest are in McKinley, Cibola, and San Juan Counties. Graph includes only federal uniformly distributed doses.
  - 804,991 first doses have been administered in NM.
- Transmission is based on mobility with modifications due to PHO’s and the red/yellow/green/turquoise (RYGT) framework.
  - Public health orders (PHO) and public behavior similar to previous models.
  - There are no extrapolations to RYGT assignments.
  - Currently modeling turquoise counties as a progressively increasing force-of-infection.
- Daily reported cases in El Paso are possibly increasing, some ambiguity.

- Isolation and quarantine rates are assumed to be stable based on state-reported quarantine times.
  - Base isolation rates mostly modeled as 50% Dec. 8th-22nd, 45% until Jan 10th then are increased to 55%.
- Baseline results reflect novel variants of SARS-CoV-2. The effect may be detectable in the near future.
  - Potential for a 50% increase in contagion/force of infection.
  - Epidemiological evidence does not discount strain replacement in New Mexico.
  - Without vaccination and with the current state of PHO opening, an increased daily incidence would be occurring.
T-80 Mobility – northern counties (Data only)

- Mobility is very similar to pre-covid-19 (Bernalillo, McKinley, Rio Arriba, Santa Fe, Taos) with a few counties being slightly lower (Sandoval, Valencia), one possibly higher (San Juan) and one varying a lot (Los Alamos).

- Weekends not shown
- Monday
- Wednesday/Thursday
- Friday (usually higher)
T-80 Mobility – southern counties and Curry (Data only)

- Mobility is similar to pre covid-19 (Chaves, Curry, Grant, Otero, Roosevelt) with some counties having higher mobility (Dona Ana, Lincoln, Socorro) and some possibly with lower mobility (Eddy, Lea, Luna).

- Weekends NOT shown
- Monday
- Wednesday/Thursday
- Friday (usually higher)
Hospital bed concurrent usage by COVID-19 patients (Statewide)

- Left panel: Linear vs. time (y-scale=0:1200) shows hospital beds.
- Right panel: Log vs. time, same data and models (y-scale = 100:1000, 10x).
- Divergence between 15Dec2020 model, subsequent EMR data, and later EG models reflects the impact of vaccination.
- Long-term change in slope may be due to shifting demographics.
- Our flattening in cases is delayed compared with data by about two weeks.
What is happening in the rest of the U.S.?

The 10 most populous states

**Case are rising:** Florida, Illinois, Michigan, Pennsylvania

** Possibly rising:** California, New York, Ohio

**Case are not rising:** Georgia, North Carolina, Texas
Outlook with Vaccination

- Quarantine currently plays a similar role to vaccination.
- Infection control also appears to be comparable to vaccination.
- Currently modeling 90% vaccine effectiveness.
- Apr 6th model: >804k people vaccinated (1 or 2 doses).
- By-county matching to vaccination.
- NM is currently trading relaxed infection control for vaccination. NM appears just above the “speed limit”
- Variant replacement possibly contributing to the rise.
- Assuming only susceptible people are vaccinated.
- Unchanged quarantine effectiveness assumed in all cases.
- Vaccine hesitancy not account for yet.
Short- & Long-Term Forecast for NM: Cases

So what?
The daily number of cases are expected to range between 81 and 300 in the next few weeks.
Short- & Long-Term Forecast for NM: Deaths

So what?
The daily number of deaths are expected to range between 3 and 7 in the next few weeks.
Growth Rate for NM

So what?
As of April 5th, the average growth rate in NM is at 0.10% (same as last week)
Cumulative Cases & Daily Growth Rate for NM: April 6

Cases (Log Scale)
- 22,026
- 2,981
- 403
- 55

7-day-average daily growth rate (%)
- 0.1
- 0.0
- 0.0

Data Source: JHU https://github.com/CSSEGISandData/COVID-19

*Growth rate is in cumulative cases
### Daily Growth Rate for NM April 6

**Daily Growth Rate for NM April 6**

<table>
<thead>
<tr>
<th>County</th>
<th>Daily Growth Rate</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>San Juan</td>
<td>0.1%</td>
<td>=</td>
</tr>
<tr>
<td>Rio Arriba</td>
<td>0.0%</td>
<td>=</td>
</tr>
<tr>
<td>Sierra</td>
<td>0.0%</td>
<td>=</td>
</tr>
<tr>
<td>McKinley</td>
<td>0.0%</td>
<td>=</td>
</tr>
<tr>
<td>Sandoval</td>
<td>0.2%</td>
<td>=</td>
</tr>
<tr>
<td>Santa Fe</td>
<td>0.1%</td>
<td>=</td>
</tr>
<tr>
<td>Cibola</td>
<td>0.0%</td>
<td>=</td>
</tr>
<tr>
<td>Bernalillo</td>
<td>0.1%</td>
<td>=</td>
</tr>
<tr>
<td>Valencia</td>
<td>0.1%</td>
<td>=</td>
</tr>
<tr>
<td>Torrance</td>
<td>0.2%</td>
<td>=</td>
</tr>
<tr>
<td>Lincoln</td>
<td>0.1%</td>
<td>=</td>
</tr>
<tr>
<td>San Miguel</td>
<td>0.1%</td>
<td>=</td>
</tr>
<tr>
<td>Chaves</td>
<td>0.0%</td>
<td>=</td>
</tr>
<tr>
<td>Dona Ana</td>
<td>0.1%</td>
<td>=</td>
</tr>
<tr>
<td>Otero</td>
<td>0.2%</td>
<td>=</td>
</tr>
<tr>
<td>Lea</td>
<td>0.1%</td>
<td>=</td>
</tr>
<tr>
<td>Eddy</td>
<td>0.0%</td>
<td>=</td>
</tr>
<tr>
<td>Curry</td>
<td>0.0%</td>
<td>=</td>
</tr>
<tr>
<td>Grant</td>
<td>0.2%</td>
<td>=</td>
</tr>
<tr>
<td>Luna</td>
<td>0.1%</td>
<td>=</td>
</tr>
<tr>
<td>Taos</td>
<td>0.1%</td>
<td>=</td>
</tr>
</tbody>
</table>

*arrows indicate more than 0.5% difference in growth rate from last week's analysis; growth rate is in cumulative cases*
So what?

- Most people in New Mexico are living in a county that is medium per-capita case counts with a mixture of decelerating and constant.
- Lea, Otero, Sandoval are accelerating; Bernalillo was classified as accelerating but is more likely constant.

Number of New Mexicans living in regions with particular combinations of per capita case counts and 7-day growth rates:

- Low: <10 cases/100k per week
- Med: 10-99 cases/100k per week
- High: >100 cases/100k per week
Concurrent Hosp & ICU Beds Based on Forecasts – Average Stay of 8 Hosp, 15 Days for ICU/vent & 25% ICU rate

Concurrent COVID-19 ICU beds

<table>
<thead>
<tr>
<th>Week</th>
<th>Qu. 5% (best case)</th>
<th>Qu. 50% (median)</th>
<th>Qu. 95% (worst case)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4/11</td>
<td>23</td>
<td>33</td>
<td>47</td>
</tr>
<tr>
<td>4/18</td>
<td>15</td>
<td>33</td>
<td>57</td>
</tr>
<tr>
<td>4/25</td>
<td>14</td>
<td>34</td>
<td>62</td>
</tr>
<tr>
<td>5/2</td>
<td>11</td>
<td>33</td>
<td>67</td>
</tr>
<tr>
<td>5/9</td>
<td>9</td>
<td>32</td>
<td>76</td>
</tr>
<tr>
<td>5/16</td>
<td>8</td>
<td>31</td>
<td>84</td>
</tr>
</tbody>
</table>

"Scaled" Scenario

So what?

Model is predicting ICU beds to stay the same or decrease over the next 3 weeks.
Concurrent Hosp & ICU Beds Based on Forecasts – Average Stay of 8 Hosp, 15 Days for ICU/vent & 25% ICU rate

Concurrent COVID-19 non-ICU “med-surge” beds

<table>
<thead>
<tr>
<th>Week</th>
<th>Qu. 5% (best case)</th>
<th>Qu. 50% (median)</th>
<th>Qu. 95% (worst case)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4/11</td>
<td>33</td>
<td>54</td>
<td>82</td>
</tr>
<tr>
<td>4/18</td>
<td>27</td>
<td>55</td>
<td>100</td>
</tr>
<tr>
<td>4/25</td>
<td>23</td>
<td>56</td>
<td>100</td>
</tr>
<tr>
<td>5/2</td>
<td>19</td>
<td>54</td>
<td>111</td>
</tr>
<tr>
<td>5/9</td>
<td>14</td>
<td>52</td>
<td>123</td>
</tr>
<tr>
<td>5/16</td>
<td>13</td>
<td>52</td>
<td>143</td>
</tr>
</tbody>
</table>

“Scaled” Scenario

So what?

Med-surge general bed needs are predicted to stay the same over the next 3 weeks.