Short- & Long-Term Forecast for NM: Cases

So what?
The daily number of cases are expected to range between 80 and 444 in the next few weeks.
So what?
The daily number of deaths are expected to range between 6 and 15 in the next few weeks.
Growth Rate for NM

So what?

As of February 16th, the average growth rate in NM is at 0.23% (down from 0.27%)

Los Alamos National Laboratory
Regional Growth Rates, Hospitalization & Shelter Forecasts
Cumulative Cases & Daily Growth Rate for NM: Feb 15

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

7-day-average daily growth rate (%)
- 1.0
- 0.5
- 0.2
- 0.1

*Growth rate is in cumulative cases
### Daily Growth Rate for NM Feb 15

#### County | Daily Growth Rate | Change
--- | --- | ---
San Juan | 0.2% | =
Rio Arriba | 0.3% | =
Sierra | 0.1% | =
McKinley | 0.2% | =
Sandoval | 0.3% | =
Santa Fe | 0.2% | =
Cibola | 0.2% | =
Bernalillo | 0.3% | =
Valencia | 0.2% | =
Torrance | 0.3% | =
Lincoln | 0.3% | =
San Miguel | 0.5% | =
Chaves | 0.3% | =
Dona Ana | 0.3% | =
Otero | 0.6% | =
Lea | 0.1% | =
Eddy | 0.2% | =
Grant | 0.8% | =
Luna | 0.2% | =
Taos | 0.2% | =
Union | 0.0% | =
Hidalgo | 0.2% | =
Guadalupe | 0.0% | =
Catron | 1.0% | ↑

*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 decelerating with high per-capita case counts
• Counties with >500 weekly cases per 100k: None
• Chaves and San Miguel are accelerating; Chaves has the highest per-capita case counts in the state (253/100k/week)

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

Los Alamos National Laboratory
Concurrent Hosp & ICU Beds Based on Forecasts – Average Stay of 8 Hosp, 15 Days for ICU/vent & 25% ICU rate

So what?
We are below ICU bed capacity for concurrent COVID-19 patients. Model is predicting a decrease over the next 3 weeks and then leveling off or potentially an increase again.
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>2/21</td>
<td>113</td>
<td>178</td>
<td>284</td>
</tr>
<tr>
<td>2/28</td>
<td>62</td>
<td>142</td>
<td>277</td>
</tr>
<tr>
<td>3/7</td>
<td>45</td>
<td>127</td>
<td>281</td>
</tr>
<tr>
<td>3/14</td>
<td>42</td>
<td>137</td>
<td>341</td>
</tr>
<tr>
<td>3/21</td>
<td>42</td>
<td>161</td>
<td>395</td>
</tr>
<tr>
<td>3/28</td>
<td>53</td>
<td>178</td>
<td>466</td>
</tr>
</tbody>
</table>

“Scaled” Scenario

So what?

Med-surge general bed needs are predicted to decrease during the next 3 weeks
Regional Hospitalization Forecasts: Central

Concurrent COVID-19 ICUs beds: Central

<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>2/21</td>
<td>27</td>
<td>38</td>
<td>62</td>
</tr>
<tr>
<td>2/28</td>
<td>12</td>
<td>31</td>
<td>67</td>
</tr>
<tr>
<td>3/7</td>
<td>8</td>
<td>30</td>
<td>71</td>
</tr>
<tr>
<td>3/14</td>
<td>7</td>
<td>34</td>
<td>82</td>
</tr>
<tr>
<td>3/21</td>
<td>8</td>
<td>39</td>
<td>91</td>
</tr>
<tr>
<td>3/28</td>
<td>8</td>
<td>41</td>
<td>100</td>
</tr>
</tbody>
</table>

So what?

ICU bed usage is expected to decrease
Regional Hospitalization Forecasts: Southwest

Concurrent COVID-19 ICUs beds: Southwest

<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>2/21</td>
<td>17</td>
<td>23</td>
<td>34</td>
</tr>
<tr>
<td>2/28</td>
<td>9</td>
<td>20</td>
<td>40</td>
</tr>
<tr>
<td>3/7</td>
<td>5</td>
<td>20</td>
<td>44</td>
</tr>
<tr>
<td>3/14</td>
<td>4</td>
<td>23</td>
<td>49</td>
</tr>
<tr>
<td>3/21</td>
<td>5</td>
<td>24</td>
<td>54</td>
</tr>
<tr>
<td>3/28</td>
<td>6</td>
<td>27</td>
<td>63</td>
</tr>
</tbody>
</table>

So what?

ICU bed usage is expected to decline in the Southwest region.
Regional Hospitalization Forecasts: Northwest

Concurrent COVID-19 ICUs beds: Northwest

<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>2/21</td>
<td>4</td>
<td>9</td>
<td>13</td>
</tr>
<tr>
<td>2/28</td>
<td>1</td>
<td>6</td>
<td>13</td>
</tr>
<tr>
<td>3/7</td>
<td>0</td>
<td>4</td>
<td>13</td>
</tr>
<tr>
<td>3/14</td>
<td>0</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>3/21</td>
<td>0</td>
<td>5</td>
<td>19</td>
</tr>
<tr>
<td>3/28</td>
<td>0</td>
<td>6</td>
<td>21</td>
</tr>
</tbody>
</table>

So what?
ICU bed usage is expected to decrease in the Northwest region
Regional Hospitalization Forecasts: Southeast

Concurrent COVID-19 ICUs beds: Southeast

<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>2/21</td>
<td>2</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>2/28</td>
<td>0</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>3/7</td>
<td>0</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>3/14</td>
<td>0</td>
<td>2</td>
<td>11</td>
</tr>
<tr>
<td>3/21</td>
<td>0</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>3/28</td>
<td>0</td>
<td>4</td>
<td>13</td>
</tr>
</tbody>
</table>

So what?

ICU bed usage is expected to be low in the Southeast region.
Regional Hospitalization Forecasts: Northeast

Concurrent COVID-19 ICUs beds: Northeast

<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>2/21</td>
<td>3</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>2/28</td>
<td>0</td>
<td>4</td>
<td>11</td>
</tr>
<tr>
<td>3/07</td>
<td>0</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>3/14</td>
<td>0</td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>3/21</td>
<td>0</td>
<td>5</td>
<td>18</td>
</tr>
<tr>
<td>3/28</td>
<td>0</td>
<td>5</td>
<td>20</td>
</tr>
</tbody>
</table>

So what?

ICU bed usage is expected to be low in the Northeast region.
Non-Congregational Shelter Forecast
Non-Congregate Shelter Forecast

• Our goal is to inform the capacity of shelters for forecasting the need of additional rooms.

• We calculate a ratio between the mean number of daily new cases over the previous two weeks to current occupied rooms.
  – We apply this ratio to the forecast of COVID-19 cases from the LANL COFFEE model to estimate the number of rooms needed.

• We use the spread in the case forecast to report a subsequent spread in the shelter forecast.

• We calculate the number of new rooms needed by applying the ratio of occupied rooms:new cases to the number of cases forecasted in each county.

• NEW AS OF 2/7/21: We added a second forecast method for comparison by averaging the shelter forecast with current shelters in use to smooth the forecast.
Non-Congregate Shelter Forecast: Bernalillo

Number of cases as of 2/14/21: 51,179
Number of shelter rooms available: 221
Total number of patients/medical workers (including specialty): 36
Number of patients: 33
Number of medical workers: 3
Occupied rooms: new cases ratio: 0.26
2-week avg. new cases per day: 140

<table>
<thead>
<tr>
<th>Date</th>
<th>Total Cases (Range)</th>
<th># of Rooms Needed</th>
<th>Deficit (-) or Surplus of Rooms</th>
<th># of Rooms Needed (New Forecast Method)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2/21/21</td>
<td>51,683 (51,361-52,253)</td>
<td>19 (7-40)</td>
<td>202</td>
<td>27</td>
</tr>
<tr>
<td>2/28/21</td>
<td>52,126 (51,496-53,311)</td>
<td>16 (5-39)</td>
<td>205</td>
<td>24</td>
</tr>
<tr>
<td>3/7/21</td>
<td>52,599 (51,617-54,529)</td>
<td>17 (4-45)</td>
<td>204</td>
<td>22</td>
</tr>
</tbody>
</table>

2-week avg. new cases per day decreased from 179 last week to 140 this week.

Last week we forecasted 23 (10-43) rooms in use, 32 rooms with the adjustment; there are 36 actually in use, so we are continuing to slightly under forecast.
Number of cases as of 2/14/21: **9,438**
Number of shelter rooms available: **52**
Total number of patients/medical workers (including specialty): **13**
Number of patients: **13**
Number of medical workers: **0**
Occupied rooms: new cases ratio: **0.59**
2-week avg. new cases per day: **22**

### Forecast Summary

<table>
<thead>
<tr>
<th></th>
<th>2/21/21</th>
<th>2/28/21</th>
<th>3/7/21</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total cases</td>
<td>9,506</td>
<td>9,561</td>
<td>9,617</td>
</tr>
<tr>
<td></td>
<td>(9,454-9,610)</td>
<td>(9,462-9,766)</td>
<td>(9,468-9,938)</td>
</tr>
<tr>
<td># of rooms needed</td>
<td>6 (1-15)</td>
<td>5 (1-13)</td>
<td>5 (1-15)</td>
</tr>
<tr>
<td>Deficit (-) or surplus of rooms</td>
<td>46</td>
<td>47</td>
<td>47</td>
</tr>
<tr>
<td># of rooms needed (new forecast method)</td>
<td>9</td>
<td>8</td>
<td>7</td>
</tr>
</tbody>
</table>

2-week avg. new cases per day decreased from 34 last week to 22 this week

Last week we forecasted 7 (3-13) rooms in use, 9 rooms with the adjustment; there are 13 actually in use, so we are under forecasting.
Non-Congregate Shelter Forecast: McKinley

Number of cases as of 2/14/21: **11,866**
Number of shelter rooms available: **160**
Total number of patients/medical workers (including specialty): **23**
Number of patients: **18**
Number of medical workers: **5**
Occupied rooms:new cases ratio: **0.95**
2-week avg. new cases per day: **24**

<table>
<thead>
<tr>
<th></th>
<th>2/21/21</th>
<th>2/28/21</th>
<th>3/7/21</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total cases</td>
<td>11,931 (11,878-12,047)</td>
<td>11,986 (11,884-12,214)</td>
<td>12,043 (11,891-12,401)</td>
</tr>
<tr>
<td># of rooms needed</td>
<td>9 (2-25)</td>
<td>7 (1-23)</td>
<td>8 (1-25)</td>
</tr>
<tr>
<td>Deficit (-) or surplus of rooms</td>
<td>151</td>
<td>153</td>
<td>152</td>
</tr>
<tr>
<td># of rooms needed (new forecast method)</td>
<td>16</td>
<td>13</td>
<td>12</td>
</tr>
</tbody>
</table>

2-week avg. new cases per day decreased from 36 last week to 24 this week

Last week we forecasted 13 (4-30) rooms in use, 22 rooms with the adjustment; there are 23 actually in use, so the adjustment may be a more accurate forecast
Number of cases as of 2/14/21: **13,326**
Number of shelter rooms available: **21**
Total number of patients/medical workers (including specialty): **1**
Number of patients: **1**
Number of medical workers: **0**
Occupied rooms:new cases ratio: **0.04**
2-week avg. new cases per day: **26**

<table>
<thead>
<tr>
<th></th>
<th>2/21/21 (13,356-13,499)</th>
<th>2/28/21 (13,374-13,647)</th>
<th>3/7/21 (13,388-13,810)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total cases</td>
<td>13,410</td>
<td>13,474</td>
<td>13,537</td>
</tr>
<tr>
<td># of rooms needed</td>
<td>0 (0-1)</td>
<td>0 (0-1)</td>
<td>0 (0-1)</td>
</tr>
<tr>
<td>Deficit (-) or surplus of rooms</td>
<td>21</td>
<td>21</td>
<td>21</td>
</tr>
<tr>
<td># of rooms needed (new forecast method)</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

2-week avg. new cases per day decreased from 41 last week to 26 this week.

Last week we forecasted 1 (0-2) rooms in use, 2 rooms with the adjustment; there is 1 actually in use.
16 Feb 2021: EpiGrid modeling

- A 15-20% increase in transmissibility is assumed for yellow/green counties as compared with red counties up thru Feb. 24th.

- A 30-40% increase in transmissibility is assumed for yellow/green counties starting Feb. 24th. Takes time and confidence for restaurants to open.
16 February 2021 Model (EpiGrid) – more details and information

• Daily reported cases in El Paso are approximately constant.
• See Figure for historical vaccinations. 300,913 people have at least one dose.
• Cumulative vaccinations match by-county. The time sequence increases the same way for each county.
• Transmission is based on mobility with modifications due to PHO's and the red/yellow/green framework.
  • Modeling of public reaction and public health orders (PHO) similar to previous models.
  • Assumes most counties are yellow or green starting Feb. 24th.
• Death rates include some of the inhomogeneity by-county.
  • Counties with larger at-risk populations have higher death rates.
  • Starting to model the expected change in death rate due to vaccination of older population.
• 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 is numerically small at this time.
  • Potential for a 50% increase in contagion/force of infection in the future.
  • No epidemiological evidence yet for strain replacement in New Mexico. Good infection control helps.
  • Without vaccination, an increased daily incidence in March would have been a distinct possibility (with red/yellow/green changes, and increasing mobility in some counties).
  • Properties of novel viral variants are not fully characterized.
T-80 Mobility – northern counties (Data only)

- Bernalillo, Sandoval and Valencia have had increasing mobility over the last 4 weeks.
- San Juan and Santa Fe also appears to be increasing.
- Los Alamos, McKinley, Rio Arriba, Taos have fairly stable mobility similar mobility to the summer of 2020.

- Weekends not shown
- Monday
- Wednesday/Thursday
- Friday (usually higher)

McKinley

Bernalillo
T-80 Mobility – southern counties and Curry (Data only)

- Dona Ana, Chaves, Curry, Grant, Luna, Otero have increased in last two weeks.
- Chaves, Eddy, Lea, Lincoln, Roosevelt, Socorro are stable (to within the noise).

- 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. Models: 09Feb21 (purple), 12Jan21 (yellow), 15Dec20 (cyan).
- Right panel: Log vs. time, same data and models (y-scale = 240:1200, 5x).
- Christmas and New Year’s are 4-5x Thanksgiving modulation of the force of infection/level of contagion.
- Unresolved hospitalized COVID-19 cases dating from Christmas and New Year’s are declining.
Effect of Vaccination on Incidence

- Vaccination is lowering daily incidence >20%.
- Infection control and quarantine currently play larger roles in epidemic control than vaccination.
- Currently modeling 90% vaccine effectiveness.
- Feb 16th Model: ~300k people vaccinated (1 or 2 doses).
- NM reports 300,913 people vaccinated.
- By-county matching to vaccination.
- Flat red curve in March does not account for additional vaccine that may be available.
- Flattening of daily incidence is a consequence of red to green counties and increased mobility.
- Unchanged quarantine effectiveness assumed in all cases.
Situational Awareness:

- Cases in Grant, Hidalgo, Otero and Quay, San Miguel may not be decreasing.
- Cases in Dona Ana, Los Alamos, Rio Arriba, Sandoval, and Valencia are decreasing but still higher than at the start of October. In contrast other counties have incidence similar to early October.
Conclusions and Discussion

• New Mexico’s daily incidence is slowly declining state-wide. Daily incidence could stop declining by March.
• Increased vaccine supply and administration and/or improved effective quarantine rates likely needed to see continued epidemic improvement in the context of great activity/mobility, opening, and contact.
• COVID-19 vaccination reported by the State is responsible for an >20% reduction in daily incidence.
• Infection control and quarantine continue to play larger roles than vaccination in epidemic control.
• Multiple viral variants continue to pose a risk to epidemic control. National and State monitoring for strain emergence is likely improving. Model is assuming about 1:1000 variant cases in late January.
• El Paso’s daily incidence is roughly flat.
• Nationwide geographical dispersion is seeding some local transmission and variants.
• Testing suggests that situational awareness is fair to good.
• Targeting vaccine to high-mortality areas and populations will have the largest immediate effect on this model.
• Discussion:
  – Vaccinating high risk-of-mortality populations will lower the mortality rate and further lower hospital loading.
  – Good infection control in schools appears to be well-correlated with improved outcomes. Improved PPE may be required in response to viral variant emergence. Meal times, busses, and passing periods are likely the riskiest school-related activities.
  – There is not yet clear epidemiological evidence for a more contagious variant of SARS-CoV-2 in New Mexico. This is not a warning system.
  – Qualitatively higher testing rates (i.e. 10x) can substantially offset local epidemics (i.e. South Korea) by facilitating tracing and quarantine. Sequencing can provide diagnostics, and provides variant-level information that is likely to become important in the near future, and is compatible with high testing rates.
  – Elimination of COVID-19 removes or reduces the risk of novel variant emergence.