COVID-19 Task Team
ADHS Projections
ASU Center for Health Information & Research (CHiR)

Draft
Status Update
21 May 2020

Li Liu, MD, Scott Morris, PhD, Anita Murcko, MD, FACP, George Runger, PhD
Model, Monitor, Adjust Strategy

• Data based monitoring (surveillance)
  • Policy, social, behavior major impact to projections
• AHCCCS analysis
• Work with UArizona
• Meaningful groups
  • Subpopulations—ethnicity, age, vulnerability, geography
  • ...
  • Tests, hospital data, social determinants, behavior data, etc.
• Individual, basic and integrated models (AI) for vulnerability
Iceland Data

• Update since May 6, 2020 ...

• Sample tested approximately 350 per day
  • Approx. 4000 tests, 2 + = 0.05%
  • Currently 0 Hospitalized

• Multiply to AZ ≈ 4000 cases, lower estimate
Maricopa County Hospitalizations

- On April 12 hospitalizations
  - Start to long, flat peak in MC with SIP
  - Lag in rural areas

This number is likely to increase as there is a 6 day reporting delay from when specimens were collected.
## Types of AZ Tests

- **Tests:** 46926
  - PCR: 39757
  - IgG: CHECK? 3908
  - IgM: CHECK? 473
  - IgA: CHECK? 372
  - Unspecified: 89
  - Other (flu, other covid test, etc.): 2327

- **Individuals Tested:** 31537
Details of AZ Tests

- Individuals Tested: 31537 (all tests,

<table>
<thead>
<tr>
<th>Insurance</th>
<th>-1</th>
<th>0</th>
<th>1</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>NA</td>
<td>2099</td>
<td>16283</td>
<td>12981</td>
<td>31363</td>
</tr>
<tr>
<td>Private</td>
<td>1</td>
<td>5</td>
<td>44</td>
<td>50</td>
</tr>
<tr>
<td>Public</td>
<td>1</td>
<td>9</td>
<td>96</td>
<td>106</td>
</tr>
<tr>
<td>Self-Pay</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>8</td>
</tr>
</tbody>
</table>
Test by Occupation

- **Preliminary test results by occupation**

<table>
<thead>
<tr>
<th>Occupation</th>
<th>0</th>
<th>1</th>
<th>rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>healthcare workers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>16238</td>
<td>12639</td>
<td>0.437</td>
</tr>
<tr>
<td>Yes</td>
<td>63</td>
<td>496</td>
<td>0.887</td>
</tr>
<tr>
<td>retail workers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>16300</td>
<td>13074</td>
<td>0.445</td>
</tr>
<tr>
<td>Yes</td>
<td>1</td>
<td>61</td>
<td>0.983</td>
</tr>
<tr>
<td>law enforcement officers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>16278</td>
<td>13063</td>
<td>0.445</td>
</tr>
<tr>
<td>Yes</td>
<td>23</td>
<td>72</td>
<td>0.757</td>
</tr>
</tbody>
</table>
## Hospital Stays

<table>
<thead>
<tr>
<th></th>
<th>days in hospital</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min.</td>
<td>1stQu</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

![Bar chart showing frequency of days in hospital](chart.png)

ADHS Task Force CHIR May 2020
Relative Risk

- Preliminary
- Relative Risk of adverse outcomes with comorbidities
Models for Adverse Outcomes: Hospitalizations, ICU, Intubation, Death, Severity Scores

- **Preliminary**
- Example hospitalizations
- Coefficient estimates
  - + increase
  - - decrease
- More comprehensive to follow
Real world vs models

- Human behavior is hard to model
- Different groups behave differently. Thus, have different $R_0$
- How sensitive are models to assumptions about human behavior?
Assuming single apathetic population

$R_0$ is reduced by some proportion as a result of social distancing, etc.
Assuming responsive population

Assumption: a patient completely avoids infection while one of their friends is infected
Assuming multiple responsive populations

Assumption: a patient reduces their risk based on the % of population infected.

e.g., if 5X sensitive, people reduce $R_0$ by 5% for each 1% of population infected
Georgia (early opening)

Leading indicator for AZ, can detect issues in advance
Florida (early opening)

Leading indicator for AZ, can detect issues in advance
COVID-19 Modeling Update

Esma Gel, PhD, Megan Jehn, PhD, Anna Muldoon, MPH, Heather Ross PhD, DNP, ANP-BC, and Tim Lant, PhD, MAS,

May 14, 2020
These projections are not intended to be predictions or quantitative guesses about what will actually happen in the mid-range (weeks-to-months) or long-term (months-to-years). They are intended to show the relative effects of changes in transmission, social distancing, weather sensitivity, current burden of disease, and other epidemiological factors. As more testing, tracing, and isolation come online and policies change, the estimates will change.
Time Distributions for New Exposures

- The delay from new exposures to peak hospitalization is approximately 2 weeks.
- It may require a month to resolve an infection and estimates include tail cases up to 2 months of hospitalization.
Detected Reduction in $\beta$ (Backcast Exposure)

Presumed Exposures for 4X Scenario with fitted $\beta$
COVID-19 Healthcare Demand Projections: Arizona

Esma Gel, Megan Jehn, Timothy Lant, Anna Muldoon, Trisalyn Nelson, Heather M Ross

doi: https://doi.org/10.1101/2020.05.13.20099838

This article is a preprint and has not been peer-reviewed [what does this mean?]. It reports new medical research that has yet to be evaluated and so should not be used to guide clinical practice.

COVID-19 SARS-CoV-2 preprints from medRxiv and bioRxiv