Using a Dashboard to Improve Tracking of Coccidioidomycosis (CM) in Urgent Care Patients, Maricopa County Arizona.

John N Galgiani,
Anqi Lang, Jie Pu, Irene Ruberto, Jennifer Collins,
Lia Koski, Thomas Williamson, and Brandon Howard

University of Arizona College of Medicine-Tucson
Banner Health Systems
Arizona Department of Health Services
Maricopa County Department of Public Health
How often is community acquired pneumonia (CAP) due to CM?

Small Arizona prospective studies:
- n=55, 29% (16%-44%)*
- n=35, 17% (7%-34%)**

Rates vary at different times of the year:***

*Valdivia 2006; **Kim 2009  ***Hugenholtz 1957; Kerrick 1985
The Problem: Lack of Testing

Arizona CAP patients tested for coccidioidomycosis (CM)

- Medical Clinics (2003-4): * 2%-13%
- Emergency Departments (2014): ** 2.8%
- Urgent Care Clinics (2019): *** 7.9%

Southern California outpatient CAP (2011): ¥ 6.0%

Failure to diagnose CM has consequences§

- Overuse of antibacterial drugs
- Additional diagnostic tests and procedures
- Otherwise unnecessary hospitalization

*Chang 2008; **Khan 2018; ***Pu 2023; ¥Tartof 2018 § Donovan 2019; Pu 2021
Systems Solution to improve CM testing

2015: UArizona physicians affiliated with Banner Health.
2018: Banner established a clinical practice for recognition and management of CM in ambulatory patients.
2020: Banner Urgent Care Services (BUCS) identified as infrequently testing CAP patients for CM. Starting in 2020, clinicians were reminded to do this when first hired and at quarterly medical updates.
Valley Fever Protocol for BUCS 2023

- Order Cocci Serologies – (Coccidioides Screen with flex to CF Titer when indicated (RL) CPT 1061)
- Verify PCP follow-up*

- Cocci serologies results positive/indeterminant when results reviewed by Provider
  - Contact Patient to review results
  - Add VF diagnosis to patient’s *chronic* medical history
  - Verify PCP follow-up*
  - Do not start antifungal treatment in UC

*If Patient doesn’t have a Primary Care Provider, use the Referral AMB order to request PCP follow up through BMG.
Periodic Reminders began in 2020

Pu et al. 2023

CAP per 1,000 BUCS patients

% CAP tested for CM

Pu et al. 2023
Systems Solution to improve CM testing

2015: UArizona physicians affiliated with Banner Health.
2018: Banner established a clinical practice for recognition and management of CM in ambulatory patients.
2020: Banner Urgent Care Services (BUCS) identified as infrequently testing CAP patients for CM (7.9%). Starting in 2020, clinicians were reminded to do this when first hired and at quarterly medical updates.
2023: To improve further, a CM dashboard was constructed, and this is the basis for the current presentation.
Methods

Setting: BUCS in Maricopa County, Arizona
BUCS has 56 clinics, 144-236 clinicians (NPs=50%; PAs=35%; MD/DOs=15%)
45 clinics are in Maricopa County.

Patients
All patient clinic visits, 2018-2023, with subset analyses for patients with CAP
(ICD10=J18.*) or erythema nodosum (EN, L52).

Data from a Microsoft Power BI dashboard, repopulated daily
Frequencies of patient visits, occurrence of CAP or EN, CM testing, and results.
Monthly counts of confirmed CM cases reported to Maricopa County Department of Public Health.
Testing rates and results

All BUCS patients

Red graph is test Rate per 1,000
Blue bars are % of CM tests Pos.

---

**BUCS Cocci Tracker**

<table>
<thead>
<tr>
<th>MEASURE_YEAR</th>
<th>LOCATION</th>
<th>LOCATION</th>
<th>J18Flag</th>
<th>L52Flag</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>2023</td>
<td>Multiple selections</td>
<td>All</td>
<td>All</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>2018 Only</th>
<th>L52 Only</th>
<th>Neither</th>
<th>Total</th>
<th>2019 Both</th>
<th>J18 Only</th>
<th>L52 Only</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>1864</td>
<td>15</td>
<td>238722</td>
<td>239785</td>
<td>1</td>
<td>2193</td>
<td>26</td>
</tr>
<tr>
<td>2019</td>
<td>22</td>
<td>2</td>
<td>191</td>
<td>203</td>
<td>1</td>
<td>51</td>
<td>12</td>
</tr>
<tr>
<td>2020</td>
<td>22</td>
<td>2</td>
<td>192</td>
<td>204</td>
<td>1</td>
<td>51</td>
<td>12</td>
</tr>
<tr>
<td>2021</td>
<td>7</td>
<td>1</td>
<td>17</td>
<td>20</td>
<td>1</td>
<td>13</td>
<td>6</td>
</tr>
<tr>
<td>2022</td>
<td>11.66</td>
<td>17.65</td>
<td>0.80</td>
<td>0.85</td>
<td>22.73</td>
<td>315.79</td>
<td></td>
</tr>
<tr>
<td>2023</td>
<td>31.82%</td>
<td>50.00%</td>
<td>8.85%</td>
<td>9.80%</td>
<td>25.49%</td>
<td>50.00%</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1886</td>
<td>17</td>
<td>239813</td>
<td>239900</td>
<td>1</td>
<td>244</td>
<td>38</td>
</tr>
</tbody>
</table>

- **Test and Positivity Rate Over Time**

- **Positivity Rate**: 9.80% (2018), 15.87% (2019), 17.17% (2020), 13.06% (2021), 10.85% (2022), 11.57% (2023)

- **Test Rate/1000**: 0.85, 0.99, 2.43, 2.73, 2.67, 3.57

- **Location**
  - BUCCS 67TH & BETHANY HOME
  - BUCCS ALMA SCHOOL & QUEEN CREEK
  - BUCCS ARIZONA & ELLIOT
  - BUCCS BELL & 32ND
  - BUCCS BELL & 43RD
  - BUCCS BELL & REEMS
  - BUCCS CACTUS & 75TH
  - BUCCS CAMELBK & 44TH ST
  - BUCCS CAMELBK & 7TH ST
  - BUCCS CAVE CREEK & 7TH ST
  - BUCCS CENTRAL & WASHINGTON
  - BUCCS CHANDLER & 42ND
  - BUCCS COLLEGE & BOARDWALK
  - BUCCS CRISMON & SOUTHERN
  - BUCCS DEER VALLEY & 83RD

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>Total Patients</th>
<th>Not Tested Patients</th>
<th>Tested Patients (Ordered)</th>
<th>Tested Patients (Resulted)</th>
<th>Tested Patients</th>
<th>Positive Patient</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUCCS 67TH &amp; BETHANY HOME</td>
<td>27135</td>
<td>27120</td>
<td>21</td>
<td>21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BUCCS ALMA SCHOOL &amp; QUEEN CREEK</td>
<td>38032</td>
<td>37929</td>
<td>155</td>
<td>141</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BUCCS ARIZONA &amp; ELLIOT</td>
<td>22566</td>
<td>22519</td>
<td>66</td>
<td>66</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BUCCS BELL &amp; 32ND</td>
<td>43667</td>
<td>43622</td>
<td>82</td>
<td>73</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BUCCS BELL &amp; 43RD</td>
<td>47008</td>
<td>46999</td>
<td>60</td>
<td>57</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BUCCS BELL &amp; REEMS</td>
<td>60339</td>
<td>60181</td>
<td>294</td>
<td>283</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BUCCS CACTUS &amp; 75TH</td>
<td>25694</td>
<td>25621</td>
<td>73</td>
<td>72</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BUCCS CAMELBK &amp; 44TH ST</td>
<td>4128</td>
<td>4079</td>
<td>49</td>
<td>46</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BUCCS CAMELBK &amp; 7TH ST</td>
<td>41584</td>
<td>41528</td>
<td>85</td>
<td>81</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BUCCS CAVE CREEK &amp; 7TH ST</td>
<td>16567</td>
<td>16553</td>
<td>19</td>
<td>19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BUCCS CENTRAL &amp; WASHINGTON</td>
<td>23675</td>
<td>23645</td>
<td>38</td>
<td>36</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BUCCS CHANDLER &amp; 42ND</td>
<td>17491</td>
<td>17330</td>
<td>96</td>
<td>90</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BUCCS COLLEGE &amp; BOARDWALK</td>
<td>9929</td>
<td>9929</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BUCCS CRISMON &amp; SOUTHERN</td>
<td>60860</td>
<td>60593</td>
<td>521</td>
<td>497</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BUCCS DEER VALLEY &amp; 83RD</td>
<td>34684</td>
<td>34647</td>
<td>73</td>
<td>72</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Total** 125399 | 125204 | 4924 | 4636 | 60

***The denominator of positivity rate is patients with test resulted.***
Testing rates and results

CAP only

Percent Positive

30%

0%
Testing rates and results

EN only

60% Positive
0%
Testing rates and results

No EN
No CAP
>50% of all CM

Percent Positive

15% 0%

---

BUCS Cocci Tracker

<table>
<thead>
<tr>
<th>MEASURE_YEAR</th>
<th>LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>2023</td>
</tr>
<tr>
<td></td>
<td>Multiple selections</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>2021</th>
<th>2022</th>
<th>2023</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Neither</td>
<td>Total</td>
<td>Neither</td>
</tr>
<tr>
<td>Not Tested Patients</td>
<td>413135</td>
<td>324503</td>
<td>374503</td>
</tr>
<tr>
<td>Tested Patients (Ordered)</td>
<td>883</td>
<td>696</td>
<td>1225</td>
</tr>
<tr>
<td>Tested Patients (Resulted)</td>
<td>885</td>
<td>686</td>
<td>990</td>
</tr>
<tr>
<td>Positive Patients</td>
<td>100</td>
<td>67</td>
<td>98</td>
</tr>
<tr>
<td>Test Rate/1000</td>
<td>2.13</td>
<td>2.13</td>
<td>4.33</td>
</tr>
<tr>
<td>Positivity Rate</td>
<td>11.30%</td>
<td>6.77%</td>
<td>9.90%</td>
</tr>
</tbody>
</table>

Total Patient | 414018 | 325190 | 325199 | 282050 | 282950 | 1240306 |

Test and Positivity Rate Over Time

- Positivity Rate
- Test Rate/1000

---

***The denominator of positivity rate is patients with test result.***
Maricopa Co. Compared to BUCS
Coefficient Of Correlation
r=0.86

Black columns: Maricopa
White columns: BUCS
30-day moving average

CAP
All Causes

Lines are Tests For CM

r = 0.54, p < 0.001

r = 0.52, p < 0.001

r = 0.55, p < 0.001

r = 0.52, p < 0.001
30-day moving average

Non-CM CAP
CM CAP

Lines are % Of CAP Due to CM
• Reminders to test CAP for CM improves testing practices.
• A CM dashboard may produce additional improvement.
• Since 2020, BUCS and Maricopa Co. monthly case counts are strongly correlated.
• As recommended, BUCS testing for CM follows CAP frequencies.
• % CAP due to CM ranges from <5% to >45%, and the timing of peak frequencies differ from year to year.
• E. nodosum in endemic areas should be tested routinely for CM.
• Over half of CM patients in BUCS had neither CAP nor E. nodosum.
• Example of private medicine assisting in public health surveillance.
Thank you

spherule@arizona.edu