Prevalence of Methicillin Resistant Staph Aureus Over Time in Resident Physicians

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Overview

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Background – Introduction to MRSA

- Methicillin-resistant *Staphylococcus aureus* (MRSA)\(^1, 2\)
  - Opportunistic bacteria found on skin
  - Antibiotic resistant – CDC “serious threat”\(^3\)
- MRSA ➔ staph infections\(^1, 2\)
  - Skin infections
  - Pneumonia
  - Bacteremia
  - Surgical site infections
  - Sepsis
  - Endocarditis
  - Death

Carr JH. MRSA Bacteria Photo 1. In: CDC Public Health Image Library [database]. 1998. This image is in the public domain and free of copyright restrictions.
Background – Epidemiology of MRSA

- ~5% of patients in U.S. hospitals carry MRSA in their nose or on their skin\(^1\)
  - 2% prevalence outside of care settings\(^2\)
  - 70,000 severe infections and 9,000 deaths per year\(^5\)
  - No significant decline in bloodstream infections from 2013-2016\(^2\)
  - Severe infections mostly during or after inpatient care\(^3\)
Background – Prevention of Healthcare Associated MRSA Infections

- In health care settings, MRSA is primarily spread by direct contact with colonized providers\(^2\)
  - Asymptomatic colonized people
  - Infected wounds
  - Contaminated hands
- CDC recommendation: contact precautions\(^4\), \(^5\)
  - Handwashing & disinfecting
  - Procedure-specific precautions
- No recommended protocol for testing & treating providers
  - Residents as model of health care workers

Smith K. Fifth of eleven steps of handwashing. In: CDC Public Health Image Library [database]. 2004. This image is in the public domain and free of copyright restrictions.
Study Questions

• **Primary:** Will the occurrence of MRSA colonization in residents increase as they progress through their first post-graduate year of training?
  – Increased hospital exposure

• **Secondary:** Will the current standard for MRSA care, mupirocin 2% ointment twice a day for 5 days, eliminate MRSA colonization in resident physicians?
  – Potential use as hospital protocol

• Conducted across three HCA Healthcare hospital sites
Materials & Methods (PGY-1)

- **PGY-1 Protocol**
  - Enrollment & 1st test: Orientation
    - Informed consent
    - Demographics: antibiotics, hospitalizations/surgeries, allergies
    - Nasal swab
  - Week of treatment & re-test (+)
    - Treatment diary
  - 3 follow-up visits (all)

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**Nasal Swab Protocol**
- Insert swab into patient’s nostril up to 2.5 cm from the edge of the nares. Roll the swab 5 times along the mucosa inside the nostrils.
- Insert the same swab into the second nostril and repeat sampling as in the previous step.
- Return swab to its container and send to the laboratory within 24 hrs.
Materials & Methods (PGY-2-5)

- **PGY-2-5 Protocol**
  - Enrollment & swab at didactics
  - No repeat visits except for treatment

- Nasal swab to lab w/in 48 hrs for PCR
  - Alternate sites → GSMC

- Results to head of research w/in 24 hrs
  - Recorded in VDI & site binders
## Results: PGY-1 Visit 1 PCR Results

<table>
<thead>
<tr>
<th>Site</th>
<th># Tested</th>
<th># Positive</th>
<th># Negative</th>
<th>Colonization Prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>44</td>
<td>1</td>
<td>43</td>
<td>2.27</td>
</tr>
<tr>
<td>2</td>
<td>17</td>
<td>0</td>
<td>17</td>
<td>0.00</td>
</tr>
<tr>
<td>3</td>
<td>20</td>
<td>1</td>
<td>19</td>
<td>5.00</td>
</tr>
<tr>
<td>Total</td>
<td>81</td>
<td>2</td>
<td>79</td>
<td>2.47</td>
</tr>
</tbody>
</table>

Prevalence of MRSA in Resident Physicians
## Results: PCR Results after 1st Treatment

<table>
<thead>
<tr>
<th>PGY-1 PCR Results</th>
<th>PGY-2-5 PCR Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 1 PGY-1 (+) subject at Site 1 was negative after one round of treatment (7/10/19)</td>
<td>• Still in collection process as of 7/23/19</td>
</tr>
<tr>
<td>• 1 PGY-1 (+) subject at Site 3 was positive after one round of treatment (7/13/19)</td>
<td></td>
</tr>
<tr>
<td>– Other not yet tested</td>
<td></td>
</tr>
</tbody>
</table>

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## Results: PGY-2-5 Visit 1 PCR Results

<table>
<thead>
<tr>
<th>Site</th>
<th># Tested</th>
<th># Positive</th>
<th># Negative</th>
<th>Colonization Prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>24</td>
<td>1</td>
<td>23</td>
<td>4.17%</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>0.00%</td>
</tr>
<tr>
<td>3</td>
<td>24</td>
<td>1</td>
<td>23</td>
<td>4.17%</td>
</tr>
<tr>
<td>Total</td>
<td>51</td>
<td>2</td>
<td>49</td>
<td>3.92%</td>
</tr>
</tbody>
</table>
Discussion

- **PGY-1**: Similar to prevalence in general population (2.47% vs. 2%)
  - Potential influence of previous clinical experiences
- **PGY-2-5**: Have a higher prevalence as of 7/23/19
  - Not yet approaching hospital patient prevalence (3.92% vs. 5%)
  - Yet to determine if due to lower number of participants (n = 81 vs. n = 51)
  - Continuing to collect data for PGY-2-5s, particularly from Sites 2 & 3
- After mupirocin treatment, one person tested negative and one positive
  - Need to review treatment diary (self-report)
  - Potential influence of continued patient interaction
- If funding permits, would like to extend study to medical students
This project was funded by the Research Eureka Accelerator Program (REAP) grant from the Edward Via College of Osteopathic Medicine.
Questions?
References


6. Preliminary data reported from Grand Strand Medical Center laboratory. Data was obtained from a variety of sources, including inpatient and outpatient settings. Of the 6,513 nasal cultures tested, 683 (10.5%) were positive for MRSA.