The 4th Asia-Pacific Regional Conference on Service-Learning

“Service-Learning as a Bridge from Local to Global: Connected World, Connected Future”
Dr. Napoleon M. Pagsinohin
PHILIPPINES
Prevalence of Community - Acquired Methicillin Resistant *Staphylococcus aureus* (CA-MRSA) Nasal Carriage among Geriatric Residents in a Suburban Community in Antipolo, Rizal
Course: Medical Technology
Third Year Level
Bacteriology 102
Staphyloccous aureus

Objective: Identify, characterize and differentiate Staphylococcus aureus from other bacteria
Class Activity:
1. Obtain samples from community residents.
2. Identify *Staphylococcus aureus* from the samples.
3. Differentiate and characterize *S. aureus* from other bacteria.
Prevalence of Community - Acquired Methicillin Resistant *Staphylococcus aureus* (CA-MRSA) Nasal Carriage among Geriatric Residents in a Suburban Community in Antipolo, Rizal
MRSA

Methicillin Resistant Staphylococcus aureus

Gram (+) cocci

Catalase (+)

Coagulase (+)

mecA gene

RESISTANT to majority of antibiotics

SUPERBUG!
MRSA

- Methicillin Resistant *Staphylococcus aureus*
- Gram (+) cocci
- Catalase (+)
- Coagulase (+)
- meca gene
- RESISTANT to majority of antibiotics
- SUPERBUG!
EMERGENCE OF MRSA

- Introduction of Methicillin in 1959
- Resistance to Methicillin reported within a year after its introduction in United Kingdom
- 1st report of MRSA infections among healthy individuals emerged in 1990’s
  + Prescription not taken correctly
  + Antibiotics for viral infections
  + Antibiotics sold without medical supervision
  + Spread of resistant microbes in hospitals due to lack of hygiene
WHY ARE MRSA IMPORTANT?

1. It is more pathogenic.
   + more virulence factors
2. Limited treatment options
3. Easily transmitted
4. More expensive treatment
5. Fatal if not treated properly.
TYPES OF MRSA

- Hospital Acquired – MRSA
  - Patients with exposure to healthcare (e.g., Hospital admission)
  - Underwent surgical procedure
  - Common in newborns, immunocompromised, nursing homes

- Community Acquired – MRSA
  - Athletes and grade school children
  - Elderly individuals
  - Serious skin infections and pneumonia
SIGNS AND SYMPTOMS

- Carriers are usually *asymptomatic*
- Flu-like symptoms
- Pimples or boils
MRSA

- Resistance is not limited to Methicillin
- Resistant also to Oxacillin, Cloxacillin, Dicloxacillin, Nafcillin
- Resistant to Cephalosporins
- Now with strains resistant to Vancomycin
MRSA IN THE ELDERLY

- Poor functional status
- Weakened immune system
- Greater chance of being exposed to infected persons
- Had used more antibiotics than younger individuals
NASAL CARRIAGE

- . . . . Of *Staphylococcus aureus*
  + Normal commensal of humans
  + 28% of the general population (USA)

- . . . . Of *MRSA*
  + 50-70% in dialysis patients (HA-MRSA)
  + 43% elderly (HA-MRSA)
  + 1.5% of the general population (USA)
  + Philippines - HA-MRSA ?????
  + Philippines – CA-MRSA ?????
  + Philippines – CA-MRSA in elderly ????
With weaker immune system and greater probability of multiple antibiotic therapy in the past, elderly patients are prone to carry MRSA, hence, it is hypothesized that MRSA is prevalent in this group of population.
OBJECTIVES

General:
- To determine the prevalence of MRSA nasal carriage among geriatric residents of Pagrai, Antipolo City.

Specifics:
- To isolate *Staphylococcus aureus* specimens from samples obtained from the subjects.
- To test the sensitivity of the *Staphylococcus aureus* isolates to 10 antibiotics, specifically to Cefoxitin, through antibiograms using the disk diffusion method according to the guidelines of the Clinical Laboratory Standards Institute.
PLACE OF STUDY

PAGRAI/HILLS SUBDIVISION

PROJECT OF HON. GOY. CASIMIRO A. YNARES III MD.

Subdivided into 5 Units
Suburban Community
East of Metro Manila
General Population: 12,000
Elderly Population: ~600 (official list 390)
SUBJECTS:

- 60 elderly (>60 years old) were randomly selected from the Barangay’s List of Senior Citizens
- Stratified Random Sampling
INCLUSION AND EXCLUSION CRITERIA

**INCLUSION**
- Elderly individuals on official list of the Community
- Living in PAGRAI for the last year

**EXCLUSION**
- History of hospitalization within 1 year
- History of medical procedure within 1 year
- Antibiotic therapy within 2 weeks prior to study
Table 1: Demographic Data of Subjects Enrolled in the Study

<table>
<thead>
<tr>
<th>CHARACTERISTIC</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender:</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>11</td>
</tr>
<tr>
<td>Female</td>
<td>49</td>
</tr>
<tr>
<td>Age:</td>
<td></td>
</tr>
<tr>
<td>Young Old (60-74)</td>
<td>45</td>
</tr>
<tr>
<td>Aged (75-84)</td>
<td>11</td>
</tr>
<tr>
<td>Oldest Old (&gt; 85)</td>
<td>4</td>
</tr>
<tr>
<td>Age Range</td>
<td>60-99</td>
</tr>
<tr>
<td>Mean Age:</td>
<td>70.54</td>
</tr>
<tr>
<td>Median:</td>
<td>69</td>
</tr>
<tr>
<td>Mode:</td>
<td>65</td>
</tr>
</tbody>
</table>
A swab from both anterior nares was obtained from each subject. Swabs were carefully inserted into each nostril so that the tip is entirely at the nasal osteum level (about 2.5cm from the edge of the nare) and gently rolled 5 times.
METHODOLOGY

Specimen Collection
(Nasal swab)

Culture of Isolates (NB)

Selective Media (MSA)

Enriched Media (BAP)

1. Colony Morphology
2. Gram’s Stain
3. Slide Catalase test
4. Tube coagulase test

1st

2nd

Enriched Media (BAP)

Antibiogram preparation
(Determination of MRSA)
Swabs were placed on Nutrient Broth.

Incubated for 24 hours at 35°C.

Samples were then cultured in Mannitol Salt Agar (MSA).

Inoculated MSA plates incubated at 35ºC for 72 hours.

Mannitol fermenting colonies examined by Gram stain.

Subculture was made using again MSA.

Samples were then cultivated in an Enrichment Media – Blood Agar Plate (BAP), and were incubated at 35°C for 24 hours.

Identification of Staphylococcus aureus was done using distinct colony characteristics, catalase and coagulase tests.
A suspension equivalent to MacFarland 0.5 was prepared from each strain. Positive samples for *Staphylococcus aureus* were then subjected to Kirby-Bauer Test using Mueller-Hinton Agar (MHA) with Ampicillin, Oxacillin, Gentamycin, Chloramphenicol, Clindamycin, Penicillin, Cefoxitin, Ofloxacin, Vancomycin and Trimetophrim-Sulfamethoxazole antibiotic discs.

Zone of Inhibition was measured in millimeter following the Clinical Laboratory Standardized Institute Guidelines. MRSA was identified as antibiogram with less than 14mm zone of inhibition to Cefoxitin.
RESULTS AND DISCUSSION

- Screening of 60 geriatric residents identified 47 donors (78%) whose nasal vestibules were colonized with *Staphylococcus sp.*

- 35 (58%) were consistent with *Staphylococcus aureus* using colony morphology characteristics, gram stain, catalase and coagulase tests as parameters.

- Only those samples positive in all parameters were labeled as *Staphylococcus aureus*. 
Organisms Identified From Nasal Swabs of Elderly Residents in a Suburban Community in Antipolo, Rizal

- Staphylococcus aureus: 58%
- Other Organisms: 22%
- Staphylococcus non-aureus: 20%
NASAL CARRIAGE OF *Staphylococcus aureus*

- Higher nasal carriage of *Staphylococcus aureus* 58.3% (35 of the 60 subjects) as compared to general population carriage of 37.2%.

- No available data of its carriage in the elderly

- As an individual ages, less aerobic organisms are expected to inhabit the anterior nares, hence, lower than the general population’s carriage was expected.

- But why was the result *higher????*
NASAL CARRIAGE OF *Staphylococcus aureus*

Factors:

- Immune status
- Functional ability
- Comorbidities
  - Diabetes Mellitus
  - Liver Disease
  - Cerebro-vascular accident
  - Skin disease
### TABLE 2: PREVALENCE OF *Staphylococcus aureus* NASAL CARRIAGE IN DIFFERENT AGE GROUPS IN ELDERLY

<table>
<thead>
<tr>
<th>Age Group</th>
<th>No. of Samples</th>
<th>No. of S. aureus Carriers</th>
<th>Percentage of Carriers</th>
</tr>
</thead>
<tbody>
<tr>
<td>60-74</td>
<td>45</td>
<td>25</td>
<td>56%</td>
</tr>
<tr>
<td>75-85</td>
<td>11</td>
<td>7</td>
<td>63%</td>
</tr>
<tr>
<td>&gt;85</td>
<td>4</td>
<td>3</td>
<td>75%</td>
</tr>
</tbody>
</table>

Result of this study is comparable to the nasal carriage of Immunocompromised persons (dialysis patients).

– Saxena et al, 2003
Antibiotic Sensitivity of Elderly Residents in a Suburban Community in Antipolo, Rizal

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>Sensitive</th>
<th>Intermediate</th>
<th>Resistant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Penicillin</td>
<td>4</td>
<td>0</td>
<td>31</td>
</tr>
<tr>
<td>Ampicillin</td>
<td>4</td>
<td>0</td>
<td>31</td>
</tr>
<tr>
<td>TMP-SMX</td>
<td>25</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>Clindamycin</td>
<td>23</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Oxacillin</td>
<td>28</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Cefoxitin</td>
<td>30</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Ofloxacin</td>
<td>34</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Gentamycin</td>
<td>35</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Prevalence of MRSA in a Suburban Community in Antipolo, Rizal

Staphylococcus aureus 86%
MRSA

Resistant 8%
Intermediate 6%
All MRSA carriers are female

All MRSA carriers are “young old” - (60-74 age group)
PREVALENCE OF CA-MRSA

+ 5% of all the subjects
  ✗ Higher than US data (1.5%)

+ 8% of S. aureus carrier
  ✗ Higher than US data (5%)

+ No co-resistance between Cefoxitin and Vancomycin was observed.
CONCLUSION

There is higher prevalence of *Staphyloccocus aureus* and MRSA carriage in the elderly as compared to the general population.
Post Script:

The 3 elderly residents identified to be carriers of CA-MRSA were provided with medical evaluation, counselled about the pathogenicity of CA-MRSA, and advised regular medical check-up.
The students:

had learned about *Staphylococcus*, its characteristics, and its pathogenicity

had learned about the role of microorganisms in the community

had acquired the skills required for the subject matter
AFTER THE STUDY:

The community:

had established the existence of MRSA in the community

had learned about MRSA and its possible effects to their health

became more aware of the deleterious effects of MRSA infection

had learned about the importance of proper hygiene and taking antibiotics as prescribed by the physicians
IMPORTANCE OF THE STUDY:

This study provided mutual benefits between the students and the community. Likewise, the result of this study is deemed useful as reference for surveillance and future implementation of programs concerning MRSA in the country.
Thank you very much!
Prevalence of Community - Acquired Methicillin Resistant Staphylococcus aureus (CA-MRSA) Nasal Carriage among Geriatric Residents in a Suburban Community in Antipolo, Rizal