EQuIP for LTC webinar
“Bugs and Drugs”
4/26/17 10:00 AM
Bugs and Drugs in Nursing Homes

Ryan Ruiz
Antibiotic Resistance Lab
Washington State Dept of Health

Justin Jellison, PharmD
ID Pharmacist Specialist
St Joseph Medical Center
Enrollment in EQuIP

- Formal participation encouraged (not mandatory)
- Requires signed enrollment form by facility leadership & contact info for facility attendees
- Annual facility self-assessment
- Opportunity to participate in small group collaborative and QI projects
  - Work together
  - Share outcome data
  - Community of support
- Establish ASP & be recognized on DOH Honor Roll for Stewardship

http://www.doh.wa.gov/YouandYourFamily/IllnessandDisease/HealthcareAssociatedInfections/EQuIP/LTC
JumpStart Stewardship
Implementing Antibiotic Stewardship in Nursing Homes

http://www.doh.wa.gov/YouandYourFamily/IllnessandDisease/HealthcareAssociatedInfections/EQuIP/LTC
Leadership Commitment Poster

- Customize for your facility
- Post in prominent location
- Include in admission packet

Your nursing home photo and logo here!
Bacteriology and Antimicrobial Resistance

Ryan S. Ruiz, MS, MLS (ASCP)cm
Washington State Department of Health Antibiotic Resistance Lab Network
Clinical Microbiology

- Bacteriology
- Common Infections
- Resistance Mechanisms
- Interpretation of Antimicrobial Resistance Testing
The gram stain is a method to divide bacteria into either gram positive or gram negative organisms.

A series of dyes and chemicals produces a blue/purple or pink/red color under a microscope.
Clinical Decisions

- The gram stain is an excellent tool to understand what may be going on.
- Empiric therapy is often dictated by this method. (Explained by next speaker)
- Part of a larger clinical picture.
Urinary tract infections are commonly associated with use of urinary catheter.
NHSN approximates 75% are hospital acquired infections.
Typical organisms: *Escherichia coli*, *Staphylococcus sp.* including *aureus*. 

![E. coli](image1)

![Staph spp.](image2)
Often, the site of infection may lead to clues as to the type of organism seen.

- Skin or superficial: Gram Positives (depending on location)
- Deeper tissue (sterile sites): sometimes gram positive (rods)
- Respiratory: Mixture of Gram Positive, Negative, and Yeast
Resistance to antibiotics

- Typically four ways bacteria combat drugs:
  - i. pump it out
Resistance to antibiotics

- Typically four ways bacteria combat drugs:
  - i. pump it out
  - ii. Keep it out
Resistance to antibiotics

- Typically four ways bacteria combat drugs:
  - i. pump it out
  - ii. Keep it out
  - iii. Change on themselves where the drug would target
Resistance to antibiotics

- Typically four ways bacteria combat drugs:
  - IV. DESTROY THE DRUG!!!
Antimicrobial Susceptibility Testing

- A way for laboratories to determine what drugs will work for what bugs.

Kirby Bauer  
E test  
Microbroth Dilution
Antimicrobial Susceptibility Testing

KB is qualitative

E Test and MB are quantitative

Note: Always confer with physician and/or pharmacist for treatment options!!
Real–World Application of the Antibiogram

Justin Jellison, PharmD
Infectious Disease Pharmacist Specialist
St. Joseph Medical Center, Tacoma, WA
I have an antibiogram, now what?

- Interpreting the antibiogram
- Guide empiric antimicrobial selection
  - Pneumonia (PNA)
  - Urinary Track Infection (UTI)
  - Skin, soft tissue (SSTI)
- Detect and track trends in antimicrobial resistance
# Interpreting the Antibiogram

## 2015 Summary St. Joseph Medical Center

### Percent Susceptible

<table>
<thead>
<tr>
<th>Gram Positive Isolates</th>
<th># of isolates</th>
<th>Amp/Sulb</th>
<th>Ampicillin</th>
<th>Cefazolin</th>
<th>Ceftazidime</th>
<th>Cefepime</th>
<th>Ciprofloxacin</th>
<th>Levofoxacin</th>
<th>Gentamicin</th>
<th>Tobramycin</th>
<th>Nitrofurantoin</th>
<th>Meropenem</th>
<th>Pip/Tazo/Bactam</th>
<th>Trimeth/Sulf</th>
<th>Clindamycin</th>
<th>Erythromycin</th>
<th>Oxacillin</th>
<th>Penicillin</th>
<th>Rifampin</th>
<th>Tetracycline</th>
<th>Vancomycin</th>
<th>Beta-lactamase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staphylococcus aureus</td>
<td>779</td>
<td></td>
<td></td>
<td>50</td>
<td>50</td>
<td>99</td>
<td>94</td>
<td>71</td>
<td>40</td>
<td>48</td>
<td>0</td>
<td>99</td>
<td>91</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Staphylococcus not aureus</td>
<td>154</td>
<td></td>
<td></td>
<td>44</td>
<td>46</td>
<td>87</td>
<td>56</td>
<td>61</td>
<td>47</td>
<td>41</td>
<td>1</td>
<td>98</td>
<td>83</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enterococcus species</td>
<td>184</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>92</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strep pneumoniae, invasive</td>
<td>12</td>
<td></td>
<td></td>
<td>100</td>
<td>100</td>
<td></td>
<td>85</td>
<td>90</td>
<td>90</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strep pneumoniae, non-invasive</td>
<td>17</td>
<td></td>
<td></td>
<td>100</td>
<td>100</td>
<td></td>
<td>100</td>
<td>90</td>
<td>100</td>
<td>90</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gram Negative Isolates</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acinetobacter baumannii</td>
<td>20</td>
<td>0</td>
<td>0</td>
<td>40</td>
<td>0</td>
<td>0</td>
<td>65</td>
<td>55</td>
<td>60</td>
<td>75</td>
<td>80</td>
<td>0</td>
<td>NA</td>
<td>NA</td>
<td>70</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Citrobacter freundii</td>
<td>22</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>86</td>
<td>86</td>
<td>95</td>
<td>95</td>
<td>95</td>
<td>95</td>
<td>95</td>
<td>86</td>
<td>91</td>
<td>91</td>
<td>86</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enterobacter aerogenes</td>
<td>37</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>76</td>
<td>76</td>
<td>100</td>
<td>86</td>
<td>86</td>
<td>100</td>
<td>100</td>
<td>46</td>
<td>100</td>
<td>76</td>
<td>95</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enterobacter cloacae</td>
<td>76</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>72</td>
<td>76</td>
<td>92</td>
<td>89</td>
<td>89</td>
<td>96</td>
<td>93</td>
<td>32</td>
<td>93</td>
<td>75</td>
<td>93</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Escherichia coli</td>
<td>1,283</td>
<td>57</td>
<td>48</td>
<td>83</td>
<td>89</td>
<td>89</td>
<td>90</td>
<td>72</td>
<td>72</td>
<td>90</td>
<td>91</td>
<td>95</td>
<td>100</td>
<td>95</td>
<td>71</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Haemophilus influenzae</td>
<td>41</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>75</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Klebsiella pneumoniae</td>
<td>231</td>
<td>84</td>
<td>0</td>
<td>92</td>
<td>92</td>
<td>92</td>
<td>64</td>
<td>69</td>
<td>86</td>
<td>89</td>
<td>0</td>
<td>100</td>
<td>96</td>
<td>89</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Klebsiella oxytoca</td>
<td>45</td>
<td>56</td>
<td>0</td>
<td>67</td>
<td>89</td>
<td>89</td>
<td>91</td>
<td>91</td>
<td>96</td>
<td>96</td>
<td>81</td>
<td>90</td>
<td>91</td>
<td>87</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moraxella catarrhalis</td>
<td>101</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proteus mirabilis</td>
<td>104</td>
<td>81</td>
<td>60</td>
<td>89</td>
<td>92</td>
<td>92</td>
<td>64</td>
<td>69</td>
<td>86</td>
<td>89</td>
<td>0</td>
<td>100</td>
<td>100</td>
<td>57</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pseudomonas aeruginosa</td>
<td>201</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Serratia marcescens</td>
<td>31</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>100</td>
<td>100</td>
<td>97</td>
<td>97</td>
<td>100</td>
<td>97</td>
<td>0</td>
<td>94</td>
<td>97</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Guide Empiric Antimicrobial Selection

- Site–specific recommendations
  - Order sets, guidelines, algorithms

- Educate!
Guide Empiric Antimicrobial Selection

- Start with national recommendations
  - IDSA

- Know typical bugs for the suspected infection
  - Pneumonia (PNA): *Pseudomonas, Staph, Klebsiella, E.coli*
  - UTI: *E.coli, Klebsiella, Proteus*
  - SSTI: *Strep, Staph*
# Let’s Look at an Example: PNA

## Pneumonia Treatment Algorithm

### 1. Assess HCAP Criteria
- Hospitalized for >48hrs in past 90 days
- Resident of SNF or extended care facility
- Received HD in past 30 days
- IV antibiotics or chemotherapy in past 30 days
- Home wound care
- Exposure to family member with MDR pathogen

### 2. Assess Pseudomonas/MDRO Risk Factors
- ≥7 days of continuous antibiotics in past 90 days
- Poor functional status (significant debilitation with incontinence and inability to perform ADLs)
- Hospitalized for >48hrs in past 90 days
- Immunosuppression (ANC < 1000, congenital immunodeficiency, asplenia, HIV, hematologic malignancies, prednisone equivalent > 10 mg/day for 2+ weeks)
- Bronchiectasis/Structural lung disease

### 3. Choose Appropriate Category

#### CAP with 0-1 MDRO risk factors
- **ICU/PCU**
  - Doxycycline 100 mg PO BID PLUS Ceftriaxone 1 gm (2 gm for BMI ≥ 30) IV daily
  - Azithromycin 500 mg IV daily PLUS Ceftriaxone 1 gm (2 gm for BMI ≥ 30) IV daily
  - Levofoxacin 750 mg PO/IV daily
  - Add Vancomycin per pharmacy for MRSA risk*
  - Aspiration**: See Addendum

#### HCAP with 0-1 MDRO risk factors
- **MED/Tele**
  - Ceftriaxone 2gm IV daily PLUS Levofoxacin 750mg IV Daily
  - Add Vancomycin per pharmacy for MRSA risk*
  - Aspiration**: See Addendum

#### CAP or HCAP with 2+ MDRO risk factors
- **ICU/PCU**
  - Cefepime 1 gm IV q8hrs (2 gm for ICU/PCU or BMI ≥ 30) OR Pip/tazo 4.5 gm x1, then 3.375 gm IV q8hrs extended infusion
  - PLUS PLUS Vancomycin per pharmacy
  - Aspiration**: See Addendum

#### NON-severe
- Pharmacy will adjust antibiotics for renal function
- Contact pharmacist for recommendations in PCN/cephalosporin allergies
- Meropenem is reserved for h/o ESBL or broad spectrum antibiotic failure

**Scroll down to see aspiration addendum

---

*MRSA Risk: ≥ 48hr hospital stay in past 90 days, inhaled tobacco use, IV drug abuse, ≥7 days duration of antibiotics in past 90 days, SNF stay within last 90 days, prior MRSA in any culture, ICU admit in past 90 days

Updated by Justin Jellison, PharmD; Approved by ASP Committee
## Let’s Look at an Example: PNA

<table>
<thead>
<tr>
<th>Gram Positive Isolates</th>
<th># of isolates</th>
<th>Amp/Sulb</th>
<th>Ampicillin</th>
<th>Cefazolin</th>
<th>Ceftriaxone</th>
<th>Cefepime</th>
<th>Ciprofloxacin</th>
<th>Levofloxacin</th>
<th>Gentamicin</th>
<th>Tobramycin</th>
<th>Nitrofurantoin</th>
<th>Meropenem</th>
<th>Pip/Tazobactam</th>
<th>Trimeth/Sulf</th>
<th>Clindamycin</th>
<th>Erythromycin</th>
<th>Oxacillin</th>
<th>Penicillin</th>
<th>Rifampin</th>
<th>Tetracycline</th>
<th>Vancomycin</th>
<th>Beta-Lactamase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staphylococcus aureus</td>
<td>779</td>
<td>50</td>
<td>50</td>
<td>99</td>
<td>94</td>
<td>71</td>
<td>40</td>
<td>48</td>
<td>0</td>
<td>99</td>
<td>91</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Staphylococcus not aureus</td>
<td>154</td>
<td>44</td>
<td>46</td>
<td>87</td>
<td>56</td>
<td>61</td>
<td>47</td>
<td>41</td>
<td>1</td>
<td>98</td>
<td>83</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enterococcus species</td>
<td>184</td>
<td>88</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strep pneumoniae, invasive</td>
<td>12</td>
<td>100</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strep pneumoniae, non-invasive</td>
<td>17</td>
<td>100</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Gram Negative Isolates

| Acinetobacter baumannii                         | 20           | 0        | 0           | 0          | 40          | 0        | 65            | 55          | 60         | 75         | 80          | 0        | NA            | NA          | 70         |            |          |            |          |              |           |               |
| Citrobacter freundii                            | 22           | 0        | 0           | 0          | 86          | 86        | 95            | 95          | 95         | 91         | 95          | 86        | 100           |             | 91         | 86          |          |            |          |              |           |               |
| Enterobacter aerogenes                          | 37           | 0        | 0           | 0          | 76          | 76        | 100           | 86          | 88         | 100        | 100         | 46        | 100           |             | 76         | 95          |          |            |          |              |           |               |
| Enterobacter cloacae                            | 76           | 0        | 0           | 0          | 72          | 76        | 92            | 89          | 89         | 96         | 93          | 32        | 93            |             | 75         | 93          |          |            |          |              |           |               |
| Escherichia coli                               | 1,283        | 57       | 48          | 83         | 89          | 89        | 90            | 72          | 72         | 90         | 91          | 95        | 100           |             | 95         | 71          |          |            |          |              |           |               |
| Haemophilus influenzae                          | 41           |          |             |            |             |          |               |             |            |            |             |           | 75            |          |            |             |          |            |          |              |           |               |
| Klebsiella pneumoniae                           | 231          | 84       | 0           | 92         | 94          | 93        | 95            | 88          | 89         | 97         | 94          | 40        | 100           |             | 96         | 89          |          |            |          |              |           |               |
| Klebsiella oxytoca                              | 45           | 56       | 0           | 67         | 89          | 87        | 89            | 91          | 91         | 96         | 96          | 81        | 100           |             | 91         | 87          |          |            |          |              |           |               |
| Moraxella catarrhalis                           | 101          |          |             |            |             |          |               |             |            |            |             |           | 0             |          |            |             |          |            |          |              |           |               |
| Proteus mirabilis                               | 104          | 81       | 60           | 89         | 92          | 92        | 69            | 69          | 86        | 89         | 0          | 100         | 100          | 57         |            |             |          |            |          |              |           |               |
| Pseudomonas aeruginosa                          | 201          |          |             |            |             |          | 87            | 91          | 56         | 83         | 90          | 87         | 90            | 90          |            |             |          |            |          |              |           |               |
| Serratia marcescens                             | 31           | 0        | 0           | 100        | 100        | 100       | 97            | 97          | 100        | 97         | 0           | 94         | 97            | 100         |            |             |          |            |          |              |           |               |
Guide Empiric Antimicrobial Selection

- Review new data/antibiogram annually
- As needed: alter recommendations as indicated by antibiogram
- Get out and educate!
Track and Detect Trends in Antimicrobial Resistance

- Annual antibiogram is a snapshot:

![Table showing percent susceptible for Escherichia coli with specific antibiotic resistances.]
Susceptibility trends over time can indicate overuse of certain antibiotics.
Track and Detect Trends in Antimicrobial Resistance

Expand timeline back to reveal true trends
Track and Detect Trends in Antimicrobial Resistance

Track and report your success too!

Pseudomonas Percent Susceptible Trend at SJMC

![Graph showing trends in Pseudomonas percent susceptible over years.](image)
Upcoming EQuIP for LTC Webinars

- 5/24/17—Rita Olans, DNP, “Staff nurse’s role in stewardship”
- 6/28/17—Dr. Joseph Boero, “Empowering nurses to support stewardship”
- 7/26/17—Dr. Amit Desai, "Clinical pearls to reduce antibiotic overuse in nursing homes"
- 8/23/17—Dr. Gwinwa Dumyati, “Stewardship to reduce CDI in nursing homes”
- 9/27/17—Dr. Chris Crnich “Antibiotic Stewardship in Nursing Homes: What are the Low Hanging Fruit?”
Before next EQuIP webinar on April 26

- Share the webinar registration link with your colleagues
- Consider formally enrolling in EQuIP for LTC
- Please send suggestions or requested topics to marisa.dangeli@DOH.wa.gov
Q & A

marisa.dangeli@DOH.wa.gov
206-418-5595