Make your Data Work for You!

ASP Dashboard Development

Kathryn K. Davis, PharmD, BCPS

Catholic Medical Center
Summary
Jan-June 2016

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th># Orders (2016)</th>
<th>Actual Duration Range (Days)</th>
<th>Actual Duration Average (Days)</th>
<th>Days on Therapy (mDOT)</th>
<th>Days on therapy/1000 Pharmacy adjusted patient days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acyclovir IV PBL</td>
<td>23</td>
<td>1 to 7</td>
<td>2</td>
<td>46</td>
<td>0.85</td>
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<tr>
<td>Amikacin</td>
<td>0</td>
<td>n/a</td>
<td>n/a</td>
<td>0</td>
<td>0</td>
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<td>Amphotericin liposomal IV PBL</td>
<td>0</td>
<td>n/a</td>
<td>n/a</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Ampicillin IV PBL</td>
<td>51</td>
<td>1 to 7</td>
<td>3.5</td>
<td>192</td>
<td>4.12</td>
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<td>Ampicillin/Subactam IV PBL</td>
<td>191</td>
<td>1 to 46</td>
<td>2.7</td>
<td>521</td>
<td>5.62</td>
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<td>Azithromycin IV PBL</td>
<td>182</td>
<td>1 to 8</td>
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<td>410</td>
<td>7.57</td>
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<td>Aztreonam - IV PBL</td>
<td>78</td>
<td>1 to 10</td>
<td>3.0</td>
<td>241</td>
<td>4.45</td>
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<td>Ceftazolin IV</td>
<td>1170</td>
<td>1 to 45</td>
<td>1.8</td>
<td>2159</td>
<td>39.88</td>
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<tr>
<td>Cefotaxin IV</td>
<td>64</td>
<td>1 to 2</td>
<td>1.0</td>
<td>65</td>
<td>1.2</td>
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<tr>
<td>Ceftriaxone IV PBL</td>
<td>48</td>
<td>1 to 10</td>
<td>3.5</td>
<td>169</td>
<td>3.12</td>
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<tr>
<td>Ciprofloxacin - IV PBL</td>
<td>271</td>
<td>1 to 14</td>
<td>2.5</td>
<td>699</td>
<td>12.91</td>
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<tr>
<td>Clindamycin IV PBL</td>
<td>130</td>
<td>1 to 10</td>
<td>2.5</td>
<td>326</td>
<td>6.02</td>
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<tr>
<td>Daftomycin IV PBL</td>
<td>109</td>
<td>1 to 42</td>
<td>3.0</td>
<td>331</td>
<td>6.11</td>
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<td>Doxycycline IV PBL</td>
<td>31</td>
<td>1 to 7</td>
<td>1.9</td>
<td>61</td>
<td>1.13</td>
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<td>Ertapenem IV PBL</td>
<td>313</td>
<td>1 to 15</td>
<td>2.5</td>
<td>804</td>
<td>14.95</td>
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<td>Erythromycin IV PBL</td>
<td>1</td>
<td>1 to 2</td>
<td>2.0</td>
<td>2</td>
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<td>Fluconazole IV PBL</td>
<td>43</td>
<td>1 to 14</td>
<td>3.4</td>
<td>135</td>
<td>2.49</td>
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<tr>
<td>Ganciclovir IV PBL</td>
<td>2</td>
<td>1 to 2</td>
<td>1.5</td>
<td>3</td>
<td>0.06</td>
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<tr>
<td>Gentamicin IV PBL</td>
<td>168</td>
<td>1 to 19</td>
<td>2.0</td>
<td>340</td>
<td>6.28</td>
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<td>Impenem-clastatin IV PBL</td>
<td>1</td>
<td>1</td>
<td>1.0</td>
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<td>0.02</td>
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<td>Levofloxacin IV PBL</td>
<td>525</td>
<td>1 to 11</td>
<td>2.6</td>
<td>1407</td>
<td>25.99</td>
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<td>Linezolid IV PBL</td>
<td>5</td>
<td>1 to 3</td>
<td>3.4</td>
<td>17</td>
<td>0.31</td>
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<td>Meropenem IV PBL</td>
<td>24</td>
<td>1 to 39</td>
<td>4.7</td>
<td>115</td>
<td>2.12</td>
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<td>Meropenem IV PBL</td>
<td>220</td>
<td>1 to 14</td>
<td>3.4</td>
<td>761</td>
<td>14.06</td>
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<tr>
<td>Miconafin IV PBL</td>
<td>11</td>
<td>1 to 15</td>
<td>5.1</td>
<td>57</td>
<td>1.05</td>
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<td>Nalidix IV PBL</td>
<td>34</td>
<td>1 to 21</td>
<td>6.0</td>
<td>205</td>
<td>3.79</td>
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<tr>
<td>Penicillin IV PBL</td>
<td>167</td>
<td>1 to 3</td>
<td>1.1</td>
<td>184</td>
<td>3.4</td>
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<tr>
<td>Penamidone IV PBL</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Piperaclit/azobactam IV PBL</td>
<td>1198</td>
<td>1 to 29</td>
<td>2.7</td>
<td>3282</td>
<td>60.62</td>
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<tr>
<td>Ritapin IV PBL</td>
<td>4</td>
<td>1 to 2</td>
<td>1.25</td>
<td>5</td>
<td>0.09</td>
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<tr>
<td>Sulfamethoxazole/Trimethoprim IV PBL</td>
<td>7</td>
<td>1 to 16</td>
<td>5.1</td>
<td>36</td>
<td>0.66</td>
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<tr>
<td>Tobramycin IV PBL</td>
<td>3</td>
<td>2 to 4</td>
<td>2.6</td>
<td>8</td>
<td>0.15</td>
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<tr>
<td>Vancomycin IV PBL</td>
<td>2540</td>
<td>1 to 29</td>
<td>1.6</td>
<td>4069</td>
<td>75.16</td>
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<tr>
<td>Vancomycin IV PBL (by patient)</td>
<td>1298</td>
<td>7 to 45</td>
<td>2.85</td>
<td>3597</td>
<td>66.33</td>
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<tr>
<td>Vancomycin IV PBL</td>
<td>8</td>
<td>1 to 10</td>
<td>2.6</td>
<td>23</td>
<td>0.42</td>
</tr>
</tbody>
</table>
Information Systems to the Rescue!

Antibiotics Stewardship Dashboard

Timeline Selection

Ordered Discipline Selection

- Select all
- Anesthesiology
- Cardiology
- Cardiothoracic Surgery
- Critical Care
- Dental Med/Oral Surgery
- Gastroenterology
- General Surgery
- Hematology/Oncology
- Hospital Medicine
- Hospital Neurology
- Infectious Diseases
- Nephrology
- Neurology
- Neurosurgery
- OB/GYN
- Oral/Maxillofacial Surgery
- Orthopaedic Surgery
- Other
- Pharmacy
- Plastic Surgery
- Podiatry
- Rheumatology
- Urology

Antibiotics Days by Class

- Cephalosporins
- Penicillins
- Glycopeptide Antibiotics
- Quinolones
- Macrolide Derivatives
- Antiviral Agents
- Antifungals
- Tetracyclines
- Carbapenems
- Beta-Lactamase Inhibitors
- Miscellaneous

Antibiotics Days by Indication

- Wound infection
- Sepsis
- Bacteremia
- Cellulitis
- Endocarditis
- GI
- Mental
- Osteomyelitis
- Other
- Pneumonia
- Pneumonia Comp.

Antibiotics Days by Drug

- Vancomycin IVPB
- Piperacillin/Tazobactam IVPB
- CeFAZolin IV PUSH
- CefTRIAxone IV PUSH
- Vancomycin
- Azithromycin
- MetroNIDAZOLE IVPB
- LevoFLOXacin
- DAPTomyacin IVPB
- Ciprofloxacin
- LevoFLOXacin IVPB

Antibiotics Days Through Time by Class

- Aminoglycosides
- Antifungals
- Antimalarials
- Antituberculars
- Antiviral agents
- Carbapenems
- Cephalosporins

Number of Antibiotics Orders: 39993
Number of Antibiotics Days: 109724
Antibiotics Doses: 188790

ASP Dashboard created using Microsoft Power BI (Business Intelligence)
Improved ASP Reporting and Analysis

- Visualize trends
  - Begin to understand the underlying cause
- Identify opportunities for intervention
- Determine effectiveness of interventions
- Mechanism for provider feedback
Visualize Trends

- Oral vancomycin utilization is trending up
  - Drill down to begin to understand the underlying cause
  - Go back to spreadsheet to review orders, indication
- Task Force gathered to reduce CDI infection
Identify Opportunities for Intervention

Antibiotics Stewardship Dashboard

Number of Antibiotics Orders: 1343
Number of Antibiotics Days: 3887
Antibiotics Doses: 7566

Timeline Selection:
1/1/2018 | 12/31/2018

Antibiotics Days by Indication

- Sepsis
- Bacteremia
- Cellulitis
- Endocarditis
- Epiud... (rest of the list not fully visible)

Antibiotics Days by Drug

- Piperacillin/Tazobactam IVPB: 1163
- Vancomycin IVPB: 1026
- CefTRIAXone IV PUSH: 346
- CefAZolin IV PUSH: 258
- Aztreonam - IV Push: 124
- Ertapenem IV Push: 124
- Meropenem IV PUSH: 123
- DAPT/Amorcin IVPB: 85
- Ampicillin IVPB: 70
- MetroNIDAZOLE IVPB: 47
- Ampicillin/Subactam IVPB: 43

Do we have any work to do here?

- Select by indication to review antimicrobial use for a particular disease state
Identify Opportunities for Intervention

Antibiotics Stewardship Dashboard

Number of Antibiotics Orders: 4938
Number of Antibiotics Days: 8555
Antibiotics Doses: 12751

Timeline Selection
1/1/2018 - 3/6/2019

Antibiotics Days by Indication

- Sepsis
- Pre-op pr...
- Post-op...
- Pneumonia...
- Other
- Cellulitis
- Cellulitis
- Bacteremia
- GI
- GI
- MenL...
- Osteo...

Antibiotics Days by Drug

- Vancomycin IVPB: 8555
- Piperacillin/Tazobactam IVPB: 7937
- CefAZolin IV PUSH: 6057
- CefTRIAXone IV PUSH: 8013
- Vancomycin: 2183
- Azithromycin: 1916
- Ertopenem IV Push: 1789
- DAPT0mycin IVPB: 1389
- Ciprofloxacin: 1341
- LevoFLOXacin: 1257
- MetroNIDAZOLE IVPB: 1177

Select by medication to evaluate indications for use
Determine Effectiveness of Interventions

- Monitor success/failure of ASPs FQ interventions
- Medical staff education
  - Risks associated with FQ and therapeutic alternatives
- Fluoroquinolone use decreased by 30% (2017 Q1 to 2018 Q4)
Mechanism for Provider Feedback
Mechanism for Provider Feedback

We can do better!
Contact Information

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Amoxicillin challenge without penicillin skin testing in evaluation of penicillin allergy in a cohort of Marine recruits

Mark H. Tucker, MD; Chad M. Lomas, MD; Nanda Ramchandar, MD; and Jeremy D. Waldram, MD

Clinical implications

- Most patients reporting penicillin allergy are not truly penicillin allergic. Excluding penicillin allergy in these individuals has significant benefits. Oral amoxicillin challenge is a safe way to evaluate low-risk individuals with a history of penicillin allergy.

Editorial

Moving Toward Optimizing Testing for Penicillin Allergy

Werner Aberer, MD, and Eric Macy, MD, MS

Graz, Austria; and San Diego, Calif

2213-2198
Penicillin Allergy Testing and Antibiotic Stewardship

- 51,582 unique pcn “allergic” hospitalized individuals matched to 2 unique subjects each.
- PCN allergic cases averaged a 10% longer LOS compared to well matched cohort patients (matched for discharge diagnosis, sex, age, date of admission)
- PCN “allergic” patients were treated with significantly more FQ, clindamycin, and vancomycin (p<0.0001) compared to controls.
- pcn “allergic” cases had 23.4% more C. difficile infections, 14% more MRSA, and 30.1% more VRE than controls.
- Conteras M L. Allergy and Clinical Immunol 2014;133:790-6
Penicillin Allergy Testing Protocol

- Assess likely hood of penicillin allergy (review algorithm)

- Define treatment plan:

  A. Give PCN full dose
  B. Amoxicillin challenge.
  C. Skin test with Pre-Pen, if negative give amoxicillin challenge.
  D. Call specialist or desensitization following published protocol.
  E. Avoid B lactam antibiotics.

- Discuss treatment plan with provider.

Amoxicillin challenge procedure:

Patient must not be taking beta antagonists (beta -blockers) or H1 antagonists (antihistamines) for 24 hours prior to challenge.

Existing IV access optional depending on allergy history.

Administer amoxicillin 250mg po X1 observe patient every 15 minutes for 1 hour. If the patient reports no adverse events, the patient may receive a penicillin product. RN to document patient response. Pharmacy will remove penicillin from the allergy profile. A note regarding the test will be made in the EMR.
Allergy Assessment Tool

Reported PCN Allergy

Assess Nature of Allergy

- Onset within minutes to hours of administration:
  - Anaphylaxis
  - Urticaria
  - Further Assess:
    - How long ago?
    - What specific agent?
    - Tolerates other β-lactams
  - > 12 months ago
  - Give Amoxicillin challenge
  - < 12 months ago
  - Skin Test with pre-pen, if negative result, give amoxicillin challenge

- Intolerance:
  - GI Upset
  - Headache
  - Okay to attempt β-lactam

- Onset after > 48 hours:
  - Maculopapular Rash
  - Okay to attempt therapy with alternate β-lactam

- Onset after > 48 hours:
  - SJS, TEN
  - Serum Sickness, Hemolytic Anemia, AIH
  - Strictly avoid Skin Test or Challenge
PENICILLIN DESENSITIZATION PROTOCOL

Prior to beginning desensitization
- Verify that the patient record reflects knowledge of risks/benefits of the procedure. If there is no documentation contact pharmacy.
- Patients should be evaluated before each sequential dose of antibiotic is administered.
- Monitor and record vital signs every 15 minutes.
- Provide adequate intravenous (IV) access. Optimize the patients' hemodynamic status and avoid use of beta-blockers. The patient should not have received a beta-blocker within 12 hours of the procedure.
- Ensure that epinephrine, IV diphenhydramine, and methylprednisolone are available. Equipment and drugs for tracheal intubation should be readily accessible.
- Obtain informed consent from the patient or appropriate surrogate decision maker.
- Do not premedicate the patient with antihistamines or steroids.

Preparation of dilutions:
After the specific antibiotic (e.g. ceftriaxone 1 gram) is decided upon and the desired final dose is calculated, serial 10-fold dilutions of that dose in 50 mL or normal saline should be made:

<table>
<thead>
<tr>
<th>Dilution #</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1 x 10-6 concentration of the final dose in 50 mL normal saline</td>
</tr>
<tr>
<td>2</td>
<td>1 x 10-6 concentration of the final dose in 50 mL normal saline</td>
</tr>
<tr>
<td>3</td>
<td>1 x 10-4 concentration of the final dose in 50 mL normal saline</td>
</tr>
<tr>
<td>4</td>
<td>1 x 10-3 concentration of the final dose in 50 mL normal saline</td>
</tr>
<tr>
<td>5</td>
<td>1 x 10-2 concentration of the final dose in 50 mL normal saline</td>
</tr>
<tr>
<td>6</td>
<td>1 x 10-1 concentration of the final dose in 50 mL normal saline</td>
</tr>
<tr>
<td>7</td>
<td>Full strength final dose</td>
</tr>
</tbody>
</table>

Administration of dilutions
- 50 mL of each dilution, starting with Dilution #1, should be administered intravenously over 20 minutes.
- Following the completion of each dose, the patient should be observed for 15 minutes.
- If no reaction has occurred, the next dose can be given in the same manner.

Adverse reactions:
If the patient exhibits signs of anaphylaxis administer epinephrine 0.5 mg IM (0.5 mL of the 1:1,000 dilution), preferably in the anterior or lateral thigh; can repeat every 3 to 5 minutes as needed. Initiate emergency response, call provider.
PCN Allergy Testing Results in Less Healthcare Utilization

308 cases matched to 1251 controls

3.6 year F/U

9% fewer outpatient visits / year

13% fewer ED visits

$2 million of utilization saved over 3.6 years

Macy E. JACI in Practice 2017; 5: 705-10
Penicillin- Associated Anaphylaxis Epidemiology

6,144,422 unique individuals with at least one healthcare encounter over 8yr period. 37,387,312 patient years.
All potential cases audited for actual anaphylaxis.

22 cases (1 in 207,191 or 0.00048%) of anaphylaxis associated with PO PCN.

13 females
16 amoxicillin related
4 amox/clav
2 dicloxacillin related

3 cases (1 in 95,298 or 0.00105%) of anaphylaxis associated with a parenteral penicillin.

1 female
1 amp/sulbactam, 2 pip/tazo

IV exposure more likely to result in anaphylaxis (p < 0.001)

Macy and coworkers  Manuscript in preparation
Risk Stratification for PCN Testing

• Low risk Hx
  • Nonallergic symptoms (GI), solely with a Hx of family members with PCN allergy. Pruritis with out rash, unknown Hx > 10 years ago.
    • Amoxicillin challenge

• Moderate risk Hx
  • Urticaria or other pruritic rashes with features of IgE-mediated reaction
    • PCN skin test, followed by amoxicillin challenge (95-100% negative predictive value)

• High risk Hx
  • Anaphylaxis, positive PCN skin test, recurrent PCN reaction, documented hypersensitivity to multiple β-lactams.
    • Evaluated by specialist or desensitized
Penicillin Allergy Testing and Antibiotic Stewardship
Associated Amoxicillin Risk

• The risk of causing death with an oral amoxicillin exposure is extremely rare. One death in 100,000,000 amoxicillin courses in Great Britain over 35 years. Most oral.

• Seven additional amoxicillin-associated deaths with parenteral or unknown routes of exposure.

• Oral 3gm amoxicillin single dose prophylaxis, 0 fatal reactions per million. 22.62 non-fatal reactions / million.

• Oral 600mg clindamycin single dose prophylaxis, 13 fatal reactions per million, 149 non-fatal reactions / million (most C. diff.).

Thornhil MH. JAC 2015: 70; 2382-88
Lee P. JAC 2007: 60; 1172-9
Who Needs Penicillin Allergy Testing?

Key Messages

- All individuals with an unconfirmed penicillin allergy should have their penicillin allergy evaluated and, if appropriate, tested to confirm current hypersensitivity or tolerance.

- All individuals with a penicillin-associated history of anaphylaxis, rash, gastrointestinal symptoms, headaches, other low-risk symptoms, an unknown history, or a reported family history of penicillin allergy can undergo testing to confirm current tolerance and convince the patient that penicillins can safely be used.

- The reference standard test to confirm current penicillin class antibiotic hypersensitivity or tolerance is an oral challenge with a therapeutic dose, typically 250 mg for adults, and 1 hour of observation to confirm acute tolerance, followed by 5 days of at home follow-up to confirm the absence of clinically significant T-cell-mediated delayed-onset hypersensitivity.

- Low-risk individuals, with penicillin reaction histories that are unlikely to be IgE mediated, can safely go to a direct oral amoxicillin challenge with a therapeutic dose to confirm current tolerance.

- Puncture and intradermal skin testing using only penicilloyl-polylysine, with at least 5 mm of wheal and flare greater than wheal as the criteria for a positive test result, is now sufficient to rule out a high risk of having anaphylaxis during a confirmatory oral amoxicillin challenge.

- Individuals with positive skin test results should not undergo oral challenges and, like individuals with immediately positive oral challenge results, undergo oral penicillin desensitization if they have a documented infection for which a penicillin is the drug of choice.

https://doi.org/10.1016/j.anai.2018.07.041
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Reasons Why PCN Hypersensitivity Has Been Higher in the Past

• “We discussed what to do with the pungent brown red powder. We decided to dissolve it in saline and pass it through an E.K Seitz pad (asbestos pad) to sterilize it.”

• Immunologically mediated sensitization are more likely with topical exposure, followed by parenteral exposures, and least likely with oral exposures.

• By 1946 there were 47 PCN ADE case reports
  - Allergic hydrrarthrosis, urticaria, serum sickness, anaphylactic shock-like syndrome. All after IM administration.

• Reaction frequency ~0.5%

• Now known that PCN left in solution degrades to adverse reactive substances

<table>
<thead>
<tr>
<th>Date</th>
<th>Patient</th>
<th>Reported Abx Allergy</th>
<th>Description of Allergy by patient</th>
<th>Adjudicated Allergy</th>
<th>Allergy Assessment Process</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>12/6/18 J.S.</td>
<td>Macrolides, PCN, TCN</td>
<td>Not Sure, LTA*</td>
<td>Amox challenge</td>
<td>tolerated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12/6/18 C.T.</td>
<td>Zosyn</td>
<td>Hives on infusion</td>
<td>Amox challenge</td>
<td>tolerated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12/18/18 A.B.</td>
<td>PCN</td>
<td>May be rash, LTA</td>
<td>Amox challenge</td>
<td>tolerated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12/26/18 J.F.</td>
<td>PCN</td>
<td>7yr old, bee stings IM PCN abdomen</td>
<td>Amox challenge</td>
<td>tolerated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12/30/18 A.G.</td>
<td>PCN</td>
<td>Rash</td>
<td>Amox challenge</td>
<td>tolerated</td>
<td></td>
<td></td>
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<tr>
<td>1/2/19 J.H.</td>
<td>PCN</td>
<td>Rash</td>
<td>7 days after PCN start</td>
<td>Amox challenge</td>
<td>tolerated</td>
<td></td>
</tr>
<tr>
<td>1/2/19 A.C.</td>
<td>PCN</td>
<td>IM, 1950’s</td>
<td>Amox challenge</td>
<td>tolerated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1/7/19 M.A.</td>
<td>PCN</td>
<td>Anaphylaxis as child</td>
<td>Did not go to hospital for treatment</td>
<td>Amox challenge</td>
<td>tolerated</td>
<td></td>
</tr>
<tr>
<td>1/10/19 K.D.</td>
<td>Amoxicillin</td>
<td>Hives as child</td>
<td>&gt; 48hr post 1st dose</td>
<td>Amox challenge</td>
<td>tolerated</td>
<td></td>
</tr>
<tr>
<td>1/14/19 R.W</td>
<td>“PCN” in ICU</td>
<td>Gums swelled, son has Hx PCN allergy</td>
<td>Amox challenge</td>
<td>tolerated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1/18/19 A.G.</td>
<td>PCN</td>
<td>Hives when young</td>
<td>Amox challenge</td>
<td>tolerated</td>
<td></td>
<td></td>
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<tr>
<td>1/15/19 L.P.</td>
<td>PCN</td>
<td>82yo, PCN allergy as child</td>
<td>Zosyn full dose</td>
<td>tolerated</td>
<td></td>
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<tr>
<td>1/28/19 C.C.</td>
<td>Amoxicillin</td>
<td>Rash in teen years</td>
<td>Not immediate</td>
<td>Amox challenge</td>
<td>tolerated</td>
<td></td>
</tr>
<tr>
<td>3/1/19 L.H.</td>
<td>PCN</td>
<td>“Red butt” as child</td>
<td>Amox challenge</td>
<td>tolerated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3/14 M.M</td>
<td>PCN</td>
<td>Anaphylaxis, rash, tongue swelling</td>
<td>Post-op, no clear S+S of anaphylaxis, only SOB</td>
<td>Amox challenge</td>
<td>tolerated</td>
<td></td>
</tr>
</tbody>
</table>
Risks Associated With not Evaluating Individuals With a PCN Allergy

- Inferior Clinical Outcomes
- More SSI when PCN is the SOC and not used
- More deaths and inferior outcomes is PCN s not used in MSSA infections
- Longer hospitalizations and exposure to antibiotics associated with C. difficile and VRE
ANTIMICROBIAL STEWARDSHIP ROUNDS AND REPORTING IN A SMALL COMMUNITY HOSPITAL

JONATHAN NAPOLI, PHARMD, MHA, BCPS
CLINICAL PHARMACY MANAGER
Objectives

• Describe the AMP program at Parkland including committee and stewardship rounds structure

• Detail the creation and utility of reporting tools

• Discuss how reporting is presented at varying levels of facility committees.
Parkland Medical Center

- Derry, NH
  - 86 Licensed Beds
    - Emergency Room
    - Intensive Care Unit (8 bed)
    - Med/Surg
    - Intermediate Cardiac
    - Progressive Care (Step-down)
    - Behavioral Health
    - Post op/Pediatrics Floor
    - Labor/Maternity
  - Level III Trauma Center
  - 24/7 Cath Lab, Chest Pain Accredited
  - TJC Primary Stroke Center

- 23,094 Emergency Room Visits in 2017
- 4,394 Admissions in 2018
Antimicrobial Management Program

- Bi-Monthly Committee Meetings
- Twice-weekly Stewardship Rounds
- Reporting Structure
COMMITTEE MEETINGS
AMP Committee Meetings

- Membership:
  - Pharmacist and ID Physician Co-Chairs
  - CMO
  - Hospitalist
  - Infection Prevention
  - Micro
  - Nursing
  - Informatics
AMP Committee Meetings

• Clinical literature review
• Order set updates
• New protocol development
• Anti-infective formulary review
• Medication use evaluations
• Stewardship activity review
• DOT review, drilled down to provider level
Stewardship Rounds

• Occur twice weekly

Dedicated AMS Pharmacist runs report for current inpatients on antibiotics → RPH performs in-depth review of abx appropriateness, clinical parameters and DOT (2-3 hrs) → Pharmacist meets with ID Physician to review cases (1 hr)

All recommendations/provider discussions are documented and sent to ID and Clinical Pharmacy Manager (0.5 hrs) → Changes made in EMR (0.5 hrs) → Pharmacist follows up discussing recommendations with attending providers (1 hr)
Stewardship Rounds

- Clinical Pharmacy Manager compiles recommendation information into spreadsheet
Stewardship Rounds

- Data in spreadsheet used to create pivot tables, graphs, and dashboards.
Stewardship Rounds

• Collateral benefit:
  – Pharmacists report significant education from discussions with ID physician which is leveraged on non-stewardship days
  – Clinical manager able to identify opportunities with improper use of certain medications or practice discussions with specific providers
  – Clinical manager better positioned to explain particular trends seen in antibiotic utilization
Reporting

Antimicrobial Management Program Committee (AMP)

Pharmacy and Therapeutics (P&T)

Medical Executive Committee (MEC)
AMP Committee

- Goals of reporting: Identify opportunities/action plans
  - Educational opportunities
    - Use data and visuals to highlight providers who may be over-utilizing resources
    - Review acceptance rates of stewardship recs
  - Utilization opportunities
    - If over-utilization: is it specific provider or generalized? If generalized, a medication use evaluation may be necessary.
    - Reports can help show impact of previous strategies.
AMP Committee

- Using EMR or Pharmacy Surveillance Software – calculate DOT of abx by provider
AMP Committee

- Use EMR data to calculate Days of Therapy, normalized by patient days.
- Import into Excel, create pivot tables/graphs, update regularly

<table>
<thead>
<tr>
<th></th>
<th>Dec</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>June</th>
<th>July</th>
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<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan 19</th>
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</thead>
<tbody>
<tr>
<td>Pip/Tazo</td>
<td>50.6</td>
<td>49.5</td>
<td>63.5</td>
<td>57.5</td>
<td>50.3</td>
<td>48.2</td>
<td>43.4</td>
<td>38</td>
<td>55.6</td>
<td>60.85</td>
<td>61.06</td>
<td>50.89</td>
<td>47.19</td>
<td>48.51</td>
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<tr>
<td>Meropenem</td>
<td>23</td>
<td>27.7</td>
<td>25</td>
<td>30.4</td>
<td>15</td>
<td>21.7</td>
<td>19.5</td>
<td>17</td>
<td>15.7</td>
<td>17.45</td>
<td>21.23</td>
<td>16.51</td>
<td>19.01</td>
<td>13.12</td>
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<td>Vancomycin</td>
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<td>40</td>
<td>47</td>
<td>44.8</td>
<td>25.9</td>
<td>41.2</td>
<td>32.3</td>
<td>37</td>
<td>31.5</td>
<td>35.36</td>
<td>28.89</td>
<td>32.57</td>
<td>34.82</td>
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<table>
<thead>
<tr>
<th></th>
<th>Dec</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan 19</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Antibiotics</td>
<td>339</td>
<td>331</td>
<td>307</td>
<td>314</td>
<td>242</td>
<td>304</td>
<td>269</td>
<td>237</td>
<td>302</td>
<td>292</td>
<td>307</td>
<td>279</td>
<td>287</td>
<td>272</td>
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% Change

<table>
<thead>
<tr>
<th></th>
<th>Pip/Tazo</th>
<th>Meropenem</th>
<th>Vancomycin</th>
<th>Total Abx</th>
</tr>
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<tbody>
<tr>
<td>Dec</td>
<td>0.98</td>
<td>1.20</td>
<td>1.04</td>
<td>0.98</td>
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<tr>
<td>Jan</td>
<td>1.28</td>
<td>0.90</td>
<td>1.18</td>
<td>0.93</td>
</tr>
<tr>
<td>Feb</td>
<td>0.91</td>
<td>1.22</td>
<td>0.95</td>
<td>1.02</td>
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<tr>
<td>Mar</td>
<td>0.87</td>
<td>0.49</td>
<td>0.58</td>
<td>0.77</td>
</tr>
<tr>
<td>Apr</td>
<td>0.96</td>
<td>1.45</td>
<td>1.59</td>
<td>1.26</td>
</tr>
<tr>
<td>May</td>
<td>0.90</td>
<td>0.90</td>
<td>0.78</td>
<td>0.88</td>
</tr>
<tr>
<td>June</td>
<td>0.88</td>
<td>0.87</td>
<td>1.15</td>
<td>0.88</td>
</tr>
<tr>
<td>July</td>
<td>1.46</td>
<td>0.92</td>
<td>0.85</td>
<td>1.27</td>
</tr>
<tr>
<td>Aug</td>
<td>1.09</td>
<td>1.11</td>
<td>1.12</td>
<td>0.97</td>
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<tr>
<td>Sep</td>
<td>1.00</td>
<td>1.22</td>
<td>0.82</td>
<td>1.05</td>
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<tr>
<td>Oct</td>
<td>0.83</td>
<td>0.78</td>
<td>1.13</td>
<td>0.91</td>
</tr>
<tr>
<td>Nov</td>
<td>0.93</td>
<td>1.15</td>
<td>1.07</td>
<td>1.03</td>
</tr>
<tr>
<td>Dec</td>
<td>1.03</td>
<td>0.69</td>
<td>0.98</td>
<td>0.95</td>
</tr>
<tr>
<td>Jan 19</td>
<td>1.03</td>
<td>0.69</td>
<td>0.98</td>
<td>0.95</td>
</tr>
</tbody>
</table>
AMP Committee

- Ability to show visuals of stewardship efforts on overall utilization and specific initiatives
• Antibiotic indications are required whenever order is placed.
AMP Committee

- Can breakdown antibiotics used for specific indications
  - Ex. Initiative to reduce FQ utilization in cystitis
    - Only 3% of abx orders for cystitis are FQ’s
Pharmacy and Therapeutics

• Goals of reporting:
  – Broader education for nursing leadership, providers, admin
    • Monthly reports of utilization and stewardship activities informs other disciplines what we do in stewardship
    • Engage other disciplines in helping to reach goals of decreasing utilization
    • Accountability to report outcomes associated with new protocols
  – Can be leveraged as justification for new protocol approvals
Medical Executive Committee

• Annual or biannual high-level report demonstrating results of the AMP program

• Goals of reporting:
  – Garner support from senior leadership to dedicate resources for stewardship
  – Accountability for AMP committee for goals set.
Example of Annual Report for MEC
Antimicrobial Management Program 2018

Accomplishments

- 2017 Antibiogram
- Updated order sets to reduce prominence of fluoroquinolones
- Revised Vancomycin Protocol – yielded highest percentage of goal troughs to date
- Updated C Diff Order Sets based on new guidelines
- Reviewed Intra-abdominal Sepsis treatment guidelines
- Meropenem Usage Evaluation – about 48% inappropriate use in Q4 2017

Clinical Patient Outcomes:

**IV to PO: **less risk of line infection, thrombophlebitis. Earlier Discharge.
**De-Escalation:** reduce resistance, unnecessary side effects, **Vanco Trough between 10-25:** Narrow therapeutic window.
**Decreasing Fluoroquinolone Use in UTI:** increasing resistance to gramneg’s, Side effects of FQ’s

### 2018 Antimicrobial “Activations” (Pharmacy Interventions)

- Includes: De-escalation, IV to PO conversions, Vancomycin/AG consults, Renal Adjustments, Mismatched “drug/bug” occurrences

<table>
<thead>
<tr>
<th>Total Actionable Antimicrobial Activations</th>
<th>3834</th>
</tr>
</thead>
<tbody>
<tr>
<td>Action</td>
<td>Qty</td>
</tr>
<tr>
<td>Drug Therapy Change Made</td>
<td>1475 (38%)</td>
</tr>
<tr>
<td>Recommendation Rejected</td>
<td>96 (3%)</td>
</tr>
<tr>
<td>Reviewed, No Action Necessary</td>
<td>828 (22%)</td>
</tr>
<tr>
<td>Other (consults, follow ups, rule review, etc)</td>
<td>1435 (37%)</td>
</tr>
</tbody>
</table>

**Antimicrobial Stewardship Rounds (Bi-weekly rounds with Infectious Disease MD)**

Total recs/patients: 642/1343
For nearly every two patients reviewed, one targeted abx recommendation is made

<table>
<thead>
<tr>
<th>Hospitalist</th>
<th>Accepted</th>
<th>Rejected</th>
<th>% Accept</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>25</td>
<td>0</td>
<td>100%</td>
<td>25</td>
</tr>
<tr>
<td>2nd</td>
<td>99</td>
<td>4</td>
<td>96%</td>
<td>103</td>
</tr>
<tr>
<td>3rd</td>
<td>16</td>
<td>1</td>
<td>94%</td>
<td>17</td>
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<tr>
<td>4th</td>
<td>54</td>
<td>4</td>
<td>93%</td>
<td>58</td>
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<td>5th</td>
<td>60</td>
<td>5</td>
<td>92%</td>
<td>65</td>
</tr>
<tr>
<td>6th</td>
<td>34</td>
<td>3</td>
<td>92%</td>
<td>37</td>
</tr>
<tr>
<td>7th</td>
<td>142</td>
<td>37</td>
<td>79%</td>
<td>179</td>
</tr>
<tr>
<td>8th</td>
<td>35</td>
<td>14</td>
<td>71%</td>
<td>49</td>
</tr>
</tbody>
</table>
Antimicrobial Management Program 2018

Antibiotic Utilization:

<table>
<thead>
<tr>
<th></th>
<th>2018 vs 2017 (Days of Therapy per 1KAPD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Antibiotics (YOT)</td>
<td>↓ 6% (3184 vs 3404)</td>
</tr>
<tr>
<td>Piperacillin / Tazobactam (YTD)</td>
<td>↓ 13% (579 vs 668)</td>
</tr>
<tr>
<td>Meropenem (YTD)</td>
<td>= (228 vs 227)</td>
</tr>
<tr>
<td>Vancomycin (YTD)</td>
<td>↓ 8% (401 vs 437)</td>
</tr>
</tbody>
</table>

2018 Antimicrobial Spend:

<table>
<thead>
<tr>
<th></th>
<th>2017</th>
<th>2018</th>
<th>Δ</th>
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<tbody>
<tr>
<td>Hospital Antimicrobial Expense</td>
<td>***</td>
<td>***</td>
<td>***</td>
</tr>
<tr>
<td>Exp Per APD</td>
<td>$3.91</td>
<td>$3.77</td>
<td>↓ 4%</td>
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Top 10 - 2018

<table>
<thead>
<tr>
<th>Drug</th>
<th>$ (% total)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Piperacillin/TZB (Zosyn)</td>
<td>(10.6%)</td>
<td></td>
</tr>
<tr>
<td>Vancomycin</td>
<td>(10.4%)</td>
<td></td>
</tr>
<tr>
<td>Meropenem</td>
<td>(6.3%)</td>
<td></td>
</tr>
<tr>
<td>Ceftazidine/Avibactam*</td>
<td>(7%)</td>
<td>Purchased for Richmond Warehouse during shortage</td>
</tr>
<tr>
<td>Cefazolin 10 Gram*</td>
<td>(5.8%)</td>
<td></td>
</tr>
<tr>
<td>Fidaxomycin*</td>
<td>(4.2%)</td>
<td>7 patients</td>
</tr>
<tr>
<td>Foscarnet*</td>
<td>(4.2%)</td>
<td>1 patient</td>
</tr>
<tr>
<td>Doxycycline</td>
<td>(3.4%)</td>
<td></td>
</tr>
<tr>
<td>Penicillin G</td>
<td>(3%)</td>
<td>Labor Use - GBP ppx</td>
</tr>
<tr>
<td>Cefazolin 1 gram</td>
<td>(2.6%)</td>
<td>Large proportion is surgical ppx</td>
</tr>
</tbody>
</table>

2019 Goals:

- 2018 Antibiogram
- Revise urine culture reflex criteria
- Procalcitonin protocol
- Jon to complete Society of Infectious Disease Pharmacists (SIDP) Stewardship Certification
Summary

• In a smaller-sized community hospital, structured stewardship rounding helps to promote appropriate use/de-escalation of antibiotics
• Developing systems to collect stewardship recommendations and antibiotic utilization makes it easier to identify trends and opportunities for improvement
• Creating targeted reports to deliver at various committee meetings can be leveraged to accomplish specific goals