The Role of Pharmacy in the Surgical Arena

Jason Morell, PharmD, BCPS
PGY2 ID
Objectives

1. Explain the importance of providing a complete list of medications you are receiving prior to surgery and the role of the pharmacist in pre-op screening.

2. Explain how providing a previous history of any infectious disease related history will insure best preventive antibiotic therapy to reduce your risk of infection.

3. Describe the various methods of reducing the risk of adverse effects from surgery such as post-op nausea can be assisted by clinical pharmacy.
MEDICATION RECONCILIATION
Medication List

- Joint Commission – National Patient Safety Goal (med rec)
- Need complete medication list
  - Name of medication (IR, XL, SR)
  - Dose
  - Frequency (certain days of week ?)
  - Dosage Form (patch, oral, solution)
  - PRN indications/hold parameters
  - Implantable pumps (insulin, opiates, chemo)
  - Adherence/drug level helpful (and prescriber)
Common Errors

- Metoprolol IR (Lopressor ®) vs. Metoprolol Succinate (Toprol XL®)
  - IR is 2x daily or more, XL is daily
  - Different indications
- Bupropion has three dosage forms: IR, SR, XL
- Tacrolimus is IR and has a brand name (Envarsus ®) = XL
  - Different indications, frequencies
- Omissions: patch left on patient, insulin pump running
Ways to Avoid Omissions & Errors

• Ask pharmacy for last fill date
• Cross check disease states to medications
• Ask patient for medications that are topical (ophthalmic, cream/ointment)
• Confirm “high risk” medications with prescriber and patient (read back as well)
  – Warfarin
  – Insulin (multiple)
  – Highly active anti-retroviral therapy (HAART)
  – Oral oncolytics (often cyclic in nature)
  – Immunosuppressants (transplant)
Role of Pharmacist

- Promote safe, evidence-based and effective use of pharmacotherapy to patient while mitigating adverse events

- Preoperatively:
  - Assure preoperative antimicrobial is appropriate promote beta-lactam
  - Screen allergies/intolerances
  - Ensure vancomycin is weight based
Role of Pharmacist Postoperatively

- Medication reconciliation: compare physician order against home medication, cross reference against labs/vitals
- Ensure no duplication of therapy for any medication (esp. analgesia, anti-emetic)
- Evaluate analgesia
  - Morphine in renal dysfunction → morphine 6-glucuronide slower to eliminate
  - Opiates + benzodiazepines = respiratory depression, if OSA more likely to occur (STOP BANG score)
  - Requires bowel regimen (in renal dysfunction, lytes may accumulate)
Review of previous literature

SURGICAL SITE INFECTIONS
Rate of Surgical Site Infections (SSI)

<table>
<thead>
<tr>
<th>Adjustment</th>
<th>Odds Ratio (95% CI)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>1.36 (0.94-1.97)</td>
<td>0.10</td>
</tr>
<tr>
<td>Surgery type</td>
<td>1.45 (1.00-2.12)</td>
<td>0.51</td>
</tr>
<tr>
<td>Surgery type, age, sex, race</td>
<td>1.49 (1.02-2.18)</td>
<td>0.04</td>
</tr>
<tr>
<td>Surgery type, age, sex, race, ASA class, procedure duration, wound class</td>
<td>1.51 (1.02-2.02)</td>
<td>0.04</td>
</tr>
</tbody>
</table>

- NNH = 112-124
- Marginal structural model showing association between avoidance of beta-lactams and SSI
  - Due to use of vancomycin/clindamycin
- If not receiving cefazolin also less likely to receive in recommended time for best tissue concentrations

Reducing SSIs in Nasal Carriers of *S. aureas*

• Prior to 2010, standard of care was nares screening for *S. aureas*
  – Intranasal mupirocin only
  – Mupirocin: invasive *S. aureas* in LT HD, surgical
• Multicenter, randomized, double-blind, placebo-controlled trial in Netherlands with ~20% MRSA rate (PMC 40%)
• Intervention Chlorhexidine daily + mupirocin BID x 5 days

<table>
<thead>
<tr>
<th></th>
<th>Chlorhex- Mupirocin</th>
<th>Placebo</th>
<th>RR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital acquired</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>S. aureas</em> infections</td>
<td>17 (3.4%)</td>
<td>32 (7.7%)</td>
<td>0.42 (95% CI 0.23-0.75)</td>
</tr>
<tr>
<td>SSI</td>
<td>4 (0.9%)</td>
<td>16 (4.4%)</td>
<td>0.21 (95% CI 0.07-0.62)</td>
</tr>
</tbody>
</table>

Duration of prophylaxis. New recommendations for a shortened postoperative course of antimicrobials involving a single dose or continuation for less than 24 hours are provided. Further clarity on the lack of need for postoperative antimicrobial prophylaxis based on the presence of indwelling drains and intravascular catheters is included.
Vancomycin for Surgical Prophylaxis

<table>
<thead>
<tr>
<th>Study</th>
<th>Patients</th>
<th>Results</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bolon et al 2004</td>
<td>Meta-analysis 5761 cardiothoracic patients</td>
<td>RR 1.135 CI 0.906-1.422</td>
<td>β-lactam &amp; vancomycin equally effective against SSI</td>
</tr>
<tr>
<td>Chambers et al 2010</td>
<td>Meta-analysis 14 studies ortho, cardiac, vascular</td>
<td>--</td>
<td>β-lactam &amp; vancomycin equally effective against SSI</td>
</tr>
<tr>
<td>Tacconelli et al 2008</td>
<td>RCT CSF shunt placement N=88</td>
<td>RR 0.33 CI 0.11-0.99 Mortality in cefazolin</td>
<td>Vanco superior to cefazolin</td>
</tr>
<tr>
<td>Finkelstein et al 2002</td>
<td>Cardiothoracic N=855</td>
<td>9.5% (vanc) vs 9.0% (cef)</td>
<td>β-lactam &amp; vancomycin equally effective against SSI</td>
</tr>
<tr>
<td>Garey et al 2008</td>
<td>Cardiothoracic N=6465</td>
<td>Decrease in SSI by 2.1/100 CABG vs. valve</td>
<td></td>
</tr>
<tr>
<td>Spelman et al 2002</td>
<td>Cardiothoracic N=1114</td>
<td>Cefazolin (10.5/100) to Vanc + Rif (4.9/100)</td>
<td>Switch decreased MRSA infections 65%</td>
</tr>
<tr>
<td>Walsh et al 2011</td>
<td>Cardiothoracic N=2767</td>
<td>SSI rate 2.1% vs. 0.8% P&lt;0.001</td>
<td>MRSA bundle (MRSA screen, de-colonize, vanco + cefazolin, rescreen) 93% reduction in MRSA wound infections</td>
</tr>
</tbody>
</table>
## Antimicrobial Prophylaxis Guidelines

<table>
<thead>
<tr>
<th>Specialty/Procedure</th>
<th>First Line</th>
<th>Penicillin Allergy</th>
<th>Severe Penicillin or First Line Med Allergy **</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEUROSURGERY</td>
<td>cefazolin</td>
<td>cefazolin</td>
<td>vancomycin</td>
</tr>
<tr>
<td>SPINE: lumbar discectomy (may not need abx)</td>
<td>cefazolin +/- vancomycin</td>
<td>Cefazolin +/- vancomycin</td>
<td>vancomycin</td>
</tr>
<tr>
<td>SPINE (other than lumbar discectomy)</td>
<td>Cefazolin +/- vancomycin***</td>
<td>Cefazolin +/- vancomycin***</td>
<td>vancomycin</td>
</tr>
<tr>
<td>ORTHO: ORIF closed or open fx (gustilo type I or II)</td>
<td>cefazolin</td>
<td>cefazolin</td>
<td>vancomycin</td>
</tr>
<tr>
<td>ORTHO: ORIF open (gustilo Type III)</td>
<td>cefazolin &amp; gentamycin</td>
<td>cefazolin &amp; gentamycin</td>
<td>vancomycin &amp; gentamicin</td>
</tr>
<tr>
<td>ORTHO: Joint Replacement (primary or revision without infection)</td>
<td>Cefazolin +/- vancomycin ***</td>
<td>Cefazolin +/- vancomycin ***</td>
<td>vancomycin</td>
</tr>
<tr>
<td>ORTHO: Revision Joint Replacement with INFECTION</td>
<td>MD discretion</td>
<td>MD discretion</td>
<td>MD discretion</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GENERIC NAME (Trade Name)</th>
<th>Pre-op Dose</th>
<th>Optimal Start Time (complete prior to incision)</th>
<th>Infusion Time (rate)</th>
<th>Re-dosing* Interval and dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEFAZOLIN (Ancef)</td>
<td>2 gm &lt; 120kg 3 gm &gt;/= 120 kg</td>
<td>10-60 min</td>
<td>6 min 9 min</td>
<td>q4 h 2 gm</td>
</tr>
<tr>
<td>VANCOMYCIN</td>
<td>1,000 mg &lt; = 80kg 1,500 mg 81-119 kg 2,000 mg &gt;/= 120 kg</td>
<td>60-90 min 90-120 min 120-180 min</td>
<td>60 min 90 min 120 min</td>
<td>Q8h 1,000 mg</td>
</tr>
</tbody>
</table>

* Review patient medical record -if prior positive culture for ESBL (extended spectrum beta lactamase), give Ertapenem 1gm; IVPB 30 min before incision. If prior positive culture for VRE (vancomycin resistant enterococcus), give linezolid 600mg IVPB 30 min before incision. If positive prior culture for MRSA give Vancomycin per above.

** Recent literature indicate that Cefazolin can be given but some guidelines recommend a non-beta-lactam.

***If patient does not have positive MRSA culture or have risk factors for MRSA cefazolin alone is adequate.
CDC Guidelines to Prevent SSI (2017)

- Drug: bactericidal, only when indicated
- Do not administer additional antimicrobials in clean contaminated procedures even if drain
- Irrigations (i.e. bacitracin) of no benefit
- Do not apply topical to incision prior to closure to prevent SSI

- Glycemic control (<200 mg/dl)
- Perioperative normothermia
- If normal PFT, administer increased FiO2 intraop and immediately postop via ETT
  - Adequate volume replacement
- No evidence to withhold blood transfusion to reduce SSI

Prevention is the best treatment

POST-OPERATIVE NAUSEA & VOMITING
Apfel Simplified Risk Score for PONV

Risk Factors (1 point each)
- Post-operative opioids
- Non-smoker
- Female
- History of PONV

<table>
<thead>
<tr>
<th>Risk Score</th>
<th>Prevalence PONV</th>
<th># antiemetics</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>9%</td>
<td>0-1</td>
</tr>
<tr>
<td>1</td>
<td>20%</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>39%</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>60%</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>78%</td>
<td>4</td>
</tr>
</tbody>
</table>

Anesthesiology 1999. 91(3): 693-700.
Methods to prevent PONV

Anesthesia type
- Propofol
- Regional

Prophylaxis Strategies

- Mirtazapine
- Haloperidol
- Diphenhydramine
- Gabapentin
- Scopolamine
- Ondansetron
- Midazolam
- Dexamethasone

Quick Review

A 48 year old woman is coming to have an elective TKA. She has a preoperative nares screen that is + MRSA. No known allergies. What is recommended?

a) Vancomycin
b) Cefazolin
c) Decolonization with mupirocin and chlorhexidine
d) All of the above
Quick Review

The same patient is being interviewed by anesthesia regarding her risk for PONV, since she previously reported it. She smokes 1 ppd and is expected to have post-operative opioids.

How many anti-emetics should be administered at the end of the case?
Thank you!