Resisting Resistance: Practical Decision Tools for Choosing Antimicrobials Safely

NORMA STEPHENS HANNIGAN, DNP, MPH, FNP-BC, DCC
DEANNA TOLMAN, DNP, FNP-BC
ELAINE L. LARSON, PHD, RN, FAAN, CIC
Purpose

Provide information about evidence-based decision-making strategies and support tools available for appropriate antimicrobial prescribing by nurse practitioners and other prescribers (physicians, physician assistants)
Nurse Practitioners

- Registered Nurses with graduate degrees—masters or doctorates—
- Diagnose
- Prescribe pharmaceuticals and other treatment modalities
- Manage patients in primary and acute care (referrals, follow-up)
Prescriber’s responsibility

- Cure one illness without creating another
- Determine if the disease should be treated with an antimicrobial or if watching and waiting are viable alternatives
- Prevent resistance for as long as possible
Infections commonly treated by NPs

- Helicobacter pylori
- Urinary Tract Infection
- Methacillin Resistant Staphylococcus Aureus (MRSA)
- Community Acquired Pneumonia, Upper and Lower Respiratory Tract Infections
- Cellulitis
- Sexually Transmitted Infections
- Otitis Media
- HIV
What’s the problem?

Resistance to antimicrobials occurs globally and is increasing rapidly—

- Helicobacter Pylori resistance is up 10%

- Escherichia coli resistance to trimethoprim-sulfamethoxazole led to increased use of ciprofloxacin and levofloxacin; now more resistance to those drugs.
  (Castro-Fernandez & Vargas-Romero, 2009; Rice, 2009)
What’s the problem?

- Neisseria gonorrhoeae is so resistant to fluoroquinolones that they are not recommended as treatment anywhere in the US

- HINI—CDC recommended the use of oseltamivir together with rimantadine rather than alone because resistance already being seen

  (Division of STD Prevention, 2009; CDC, 2009)
What’s the problem?

• 2007—94,000 serious MRSA cases in the US, mostly hospital related; 14% were community acquired—

Of the total, 19,000 resulted in death

(Klevenes, et al., 2007)
What’s the problem?

- Despite the evidence and availability of guidelines, prescribers continue to prescribe inappropriately

- Nurse practitioners tend to prescribe similarly to physicians

(Running, Kipp & Mercer, 2006; Ladd, 2005; Fontana, Devine & Kelber, 2000)
Factors in sub-optimal prescribing

- Parental expectations higher among Asian and Latino populations in US (Mangione-Smith, 2004)
- Physicians “soften” the longer they are in practice
- High volume workload, patient education diminished (Cadieux, Tamblyn, Dauphinee, & Libman, 2007)
- Limited antimicrobial resistance education incorporated into professional NP coursework –88.4% of respondents in survey of 149 NP programs indicated that they had dedicated antimicrobial resistance lectures (Sym, Brennan, Hart, & Larson, 2006)
Factors in sub-optimal prescribing

- Physicians obtain answers to only one in three questions that arise in clinical practice, many are regarding drug treatment.

- When answers are sought, the sources used are the readily available ones which provide an answer in one to two minutes.

  (Ely, Osheroff, Ebell, et al., 1999)
Factors in sub-optimal prescribing

- Time constraints, lack of knowledge of available resources, limited access to resources at point of care

(Sellman, Decarolis, Schullo-Feulner, Nelson, & Filice, 2004)
Factors in sub-optimal prescribing

- Perception of importance of preventing antimicrobial resistance—

  In one study, NPs ranked avoidance of long-term resistance as the eighth most important of 18 factors influencing antibiotic prescribing

  (Wright and Neill, 2001)
Factors in sub-optimal prescribing

- Influence of pharmaceutical representatives -- mixed
  (Kessenich and Westbrook, 1999; Wright and Neill, 2001)
Factors in OPTIMAL prescribing

- 80% of participants in study agreed that having immediately accessible information would be helpful to their clinical decision making.
- Only 55% of the time were external sources used, usually regarding antimicrobials.

(Sellman, Decarolis, Schullo-Feulner, Nelson, & Filice, 2004)
Survey of NPs regarding resource use in adults:

- 14.5% always relied on guidelines
- 62.5% very often relied on guidelines
- 2.6% never relied on guidelines

(Goolsby, 2007)
Decision support at the point of electronic order entry might improve antimicrobial prescribing

(Sellman, Decarolis, Schullo-Feulner, Nelson, & Filice, 2004)
Study done in Strasbourg-Brumath, France reported Feb 2011—antibiotic prescribing guidelines embedded into the electronic medical record (EMR) for use at the time of prescribing showed a significant decrease in inappropriate prescribing.

(Westphal, Jehl, Javeolot & Nonnenmacher, 2011)
To prescribe, delay, or *NOT PRESCRIBE*: that is the question.
Decision-Making Strategies

- More rigorous diagnosis—rapid antigen/PCR tests
- Vaccines for prevention
- Anti-viral treatments to prevent secondary bacterial infection

(Neiderman, 2005; Low, 2007)
And, of course....

- Use available guidelines
Decision-Making Strategies

- Consider if it is clinically appropriate to withhold antimicrobial and treat symptoms only—dependent on diagnosis, age, co-morbidities and clinical status

(Subcommittee on Management of Acute Otitis Media, 2004; National Center for Immunization and Respiratory Diseases, 2009; Wong, Blumberg & Lowe, 2006)
Decision-Making Strategies

- Pressure from patient or patient’s parent?

  - **DELAYED PRESCRIBING OF ANTIBIOTIC WITH SYMPTOMATIC TREATMENT vs. NO PRESCRIBING WITH SYMPTOMATIC TREATMENT** resulted in similar patient satisfaction rates

  - Clinical outcomes among immediate, delayed and no antibiotic groups are similar

    (Cochrane systematic review: Spurling, Del Mar, Dooley & Foxlee, 2007)
Decision Making Tools

• McIsaac Sore Throat Scoring System

• The age-appropriate sore throat score is a simple primary care management approach that improves identification of GAS infection, limits the need for throat swabs in all patients with sore throat and can reduce unnecessary antibiotic use.

  (McIsaac, White, Tannenbaum & Low, 1998)
Step 1
Determine the patient’s total sore throat score by assigning points to the following criteria:

<table>
<thead>
<tr>
<th>CRITERIA</th>
<th>POINT</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEMPERATURE &gt; 38°C</td>
<td>1</td>
</tr>
<tr>
<td>NO COUGH</td>
<td>1</td>
</tr>
<tr>
<td>TENDER ANTERIOR CERVICAL ADENOPATHY</td>
<td>1</td>
</tr>
<tr>
<td>TONSILLAR SWELLING OR EXUDATE</td>
<td>1</td>
</tr>
<tr>
<td>AGE 3–14 YR</td>
<td>1</td>
</tr>
<tr>
<td>AGE 15–44 YR</td>
<td>0</td>
</tr>
<tr>
<td>AGE ≥ 45 YR</td>
<td>-1</td>
</tr>
</tbody>
</table>

TOTAL SCORE ________
### Step 2
Choose the appropriate management suggested below according to the total sore throat

<table>
<thead>
<tr>
<th>Total Score</th>
<th>Chance of streptococcal infection in community with usual levels of infection, %</th>
<th>Suggested management</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>2–3</td>
<td>No culture or antibiotic is required</td>
</tr>
<tr>
<td>1</td>
<td>4–6</td>
<td>No culture, start penicillin</td>
</tr>
<tr>
<td>2</td>
<td>10–12</td>
<td>Culture all; treat only if culture result is positive</td>
</tr>
<tr>
<td>3</td>
<td>27–28</td>
<td>Culture all; treat with penicillin on clinical grounds*</td>
</tr>
<tr>
<td>4</td>
<td>38–63</td>
<td>Culture all; treat with penicillin on clinical grounds*</td>
</tr>
</tbody>
</table>

*If patient has high temperature or is clinically unwell, and presents early in disease course. Use erythromycin if patient is allergic to penicillin.
Prescribing

- Have current guidelines at the Point of Care (POC)

- Can be included in Electronic Medical Record (EMR) or found independently with internet search
Prescribing

- Put icons for most frequently used websites on computer desktop for capturing most up to date information in minutes

- E-mail alerts for infectious disease news
Prescribing

• Obtain antibiogram information from local hospital
# Selected Internet Antimicrobial Resources

## Free Online Data Bases

<table>
<thead>
<tr>
<th>Resource</th>
<th>Description</th>
<th>Website</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Guideline Clearinghouse</td>
<td>Compendium of thousands of peer-reviewed guidelines, with a robust search engine: you may search very specifically, i.e., &quot;antibiotic otitis infant,&quot; or &quot;antibiotic urinary geriatric female,&quot; or &quot;antibiotic resistance 2010 MRSA&quot;</td>
<td><a href="http://www.guildeine.gov/">http://www.guildeine.gov/</a></td>
</tr>
<tr>
<td>Epocrates Online</td>
<td>General free drug reference which provides indications, dosing, contraindications, adverse effects, cost estimates. Subscription provides disease-specific guidelines.</td>
<td><a href="https://online.epocrates.com/home">https://online.epocrates.com/home</a></td>
</tr>
</tbody>
</table>
# Free Online Databases

<table>
<thead>
<tr>
<th>Resource</th>
<th>Description</th>
<th>Website</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infectious Diseases Society of America (IDSA)</td>
<td>Many specific practice guidelines in free PDF form, as well as PDA versions.</td>
<td><a href="http://www.idsociety.org/content.aspx?id=9088">http://www.idsociety.org/content.aspx?id=9088</a></td>
</tr>
</tbody>
</table>

## Purchased

<table>
<thead>
<tr>
<th>Resource</th>
<th>Description</th>
<th>Website</th>
</tr>
</thead>
<tbody>
<tr>
<td>Redbook 2009</td>
<td>Pediatric infectious disease resource – updated every 3 years</td>
<td><a href="http://aapredbook.org">http://aapredbook.org</a></td>
</tr>
</tbody>
</table>
# Free E-Mail Alerts

<table>
<thead>
<tr>
<th>Service</th>
<th>Description</th>
<th>Website</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red Book Email Alerts</td>
<td>This service is free, although the full book requires a subscription</td>
<td><a href="http://aapredbook.aappublications.org/cgi/alerts/etoc">http://aapredbook.aappublications.org/cgi/alerts/etoc</a></td>
</tr>
<tr>
<td>Infectious Disease News</td>
<td>Registration is free, with several options for updates and CME.</td>
<td><a href="http://www.infectiousdiseasenews.com/login.aspx">http://www.infectiousdiseasenews.com/login.aspx</a></td>
</tr>
</tbody>
</table>
“Never commit to memory what can be easily looked up in books

--Albert Einstein
…..or on the internet or embedded in the EMR”

--Norma Stephens

Hannigan