Antimicrobial Stewardship:
Agents of Change

*A clinician applies the science of behavioral change to Antimicrobial Stewardship*

Sarah Sutton, MD
Antimicrobial Stewardship Director
Division of Infectious Diseases

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Objective

To apply effective behavior change to optimize Antimicrobial Stewardship efforts to reduce antibiotic overuse.
Health Care - Individuals, Culture & Systems

- Cultural history of Health Care
  - Cowboy management

- Hierarchy
  - Attending Physician knows best
  - Autonomous

- Discharge: The Big Cliff
  - Minimal linkage of acute to outpatient or chronic care settings

- Slow to change

Group B Strep (GBS) Screening & Prophylaxis Guideline to Prevent Perinatal Sepsis: Effective but Years to Adopt

“Why Don’t Physicians Follow Clinical Practice Guidelines?”

Sequence Of Behavior Change

Knowledge

• Lack of Self-efficacy

Attitudes

• Lack of Agreement with Guidelines

Behavior

• Lack of Time
• Fear of Malpractice
• Patient preference

Barriers to Guideline Adherence

JAMA. 1999;282(15):1458-1465
Stewardship

Learning Theory

Health Care - Individuals, Culture & Systems

Information Technology

Marketing Theory

Change Theory

1. Active Learning
2. Transformative Learning Theory
Learning Theory: Passive Learning vs. Active Learning

**Passive**
- Safe and comfortable, speaker maintains control
- Low transformation power
- Low retention

**Active**
- Teacher lets go of control
- The magic of transforming thoughts into words
- High retention

Picture by Laurel L. Russwurn Blog
Think-Pair-Share, An Active Learning Technique

• Short topic introduction
• Pose a question
  ▶ Each person writes a response
• Share with neighbor
• Share with whole group
Why do Clinicians Prescribe Antibiotics -when They Really Think Antibiotics Won’t Help?

• Diagnostic uncertainty
• Time pressure/anxiety
• Patient demand
• Physician hating discomfort
• Habit and a mental shortcut
Acknowledge the Emotions in Prescribing Antibiotics

• “Dr. X will be offended if I change her plan”
• “If the patient goes septic, I’ll get the blame.”
• “Covering my patient with antibiotics is protective.”
  – “Broader antibiotics are better.”
  – “Longer duration of antibiotics is better.”
  – “Stopping antibiotics is dangerous.”
• “I’ll sleep better if the patient is covered.”
• “I got burned once when my patient got so sick.”
How might active learning techniques like Think-Pair-Share help the Stewardship Agenda?

ACTIVE LEARNING

- Teacher lets go of control
- Higher retention
- The magic of transforming thoughts into words, *words into belief, and belief into action*

- Approach to Teaching

- Outside the classroom, with peers
  - Seek input, use open-ended questions.
Mezirow’s Transformative Learning Theory for Adult Learners


Learning is a journey, beginning with:

• First step
  – Recognizing discomfort
    • Stemming from a gap between own beliefs and behavior and Best Practice

1. Recognize knowledge gap
2. Critical Reflection
3. Acquire new knowledge
4. Trial of new behavior
5. Build competence and confidence
Mezirow’s Transformative Learning Theory for Adult Learners


Recognize gap & Feel the Discomfort

Critical Reflection
Acquire new knowledge
Trial of new behavior
Build competence and confidence
Antibiotic Overuse

50%

CDC Get Smart about Antibiotics
Scope of the Problem of Overuse:

CDC Get Smart about Antibiotic Campaign:

• Approximately 50% of in-patient antibiotics are inappropriate

• Approximately 50% of out-patient antibiotics are inappropriate
A Post-surgical Complication

A healthy young woman

- presented for elective oral maxillofacial surgery
- received antibiotic prophylaxis
- She developed postoperative severe *C. difficile* infection
- She lived, but underwent an emergent colectomy.

- WHY did this happen to her? Was *C. diff* preventable?

This Patient’s Antibiotics vs. Guidelines


THIS Pt’s antibiotics

• Cefazolin 1-2 doses intra-operatively
• THEN 2-3 post-op doses Cefazolin
• THEN Cephalexin 500 mg po QID x 3 days

National Guidelines for Surgical Antibiotic Prophylaxis

• Cefazolin 2 grams ivpb x 1; re-administer only if surgery duration exceeds 4 hours.
• No post-operative antibiotics.

2013 ASHP/IDSA/SHEA/Surgical Infection Society Therapeutic Guidelines on Antimicrobial Prophylaxis in Surgery
### Antibiotics from NMH Surgical Prophylaxis Guidelines Website

**ANTIBIOTIC**

<table>
<thead>
<tr>
<th>ANTIBIOTIC</th>
<th>INTRA-OPERATIVE FOR PROLONGED CASES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cefazolin</strong>&lt;br&gt;2 grams x 1</td>
<td>Redose if case is longer than 4 hours</td>
</tr>
<tr>
<td><strong>Clindamycin</strong></td>
<td>Redose if case is longer than 6 hours</td>
</tr>
</tbody>
</table>

**Alternative Antibiotic**
Antibiotic Overuse Hasn’t Changed, But What Has?

Increasing Mortality Attributed to *C. difficile* Infection 1999-2004

Mortality rates per million
NAP1 Strain Type Predicts Outcomes From *Clostridium difficile* Infection

- NAP1 was associated with increased risk of:
  - severe disease
  - severe outcome
  - death within 14 days of detection

- CDC multi-state study, 2057 cases

CID 2014;58:1394-1400
C. difficile Disease is Local

- *Clostridium difficile* Outbreak Strain B1 is Highly Endemic in Chicago Area Hospitals.

  Infection Control and Hospital Epidemiology 2011: 32(9):897-902.
Septic Patient,
Abnormal CT June, 2012
How Can Stewards Apply Mezirow’s Transformative Learning Theory when Telling the *C. difficile* Story?

*Journal of Transformative Education* 2003;1:58-63

Recognize gap & Feel the Discomfort

- Critical Reflection
- Acquire new knowledge
- Trial of new behavior
- Build competence and confidence
Recognize gap & Feel the Discomfort: Make the C. *diff* Story Personal and Painful!

- Make the C. *diff* Story Personal and Painful!
  - Antibiotic exposure is the **single most important risk factor** for the development of *Clostridium difficile* associated disease (CDAD).
    - Up to 85% of patients with CDAD have antibiotic exposure in the 28 days before infection (Infection Control 2007;28:926-931)
  - The hypervirulent strain is here in our city
  - Clinical case from our hospital
  - Provide antibiotic overuse data specific to each service.
  - Track C. *diff* rates by institution
Stewardship

Health Care- Individuals, Culture & Systems

Information Technology

Learning Theory

Business Theory

Change Theory
1) Transtheoretical Model of Behavior Change
2) Roger’s Diffusion Theory
Change Theory #1
Transtheoretical Model of Behavior Change (Prochaska, 1970’s, then modified 1990’s):
Change is a Process, not One Decision
Assess target’s stage then design intervention appropriate for that stage

- Tobacco cessation
- Weight control
- Mammography screening
- Condom use
Transtheoretical Model of Behavior Change
(Prochaska, 1970’s, then modified 1990’s):
Assess target’s stage then design intervention appropriate for that stage

Precontemplation Interventions

• Create awareness and interest
• Emphasize advantages of change
• Wide-spread education efforts: fact sheets, email blasts, posters, newsletters
• Get Smart about Antibiotics Week

http://ncsu.edu/ffci/publications/2010/v15-n1-2010-spring/guion-free.php
Transtheoretical Model of Behavior Change
(Prochaska, 1970’s, then modified 1990’s):
Assess target’s stage then design intervention appropriate for that stage

Interventions for Contemplation Phase

• Reduce complexity
• Education
• Emphasize advantages of change through case presentations and workshops

Choose Wisely Initiative, Beginning in 2012

Who
• American Board of Internal Medicine
• Partners:
  • Consumer Reports
  • Many subspecialty physician organizations
  • Patients
  • Clinical researchers

What
• OUTPATIENT SETTING
• To stop common practices that medical evidence shows are ineffective or dangerous
• To encourage conversations between clinicians and patients to reduce overuse of tests and procedures
  – Shared decision-making approach (dyad), not paternalism
• Simple messages
Simple Messages from

Choose Wisely:
American Academy of Pediatrics

Antibiotics should not be used for apparent viral respiratory illnesses (sinusitis, pharyngitis, bronchitis).

• 3 of 10 children who visit a pediatrician with a common cold get an antibiotic!
CDC: Get Smart about Antibiotics: More Simple Messages

- **PHARYNGITIS:** TREAT ONLY PROVEN GROUP A STREP
- **USE A DIAGNOSTIC TEST**

- MOST SORE THROATS ARE CAUSED BY VIRAL AGENTS.
- CLINICAL FINDINGS ALONE DO NOT ADEQUATELY DISTINGUISH STREP VS. NON-STREP PHARYNGITIS.
Change Theory #2: Roger’s Innovation Diffusion Theory

• Our decisions and actions are influenced by our culture and social networks.
• Ideas spread and are adopted through culture.  
  -- Therefore, the speed of change can be modified through changing culture

Many Potential Units of Change: Roger’s Innovation Diffusion Theory

• Individual: resistant to change
  – *But influenced by others:*
    ▪ Pairs: parent-child, counselor-client, doctor-patient, coach-player
    ▪ Organizations
    ▪ Culture
Patient-physician Dyad: CDC-sponsored Communication Strategies

- **Validate** the patient with a diagnosis
- **Supply** symptom relief
- **Share** normal findings during exam— and **summarize** the “good findings”
- **Reassure** and **teach** patient, “It’s good that I don’t think antibiotics are needed, because antibiotics can be harmful.”
- **Provide** roadmap.
  - What should patient expect?
  - What if fever develops? What if SOB?
Roger’s Innovation Diffusion Theory

• Spread/acceptance of a new idea depends in part on:
  – The innovation itself
    • Is there a relative advantage?
    • Does it fit the values and thought processes of the users?
• Spread depends on the character of the intended population: first, the early adopters...
CDC Core Elements of Hospital Antibiotic Stewardship Programs: A Check List

• Is there a formal procedure for all clinicians to review the appropriateness of all antibiotics 48 hours after the initial orders (e.g. antibiotic time out)?
Antibiotic Time-out: a CDC-sponsored ASP Proposal

• GOAL: reduce antibiotic overuse

• A Systematic assessment/reassessment tool of prescribed antibiotics.

• WHEN?
  – At Admission or hand-off
  – Daily rounds
  – Discharge planning
Phase 1
Antibiotic Time-out
Insert into daily rounds and daily notes with 4 Keystrokes:

.ato

Antibiotic Time Out
Diagnosis:
Justification/Culture data:
Stop/Start/Continue/or De-escalate antibiotics:
Updated antibiotic, dose, and route:
Total duration:
Antibiotic Time-out: Elective ENT Surgery in Healthy Young Woman, Revisited

• Post-op day zero- in the PACU
  – .ato (4 keystrokes)

Antibiotic Time Out

• Diagnosis: antibiotic prophylaxis.

• Justify:
  – SCIP: Antibiotics dosed 1 hour before surgery ensures lowest postoperative infection rates.
  – Post-op antibiotics don’t prevent postoperative infections.

• Action: no more antibiotics

• Updated abx:

• Total duration: X1 only, already given
Enhanced .ato, a work in progress

Early Adopter Intern types, “.ato”

• Post-op day 1

**Antibiotic time-out**

*Active antibiotic order: cefazolin 2 grams ivpb q 8 hours*

• Diagnosis: antibiotic prophylaxis.

• Justify:
  – Post-op antibiotics don’t prevent postoperative infections.

• Action: D/C cefazolin

• Updated abx:

• Total duration:
Stewardship

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Contagious: Why Things Catch On
by Jonah Berger

Six Key STEPPS for Sustained Change

• Social currency
• Triggers
• Emotion
• Public
• Practical Value
• Stories
Contagious: Why Things Catch On
...and have staying power

• Social Currency
  – Something to talk about
  – Fad
  – Improves social standing

• Emotion
  – Enhance Pride
  – Lessen Insecurity
Active Learning Activity: A Treatment Continuum
Treating Acute Sinusitis in a 50-year old otherwise healthy man

- CC: nasal stuffiness x 4 days, runny nose, now has facial pain.
- “I need an antibiotic so I can get back to work.”
- Afebrile, +bilateral maxillary facial tenderness, +green mucus
Learning Points from Choose Wisely:

Allergy and Immunology

• Viral infections cause the majority of acute rhinosinusitis.
• Only 0.5 percent to 2 percent progress to bacterial infections.
• Antibiotics are not recommended for patients with uncomplicated acute rhinosinusitis who have mild illness and assurance of follow-up.

Family Practice

• Sinusitis accounts for 16 million office visits and $5.8 billion in annual health care costs.
• Despite consistent recommendations to the contrary, antibiotics are prescribed in more than 80 percent of outpatient visits for acute sinusitis.
MOVE?

Antibiotics

No antibiotics
Behavioral Interventions to Reduce Inappropriate Antibiotic Prescribing: A Randomized Pilot Trial
Stephen D. Persell, MD, MPH, Jason N. Doctor, PhD,
Mark W. Friedberg, MD, MPP, et al., under review, presented with permission of Stephen Persell, MD

• Randomized trial

• All participants took a 20-minute education module on-line about acute upper respiratory infections

• One intervention group received regular feedback: “You are/are not a top performer. You are prescribing too many unnecessary antibiotics.”

• Intervention groups and nonintervention groups had dramatic decreases in unnecessary prescribing.
CDC Core Elements of Hospital Antibiotic Stewardship Programs: A Check List

• J. Time-sensitive automatic stop-orders for specific antibiotic prescriptions?
Antibiotic Alert at 48-72 hours, at NMH – A Work in progress

• Automatic alert for primary team at 7 am following at least 48 hours of active antibiotic orders
  – Only viewed by primary team: attending, resident, intern

• Within the alert, prescriber decides to discontinue or continue active order for antibiotic.

• Planned pilot: timed alerts only for linezolid, IV vancomycin and IV meropenem.
This patient has been receiving IV vancomycin for > 48 hours.

Can this antibiotic be discontinued?
- Yes, discontinue vancomycin
- No, continue vancomycin as currently prescribed

sign  cancel
Conclusions

• Our overuse of antibiotics is a crisis, representing beliefs and behavior that have to change.  
  and
• Stewardship and health care are changing fast  
  but
• Human behavior resists change.
• Thoughtful stewards help prescribers move through the process of change by using what we know about human nature, how we learn and how we behave in response to stimuli.