

# **Improvement Science and Antimicrobial Stewardship**

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# Disclosures

- Grant support: Pfizer Independent Grants for Learning and Change—study comparing prior approval to post-prescription review and feedback
- Consulting: Novartis—infection adjudication committee
- Some of the ideas within may be American-centric!

# Outline

- Use of a change model to implement an antimicrobial stewardship program
- Use of an implementation science model to implement antimicrobial stewardship interventions

# Implementation Science

- Implementation science is the study of methods to promote the integration of research findings and evidence into healthcare policy and practice
- It seeks to understand the behavior of healthcare professionals and other stakeholders as a key variables in the sustainable uptake, adoption, and implementation of evidence-based interventions
- AKA: translation of evidence into practice

# Two Types of Implementation in Antimicrobial Stewardship

- Implementation of the program itself
  - Who is on the team, who supports the team, what data are needed to keep the team alive
- Implementation of interventions to improve antibiotic use
  - Getting prescribers to optimize antibiotic use
- We often expend a lot of energy on starting and maintaining a program and may not put enough energy into thinking through the interventions (but we need to do both)

# **Implementing and Sustaining a Program**

Hospital  
Administration

Prescribers

## Goals of Hospital Administration

- Decrease and control costs
- Optimize patient safety
- Regulatory compliance
- Stay competitive

Include an executive summary  
Use shiny paper

## Argument to Hospital Administration

- Potential for cost-savings/  
reduction in LOS
  - Data from literature
  - Internal data
- Improved patient safety
  - Data
    - Improved antibiotic use
    - Decreased *C. difficile* rates
    - Improved patient level outcomes
  - Active issues in your facility
    - Drug interaction problem
- Ensure compliance with infectious disease regulations
- Importance of offering the same standard of care as competing hospitals



## Goals of Prescribers

- Cure the patient
- Prescribing autonomy
- Optimize patient safety
- Look smart among peers
- Regulatory compliance

Use education as a carrot

Complement good decisions

Be willing to compromise

Recruit thought leaders in different specialties to support and reiterate your message

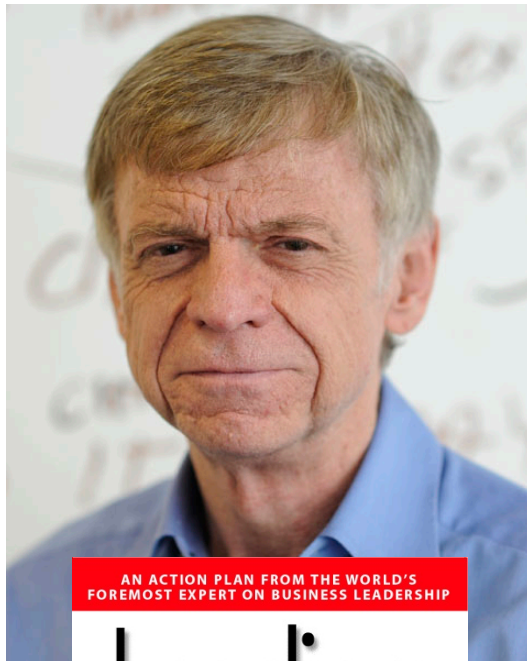
Avoid too many discussions about cost

## Argument to Prescribers

- You are not trying to tell them what to do, you are trying to make their lives better
  - Help with bug/drug mismatch
  - Help with dosing
  - Help with IV to PO switch for earlier discharge
  - Prevent adverse events: drug interactions, allergies, *C. difficile*

# **Use of a Change Model to Implement an Antimicrobial Stewardship Program**

# Change According to John Kotter



AN ACTION PLAN FROM THE WORLD'S  
FOREMOST EXPERT ON BUSINESS LEADERSHIP

## Leading Change



John P. Kotter

HARVARD BUSINESS SCHOOL PRESS

- Institutional change from the business perspective
- Proposed an 8-step model to make things happen
- Demonstrated the model via an allegorical tale of empire penguins who must find a new home because their iceberg is melting

# Kotter's Steps: Managing Change

Step 1: Create a sense of urgency

Step 2: Form a powerful guiding coalition

Step 3: Create a compelling vision for change

Step 4: Communicate the vision effectively

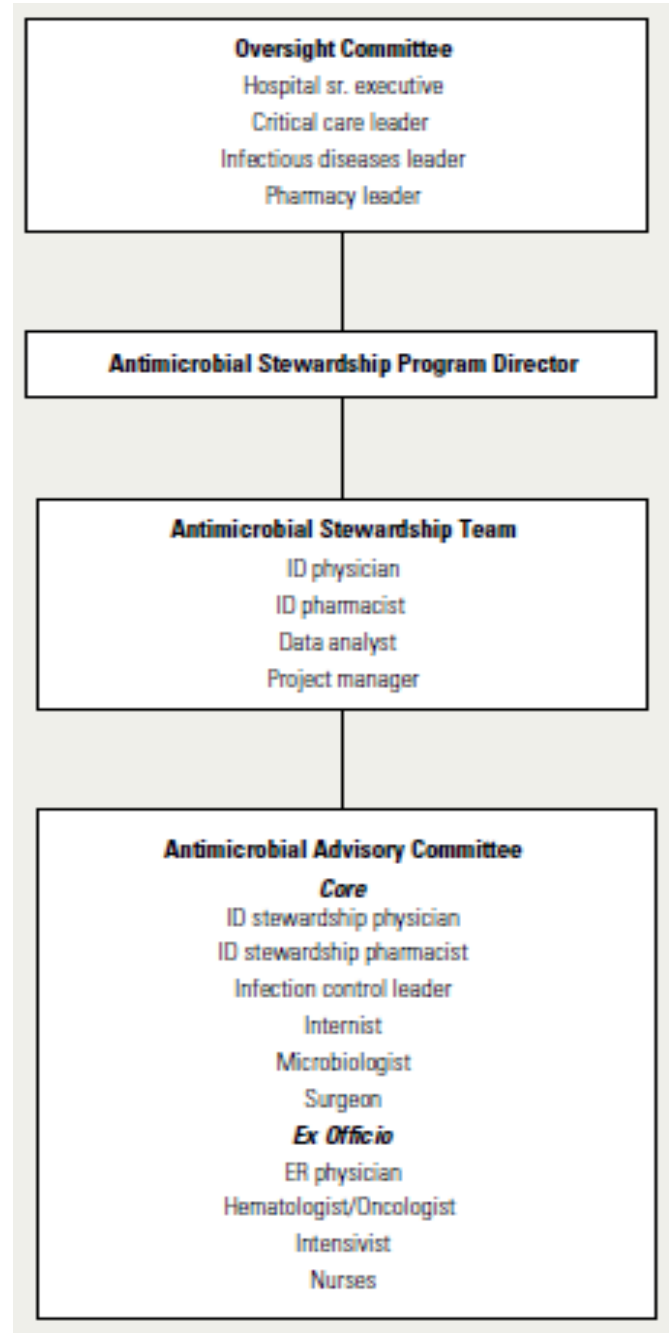
Step 5: Empower others to act on the vision

Step 6: Plan for and create short term wins

Step 7: Consolidate improvements and create still more change

Step 8: Institutionalize new approaches

- **Step 1: Create a sense of urgency**
  - Focus on patient safety and cost with hospital leaders
    - “Our CDI rates are too high and we are hurting patients”
    - “We are not compliant with the publically reported CAP measure and we are not going to win the good compliance award like our competitor”
- **Step 2: Form a powerful guiding coalition**
  - Team of leaders who represent key stakeholders
  - Team member characteristics: position power, expertise, credibility, leadership



- **Step 3: Create a compelling vision for change**
  - Vision statement “Helping patients receive the right antibiotics when they need them”
- **Step 4: Communicate the vision effectively**
  - Communicate to all levels (senior leadership/boards; department heads/unit directors; physicians/prescribers)
  - Communicate regularly
- **Step 5: Empower others to act on the vision**
  - Work with units/teams to develop mutually acceptable approaches
  - Empower non-traditional decision makers
    - Pharmacists
    - Nurses

- **Step 6: Plan for and create short term wins**

- Pick low hanging fruit

- Surgical prophylaxis
- Reduction in vancomycin use

- Recognize the team and the front-line staff as critical in making the changes

“A small win reduces importance (‘this is no big deal’), reduces demands (‘that’s all that needs to be done’), and raises perceived skill level (‘I can do at least that’)”

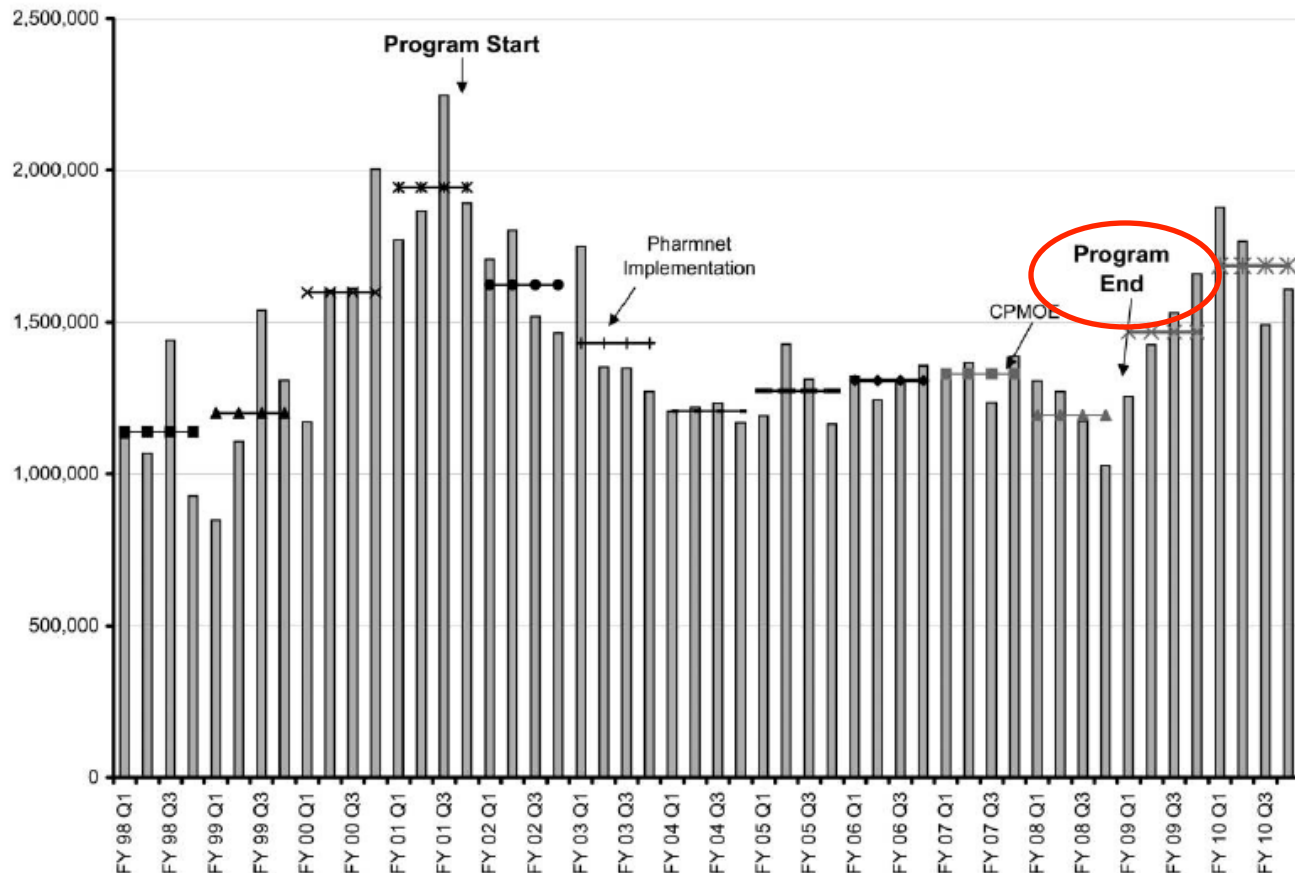
--Karl Weich, Small Wins: Redefining the Scale of Social Problems  
American Psychologist. 1984;39:46.

- **Step 7: Consolidate improvements and create still more change**
- **Step 8: Institutionalize new approaches**
  - Ensure there is institutional understanding of the positive results
  - Strive to have prescribers themselves be stewards of antimicrobials



# An Important Lesson

Antimicrobial Costs by Quarter, FY 98 - FY 10



- We need to teach prescribers to make changes without constant prompting from the stewardship team
- We cannot be in all places at all times

# **Implementation of Interventions to Improve Antibiotic Use**

# Implementation Models

- **Common themes**

- Have a clear and specific goal
- Synthesize and summarize evidence
- Assess barriers
- Make it easy to do the right thing
- Engage emotions
- Measure process and outcomes
- Evaluate successes and failures

## Program Implementation

### Overall concepts

Envision the problem within the larger healthcare system  
Engage collaborative multidisciplinary teams centrally (stages 1-3) and locally (stage 4)

### 1. Summarise the evidence

Identify interventions associated with improved outcomes  
Select interventions with the largest benefit and lowest barriers to use  
Convert interventions to behaviours

### 2. Identify local barriers to implementation

Observe staff performing the interventions  
“Walk the process” to identify defects in each step of implementation  
Enlist all stakeholders to share concerns and identify potential gains and losses associated with implementation

### 3. Measure performance

Select measures (process or outcome)  
Develop and pilot test measures  
Measure baseline performance

### 4. Ensure all patients receive the interventions

Implement the “four Es” targeting key stakeholders from front line staff to executives

#### Engage

Explain why the interventions are important

#### Educate

Share the evidence supporting the interventions

#### Execute

Design an intervention “toolkit” targeted at barriers, standardisation, independent checks, reminders, and learning from mistakes

#### Evaluate

Regularly assess for performance measures and unintended consequences

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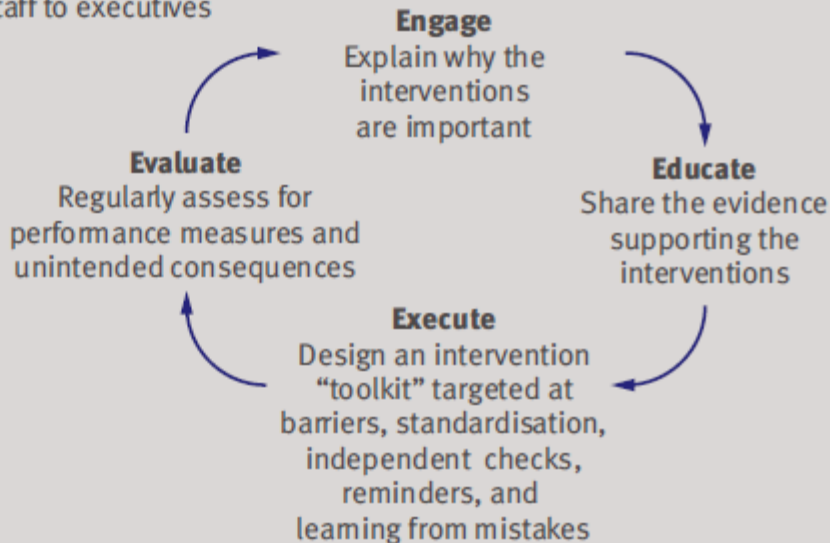
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**Evidence:** hand hygiene, good prep/drape, best site, take lines out

**Behavior:** checklist

**Local barriers:** could not find materials, dressings did not stick, nurses afraid of doctors

**Fixes:** Line cart, new dressing, safety culture training

**Measures:** compliance with process measures; CLABSI rates

### Engage

Make the problem real: harm caused by CLABSI; HCW ideas for improvement

### Educate

Present the evidence

### Execute

Deploy the toolkit  
Regular meetings

### Evaluate

Measurement and feedback  
Recognition and visibility  
Celebrate success  
Assess reasons for failure

## 1. Summarise the evidence

Identify interventions associated with improved outcomes

Select interventions with the largest benefit and lowest barriers to use

Convert interventions to behaviours

- What evidence are we translating into practice?
  - We have significant gaps in actual evidence in infectious diseases/antimicrobial stewardship
    - Where are the data that say you can stop vancomycin if MRSA is not isolated and cefepime when pseudomonas is not isolated?
    - Where are the data that say that you can stop antibiotics if cultures are negative at 48 hours?
  - We have capitalize on the existing literature and develop a research agenda for what is missing

# Some Suggestions

- Good data
  - Non-treatment of asymptomatic bacteriuria
  - Duration of therapy
    - CAP: 3-7 days
    - VAP: 7 days
    - Uncomplicated cystitis: 3-5 days
    - Pyelonephritis: 7 days
    - Cellulitis/skin and soft tissue infection: 5-7 days
    - GI perforation with source control: 1-2 days
- Not good data but common sense (harder)
  - Stop antibiotics when a non-infectious diagnosis is made
  - Narrow antibiotics if certain organisms are not identified

## 2. Identify local barriers to implementation

Observe staff performing the interventions

“Walk the process” to identify defects in each step of implementation

Enlist all stakeholders to share concerns and identify potential gains and losses associated with implementation

- Barriers in implementation of AS interventions
  - Prescribers don't believe the evidence or think their patients are different
    - Repeated conversations
    - Show data that patients are not harmed
  - Our recommendations are too complex or we sound doubtful
    - Make a single recommendation or provide no more than two options
      - Avoid decision paralysis
    - Exude confidence



## **2. Identify local barriers to implementation**

Observe staff performing the interventions

“Walk the process” to identify defects in each step of implementation

Enlist all stakeholders to share concerns and identify potential gains and losses associated with implementation

- **Barriers in implementation of AS interventions**
  - Logistical failures (e.g., didn't know patient was on antibiotics; didn't write down or transmit recommendation correctly)
    - Data and prompts at the point of care
    - Write down specific recommendations

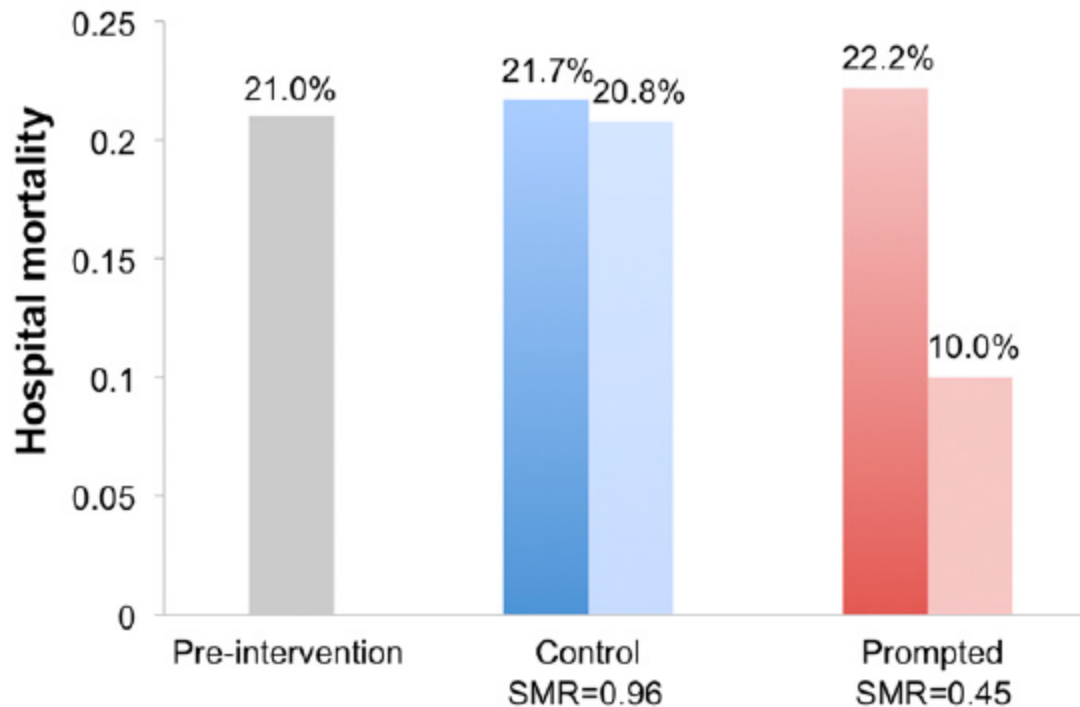
# Checklists and Prompts

- Single MICU study—2 teams
  - Control: checklist alone
  - Study: checklist plus scripted prompting by a resident who did not have patient care responsibilities
  - Pre-intervention period

<b>Pharmacy:</b>	
<b>Antibiotics (Name and Reason, eg. Vancomycin, E)</b> (Empiric, Pneumonia, Line, Abdominal, Urine, Other)	Give initial date and day number
Antibiotic 1: _____	
Antibiotic 2: _____	
Antibiotic 3: _____	
Antibiotic 4: _____	
Antibiotic 5: _____	
DVT prophylaxis (Heparin, Lovenox, SCD, Contraindicated, Other:	
GI prophylaxis	
<b>Physician:</b>	
<b>Ventilator bundle</b>	Give day number
Intubated; initial date:	
	Check = yes
Can patient have daily waking?	
Can patient have weaning trial?	
HOB > 30	
	Fellow, Attending, Planned, No
Family updated within 24 hrs	
Goals/disposition discussed	
Other?	
<b>Clinical Trial enrollment candidate (Give name: ARDS, sepsis, VAP)</b>	
<b>Attending/Fellow Certification</b>	

# Checklists and Prompts

Process Variables	Prompted	Control	p--value
Days of empiric ABX	2	3	0.012
Total ABX	3	3	0.41
Proportion empiric ABX	0.77	0.91	<0.001



### **3. Measure performance**

Select measures (process or outcome)

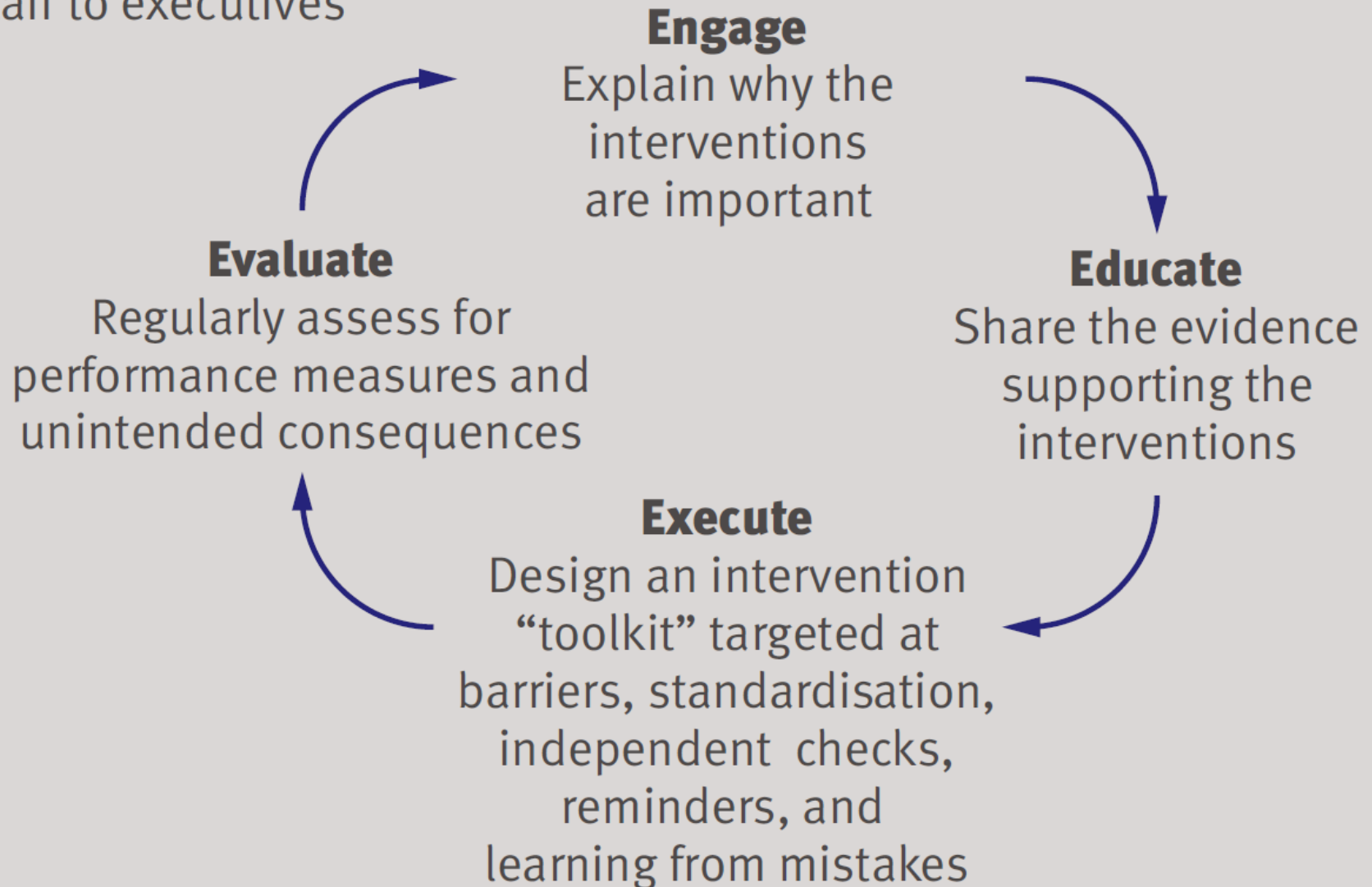
Develop and pilot test measures

Measure baseline performance

- Measure something
- For rapid cycle change, it is okay to show data that shows a trend of improvement
  - It does not have to be publication-ready

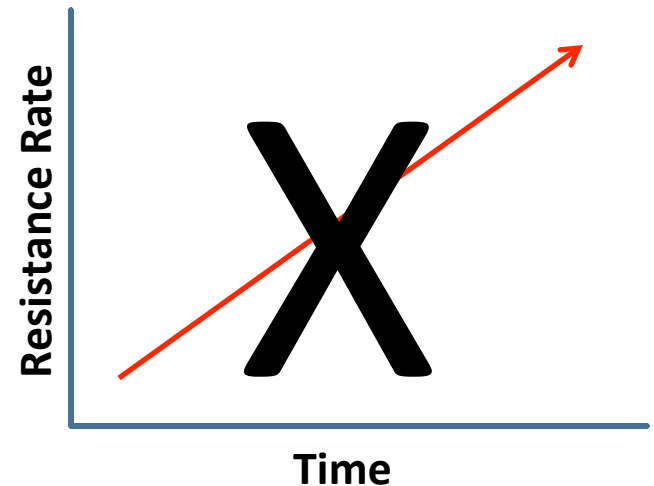
## 4. Ensure all patients receive the interventions

Implement the “four Es” targeting key stakeholders from front line staff to executives



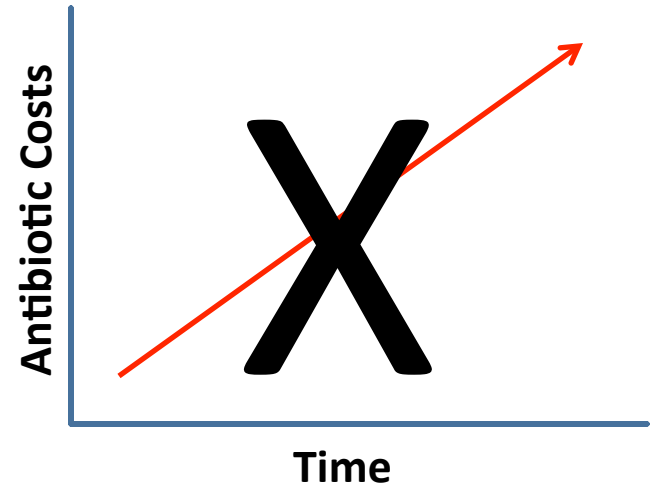
# Engage

- Show why prescribers need to care about antibiotics
  - Abstract stories and data don't work—need to appeal to their emotions
    - Cases of real patients who were harmed
    - Evidence that the *individual* patient can be harmed



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# Fortuitous Events



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## Remainder of Miley Cyrus' U.S. tour postponed due to illness

By Greg Botelho, CNN  
updated 9:32 PM EDT, Fri April 18, 2014

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In a statement, her camp explained that Cyrus got a sinus infection while in North Carolina, then "was prescribed the antibiotic Cephalexin, which she has now suffered an extreme allergic reaction to."

Cyrus said the experience "was so scary... I had been poisoning myself for a week and did not even know it."

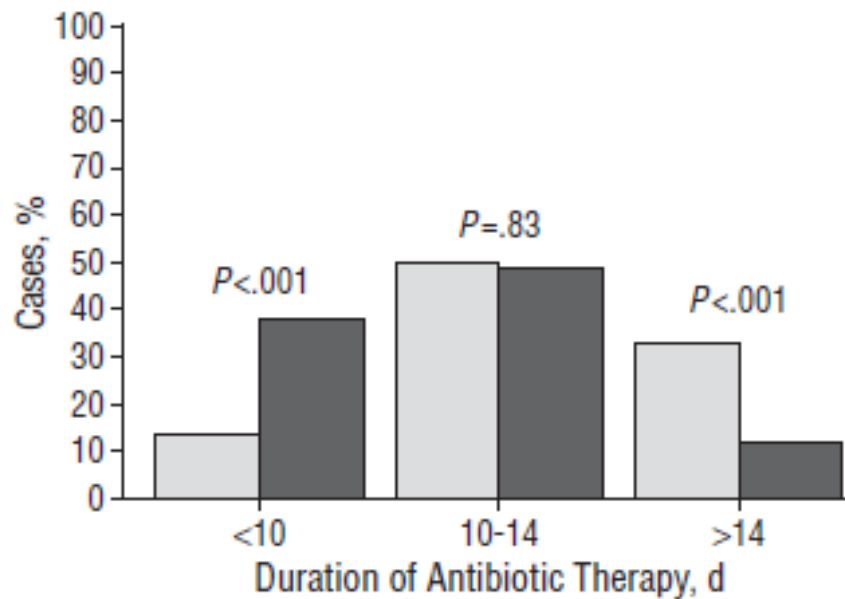


# The Other 3 Es

- Educate
  - Make evidenced-based recommendation available at the point of care
    - Pocket card or book
    - Specific recommendations on the back of a paper checklist
- Execute
  - Decide what should be in the AS toolkit
  - Involve all members of the care team
- Evaluate
  - Data feedback
  - Positive reinforcement
  - Honesty about adverse events

# Intervention to Improve Therapy for Skin and Soft Tissue Infections

- Goals
  - Decrease use of broad spectrum Gram negative coverage for SSTI (particularly pip/tazo)
  - Decrease duration of therapy from baseline median of 13 days
- Approach
  - Data-driven guidelines about empiric therapy and duration of therapy
  - Dissemination of guideline via email, website, postings in nursing stations and work areas
  - Development of an admission order set
  - Educational campaign by designated key physician peer champions from ED, urgent care, medicine, surgery, orthopedic surgery
  - Audit and feedback to peer champions
    - Quarterly data regarding antibiotic use and compliance with guideline



Outcome	All Cases		
	Baseline (n=169)	Intervention (n=175)	P Value
Outpatient follow-up <sup>b</sup>	82 (49)	98 (56)	
Clinical failure	13 (7.7)	13 (7.4)	.93
Treatment failure	4 (2.4)	3 (1.7)	
Recurrence <sup>b</sup>	5 (3.0)	8 (4.6)	
Rehospitalization due to SSTI <sup>b</sup>	8 (4.7)	8 (4.6)	
Rehospitalization <sup>b</sup>	13 (7.7)	9 (5.1)	.33
In-hospital mortality	0	0	
Length of hospital stay, median (IQR), d	4 (3-5)	4 (3-5)	.43 <sup>d</sup>

# Conclusions

- Recognize the different approaches to developing and maintaining stewardship activities in a healthcare setting
  - Institution change vs. individual change
- Consider using described models for change and implementation
- View problems and solutions from a multidisciplinary cultural and human factors perspective and engage staff with expertise in these areas
  - Be open to new approaches regarding team dynamics and behavioral approaches