Antimicrobial Stewardship

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Disclosures

- Merck/Cubist- speakers bureau
- Forest/Actavis/Durata/Allergan- speakers bureau and consultant

Agenda

- Current status of stewardship
  - National landscape
  - LTC
  - LTAC
- Ingredients for a successful program

Department of Defense strategy: an example of coordinated effort to control resistance

- Antimicrobial Resistance Monitoring and Research (ARMoR) program
- Goal: responding to the crisis of escalating antimicrobial resistance
- Launched in 2009
- Funded by the US government ($3.25 million per year)

Lesho et al. Clinical Infectious Diseases 2014; 59 (3):390-397

ARMoR

- Collection and characterization of targeted multidrug-resistant bacteria (over 20,000 isolates archived to date)
- Communication and feedback loops between the branches of the military
- Public reporting within the DoD

ARMoR

- Communication and feedback are key elements of the ARMoR program.
  - Results from the laboratory are relayed back to the submitting hospital
  - Regular summaries report on concerning organisms to hospital and military health system leadership
  - Facility-specific and aggregated summaries are sent to the appropriate leaders and policy makers.

ARMoR

- Believed to have resulted in:
  - earlier detection of outbreaks and emerging pathogens
  - informed the creation and revision of policies
  - improved practice
  - strengthened antimicrobial stewardship programs
  - Program has been credited with a decrease in carbapenem-resistant Enterobacteriaceae, and cessation of outbreaks involving MRSA and colistin-resistant *Acinetobacter* species.

What can we learn from ARMoR?

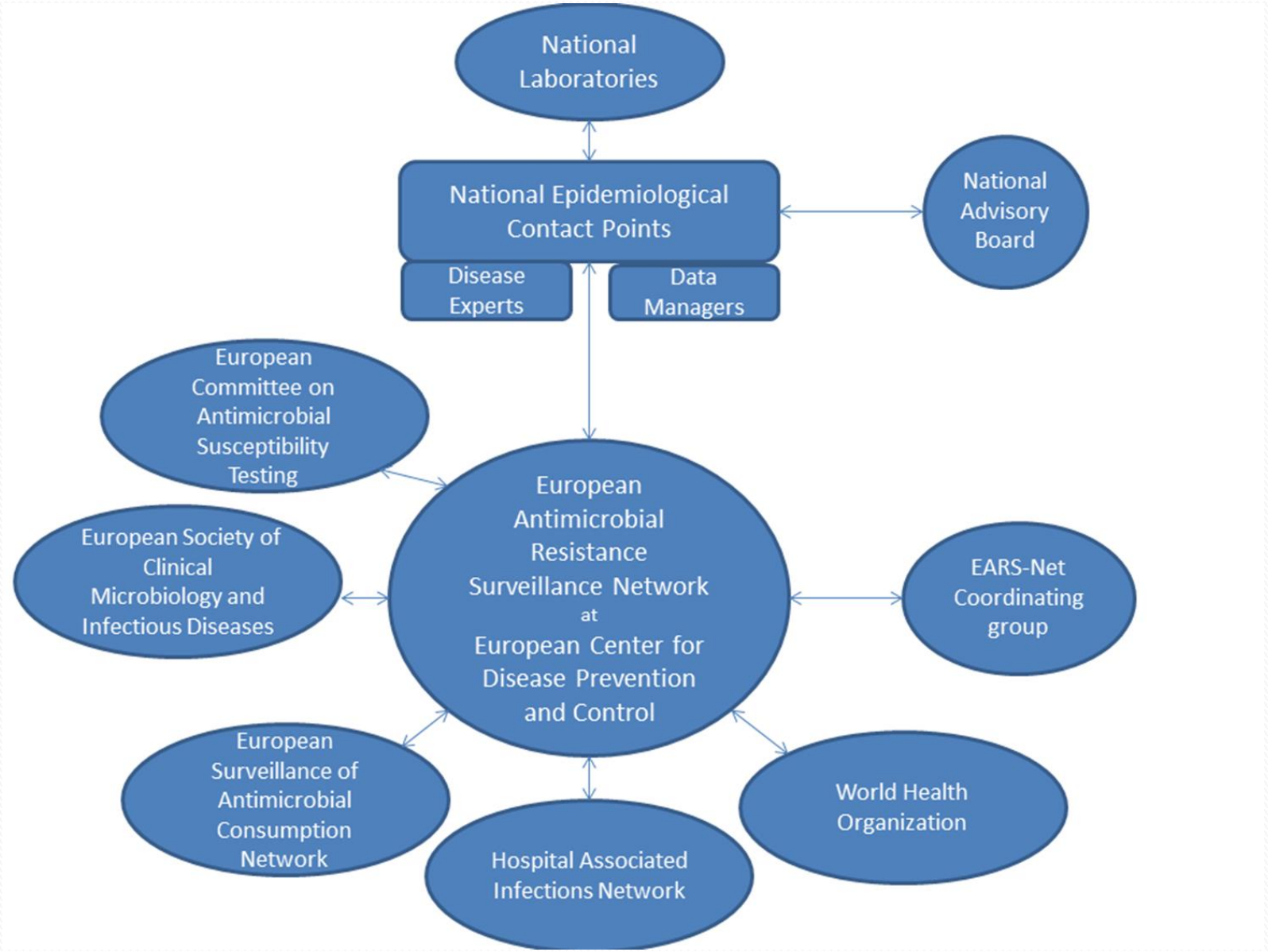
- That surveillance, antibiotic use monitoring and stewardship programs can be integrated, coordinated and useful in real-time

Doron, Boucher. Clinical Infectious Diseases 2014; 59 (3) 398-400

Meanwhile, across the Atlantic…

- The European Commission 2011 Action Plan against the rising threats of antimicrobial resistance:
- The European Centre for Disease Prevention and Control (ECDC) Programme for Antimicrobial Resistance and Healthcare-Associated Infections (ARHAI) is responsible for the coordination of surveillance networks in the EU for AMR, antimicrobial consumption and HAI
- Annual reports and easily accessible online interactive databases provide timely feedback used to strengthen stewardship efforts, and serve to raise awareness about the state of the resistance crisis at the political level, at the national level and at the level of public health officials, researchers and the general public.

Organization of European Antimicrobial Resistance Surveillance Network (EARS-Net)

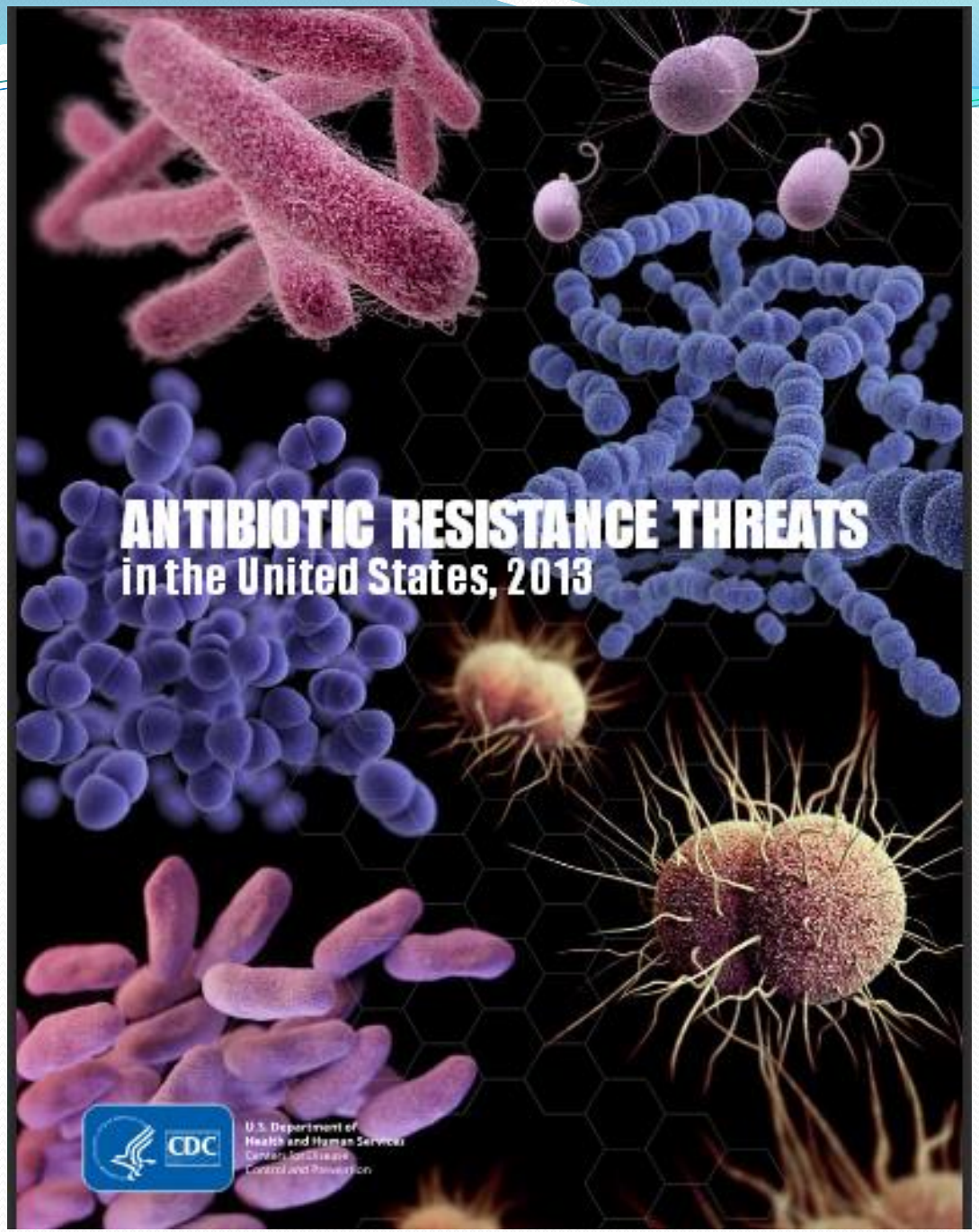



HOPE

NATIONAL ACTION PLAN FOR COMBATING ANTIBIOTIC-RESISTANT BACTERIA

MARCH 2015

THE WHITE HOUSE
WASHINGTON


ANTIBIOTIC RESISTANCE THREATS
in the United States, 2013
CDC
U.S. Department of
Health and Human Services

Urgent Threats

- *Clostridium difficile*
- Carbapenem-resistant Enterobacteriaceae (CRE)
- Drug-resistant *Neisseria gonorrhoeae*

Serious Threats

- Multidrug-resistant *Acinetobacter*
- Drug-resistant *Campylobacter*
- Fluconazole-resistant *Candida* (a fungus)
- Extended spectrum β-lactamase producing Enterobacteriaceae (ESBLs)
- Vancomycin-resistant *Enterococcus* (VRE)
- Multidrug-resistant *Pseudomonas aeruginosa*
- Drug-resistant Non-typhoidal *Salmonella*
- Drug-resistant *Salmonella* Typhi
- Drug-resistant *Shigella*
- Methicillin-resistant *Staphylococcus aureus* (MRSA)
- Drug-resistant *Streptococcus pneumoniae*
- Drug-resistant tuberculosis

Concerning Threats

- Vancomycin-resistant *Staphylococcus aureus* (VRSA)
- Erythromycin-resistant Group A *Streptococcus*
- Clindamycin-resistant Group B *Streptococcus*

TABLE 1: National Targets to Combat Antibiotic-Resistant Bacteria
By 2020, the United States will:
For CDC Recognized Urgent Threats:
Reduce by 50% the incidence of overall *Clostridium difficile* infection compared to estimates from 2011.
Reduce by 60% carbapenem-resistant Enterobacteriaceae infections acquired during hospitalization compared to estimates.
Maintain the prevalence of ceftriaxone-resistant *Neisseria gonorrhoeae* below 2% compared to estimates from 2013.
For CDC Recognized Serious Threats:
Reduce by 35% multidrug-resistant *Pseudomonas spp.* infections acquired during hospitalization compared to estimates from 2011.
Reduce by at least 50% overall methicillin-resistant *Staphylococcus aureus* (MRSA) bloodstream infections by 2020 as compared to 2011.*
Reduce by 25% multidrug-resistant non-typhoidal *Salmonella* infections compared to estimates from 2010-2012.
Reduce by 15% the number of multidrug-resistant TB infections.[1]
Reduce by at least 25% the rate of antibiotic-resistant invasive pneumococcal disease among <5 year-olds compared to estimates from 2008.
Reduce by at least 25%the rate of antibiotic-resistant invasive pneumococcal disease among >65 year-olds compared to estimates from 2008.

* This target is consistent with the reduction goal for MRSA bloodstream infections (BSI) in the *National Action Plan to Prevent Healthcare-Associated Infections (HAI): Road Map to Elimination*, which calls for a 75% decline in MRSA BSI from the 2007-2008 baseline by 2020. Additional information is available at http://www.health.gov/hai/prevent_hai.asp#hai_plan.

[1] The TB activities identified in the NAP are included as they represent critical near-term public health activities that will support progress to reduce the burden of drug-resistant TB in the U.S. Additional domestic and global activities to address drug-resistant TB will be provided in a companion action plan specific to TB and will be submitted to the President no later than September, 2015. The companion action plan will build on recommendations of the Federal TB Task Force (http://www.cdc.gov/mmwr/pdf/rr/rr5803.pdf) as well the work of the interagency USG TB working group.

TABLE 2: GOALS AND OBJECTIVES: Combating Antibiotic-Resistant Bacteria	
GOAL 1: Slow the Emergence of Resistant Bacteria and Prevent the Spread of Resistant Infections	
Objectives	
1.1	Implement public health programs and reporting policies that advance antibiotic-resistance prevention and foster antibiotic stewardship in healthcare settings and the community.
1.2	Eliminate the use of medically-important antibiotics for growth promotion in food- producing animals and bring other agricultural uses of antibiotics, for treatment, control, and prevention of disease, under veterinary oversight.
1.3	Identify and implement measures to foster stewardship of antibiotics in animals.

California- setting the example

- California Senate Bill 739 in 2006 mandated that by January 2008 all general acute care hospitals develop processes for evaluating the judicious use of antibiotics and monitor results
- The California Department of Public Health (CDPH) healthcare associated infections program developed the CDPH ASP initiative in 2010 to assist healthcare facilities in developing these processes

GOAL 2 : Strengthen National One-Health Surveillance Efforts to Combat Resistance Objectives	
2.1	Create a regional public health laboratory network to strengthen national capacity to detect resistant bacterial strains and a specimen repository to facilitate development and evaluation of diagnostic tests and treatments.
2.2	Expand and strengthen the national infrastructure for public health surveillance and data reporting, and wprovide incentives for timely reporting of antibiotic-resistance and antibiotic use in all healthcare settings.
2.3	Develop, expand, and maintain capacity in State and Federal veterinary and food safety laboratories to conduct antibiotic susceptibility testing and characterize select zoonotic and animal pathogens.
2.4	Enhance monitoring of antibiotic-resistance patterns, as well as antibiotic sales, usage, and management practices, at multiple points in the production chain for food animals and retail meat.

GOAL 3: Advance Development and Use of Rapid and Innovative Diagnostic Tests for Identification and Characterization of Resistant Bacteria	
Objectives	
3.1	Develop and validate new diagnostics—including tests that rapidly distinguish between viral and bacterial pathogens and tests that detect antibiotic-resistance—that can be implemented easily in a wide range of settings.
3.2	Expand availability and use of diagnostics to improve treatment of antibiotic-resistant infections, enhance infection control, and facilitate outbreak detection and response in healthcare and community settings.

GOAL 4: Accelerate Research to Develop New Antibiotics, Other Therapeutics, Vaccines, and Diagnostics	
Objectives	
4.1	Conduct research to enhance understanding of environmental factors that facilitate the development of antibiotic-resistance and the spread of resistance genes that are common to animals and humans.
4.2	Increase research focused on understanding the nature of microbial communities, how antibiotics affect them, and how they can be harnessed to prevent disease.
4.3	Intensify research and development of new therapeutics and vaccines, first-in-class drugs, and new combination therapies for treatment of bacterial infections.
4.4	Develop non-traditional therapeutics and innovative strategies to minimize outbreaks caused by resistant bacteria in human and animal populations.
4.5	Expand ongoing efforts to provide key data and materials to support the development of promising antibacterial drug candidates.

GOAL 5: Improve international collaboration and capacities for prevention, surveillance and antibiotic research and development	
Objectives	
Surveillance	
5.1	Promote laboratory capability to identify at least 3 of the 7 WHO priority antimicrobial resistant (AMR) pathogens[2] using standardized, reliable detection assays.
5.2	Collaborate with WHO, OIE, and other international efforts focused on the development of integrated, laboratory-based surveillance to detect and monitor antibiotic-resistance in relevant animal and human foodborne pathogens.
5.3	Develop a mechanism for international communication of critical events that may signify new resistance trends with global public and animal health implications.
5.4	Promote the generation and dissemination of information needed to effectively address antibiotic-resistance.
Research and Development	
5.5	Establish and promote international collaboration and public-private partnerships to incentivize development of new therapeutics to counter antibiotic-resistance including new, next- generation, and other alternatives to antibiotics, vaccines, and affordable, rapidly deployable, point-of-need diagnostics.
Prevention and Control	
5.6	Support countries to develop and implement national plans to combat antibiotic-resistance and strategies to enhance antimicrobial stewardship.
5.7	Partner with other nations to promote quality, safety, and efficacy of antibiotics and strengthen their pharmaceutical supply chains.
5.8	Coordinate regulatory approaches by collaborating with international organizations such as FAO and OIE to harmonize international data submission requirements and risk assessment.

[2] The WHO priority AMR pathogens are a subset of the pathogens identified as urgent and serious threats in Table 3.

CDC checklist for core elements of antimicrobial stewardship

LEADERSHIP SUPPORT	ESTABLISHED AT FACILITY
A. Does your facility have a formal, written statement of support from leadership that supports efforts to improve antibiotic use (antibiotic stewardship)?	❑ Yes ❑ No
B. Does your facility receive any budgeted financial support for antibiotic stewardship activities (e.g., support for salary, training, or IT support)?	❑ Yes ❑ No
ACCOUNTABILITY	
A. Is there a physician leader responsible for program outcomes of stewardship activities at your facility?	❑ Yes ❑ No
DRUG EXPERTISE	
A. Is there a pharmacist leader responsible for working to improve antibiotic use at your facility?	❑ Yes ❑ No
KEY SUPPORT FOR THE ANTIBIOTIC STEWARDSHIP PROGRAM *Does any of the staff below work with the stewardship leaders to improve antibiotic use?*	
B. Clinicians	❑ Yes ❑ No
C. Infection Prevention and Healthcare Epidemiology	❑ Yes ❑ No
D. Quality Improvement	❑ Yes ❑ No
E. Microbiology (Laboratory)	❑ Yes ❑ No
F. Information Technology (IT)	❑ Yes ❑ No
G. Nursing	❑ Yes ❑ No

ACTIONS TO SUPPORT OPTIMAL ANTIBIOTIC USE

POLICIES	POLICY ESTABLISHED
A. Does your facility have a policy that requires prescribers to document in the medical record or during order entry a dose, duration, and indication for all antibiotic prescriptions?	❑ Yes ❑ No
B. Does your facility have facility-specific treatment recommendations, based on national guidelines and local susceptibility, to assist with antibiotic selection for common clinical conditions?	❑ Yes ❑ No

SPECIFIC INTERVENTIONS TO IMPROVE ANTIBIOTIC USE

Are the following actions to improve antibiotic prescribing conducted in your facility?

BROAD INTERVENTIONS	ACTION PERFORMED
C. 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)?	❑ Yes ❑ No
D. Do specified antibiotic agents need to be approved by a physician or pharmacist prior to dispensing (i.e., pre-authorization) at your facility?	❑ Yes ❑ No
E. Does a physician or pharmacist review courses of therapy for specified antibiotic agents (i.e., prospective audit with feedback) at your facility?	❑ Yes ❑ No

PHARMACY-DRIVEN INTERVENTIONS ***Are the following actions implemented in your facility?***	ACTION PERFORMED
F. Automatic changes from intravenous to oral antibiotic therapy in appropriate situations?	❑ Yes ❑ No
G. Dose adjustments in cases of organ dysfunction?	❑ Yes ❑ No
H. Dose optimization (pharmacokinetics/pharmacodynamics) to optimize the treatment of organisms with reduced susceptibility?	❑ Yes ❑ No
I. Automatic alerts in situations where therapy might be unnecessarily duplicative?	❑ Yes ❑ No
J. Time-sensitive automatic stop orders for specified antibiotic prescriptions?	❑ Yes ❑ No

DIAGNOSIS AND INFECTIONS SPECIFIC INTERVENTIONS ***Does your facility have specific interventions in place to ensure optimal use of antibiotics to treat the following common infections?***	ACTION PERFORMED
K. Community-acquired pneumonia	❑ Yes ❑ No
L. Urinary tract infection	❑ Yes ❑ No
M. Skin and soft tissue infections	❑ Yes ❑ No
N. Surgical prophylaxis	❑ Yes ❑ No
O. Empiric treatment of Methicillin-resistant Staphylococcus aureus (MRSA)	❑ Yes ❑ No

P.	Non-C. Difficile infection (CDI) antibiotics in new cases of CDI	❑ Yes ❑ No
Q.	Culture-proven invasive (e.g., blood stream) infections	❑ Yes ❑ No

TRACKING: MONITORING ANTIBIOTIC PRESCRIBING, USE, AND RESISTANCE

PROCESS MEASURES		MEASURE PERFORMED
A.	Does your stewardship program monitor adherence to a documentation policy (dose, duration, and indication)?	❑ Yes ❑ No
B.	Does your stewardship program monitor adherence to facility-specific treatment recommendations?	❑ Yes ❑ No
C.	Does your stewardship program monitor compliance with one of more of the specific interventions in place?	❑ Yes ❑ No

ANTIBIOTIC USE AND OUTCOME MEASURES		MEASURE PERFORMED
D.	Does your facility track rates of C. difficile infection?	❑ Yes ❑ No
E.	Does your facility produce an antibiogram (cumulative antibiotic susceptibility report?	❑ Yes ❑ No

Does your facility monitor antibiotic use (consumption) at the unit and/or facility wide level by one of the following metrics:		MEASURE PERFORMED
F.	By counts of antibiotic(s) administered to patients per day (Days of Therapy; DOT)?	❑ Yes ❑ No
G.	By number of grams of antibiotics used (Defined Daily Dose, DDD)?	❑ Yes ❑ No
H.	By direct expenditure for antibiotics (purchasing costs)?	❑ Yes ❑ No

REPORTING INFORMATION TO STAFF ON IMPROVING ANTIBIOTIC USE AND RESISTANCE

A.	Does you stewardship program share facility-specific reports on antibiotic use with prescribers?	❑ Yes ❑ No
B.	Has a current antibiogram been distributed to prescribers at your facility?	❑ Yes ❑ No
C.	Do prescribers ever receive direct, personalized communication about how they can improve their antibiotic prescribing?	❑ Yes ❑ No

EDUCATION

A.	Does your stewardship program provide education to clinicians and other relevant staff on improving antibiotic prescribing?	❑ Yes ❑ No

THE WALL STREET JOURNAL.

WORK & FAMILY
How Office 'Bad Guys' Handle the Role

Blue Hair, Green Hair, Pink Hair: It's a Tween Thing

PERSONAL TECHNOLOGY
Review: Amazon's $50 Tablet Is the New Paperback

LIFE | HEALTH | HEALTH & WELLNESS

New Push to Stop Overuse of Antibiotics in Nursing Homes

Up to 75% of prescriptions are incorrect as heath officials open a new front in war on overuse

A nurse cares for an elderly woman in a nursing home. *PHOTO: DOCTOR STOCK/GETTY IMAGES*

Stewardship in long term care

CDC A-Z INDEX

Nursing Homes and Assisted Living (Long-term Care Facilities [LTCFs])

CDC

The Core Elements of Antibiotic Stewardship for Nursing Homes

The Core Elements of Antibiotic Stewardship for Nursing Homes adapts the CDC Core Elements of Hospital Antibiotic Stewardship into practical ways to initiate or expand antibiotic stewardship activities in nursing homes. Nursing homes are encouraged to work in a step-wise fashion, implementing one or two activities to start and gradually adding new strategies from each element over time. Any action taken to improve antibiotic use is expected to reduce adverse events, prevent emergence of resistance, and lead to better outcomes for residents in this setting.

NHSN National Healthcare Safety Network
Tracking Infections
LTCF Component

Core Elements of Antibiotic Stewardship for Nursing Homes

- Introduction
- Leadership Commitment
- Accountability
- Drug Expertise
- Take Action through Policy and Practice Change to Improve Antibiotic Use

Antibiotic Stewardship in Nursing Homes

4.1 MILLION

Americans are **admitted to** or **reside in nursing homes** during a year[1]

UP TO **70%**

of nursing home residents **received antibiotics** during a year[2,3]

UP TO **75%**

of antibiotics are **prescribed incorrectly***[2,3]

CDC recommends

7 CORE ELEMENTS

for antibiotic stewardship in nursing homes

Leadership Commitment ● Accountability
Drug Expertise ● Action ● Tracking
Reporting ● Education

*incorrectly = prescribing the wrong drug, dose, duration or reason

[1] AHCA Quality Report 2013.
[2] Lim CJ, Kong DCM, Stuart RL. Reducing inappropriate antibiotic prescribing in the residential care setting: current perspectives. Clin Interven Aging. 2014; 9: 165-177.
[3] Nicolle LE, Bentley D, Garibaldi R, et al. Antimicrobial use in long-term care facilities. Infect Control Hosp Epidemiol 2000; 21:537–45.

Centers for Disease Control and Prevention
National Center for Emerging and Zoonotic Infectious Diseases

Checklist for Core Elements of Antibiotic Stewardship in Nursing Homes

The following checklist is a companion to the Core Elements of Antibiotic Stewardship in Nursing Homes. The CDC recommends that all nursing homes take steps to implement antibiotic stewardship activities. Before getting started, use this checklist as a baseline assessment of policies and practices which are in place. Then use the checklist to review progress in expanding stewardship activities on a regular basis (e.g., annually). Over time, implement activities for each element in a step-wise fashion.

LEADERSHIP SUPPORT	ESTABLISHED AT FACILITY

1. Can your facility demonstrate leadership support for antibiotic stewardship through one or more of the following actions? ❑ Yes ❑ No

   If yes, indicate which of the following are in place (select all that apply)
   - ❑ Written statement of leadership support to improve antibiotic use
   - ❑ Antibiotic stewardship duties included in medical director position description
   - ❑ Antibiotic stewardship duties included in director of nursing position description
   - ❑ Leadership monitors whether antibiotic stewardship policies are followed
   - ❑ Antibiotic use and resistance data is reviewed in quality assurance meetings

ACCOUNTABILITY

2. Has your facility identified a lead(s) for antibiotic stewardship activities? ❑ Yes ❑ No

   If yes, indicate who is accountable for stewardship activities (select all that apply)
   - ❑ Medical director
   - ❑ Director or assistant director of nursing services
   - ❑ Consultant pharmacist
   - ❑ Other:_____

DRUG EXPERTISE

3. Does your facility have access to individual(s) with antibiotic stewardship expertise? ❑ Yes ❑ No

   If yes, indicate who is accountable for stewardship activities (select all that apply)
   - ❑ Consultant pharmacy has staff trained/is experienced in antibiotic stewardship
   - ❑ Partnering with stewardship team at referral hospital
   - ❑ External infectious disease/stewardship consultant
   - ❑ Other:_____

ACTIONS TO IMPROVE USE

4. Does your facility have policies to improve antibiotic prescribing/use? ❑ Yes ❑ No

   If yes, indicate which policies are in place (select all that apply)
   - ❑ Requires prescribers to document a dose, duration, and indication for all antibiotic prescriptions
   - ❑ Developed facility-specific algorithm for assessing residents
   - ❑ Developed facility-specific algorithms for appropriate diagnostic testing (e.g., obtaining

infection
- ❑ Implemented process for communicating or receiving antibiotic use information when residents are transferred to/from other healthcare facilities
- ❑ Developed reports summarizing the antibiotic susceptibility patterns (e.g., facility antibiogram)
- ❑ Implemented an antibiotic review process/"antibiotic time out"
- ❑ Implemented an infection specific intervention to improve antibiotic use
  Indicate for which condition(s):_____

6. Does your consultant pharmacist support antibiotic stewardship activities? ❑ Yes ❑ No

If yes, indicate activities performed by the consultant pharmacist (select all that apply)
- ❑ Reviews antibiotic courses for appropriateness of administration and/or indication
- ❑ Establishes standards for clinical/laboratory monitoring for adverse drug events from antibiotic use
- ❑ Reviews microbiology culture data to assess and guide antibiotic selection

TRACKING: MONITORING ANTIBIOTIC PRESCRIBING, USE, AND RESISTANCE

7. Does your facility monitor one or more measures of antibiotic use? ❑ Yes ❑ No

If yes, indicate which of the following are being tracked (select all that apply)
- ❑ Adherence to clinical assessment documentation (signs/symptoms, vital signs, physical exam findings)
- ❑ Adherence to prescribing documentation (dose, duration, indication)
- ❑ Adherence to facility-specific treatment recommendations
- ❑ Performs point prevalence surveys of antibiotic use
- ❑ Monitors rates of new antibiotic starts/1,000 resident-days
- ❑ Monitors antibiotic days of therapy/1,000 resident-days
- ❑ Other:_____

8. Does your facility monitor one or more outcomes of antibiotic use? ❑ Yes ❑ No

If yes, indicate which of the following are being tracked (select all that apply)
- ❑ Monitors rates of *C. difficile* infection
- ❑ Monitors rates of antibiotic-resistant organisms
- ❑ Monitors rates of adverse drug events due to antibiotics
- ❑ Other:_____

REPORTING INFORMATION TO STAFF ON IMPROVING ANTIBIOTIC USE AND RESISTANCE

9. Does your facility provide facility-specific reports on antibiotic use and outcomes with clinical providers and nursing staff? ❑ Yes ❑ No

If yes, indicate which of the following are being tracked (select all that apply)
- ❑ Measures of antibiotic use at the facility
- ❑ Measures of outcomes related to antibiotic use (i.e., *C. difficile* rates)
- ❑ Report of facility antibiotic susceptibility patterns (within last 18 months)
- ❑ Personalized feedback on antibiotic prescribing practices (to clinical providers)
- ❑ Other:_____

EDUCATION

10. Does your facility provide educational resources and materials about antibiotic resistance and opportunity for improving antibiotic use? ❑ Yes ❑ No

If yes, indicate which of the following are being tracked (select all that apply)
- ❑ Clinical providers (e.g., MDs, NPs, PAs, PharmDs)
- ❑ Nursing staff (e.g., RNs, LPNs, CNAs)
- ❑ Residents and families
- ❑ Other:_____

Prudent Use of Antibiotics in Long Term Care Residents with Suspected UTI:

Massachusetts collaborative

MASSPRO

Massachusetts Coalition
for the
Prevention of Medical Errors

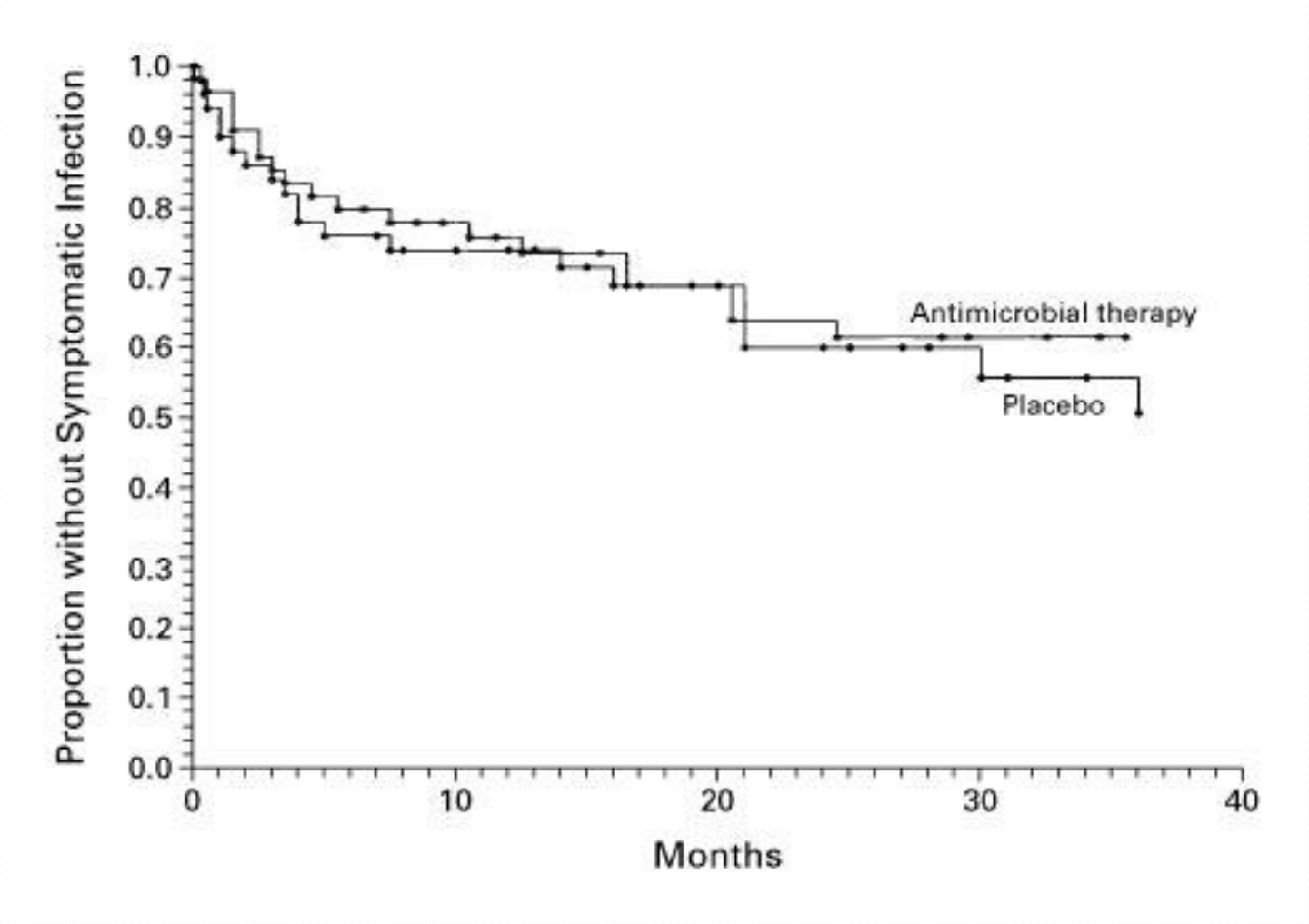
Table 2. Prevalence of asymptomatic bacteriuria in selected populations.

Population	Prevalence, %	Reference
Healthy, premenopausal women	1.0–5.0	[31]
Pregnant women	1.9–9.5	[31]
Postmenopausal women aged 50–70 years	2.8–8.6	[31]
Diabetic patients		
Women	9.0–27	[32]
Men	0.7–11	[32]
Elderly persons in the community[a]		
Women	10.8–16	[31]
Men	3.6–19	[31]
Elderly persons in a long-term care facility		
Women	25–50	[27]
Men	15–40	[27]
Patients with spinal cord injuries		
Intermittent catheter use	23–89	[33]
Sphincterotomy and condom catheter in place	57	[34]
Patients undergoing hemodialysis	28	[28]
Patients with indwelling catheter use		
Short-term	9–23	[35]
Long-term	100	[22]

[a] Age, ≥70 years.

Clinical Infectious Diseases 2005;40:643-54.

Proportion of Women with Diabetes Who Remained Free of Symptomatic Urinary Tract Infection, According to Whether They Received Antimicrobial Therapy or Placebo at Enrollment.



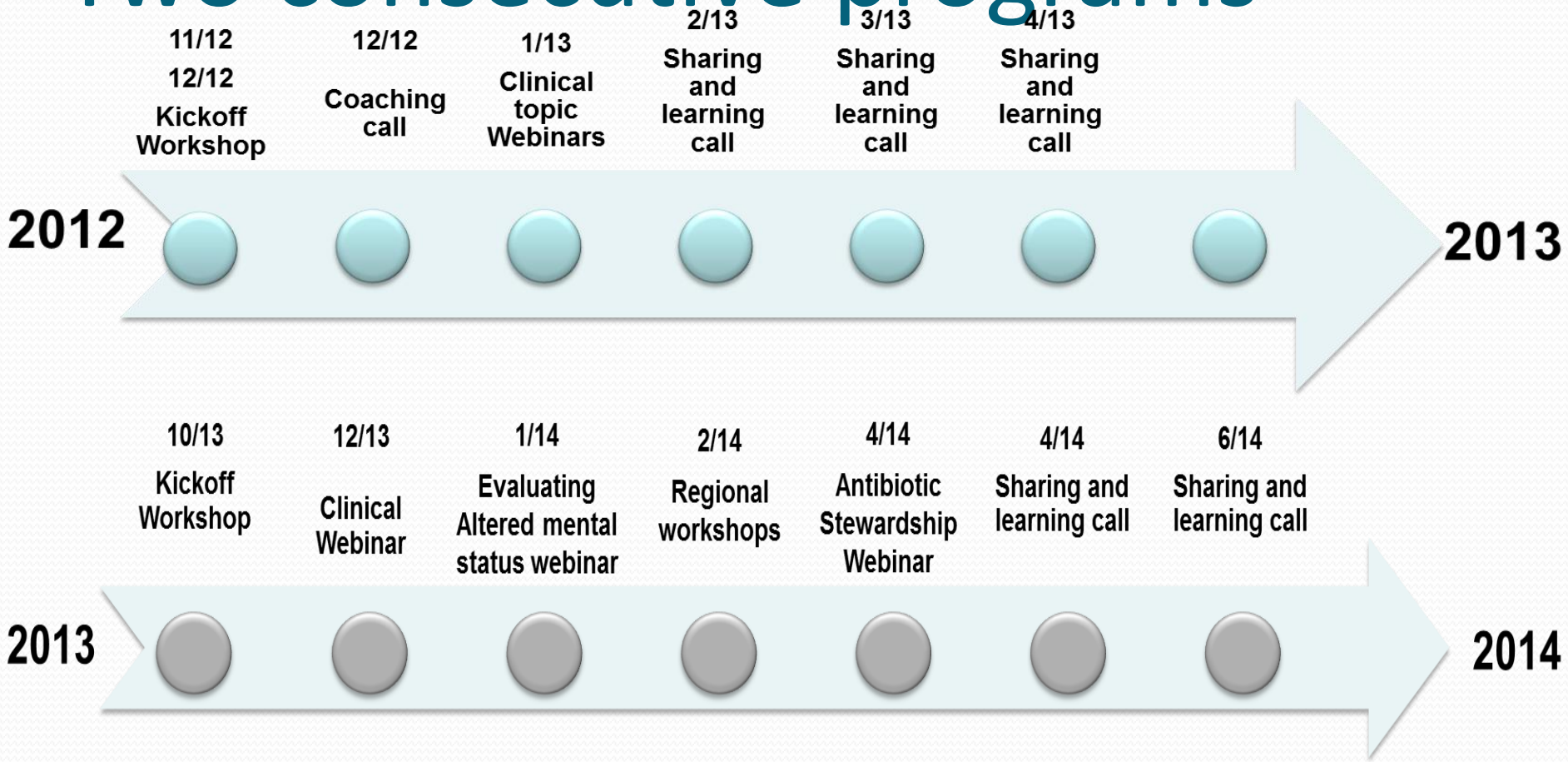
Harding GK et al. N Engl J Med 2002;347:1576-1583.

The NEW ENGLAND JOURNAL of MEDICINE

Goals of the initiative

- Improve evaluation and treatment of urinary tract infection.
- Decrease treatment for asymptomatic bacteriuria.
- Use clinical quality improvement tools for decision support.
- Communicate with patients and their loved ones for safer care.

Two consecutive programs



Round table discussions

ABCs for Diagnosing Urinary Tract Infection in Long Term Care

Resident Name:_____ Date/Time:_____

Nurse:_____ MD/NP/PA:_____

Diagnosis of Urinary Tract Infection (UTI) in long term care resident requires clinical signs and symptoms of UTI and a positive culture.

Assessment: Clinical Signs and Symptoms of UTI[1]

☐ CHECK HERE IF CRITERIA ARE MET FOR SIGNS OR SYMPTOMS

Resident without indwelling catheter*

- ☐ **Acute dysuria alone OR**
- ☐ **Fever + at least one of the symptoms below (new or increased) OR**
- ☐ **If no fever, at least two of the symptoms below (new or increased)**
  - ☐ Urgency
  - ☐ Frequency
  - ☐ Suprapubic pain
  - ☐ Gross hematuria
  - ☐ Costovertebral angle (CVA) pain or tenderness
  - ☐ Urinary incontinence

*Mental status changes alone are not specific enough to identify symptomatic urinary tract infection. See reverse side for alternative causes.

OR

Resident with indwelling catheter

- ☐ **At least one of the symptoms below (new or increased)**
  - ☐ Fever
  - ☐ Costovertebral angle (CVA) pain or tenderness
  - ☐ Rigors (shaking chills)
  - ☐ Delirium
  - ☐ Flank pain (back, side pain)
  - ☐ Pelvic discomfort
  - ☐ Acute hematuria
  - ☐ Malaise or lethargy with no other cause

Blood Pressure_____ Pulse_____ Temperature_____ Respiratory Rate_____

☐ Fever *(oral > 100°F or any site > 2°F above baseline or repeated oral > 99°F / rectal >99.5°F)*

Bacteria (Order urinalysis and culture & sensitivity if above criteria are met)

Collect clean voided specimen if possible; in and out catheter if necessary. For residents with chronic indwelling Foley catheter, change catheter; send urine obtained from new catheter.

Consider CBC, BMP if clinically indicated (e.g., lethargy, fever). The presence of an elevated WBC count suggests infection, with or without a fever.

Urinalysis			**Culture and sensitivity**
Nitrite	☐ Positive	☐ Negative	☐ Positive urine culture: Clean catch specimen: ≥ 10^5 cfu/mL with ≤ 2 organisms Catheterized specimen (straight cath or newly placed indwelling cath): ≥ 10^2 cfu/mL with ≥ 1 organism
Leukocyte esterase	☐ Positive	☐ Negative	
Pyuria	☐ > 10 WBC urinalysis		☐ Negative urine culture

Care Plan

Criteria met for UTI symptoms AND positive urine culture →	☐ Review for treatment with antibiotics ☐ Monitor vital signs ☐ Monitor fluid intake and increase if indicated
Criteria not met for UTI symptoms (with or without a positive urine culture) →	☐ Review for alternate diagnosis ☐ Monitor vital signs and symptoms ☐ Monitor fluid intake and increase if indicated ☐ Re-evaluate if above criteria for symptomatic UTI emerge

AT ANY POINT, re-evaluate and review with MD/NP/PA, if symptoms progress or if the resident has any of the following: Fever > 100.5° F, heart rate > 100 or < 50, RR > 28/min or < 10/min, BP < 90 or > 200 systolic, oxygen saturation < 90%, finger stick glucose < 70 or > 300, unable to eat or drink.

Prior to treatment consider review:

Advance directives for limiting treatment (especially antibiotics):	☐ NO	☐ YES
Medication Allergies:	☐ NO	☐ YES
The resident is on warfarin (Coumadin)	☐ NO	☐ YES

Possible causes for mental status changes include:

- Constipation
- Pain
- Dehydration
- Medication or dose change
- Hypoxia
- Infections such as pneumonia
- Hypo/hyperglycemia
- Urinary retention
- Environmental triggers

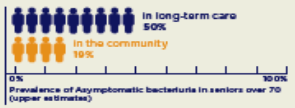
NOTES

Clinician Education Sheet

Mass. Infection Prevention Partnership
Prepared for Massachusetts long term care facilities

Treating Asymptomatic Bacteriuria: All harm, No Benefit

High Prevalence of Asymptomatic Bacteriuria
- The bladder is normally colonized in many elderly people
- A positive urinalysis or culture in the absence of symptoms reveals **colonization, not infection**
- Treatment of asymptomatic bacteriuria is **not recommended**



It's Hard to Ignore A Positive Test

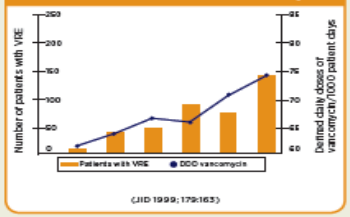
Habitual Testing + Prevalent Colonization = Unnecessary prescriptions & missing the real diagnosis


Unnecessary Rx and Missed Diagnoses Harm Patients
- Drug-drug interactions
- Renal & other complications
- Increase of multi-drug resistant bacteria
- *C. difficile* infection
- Nausea and vomiting
- Drug allergies
- Missing the real diagnosis


Myth	Fact
Positive urine culture and abnormal urinalysis (positive nitrates or leukocytes, increased white blood cells or pyuria) always indicates a urinary tract infection and requires antibiotics.	• Positive urine culture and abnormal urinalysis in a resident without symptoms is consistent with asymptomatic bacteriuria – that is, colonization – not infection. Treatment with antibiotics is not indicated.
Positive urine culture in resident with chronic indwelling catheter always indicates a urinary tract infection and requires antibiotics.	• A chronic indwelling catheter is associated with bacteriuria 100% of the time. There is no need to treat unless the resident has symptoms of a UTI.
Elderly residents often have a urinary tract infection with no symptoms except a change in mental status or delirium.	• A change in mental status or delirium is a non-specific symptom and may accompany a change in condition such as dehydration, constipation, adverse drug effect, pneumonia, urinary retention, metabolic problems, head trauma, environmental changes, or sensory deprivation. • Mental status change requires an exploration of alternative causes and may not require antibiotics for UTI unless there are more specific signs or symptoms that point to that diagnosis.
In an elderly population, urinary tract infections often present with nonspecific symptoms (e.g., falls, functional decline).	Nonspecific symptoms can be seen in many conditions such as dehydration or adverse drug effect. Diagnosing and treating UTIs based on these nonlocalizing symptoms not only results in inappropriate antibiotic use; it also completely misses the real diagnosis.
Cloudy or malodorous urine is always diagnostic of a urinary tract infection.	These changes may be seen in asymptomatic bacteriuria. Other causes can include dehydration, certain medications and diet.

Dangers of Unnecessary Antibiotics

Using Antibiotics Breeds Resistance in Your Patients and the Community



(JID 1999; 179:163)

Infection with Resistant Bacteria Increases Risk of Death

Antibiotic-resistant vs. non-resistant *Klebsiella* bacteria

(ICHE 2008; 29:1009-1108)

Do Not Test, Do Not Treat Asymptomatic Bacteriuria[1]

Criteria for Urine Testing

Resident without indwelling catheter

☐ **Acute dysuria alone OR**

☐ **Fever + at least one of the symptoms below (new or increased) OR**

☐ **If no fever, at least two of the symptoms below (new or increased)**
- ☐ Gross hematuria
- ☐ Urinary incontinence
- ☐ Urgency
- ☐ Suprapubic pain
- ☐ Costovertebral angle tenderness
- ☐ Frequency

Resident with indwelling catheter

☐ **At least one of the symptoms below (new or increased)**
- ☐ Fever
- ☐ Pelvic discomfort
- ☐ Flank pain (back, side pain)
- ☐ Malaise or lethargy no other cause
- ☐ Costovertebral angle (CVA) tenderness
- ☐ Rigors (shaking chills)
- ☐ Delirium
- ☐ Acute hematuria

No symptoms of UTI
- Do not test urine
- Do not treat if a urine test was done by someone else or for "routine"

Weakness, delirium, or fever without a focus
- Individualize care
- Be mindful of the presence of asymptomatic bacteriuria
- Seek other causes

Specific UTI symptoms
- Test or treat as usual

Challenges	Strategies for practice change
The resident's family wants a urine test and antibiotic treatment in the setting of asymptomatic bacteriuria.	• Educate the family about the prevalence of asymptomatic bacteriuria, and tell them you do not suspect UTI on clinical grounds. • Emphasize the dangers of antibiotic overuse.
We've always ordered urine cultures for nonspecific problems in residents with dementia.	• There are many potential causes for nonspecific changes in status and thorough evaluation is needed. • Residents in long-term care frequently have positive urine cultures, even when they are well.
It is okay to give an antibiotic even if it may not be needed. Better safe than sorry.	• Antibiotics can cause adverse drug reactions, *C. difficile* infection, and promote the emergence of multi-drug resistant organisms. They should not be administered unless clinically indicated.
It is hard to ignore a positive urine test even when done for no clearly apparent reason.	• Treatment decisions should not be made based on test results alone. • Evaluate the resident clinically and consider a period of observation.

References: [1] CID 2010;50:625-663; CID 2000;48:148-171; ICHE 2001;22:120-124 CID 2005;40:643-54

Massachusetts Infection Prevention Partnership
Massachusetts Coalition for the Prevention of Medical Errors, Massachusetts Department of Public Health, Massachusetts Senior Care Association, Masspro

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Resident/Family Brochure

Adapted by the
*Massachusetts Infection Prevention Partnership**

Massachusetts Coalition for the Prevention of Medical Errors

MASSACHUSETTS SENIOR CARE ASSOCIATION

When Do You Need An Antibiotic?

Taking antibiotics when you don't need them is like leaving the lights on all the time.

- The lights may burn out, leaving you in the dark when you most need them.
- If you use antibiotics when you don't need them, they may not work when you get sick.

Read more inside...

Antibiotics: Powerful Drugs, But Only When Used For The Right Reasons.

Antibiotic drugs are strong medicine that can save lives when used appropriately to treat bacterial infections. Overuse of antibiotics can cause problems for individuals and for the health of the community. It is important for us all that these powerful drugs are used only when they can help, so they will work when we really need them.

Overusing Antibiotics Can Cause Problems.

How can antibiotics hurt you?

Antibiotic drugs can save lives but using antibiotics can cause problems too. Older people have more side effects from medicines, which can cause problems all over the body.

Antibiotics can:

- Cause nausea and vomiting.
- Cause diarrhea, including the kind due to *C. difficile* that can lead to severe symptoms.
- Cause rash or other allergic reactions.
- Harm your kidneys.
- Create bacteria that are resistant to antibiotics.

What is "antibiotic resistance"?

Antibiotics normally work by killing germs called bacteria. Sometimes not all of the germs are killed. The strongest ones are left to grow and spread. A person can get sick again, and this time the germs are harder to kill because the antibiotics no longer work. This is called resistance and makes some infections very hard to control.

Resistance can make you sick longer, and need more doctor visits and drugs that are even stronger. The more often you use an antibiotic, the greater the chance that the germs will become resistant.

Bottom Line

Results

- Year 1
  - 36 facilities participated
  - 17 submitted data
  - 371,204 resident days compared to baseline period with 246,045 resident days
- Year 2
  - 32 facilities participated
  - 25 submitted data (12 new, 13 returning)
  - 301,379 resident days compared to baseline period with 145,448 resident days

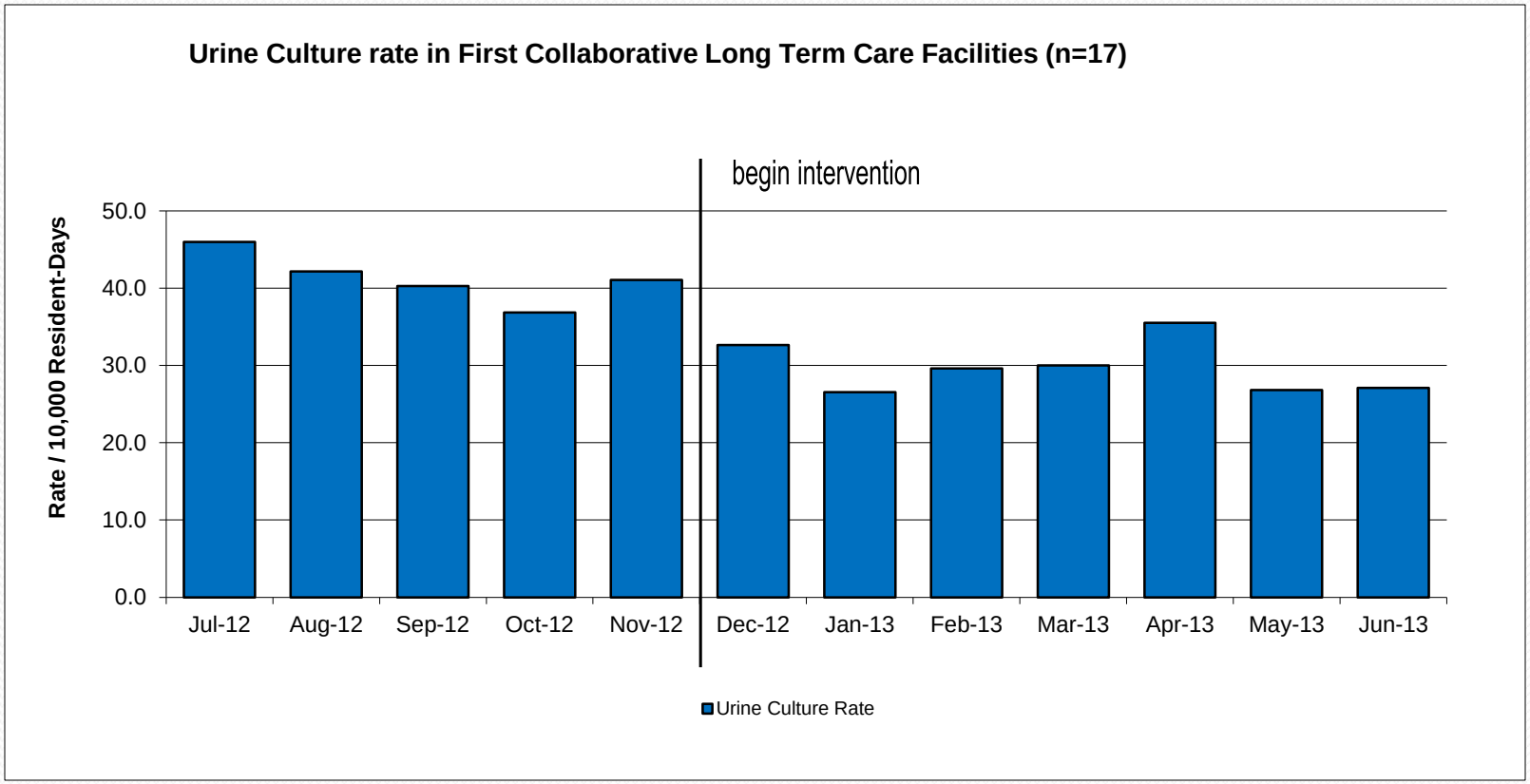
Measured outcomes

- Rate of urine culture
  - Number of urine cultures sent per 10,000 resident days
- Rate of UTI diagnosis (by clinician)
  - Number of UTI diagnoses (new, not recurrent, treated) per 10,000 resident days

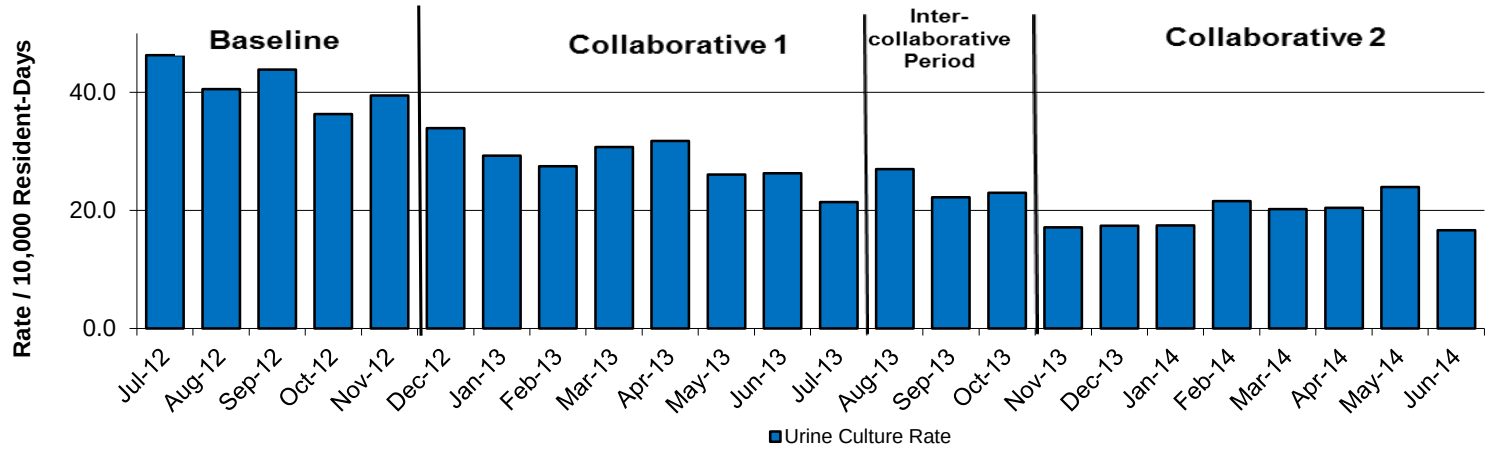
Measured outcomes

- *C. diff* rate
  - Number of *C. diff* diagnoses made per 10,000 resident days (infection that developed on or after the beginning of the 4th day of admission starting at 12:01 am or within 28 days of discharge to the community)

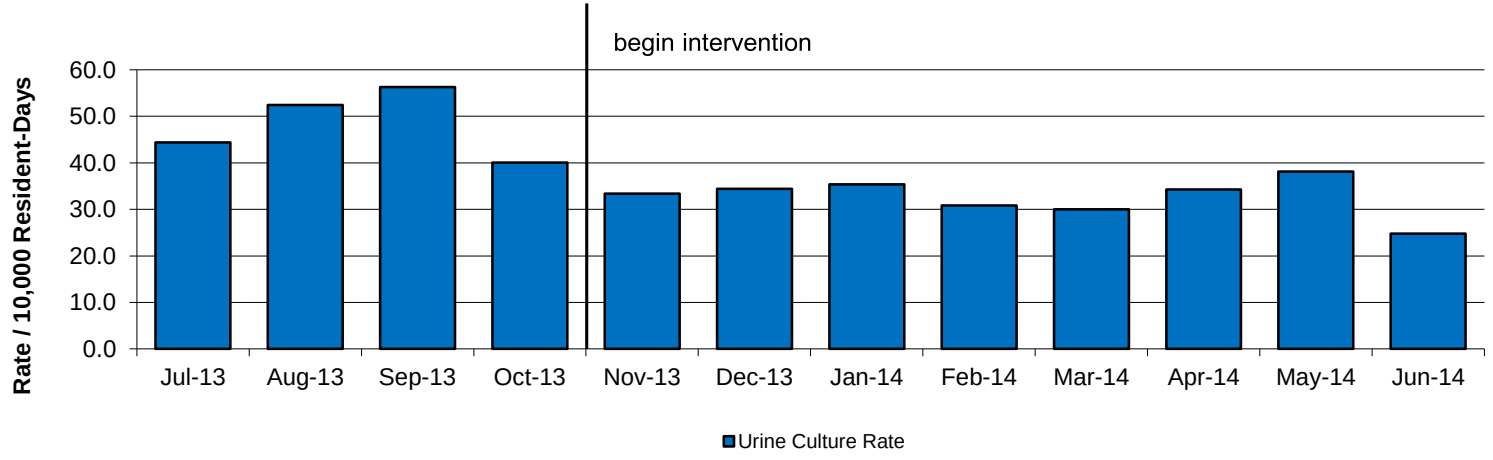
Results


Urine Culture rate in First Collaborative Long Term Care Facilities (n=17)
begin intervention
Rate / 10,000 Resident-Days
50.0
40.0
30.0
20.0
10.0
0.0
Jul-12
Aug-12
Sep-12
Oct-12
Nov-12
Dec-12
Jan-13
Feb-13
Mar-13
Apr-13
May-13
Jun-13
Urine Culture Rate

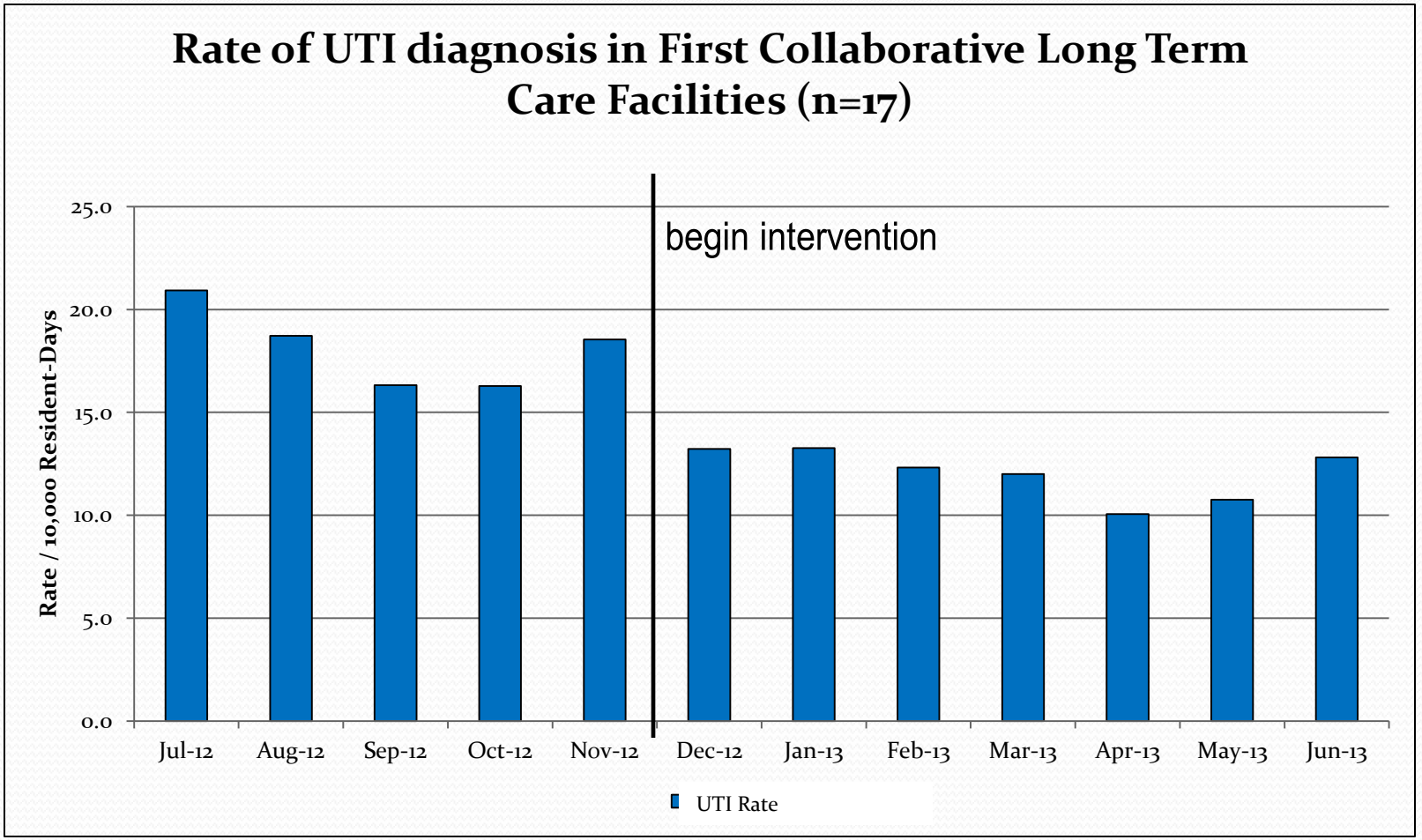
Urine Culture rate in Continuing Second Collaborative Long Term Care Facilities (n=12)



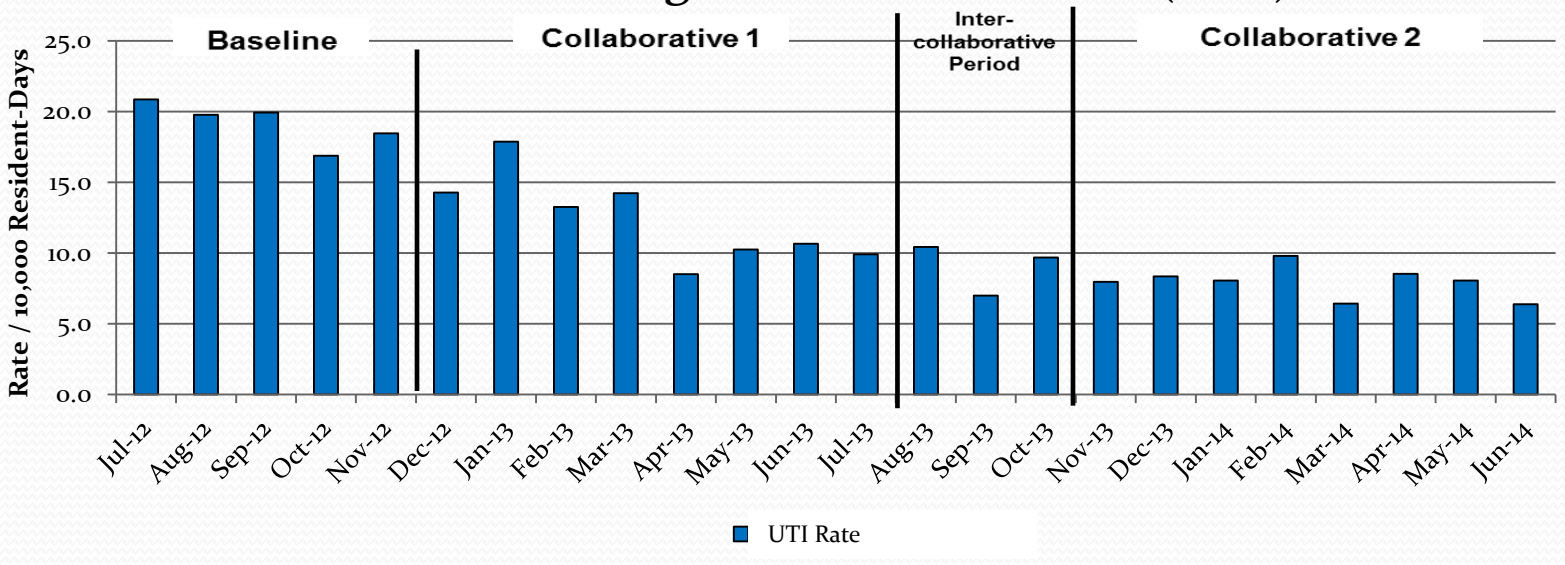
Urine Culture rate in New Second Collaborative Long Term Care Facilities (n=13)



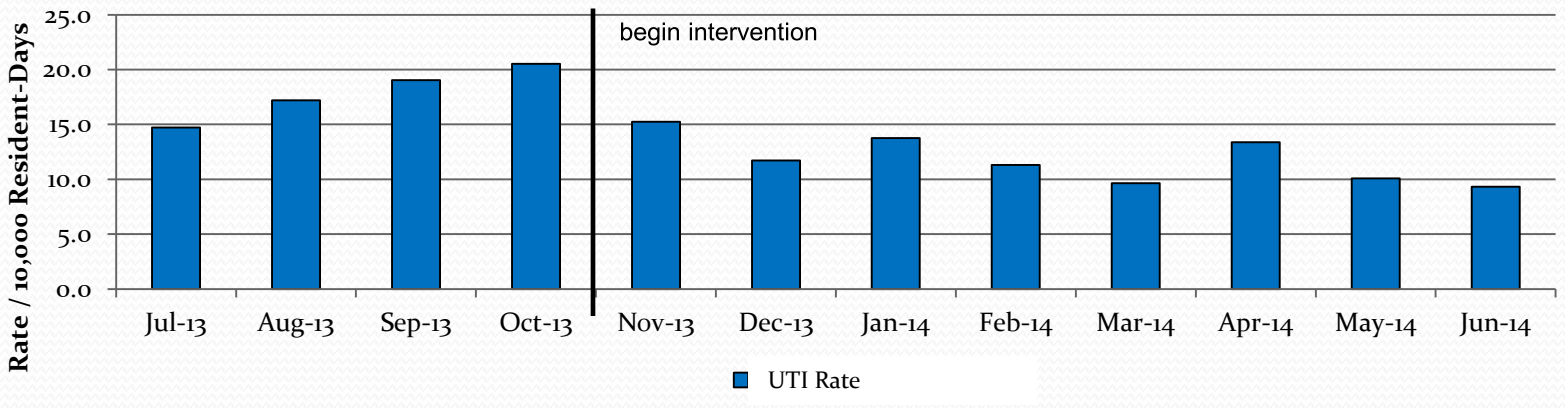
Results


Rate of UTI diagnosis in First Collaborative Long Term Care Facilities (n=17)
Rate / 10,000 Resident-Days
25.0
20.0
15.0
10.0
5.0
0.0
begin intervention
Jul-12
Aug-12
Sep-12
Oct-12
Nov-12
Dec-12
Jan-13
Feb-13
Mar-13
Apr-13
May-13
Jun-13
UTI Rate

Rate of UTI diagnosis in Continuing Second Collaborative Long Term Care Facilities (n=12)



Rate of UTI diagnosis in New Second Collaborative Long Term Care Facilities (n=13)

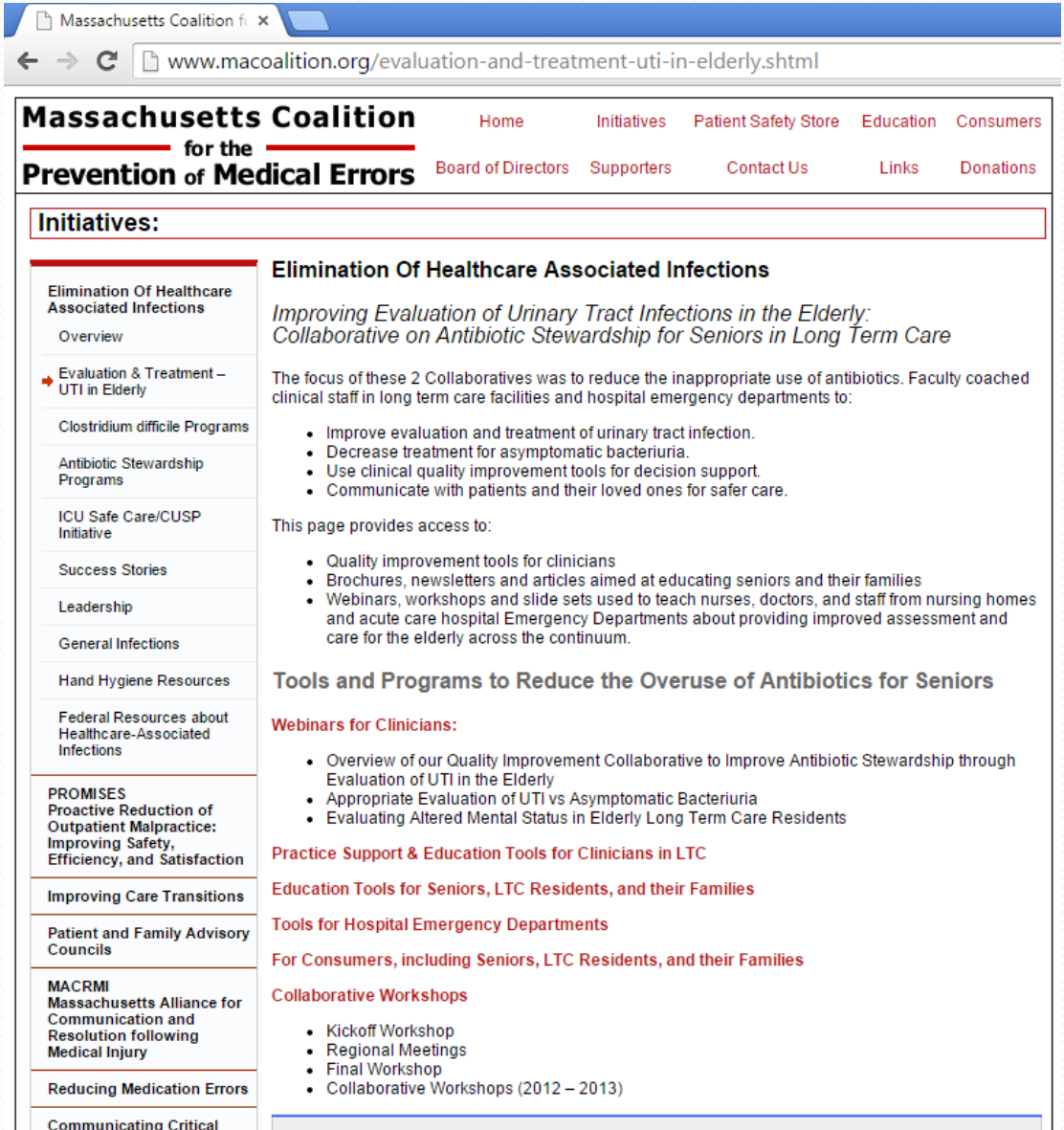


Results: Cdiff

Measure, IRR (95% CI)	1st Collaborative Experience (n=17)	Continuing Facility 2nd Collaborative Experience (n=12)	New Facility 2nd Collaborative Experience (n=13)
C. difficile IRR	0.55 (0.39 - 0.78)	0.85 (0.45 - 1.68)	0.64 (0.33 - 1.28)

Resources

- www.macoalition.org/uti-elderly-tools



Acknowledgements

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- The team: Susanne Salem-Schatz, Ruth Kandel, Danny Pallin, Nora McElroy, Barbara Bolstorff, Eileen Mchale, Al DeMaria, Paula Griswold, Irene Campbell, Laurie Herndon, Sharon Benjamin and others

New England Sinai Hospital: a successful ASP at a LTACH

The program

- Worked with leadership, ID consultant, IP, Pharmacy director
- End date and indication required by pharmacy for all antimicrobials
- List of the “great eight” antimicrobials
- Tufts MC ID physician or ID PharmD, off-site, M-F
- Log on and generate report: patients on antimicrobials at least 7 days
- Review electronic medical records
- Recommendations made by email
- Clinical pathways

Analysis

- From April 2011 through March 2014
- 885 recommendations on 734 patients
- AS staff spent approximately 1-2 hours per week reviewing cases and providing recommendations remotely
- Residents:
  - mean age of 68 years (SD ±34)
  - median length of stay of 56 days

Type of Infection

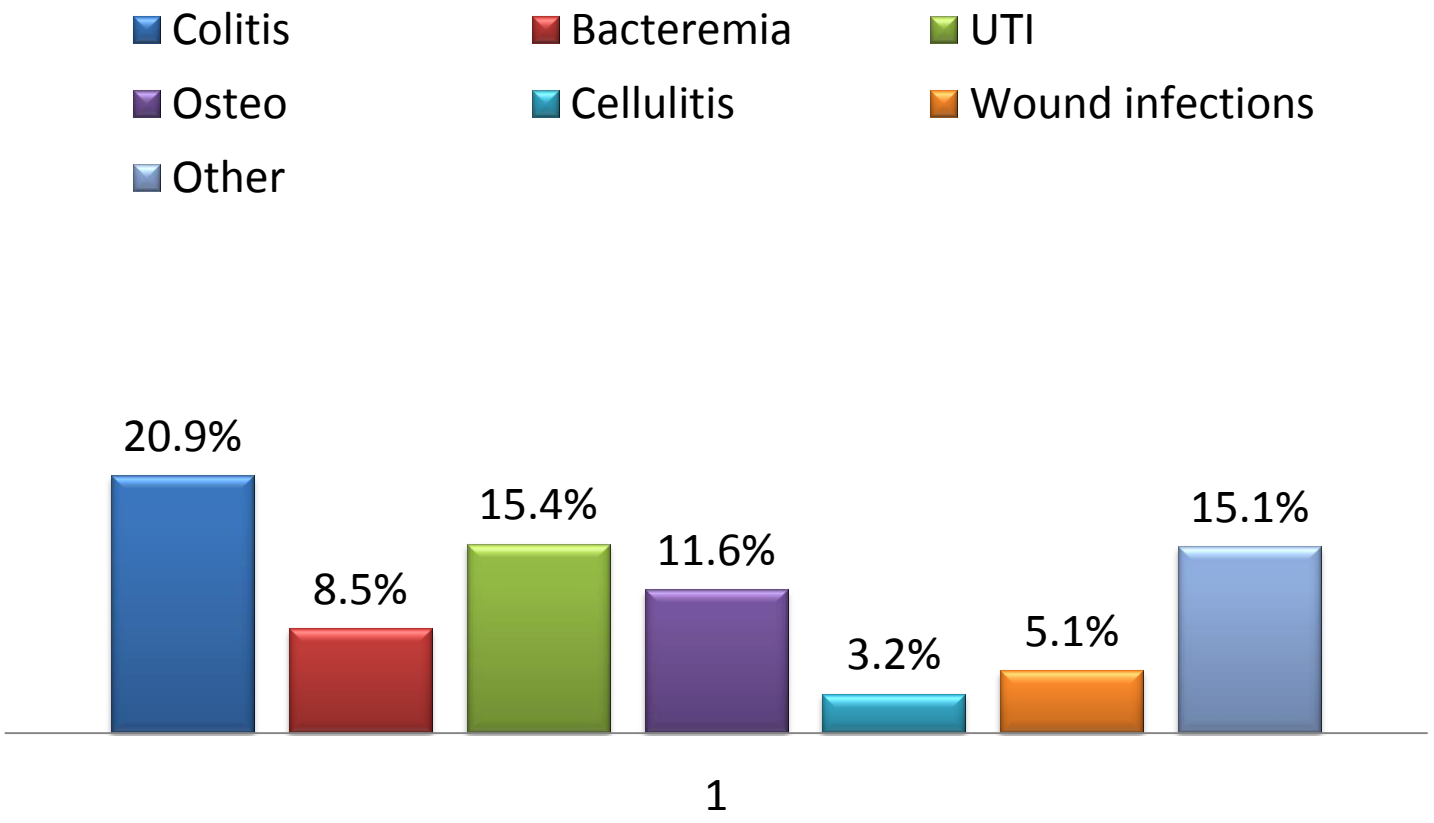
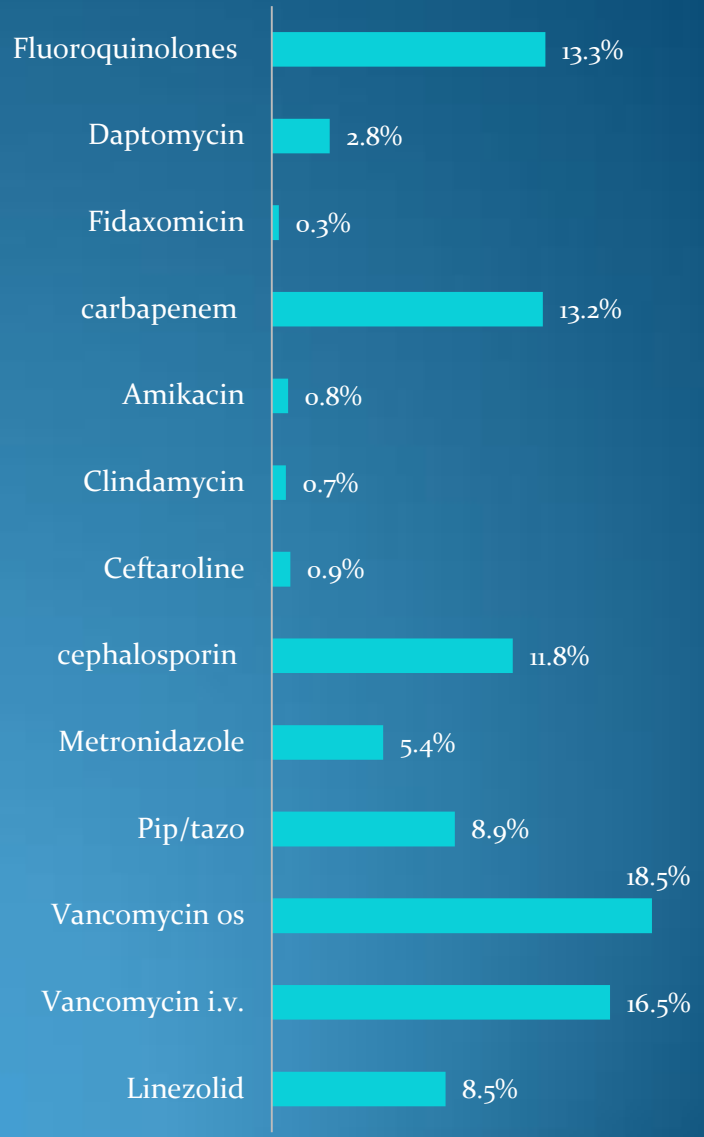


Table 1. Type of Isolates

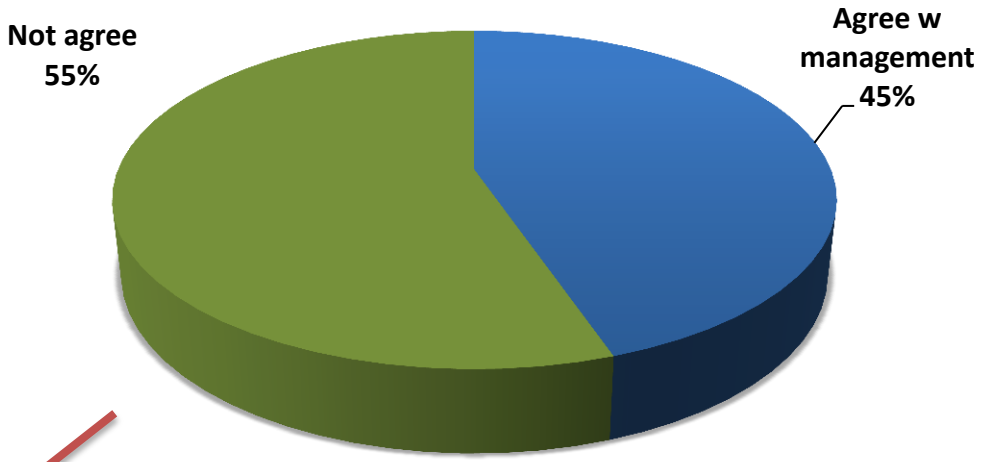
Isolate	n (%)
C. Difficile	183 (20.7)
P. aeruginosa	142 (16.0)
MRSA	119 (13.4)
ESBL	43 (4.9)
E. coli	36 (4.1)
VRE	28 (3.2)
MSSA	26 (2.9)
Klebsiella spp.	24 (2.7)

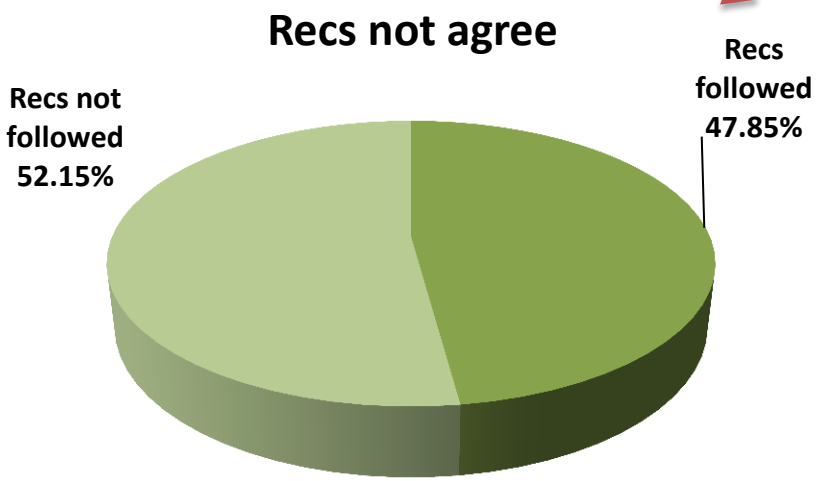
MRSA: methicillin resistant *S. aureus*; ESBL: extended spectrum beta lactamase; VRE: Vancomycin resistant *Enterococcus*; MSSA: methicillin susceptible *S. aureus*.

Isolates & Antibiotics

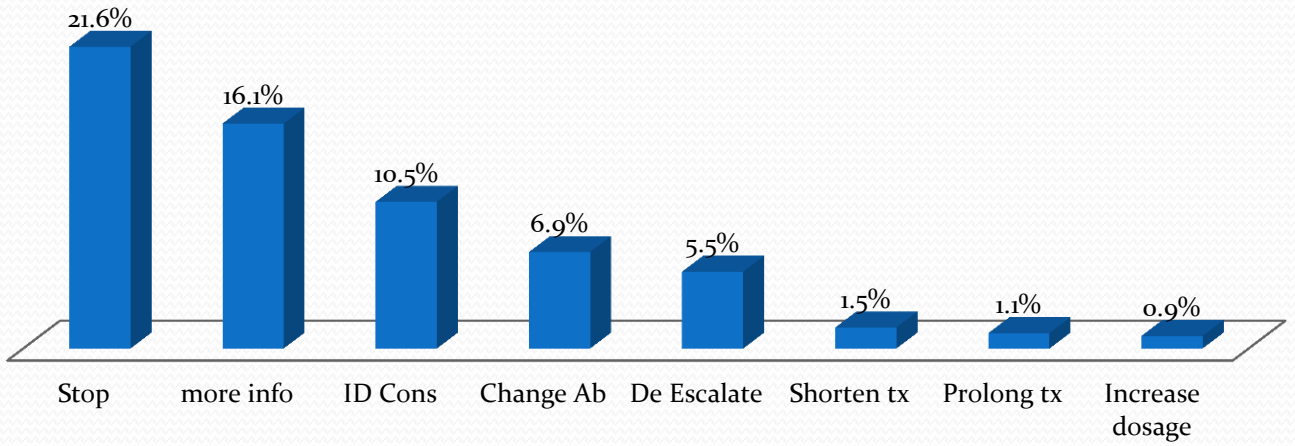


Recommendations

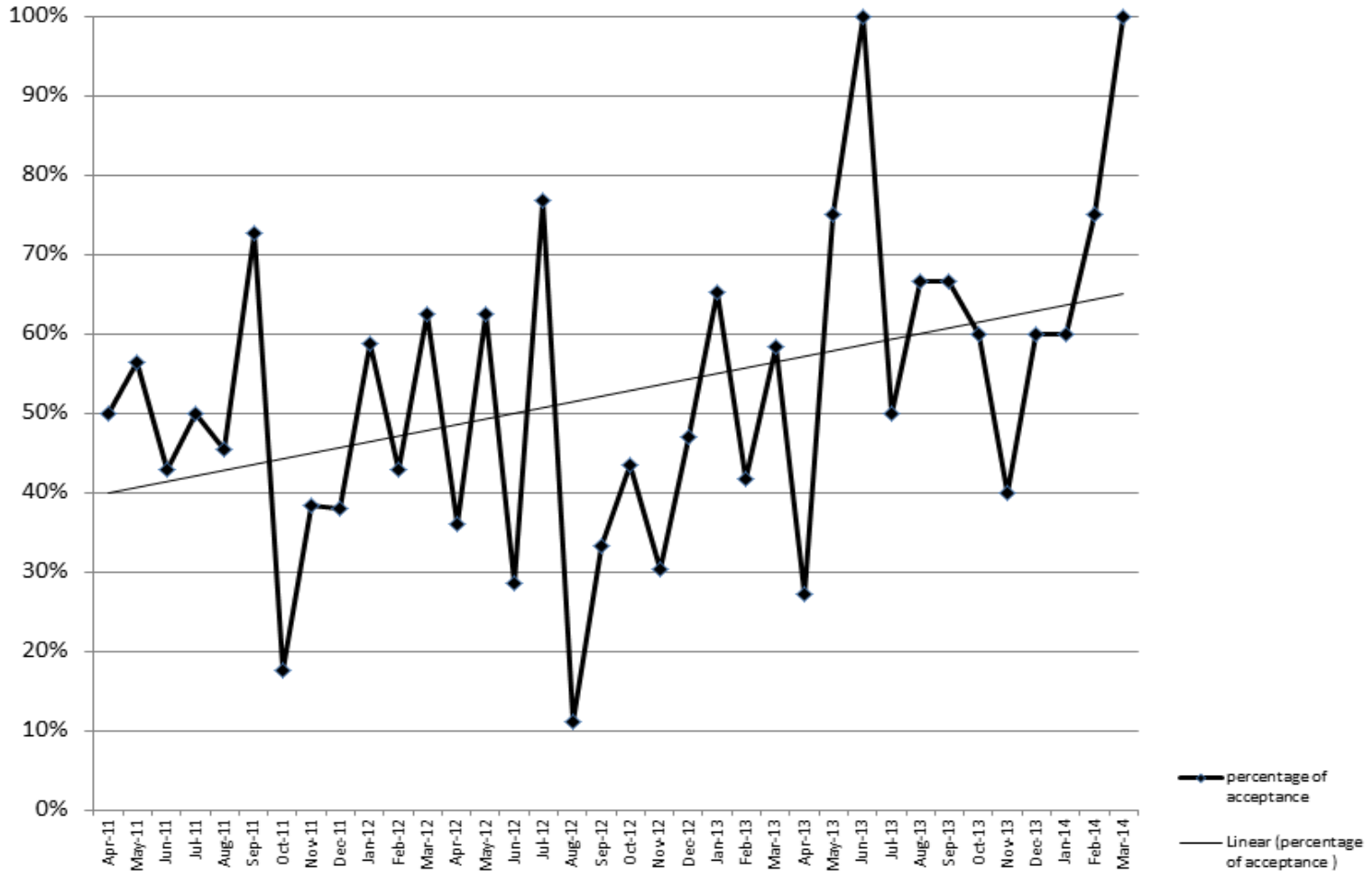




Type of Recs


21.6%
16.1%
10.5%
6.9%
5.5%
1.5%
1.1%
0.9%
Stop
more info
ID Cons
Change Ab
De Escalate
Shorten tx
Prolong tx
Increase dosage

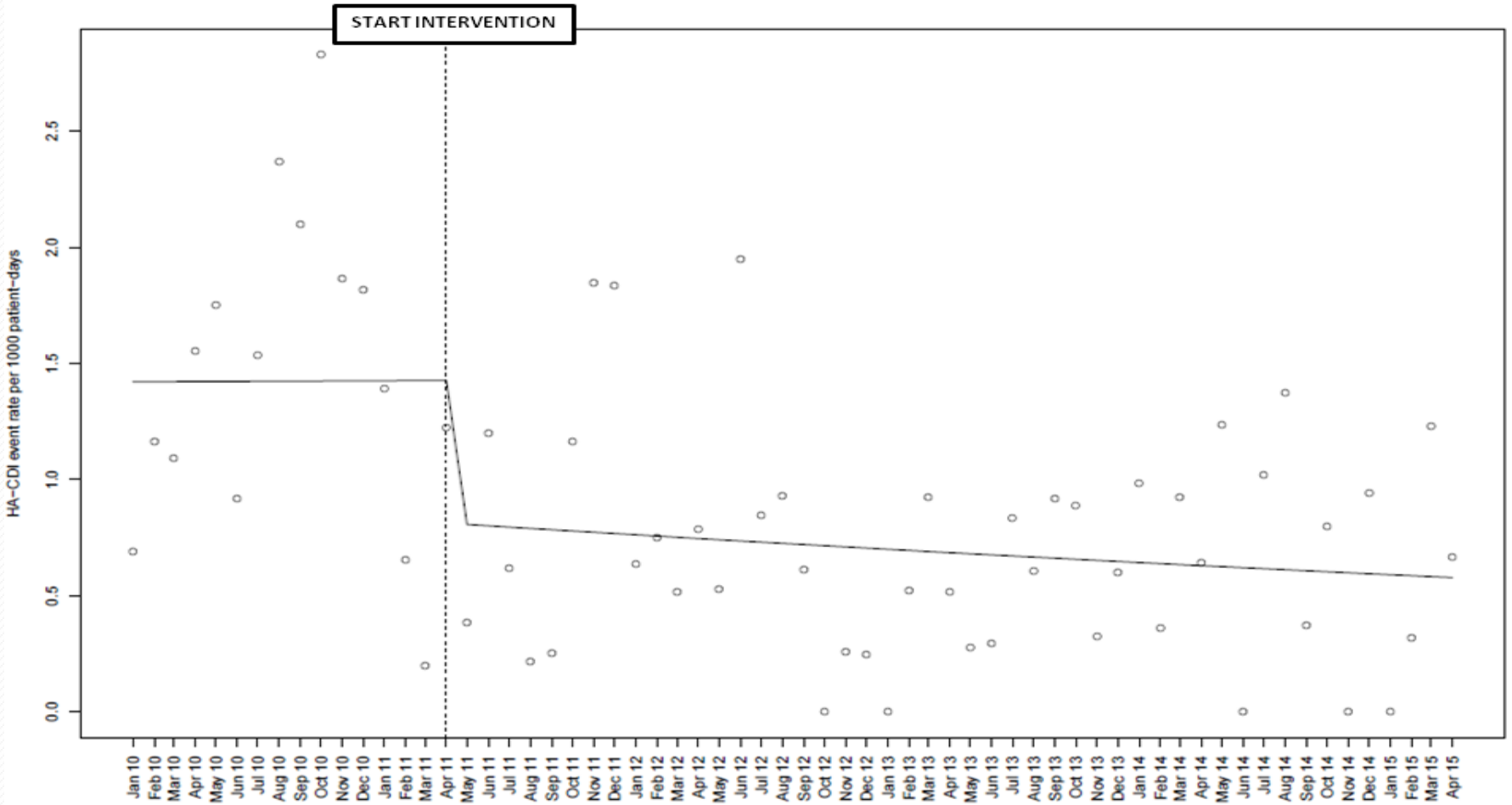
Recommendation acceptance by month

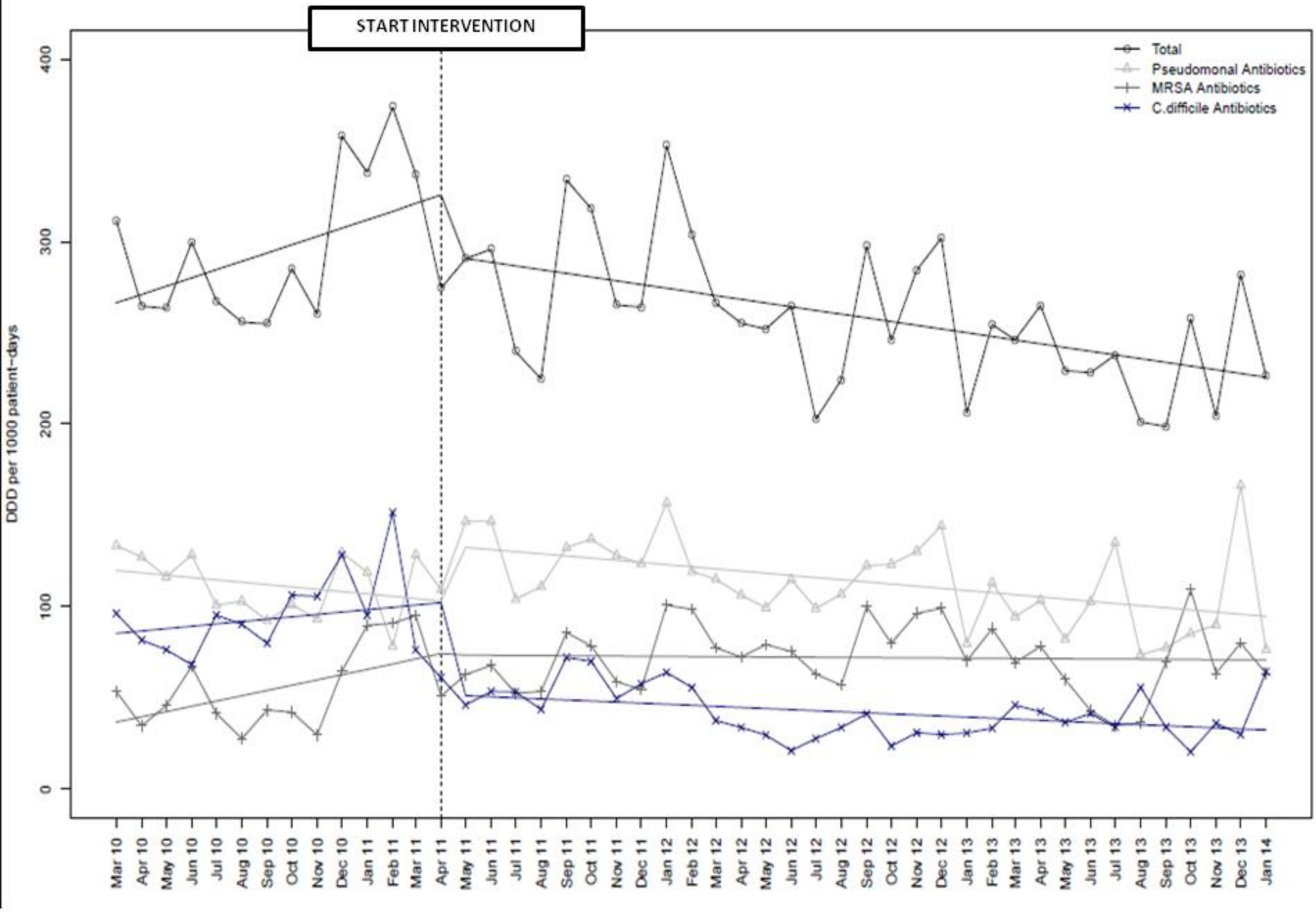


HA-CDI rate per 1000/PD

Following the intervention there was a significant decrease in monthly HA-CDI rates that was maintained throughout the post intervention period.

IRR 0.57; 95% CI 0.35-0.92; p=0.02




START INTERVENTION
Total
Pseudomonal Antibiotics
MRSA Antibiotics
C.difficile Antibiotics
DDD per 1000 patient-days
0
100
200
300
400
Mar 10
Apr 10
May 10
Jun 10
Jul 10
Aug 10
Sep 10
Oct 10
Nov 10
Dec 10
Jan 11
Feb 11
Mar 11
Apr 11
May 11
Jun 11
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Dec 13
Jan 14

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- The ID team: Lisa Davidson, Kirthana Beaulac, Lauren Epstein, Silvia Corcione
- The Sinai team: Lawrence Hotes, Alex White, Linda Hayes

What are the ingredients for a successful program?

- Culture change
- Provider education
- Use of appropriate metrics/benchmarking
- Use of the microbiology laboratory
- Use of technology and informatics

Culture change

- Be cognizant of physicians' reluctance to give up autonomy
- Create a multidisciplinary team ("champions")
- Provide a helpful ("teaching") service
- Use concepts of behavior change theory
- Solicit feedback often

Evaluation of Programmatic Changes to the ASP Program with House Officer Feedback

- House officer survey on Tufts Medical Center ASP
- 2008 Survey
- Programmatic intervention
  - Enhanced training on ASP procedures at orientation
  - Changes to the antimicrobial order form
  - "ASP question of the week"
- 2010 Survey

Hong SY, Epstein LH, Lawrence K, Davidson L, Taur Y, Nadkarni L, Doron S. Journal of Evaluation in Clinical Practice 2012:1365-2753.

Antimicrobial Stewardship Program (ASP) Impact on Patient Care 2008 and 2010

Have you ever had an interaction with ASP in which they…	Yes	No
Reminded you of a patient allergy?	30 (31%)	66 (69%)
Reminded you to adjust for renal function?	75 (78%)	21 (22%)
Prevented a medication error?	37 (38%)	60 (62%)

Differences between 2008 and 2010

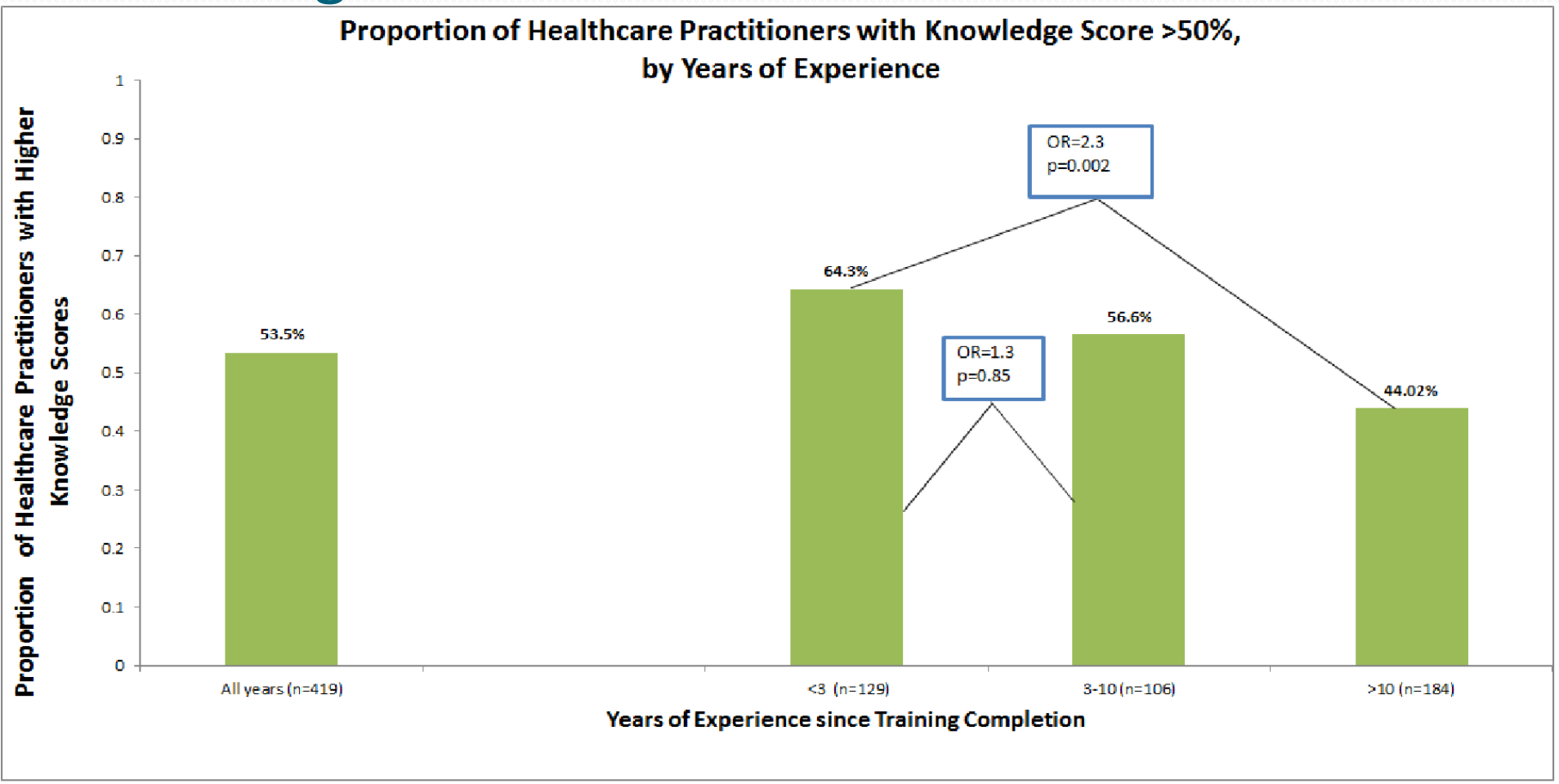
Question	2008	2010	P-value
How important is ASP in the fight against antimicrobial resistance? (very)	75%	76%	0.857
How important is ASP in the containment of healthcare costs? (very/somewhat)	86%	91%	0.435
How important is ASP in the prevention of medication errors? (very/somewhat)	96%	85%	0.060
Were ASP procedures presented during orientation? (yes)	60%	67%	0.501
Are you ever confused about ASP procedures? (always/sometimes)	**59%**	**39%**	**0.048**
How was your overall experience with ASP calls? (very good/good)	96%	98%	0.620
How was your education experience with ASP? (very good/good)	**84%**	**98%**	**0.022**

Hong SY, Epstein LH, Lawrence K, Davidson L, Taur Y, Nadkarni L, Doron S. Journal of Evaluation in Clinical Practice 2012:1365-2753.

Provider education

- Every interaction is an opportunity for education
- Keep in mind- medical school education is lacking in concepts of stewardship
- Focus on:
  - Colonization versus infection
  - Community-acquired versus hospital-acquired
  - De-escalation ("but s/he is getting better on that")
  - Early discontinuation
  - "That's what s/he was transferred here on"
- Consider surveying clinicians to gauge their knowledge

Carbapenem-resistant Enterobacteriacea knowledge scores



Thibodeau E, Doron S, Iacoviello V, Schimmel J, Snydman DR. PeerJ 2014; 2:e405

Use of appropriate metrics

- Cost
- DDD= Defined daily dose
- DOT= Days of Therapy
- LOT= Length of therapy
- Proportion receiving antimicrobial therapy
- Resistance
- CDI

Benchmarking

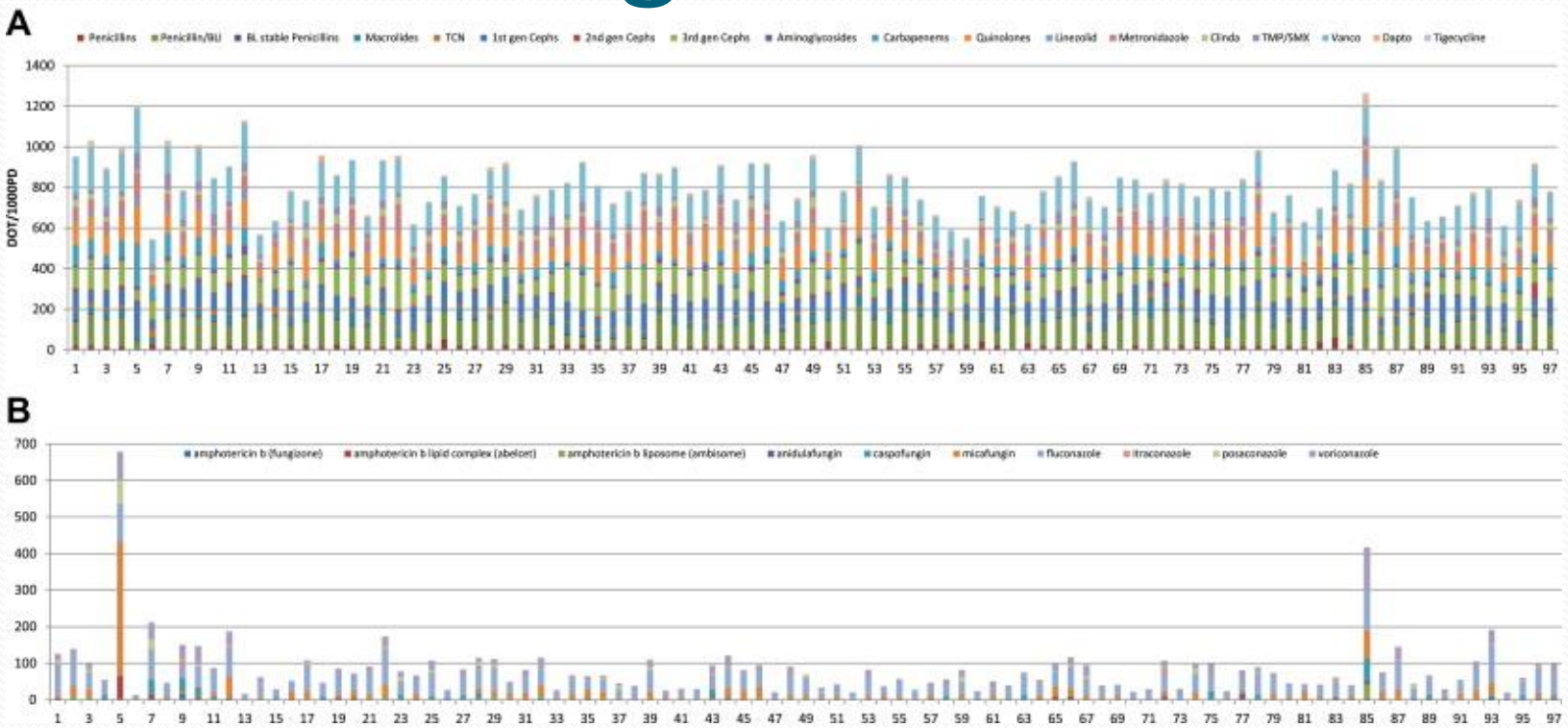


Fig. 1. Adult inpatient antibacterial (A) and antifungal (B) drug use during 2012 in 97 academic medical center hospitals participating in the University HealthSystem Consortium (http://www.uhc.edu/). These data represent raw drug usage figures that require risk adjustment to make them comparable across hospitals...

Omar M. Ibrahim, Ron E. Polk

Antimicrobial Use Metrics and Benchmarking to Improve Stewardship Outcomes : Methodology, Opportunities, and Challenges

Infectious Disease Clinics of North America, Volume 28, Issue 2, 2014, 195–214

Benchmarking

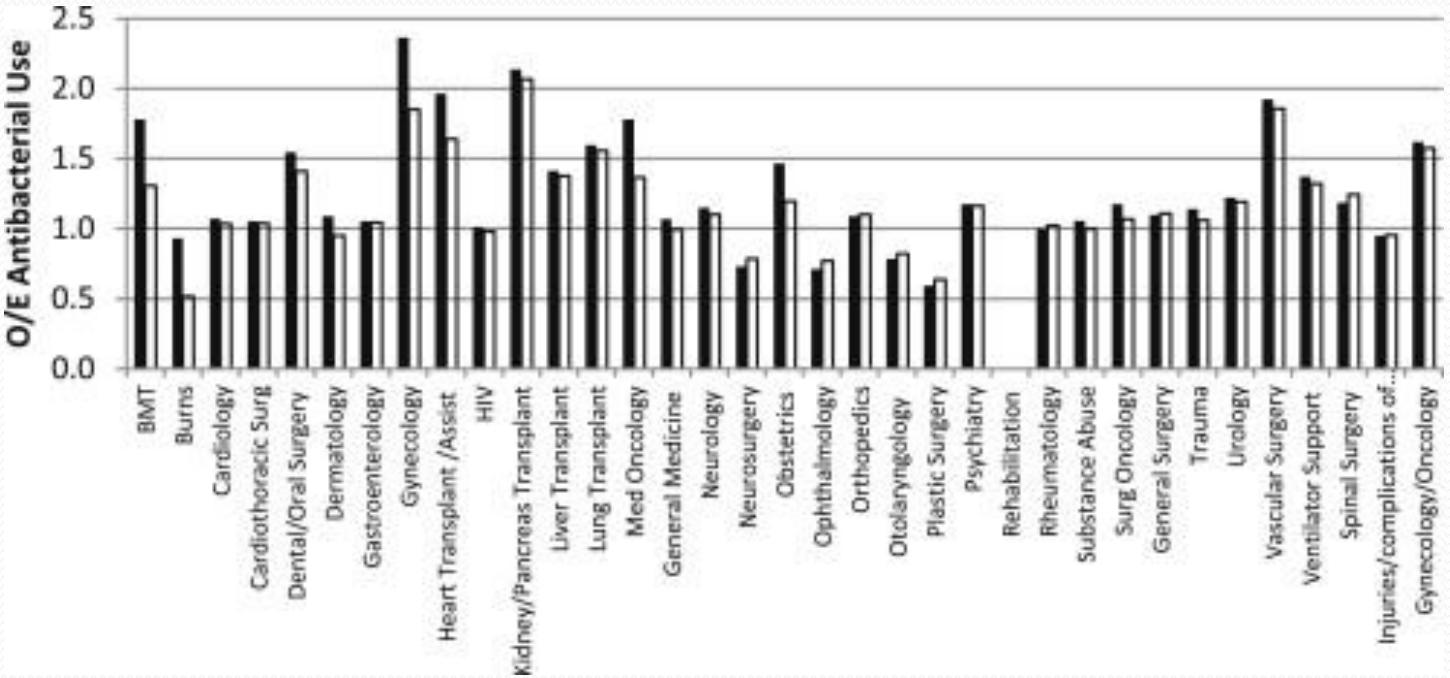


Fig. 2. Example of a risk adjusted benchmarking report for a hospital that compares the observed adult antibacterial drug use (O) with the expected (E) use in 35 clinical service lines. The solid bars are O/E ratios for DOT; the open bars are O/E ratios for LOT. Risk adjustment involved grouping each patient into 1 of the 35 clinical service lines based on their Medicare Severity Diagnosis Related Group (MS-DRG). Expected use was calculated by indirect standardization from antibacterial drug use during 2009 in 70 academic medical center hospitals (included in the 98 hospitals in Fig. 1). An O/E ratio greater than 1.0 suggests excessive use. The report also identified the reason(s) for excessive use, including excessive LOT/discharge compared with the benchmark, excessive use of combination therapies, or an excessive proportion of patients receiving antibacterial drugs. BMT, bone marrow transplant; HIV, human immunodeficiency virus.

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Cost

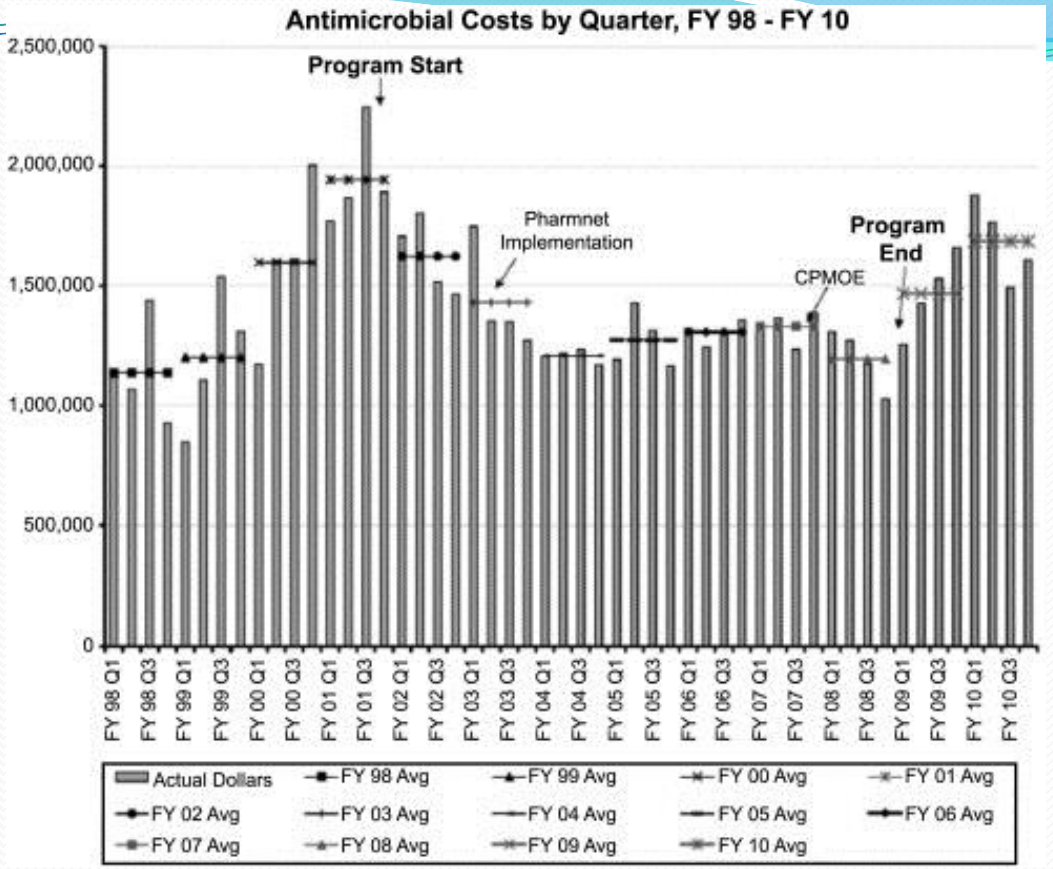

Fig. 3. Quarterly antimicrobial drug expenses at the University of Maryland hospital before initiation of the ASP (before Program Start arrow) and after implementation of the program until its termination (Program End arrow). The sudden increase in expenses after the program end is noteworthy. Vertical bars, quarterly costs; horizontal solid bars, fiscal year averages. CPMOE, computerized physician medication order entry; FY, financial year.
(*From* Standiford HC, Chan S, Tripoli M, et al. Antimicrobial stewardship at a large tertiary care academic medical center: cost analysis before, during, and after a 7-year program. Infect Control Hosp Epidemiol 2012;33(4):340; with permission.)

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Use of the microbiology lab

- Rapid diagnostics
- Development of antibiograms
  - Unit-specific
  - Disease-specific
  - Combination
- Reporting
  - Dose-dependent susceptibility
  - Disease-specific breakpoints
  - Suppression of susceptibility results

Percent Susceptible																
IN-PATIENT, Urine adult	**Penicillins & Related Antibiotics**					**Cephalosporins 1st 3rd 4th generation**					**Aminoglycosides**			**Quinolone**	**Other**		**UTI Agent**
	AMPICILLIN (59)	**AMPICILLIN / SULBACTAM (63)**	**PIPERACILLIN /TAZOBACTAM (68)**	**MEROPENEM (70)**	**ERTAPENEM (74)**	**CEFAZOLIN (72)**	**CEFOXITIN (61)**	**CEFTAZIDIME (65)**	**CEFTRIAXONE (73)**	**CEFEPIME (73)**	**GENTAMICIN (74)**	**TOBRAMYCIN (73)**	**AMIKACIN (74)**	**CIPROFLOXACIN (73)**	**TRIMETHOPRIM/SULFA (72)**	**VANCOMYCIN (70)**	**NITROFURANTOIN (71)**
	49	60	81	77	70	40	56	71	63	75	68	67	77	64	58	13	56

Percent Susceptible										
IN-PATIENT, Urine adult	**Antibiotic Combinations**									
	VANCOMYCIN + PIPERACILLIN /TAZOBACTAM (70)	**VANCOMYCIN + MEROPENEM (66)**	**VANCOMYCIN + ERTAPENEM (70)**	**VANCOMYCIN + CEFTRIAXONE (69)**	**VANCOMYCIN + CEFEPIME (69)**	**TOBRAMYCIN + PIPERACILLIN /TAZOBACTAM (73)**	**TOBRAMYCIN + MEROPENEM (72)**	**TOBRAMYCIN + ERTAPENEM (74)**	**TOBRAMYCIN + CEFEPIME (73)**	**CIPROFLOXACIN + TRIMETHOPRIM/SULFA (72)**
	86	94	86	78	91	85	78	76	77	74

Presented at ID Week 2015, San Diego

Table 12.

Symptomatic HA-UTI combination antibiogram January-December 2013

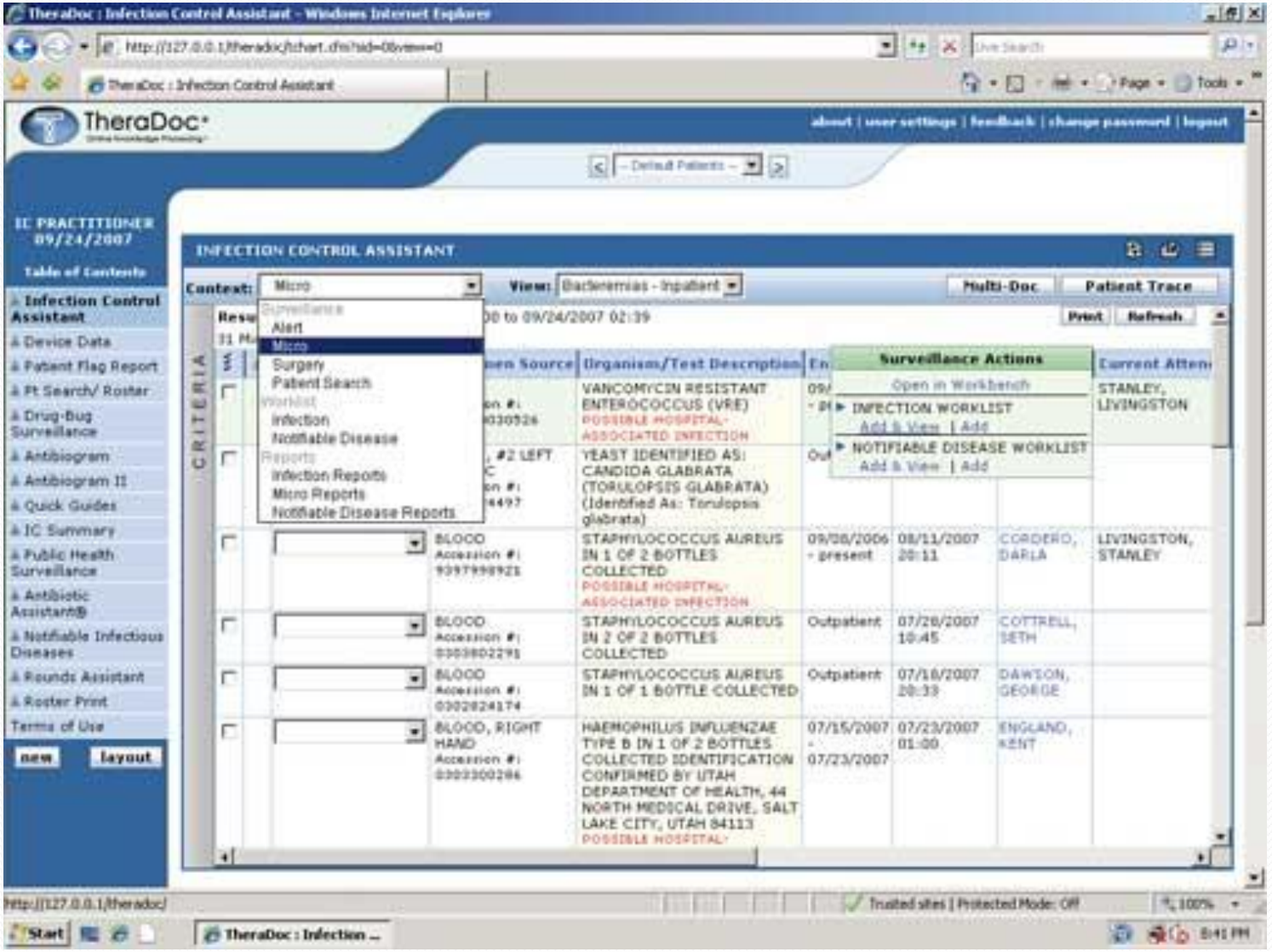
N=74 adult inpatient HA-UTI urine isolates with positive culture, positive urinalysis, and documented symptom. Data are expressed as n(%) susceptible.

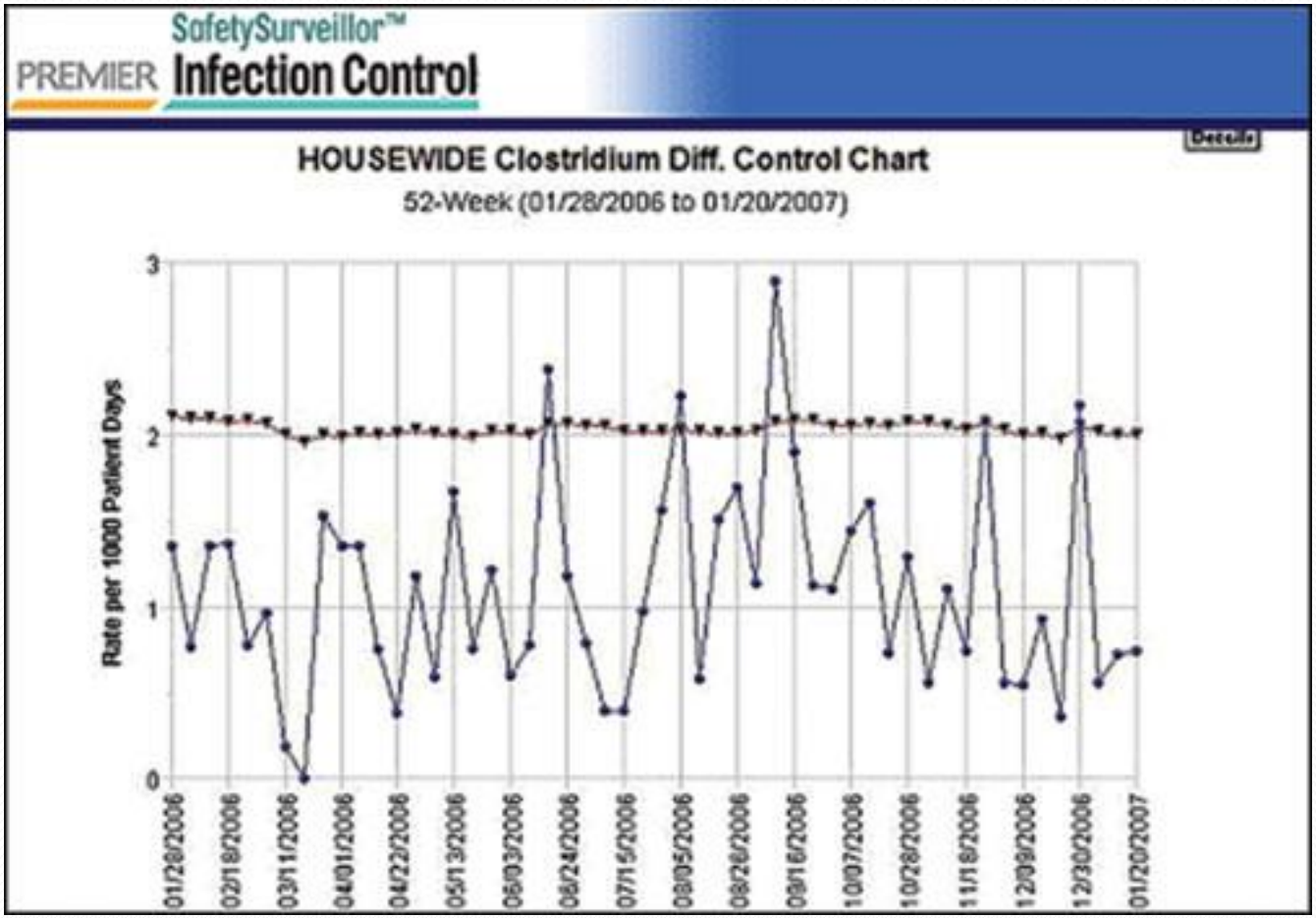
Acknowledgements

- Jenna Wick, Kirthana Beaulac

Use of technology and informatics

- Electronic health records
- Clinical Data Support Systems (CDSSs)
- Apps
- Electronic resources
- Social media


TheraDoc : Infection Control Assistant - Windows Internet Explorer
TheraDoc
about | user settings | feedback | change password | logout
IC PRACTITIONER
09/24/2007
Table of Contents
Infection Control Assistant
Device Data
Patient Flag Report
Pt Search/ Roster
Drug-Bug Surveillance
Antibiogram
Antibiogram II
Quick Guides
IC Summary
Public Health Surveillance
Antibiotic Assistant®
Notifiable Infectious Diseases
Rounds Assistant
Roster Print
Terms of Use
new
layout
INFECTION CONTROL ASSISTANT
Context: Micro
View: Bacteremias - Inpatient
Multi-Doc
Patient Trace
Print
Refresh
CRITERIA
Surveillance
Alert
Micro
Surgery
Patient Search
Worklist
Infection
Notifiable Disease
Reports
Infection Reports
Micro Reports
Notifiable Disease Reports
Surveillance Actions
Open in Workbench
INFECTION WORKLIST
Add & View | Add
NOTIFIABLE DISEASE WORKLIST
Add & View | Add
Organism/Test Description
Current Atten
VANCOMYCIN RESISTANT ENTEROCOCCUS (VRE)
POSSIBLE HOSPITAL-ASSOCIATED INFECTION
STANLEY, LIVINGSTON
YEAST IDENTIFIED AS: CANDIDA GLABRATA (TORULOPSIS GLABRATA) (Identified As: Torulopsis glabrata)
BLOOD
STAPHYLOCOCCUS AUREUS IN 1 OF 2 BOTTLES COLLECTED
POSSIBLE HOSPITAL-ASSOCIATED INFECTION
09/08/2006 - present
08/11/2007 20:11
CORDERO, DARLA
LIVINGSTON, STANLEY
BLOOD
STAPHYLOCOCCUS AUREUS IN 2 OF 2 BOTTLES COLLECTED
Outpatient
07/26/2007 10:45
COTTRELL, SETH
BLOOD
STAPHYLOCOCCUS AUREUS IN 1 OF 1 BOTTLE COLLECTED
Outpatient
07/16/2007 20:33
DAWSON, GEORGE
BLOOD, RIGHT HAND
HAEMOPHILUS INFLUENZAE TYPE B IN 1 OF 2 BOTTLES COLLECTED IDENTIFICATION CONFIRMED BY UTAH DEPARTMENT OF HEALTH, 44 NORTH MEDICAL DRIVE, SALT LAKE CITY, UTAH 84113
POSSIBLE HOSPITAL-
07/15/2007 - 07/23/2007
07/23/2007 01:00
ENGLAND, KENT
Start
TheraDoc : Infection ...


SafetySurveillor™
PREMIER Infection Control
Details
HOUSEWIDE Clostridium Diff. Control Chart
52-Week (01/28/2006 to 01/20/2007)
Rate per 1000 Patient Days
3
2
1
0
01/28/2006
02/18/2006
03/11/2006
04/01/2006
04/22/2006
05/13/2006
06/03/2006
06/24/2006
07/15/2006
08/05/2006
08/26/2006
09/16/2006
10/07/2006
10/28/2006
11/18/2006
12/09/2006
12/30/2006
01/20/2007

PK-PD Compass

View More by This Developer

By ICPD Technologies, LLC

Open iTunes to buy and download apps.

View in iTunes

This app is designed for both iPhone and iPad

Free

Category: Medical
Updated: Sep 28, 2015
Version: 1.0.2

Description

The PK-PD Compass is a first-of-its kind mobile application to help clinicians make better antibiotic decisions. Enter a whole new level of antibiotic stewardship by bringing PK-PD to the patient's bedside.

ICPD Technologies, LLC Web Site ▸ PK-PD Compass Support ▸ ...More

What's New in Version 1.0.2

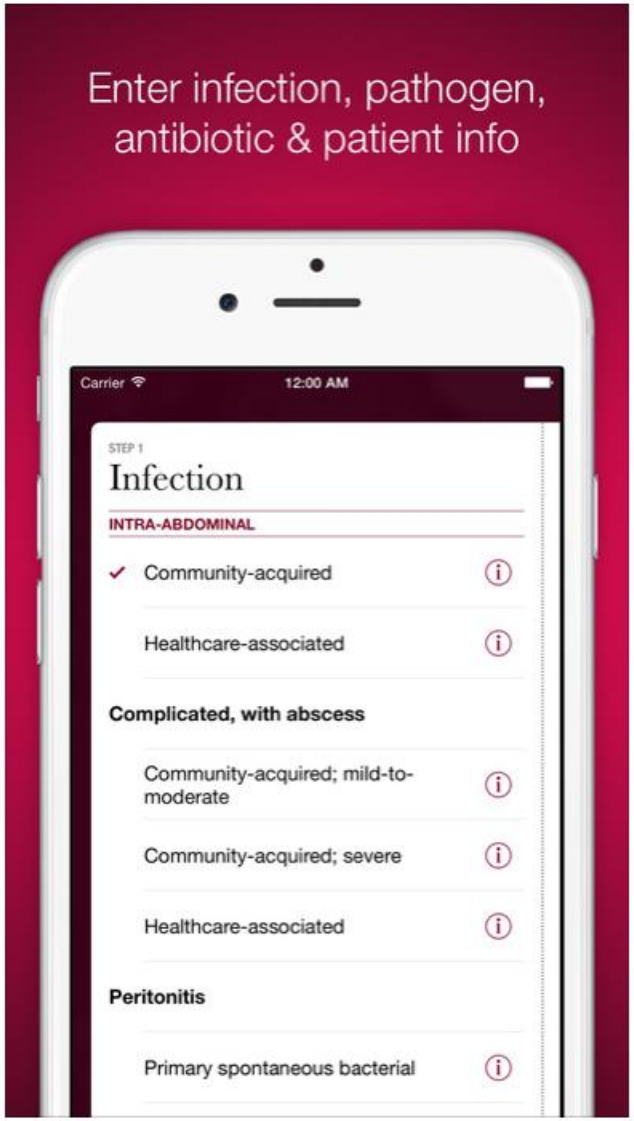
* Removed dialog panel indicating that the beta version has expired
* Minor internal stability fixes with the Results List screen

Screenshots

iPhone | iPad

n/us/app/pk-pd-compass/id1031088161?mt=8

Details | Reviews | Related



Description

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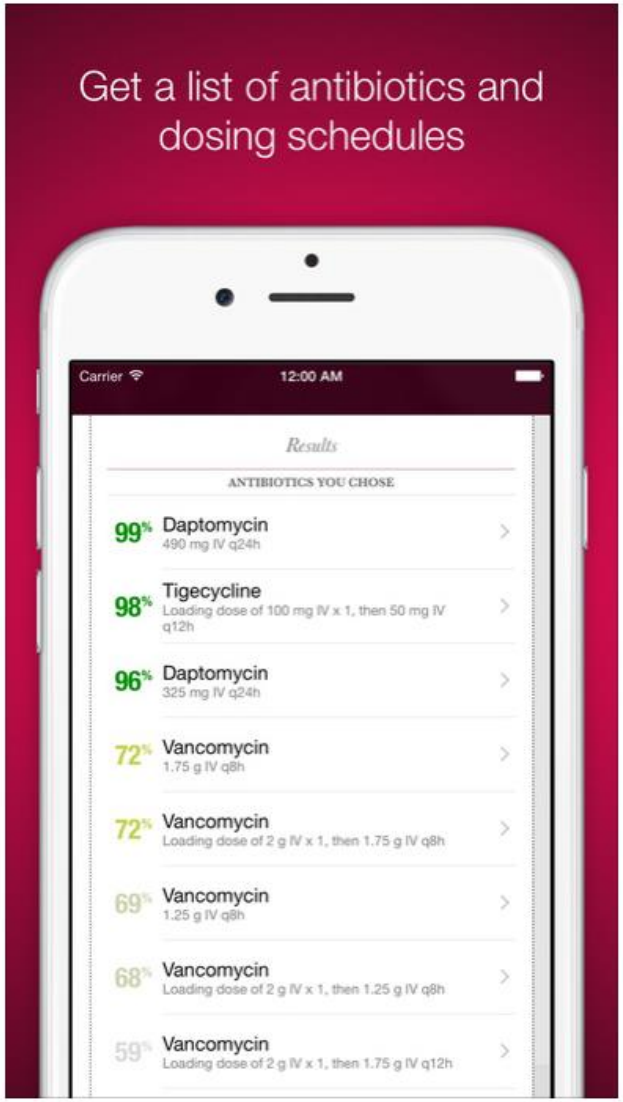

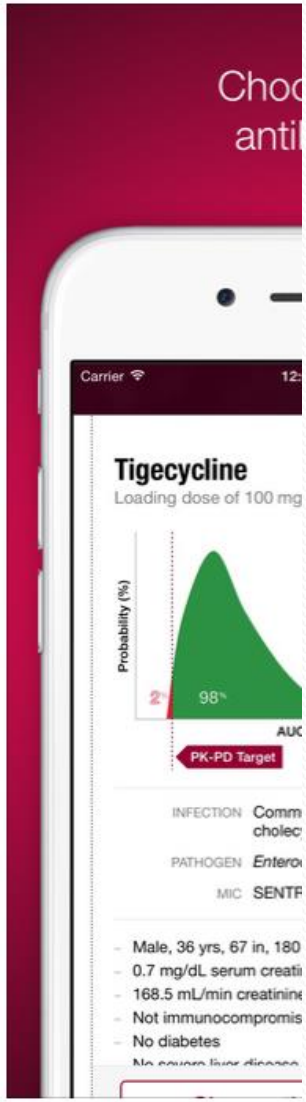

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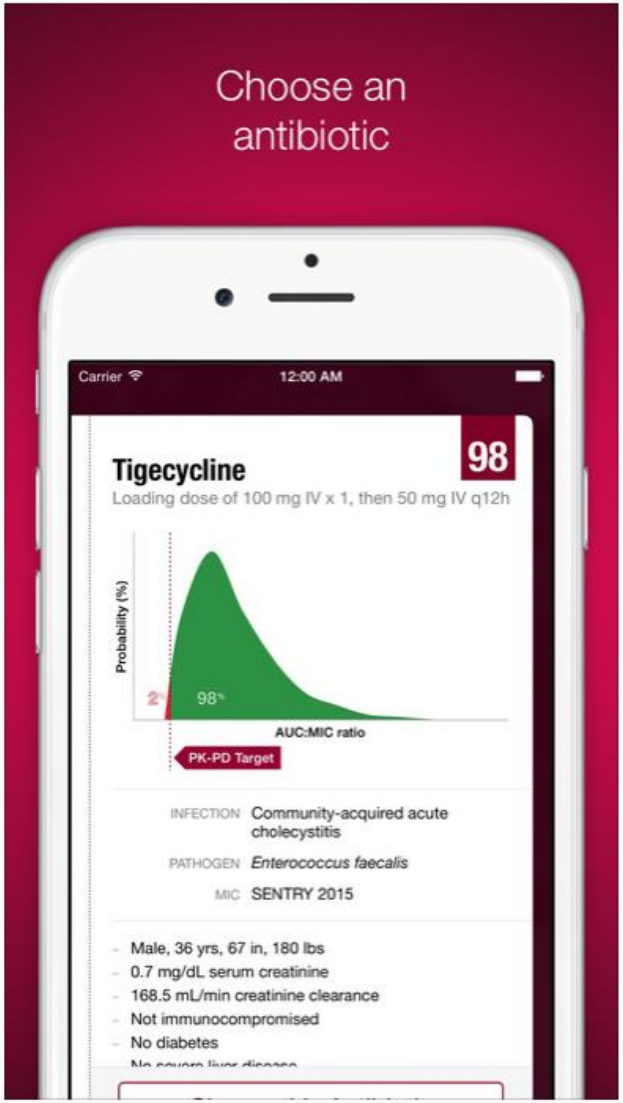

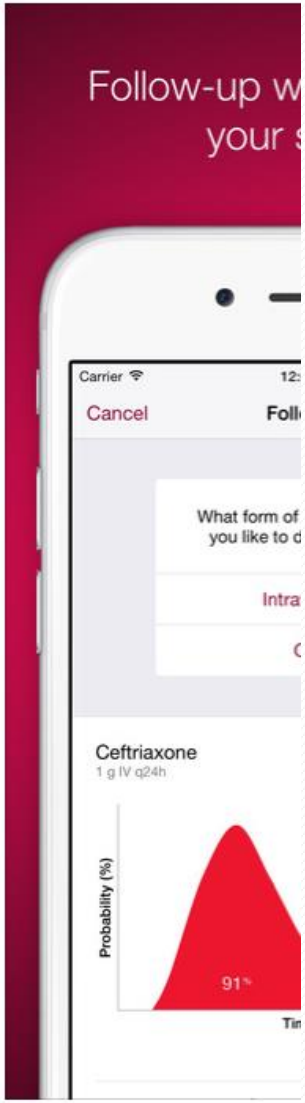

Description

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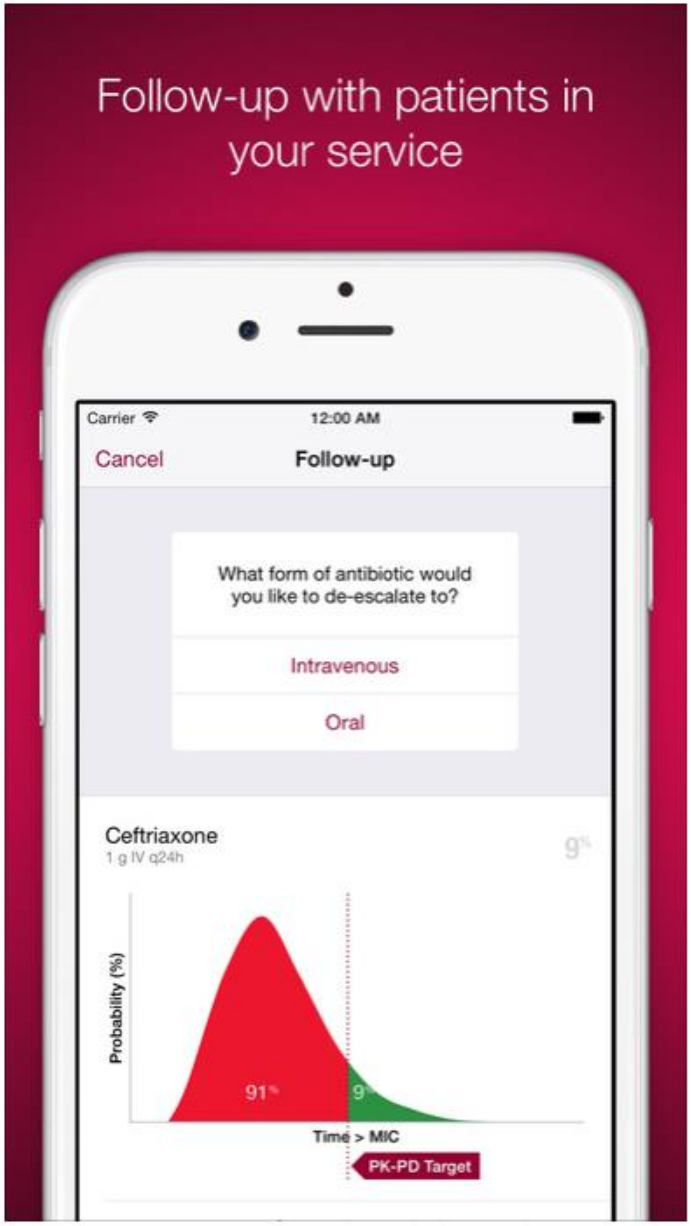

Conclusion

- Federal attention to stewardship promises to make ASPs more prevalent and to integrate systems designed to combat resistance
- Non-acute care settings are increasingly adopting stewardship practices, in various forms
- Elements of a successful ASP include culture change, provider education, use of appropriate metrics/benchmarking, use of the microbiology laboratory, use of technology/informatics

To combat resistance: Think globally, act locally