

CDC PUBLIC HEALTH GRAND ROUNDS

Combating Resistance: Getting Smart About Antibiotics



Accessible version: <https://youtu.be/Uv2yg2DIJ0A>

November 19, 2013



U.S. Department of
Health and Human Services
Centers for Disease
Control and Prevention

Antibiotic Use and Antibiotic Prescribing Practices in the Community



CDR Lauri Hicks, DO

Medical Director

Get Smart: Know When Antibiotics Work

National Center for Immunization and Respiratory Diseases

Centers for Disease Control and Prevention

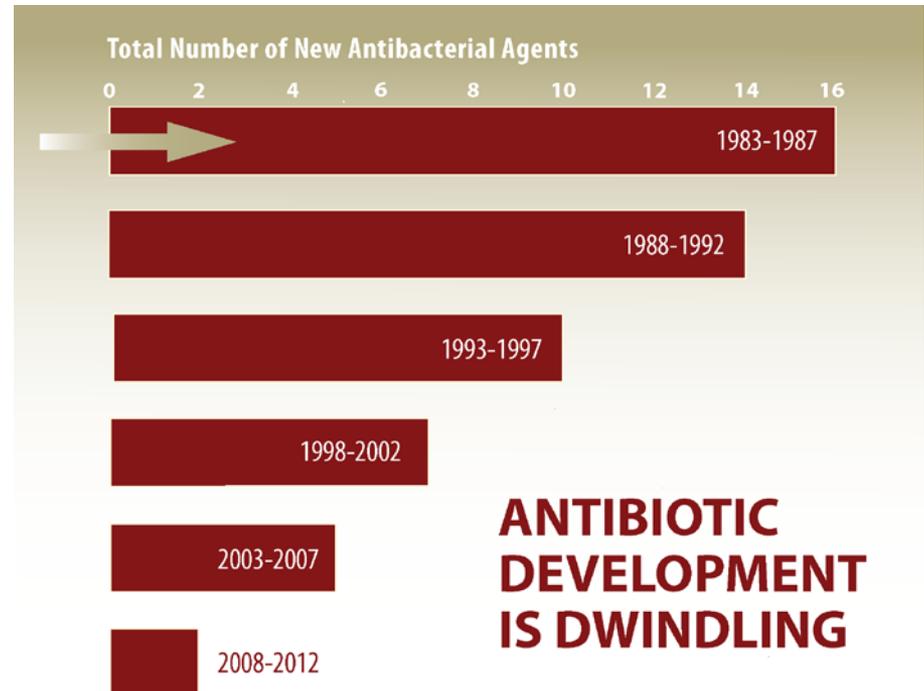
The Life-Saving Benefits of Antibiotic Use

- ❑ **Once deadly infectious diseases treatable, substantially reducing deaths compared to the pre-antibiotic era**
- ❑ **Important adjunct to modern medical advances**
 - Surgeries
 - Transplants
 - Cancer therapies



Facing the End of the Antibiotic Era

- ❑ No new types of antibiotics developed in over 10 years
- ❑ More toxic antibiotics being used to treat common infections
- ❑ Must treat antibiotics as precious and finite resource



A Primer on Appropriate Antibiotic Prescribing

- ❑ **Practice guidelines from professional organizations and CDC support more targeted antibiotic prescribing**
- ❑ **Conditions for which antibiotics are not routinely indicated**
 - Viral infections, including colds and bronchitis
 - Includes some infections (e.g., otitis media) for which antibiotic treatment had formerly been routine
- ❑ **Use of diagnostic testing to guide prescribing**
- ❑ **Choose recommended antibiotic, dose and duration**

Unintended Consequences of Antibiotic Use: Adverse Events

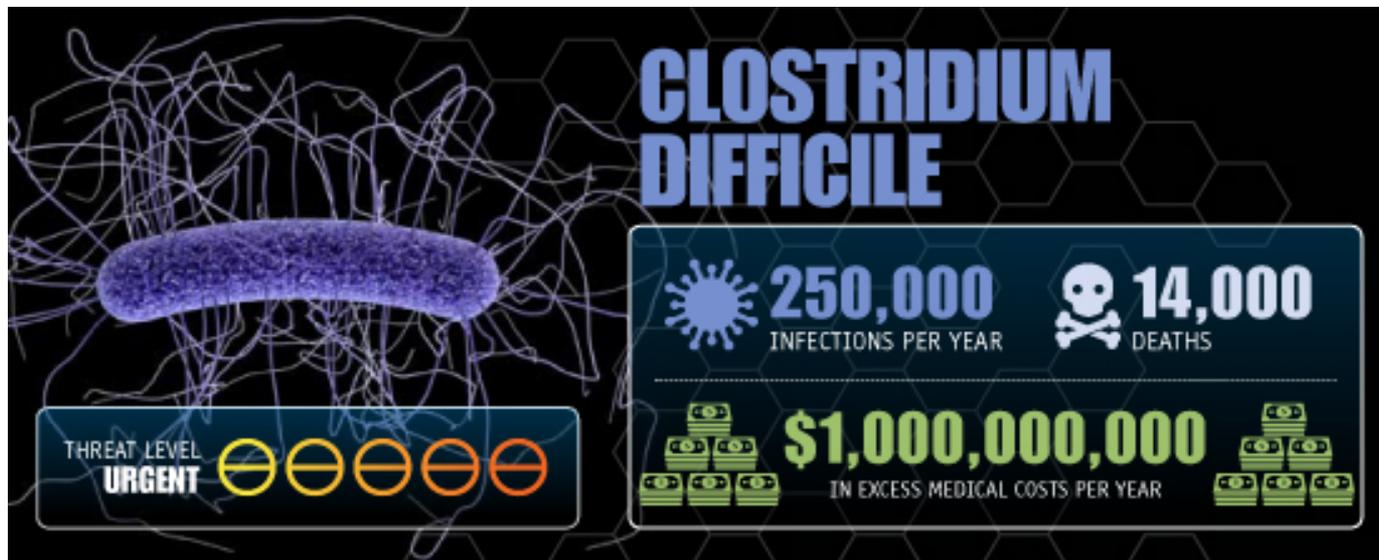
- ❑ **Adverse events range from minor (rash) to severe (systemic allergic reaction, including anaphylaxis)**
- ❑ **Antibiotics are responsible for almost 1 out of every 5 visits to emergency departments for drug-related adverse events**
- ❑ **Antibiotics are the most common cause of drug-related emergency department visits for children**

Unintended Consequences of Antibiotic Use: Potential Link to Obesity and Chronic Disease

- ❑ **Exposure to antibiotics during infancy associated with elevated BMI**
- ❑ **Further studies are needed to understand whether there are long term implications for BMI and cardiovascular disease risk**

Unintended Consequences of Antibiotic Use: *Clostridium difficile*

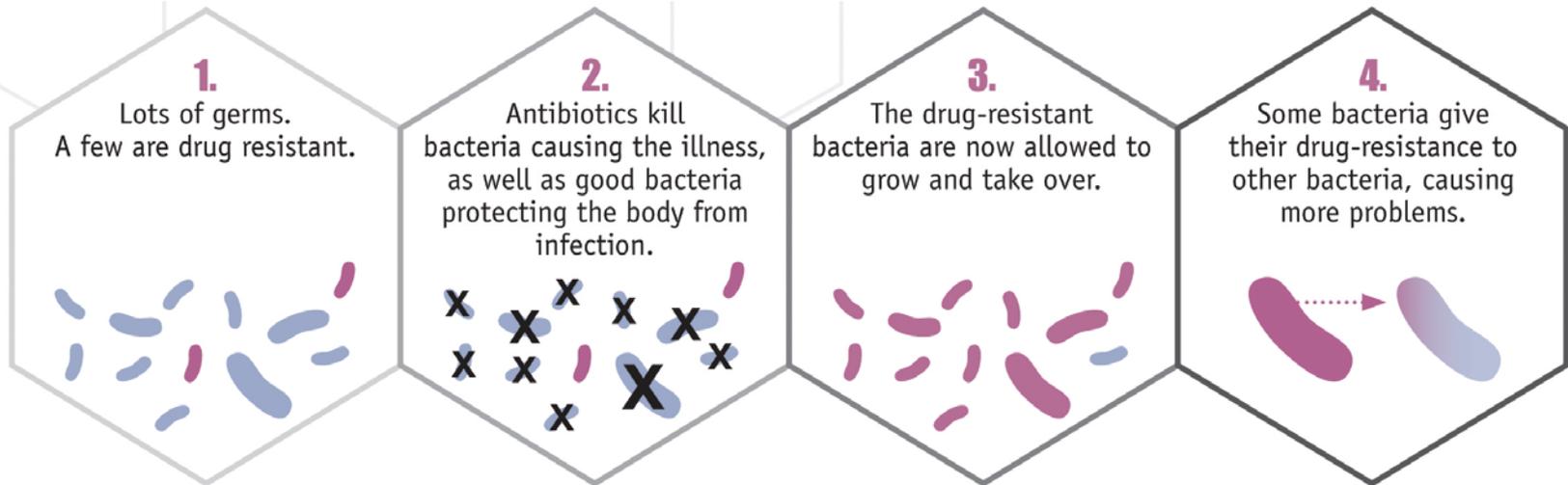
- ❑ ***C. difficile* diarrhea occurs as a result of disruption of normal gut bacteria due to antibiotic use**



Unintended Consequences of Antibiotic Use: Antibiotic Resistance



How Antibiotic Resistance Happens



Unintended Consequences of Antibiotic Use: Antibiotic Resistance

Estimated minimum number of illnesses and deaths caused annually by antibiotic resistance*:

At least  **2,049,442** illnesses,
 **23,000** deaths

**bacteria and fungus included in this report*

Estimated cost of \$30 billion annually
(range \$20-\$35 billion, 2008 dollars)

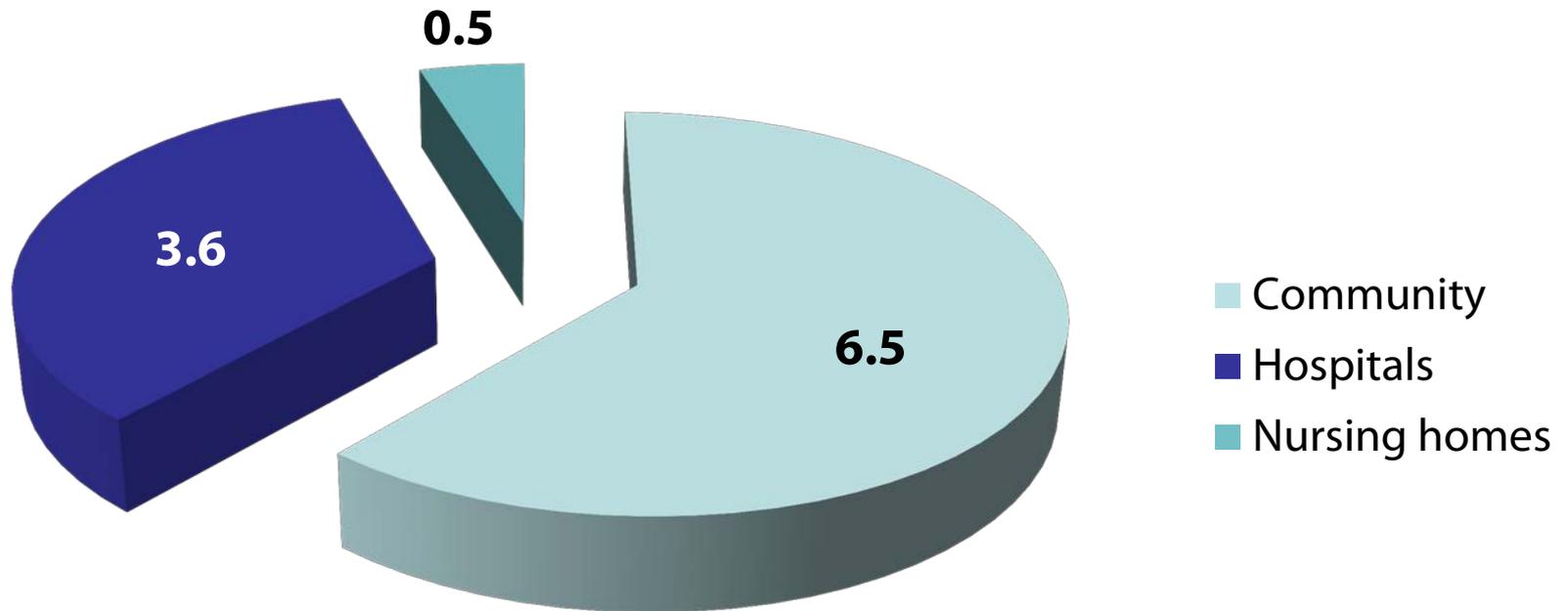
Why Antibiotic Resistant Infections Cost Us All More

- ❑ **Require prolonged and costlier treatments**
- ❑ **Extend hospital stays**
- ❑ **Necessitate additional provider visits and healthcare use**
- ❑ **Result in greater disability and death compared to infections that are easily treatable with antibiotics**

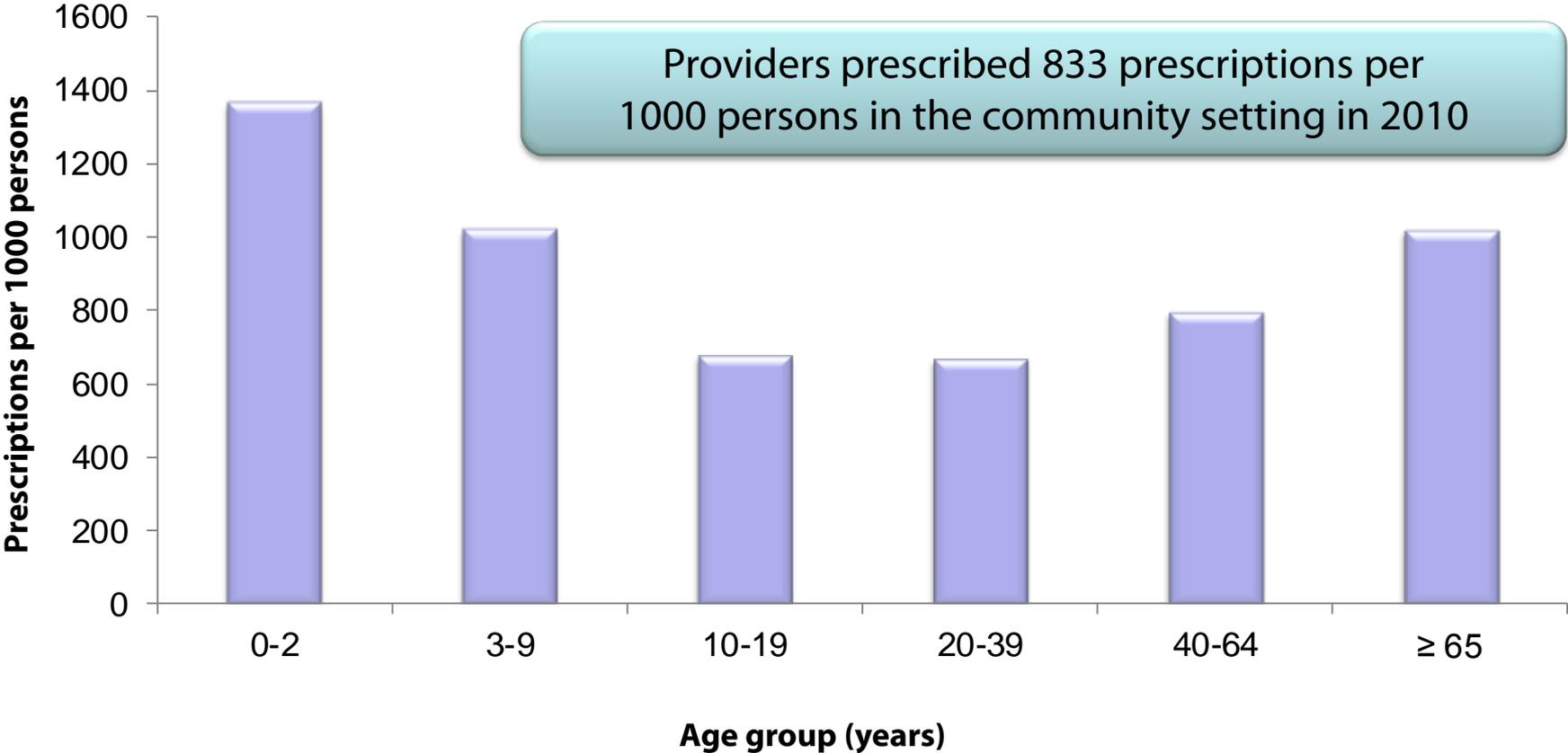


Antibiotic Prescription Costs in Billions (\$US), By Treatment Setting, United States

For 2009, total costs \$10.7 billion

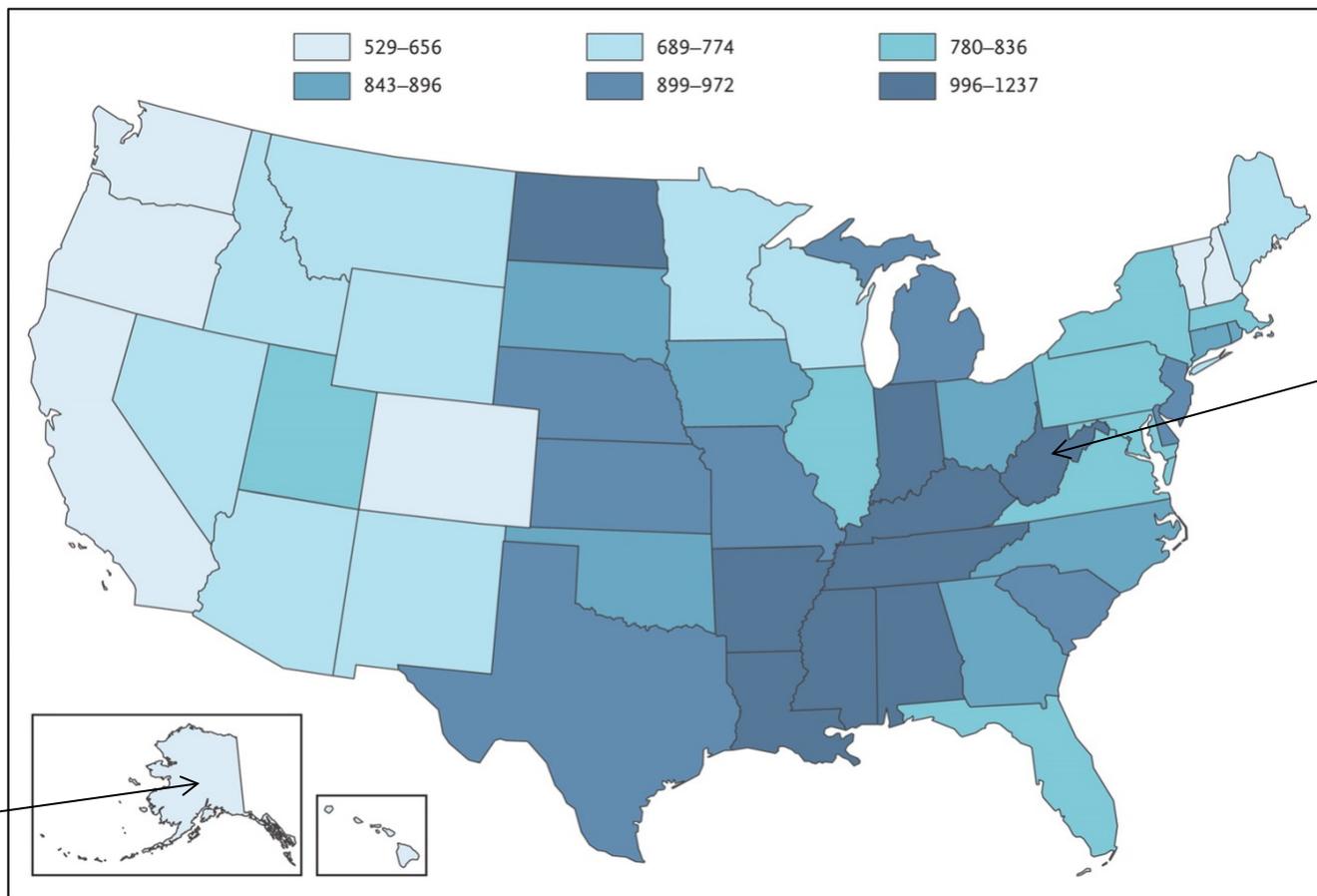


Community Antibiotic Prescribing Practices United States, 2010



Hicks LA et al. N Engl J Med 2013;368:1461-1462

Antibiotic Prescriptions per 1000 Persons of All Ages By State, 2010



**Lowest
prescribing
rate
(529/1000)**

**Highest
prescribing
rate
(1237/1000)**

Provider Prescribing Practices for Adults in the Community

- ❑ **Acute respiratory infection most common reason adults receive an antibiotic**
 - More than one out of four antibiotic prescriptions for adult outpatients are for conditions for which antibiotics are not needed
 - Even when antibiotics were indicated, the wrong drug was frequently prescribed
- ❑ **Providers in the South more likely to prescribe for conditions that do not warrant antibiotic use**

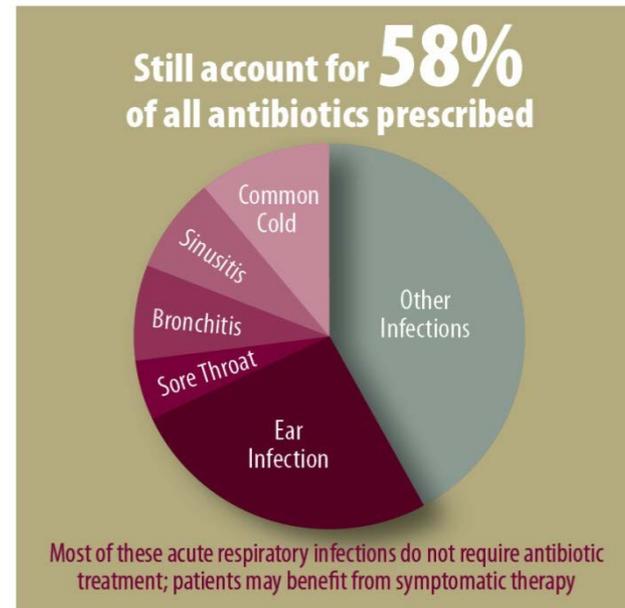
Provider Prescribing Practices for Children Under 15 Years of Age in the Community

Good news



*Comparing 1993–94 to 2007–08

Bad news



Efforts to Improve Antibiotic Use in the Community: The Get Smart Campaign

- ❑ CDC launched the National Campaign for Appropriate Antibiotic Use in the Community in 1995, which was renamed *Get Smart: Know When Antibiotics Work* in 2003
- ❑ The program works closely with a variety of partners to reduce unnecessary antibiotic use in the community
- ❑ Focus on increasing awareness among healthcare providers and the general public
 - www.cdc.gov/getsmart



Efforts to Improve Antibiotic Use in the Community: Get Smart About Antibiotics Week

- ❑ **This week! (November 18–24, 2013)**
- ❑ **Intended to increase awareness of antibiotic resistance and appropriate use of antibiotics in both inpatient and outpatient settings**
- ❑ **Engage the media to disseminate messages on the radio, in print, on television and in social media**
 - Join our Twitter chat Friday, November 22 at 1 pm EST
- ❑ **Partner with a variety of organizations, including health agencies in more than 40 countries**



Efforts to Improve Antibiotic Use in the Community: National Goals, and Progress Towards Them

Healthy People 2020 goals	2008/ 2009 (%)	2010 (%)	2020 goal (%)
Visits where antibiotics were prescribed for ear infection (children < 5 years of age)	81	76	70
Visits where antibiotics were prescribed for common cold (all ages)	28	29	21

**CDC intends to establish a national goal for overall reduction
in outpatient antibiotic use**

Summary

- ❑ Antibiotic-resistant infections are one of the most serious consequences of excessive antibiotic use and constitute an important public health problem**
- ❑ Studies in outpatient settings show progress in curbing inappropriate prescribing, but improvement is needed**
- ❑ Continued monitoring of antibiotic prescribing patterns, setting and tracking progress toward goals, and ongoing educational efforts are crucial components of response**

Looking Ahead: Interventions to Improve Community-based Antibiotic Prescribing



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U.S. Department of
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Looking Ahead: Interventions to Improve Community-based Antibiotic Prescribing

□ What goal are we trying to reach?

- Not eliminating antibiotic use
- Rather, we seek:
 - To eliminate use when there is no proven benefit; for instance, viral respiratory infections
 - In many cases, to balance small benefits to the individual against individual and population risks (e.g. from the development of resistant organisms)
 - To make shared decisions with our patients

Expectations and Their Impact on Office-based Antibiotic Prescribing

- ❑ **In 2001, more than 2 out of 3 parents of children with respiratory tract illnesses believed antibiotics were probably necessary for their child**
- ❑ **Physicians were 21% more likely to prescribe an antibiotic when they perceived parents wanted one, and 32% more likely to prescribe for a viral illness**

What Are Parents Saying Now?

"Once it (runny nose) starts turning greenish, that starts to worry us, because it could be an infection."

"When kids are screaming and you're getting fevers, I wouldn't be comfortable for my doctors to tell me 'let it play its course.' I think I'd flip."



"I believe if you don't need it [antibiotics], then don't use it."

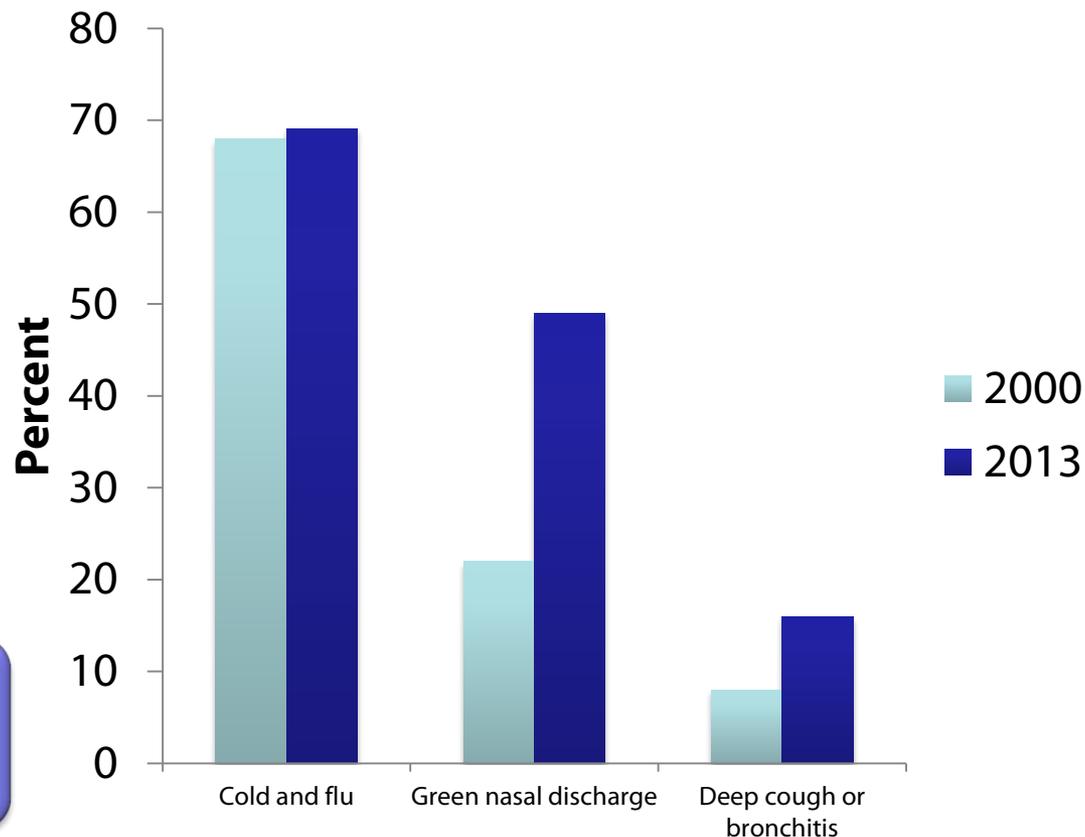
"I have the fear that if I'm ever giving my child antibiotics...he'll build up some kind of resistance to it, and when he really needs it, it's not going to do anything for him."

Focus Groups of 31 Massachusetts Parents, 2011

Making Progress: Surveys of Massachusetts Parents, 2000 vs. 2013

Parents reporting antibiotics ***“almost never”*** needed for

Green nasal discharge typically a sign of resolution, rather than secondary infection



Perspectives on Antibiotic Use for Common Infections: Summary

Patient perspective

- ❑ Want symptoms resolved, quickly and without return visit
- ❑ Want clear explanations, even when there is no “cure”
- ❑ May harbor misconceptions about when antibiotics work
- ❑ Increasingly are concerned with overuse and resistance

Clinician perspective

- ❑ Perceived patient expectations
- ❑ Diagnostic uncertainty for some respiratory tract infections
- ❑ Time pressure
- ❑ Increasingly are concerned with overuse and resistance



Otitis Media in Young Children: An Instructive Success Story

- ❑ Overall 25-30% decrease in population rate of antibiotics prescribed over the past decade, mostly because of decrease in prescriptions for middle ear infections (otitis media)
- ❑ Once diagnosed with otitis media, the fraction of patients receiving antibiotics has remained stable
- ❑ The decrease in prescription rates has been driven by decreased diagnosis of otitis media

Factors Responsible for Decreasing Antibiotic Use for Otitis Media

- ❑ **Professional guidelines have narrowed diagnostic criteria for otitis media**
- ❑ **Widespread use of pneumococcal conjugate vaccine, recommended for routine pediatric use since 2000**
- ❑ **Mostly, clinicians have just changed their threshold for making the diagnosis, largely because of concerns for antibiotic overuse**

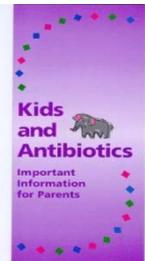
Acute Bronchitis in Adults: Prescribing Interventions Less Successful

- ❑ **Antibiotics not indicated for uncomplicated cases**
- ❑ **Many intensive interventions have been studied**
 - Patient education in the clinical setting
 - Clinical decision support
(computer-assisted provider prompts and tools)
- ❑ **Most studies show decreases in antibiotic prescribing of about 10%, but diagnosis and treatment rates still very high**
- ❑ **Change in deeply held patient beliefs about meaning of “bronchitis” will be gradual**



Changing Patient Expectations in Advance of Healthcare Visits: How and Where

- ❑ **Public health messages distributed via print, radio, TV, and social media**
- ❑ **Physician offices – most trusted source**
- ❑ **Pharmacies, child care centers, workplaces**
- ❑ **Local and statewide interventions using all of these, across the US, have decreased prescribing**
 - In Massachusetts, ongoing campaigns and the lay press were already having a significant effect, with up to 20% decreased prescribing over 3 years
 - Our concerted intervention resulted in an additional 4-7% decline in intervention communities



What Has Worked Best to Change Provider Behavior?

- ❑ **Print materials alone: weak**
- ❑ **Feedback of current practice: stronger**
- ❑ **Academic detailing, opinion leader education: stronger still**
- ❑ **Electronic decision support**
 - May have some utility

Recent study in 6 European countries showed success using web-based training in use of diagnostic tools and advanced communication strategies.

History of Present Illness	Physical Exam																																												
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“All of the Above” Approach Most Successful in Changing Antibiotic Prescribing

- ❑ Combined interventions are most successful at making provider antibiotic prescribing more rational and evidence-based**
- ❑ Interventions must be tailored by practice setting and targeted medical conditions, and should account for the baseline knowledge and attitudes of the patient population**

The Path Forward: How Do We Further Reduce Inappropriate Antibiotic Use?

- ❑ **Substantial progress has been made in reducing unnecessary antibiotic use for some conditions**
- ❑ **Actions to address clinician behavior**
 - Implementation of guidelines using evidence-based methods
 - Individual feedback to practitioners on prescribing behavior
 - Advocacy by local clinical thought and opinion leaders
 - Clinical decision support in selected circumstances
- ❑ **Integrate disciplines of quality improvement and implementation science to:**
 - Accelerate spread
 - Test and implement locally tailored interventions to meet prescribing targets

The Path Forward: How Do We Further Reduce Inappropriate Antibiotic Use?

- ❑ **Consider additional quality measures for specific conditions and overall antibiotic use rates**
- ❑ **Use data to learn from those achieving success in reducing antibiotic prescribing, while at the same time improving health outcomes**

Further Reducing Inappropriate Antibiotic Use: Patient and Parent Perceptions

- ❑ **Many patients already hold general beliefs consistent with more prudent use of antibiotics**
- ❑ **Actions to continue to shape patient expectations**
 - Engaging clinicians as the most trusted source of health information: Our patients learn what we teach them!
 - Continuing education of the public as a longer term investment, but necessary for success

Improving Antibiotic Use in Hospital Settings



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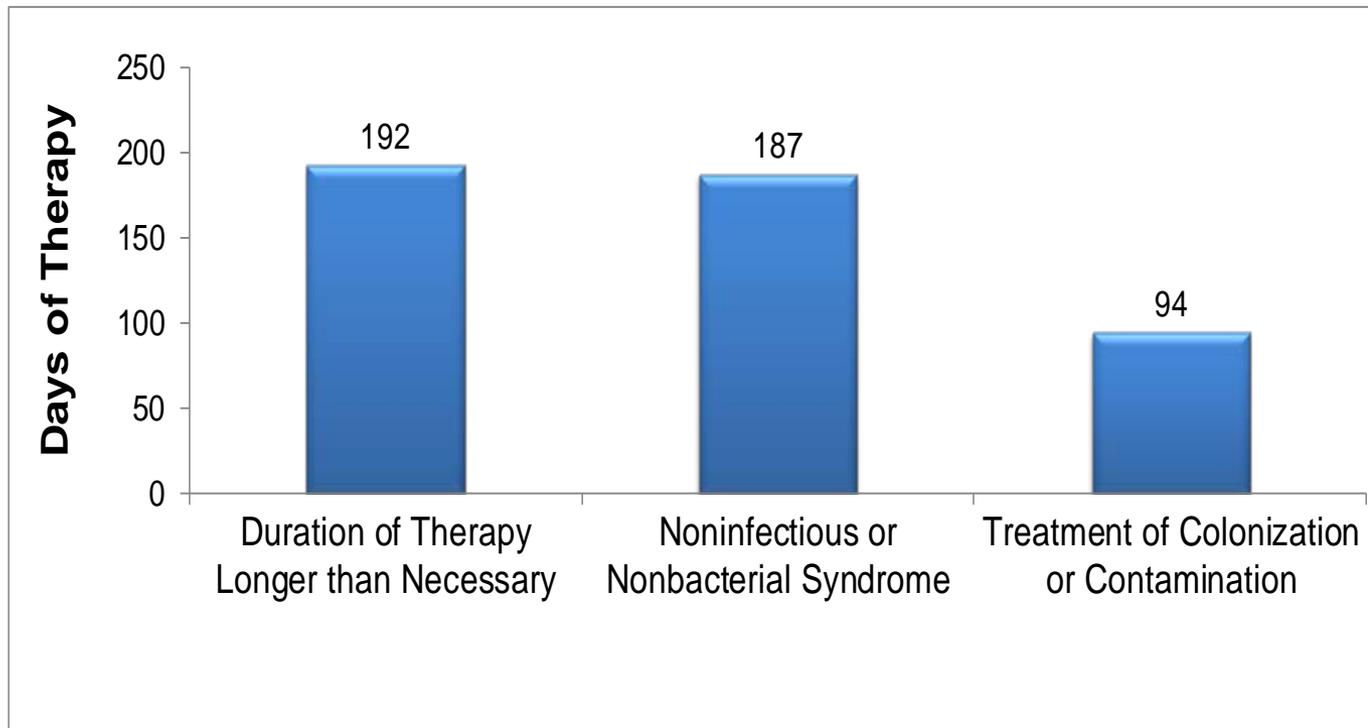
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Antibiotic Use in Acute Care Hospitals

- ❑ **In a 2011 single-day point prevalence survey in roughly 200 Emerging Infection Program Hospitals, 50% of patients were receiving at least one antibiotic**
- ❑ **This percentage is very consistent with other studies**
- ❑ **Adverse consequences of antibiotic use can be accentuated in hospitals, where a confined group of sicker patients is present**

Antibiotic Use is Often Sub-Optimal

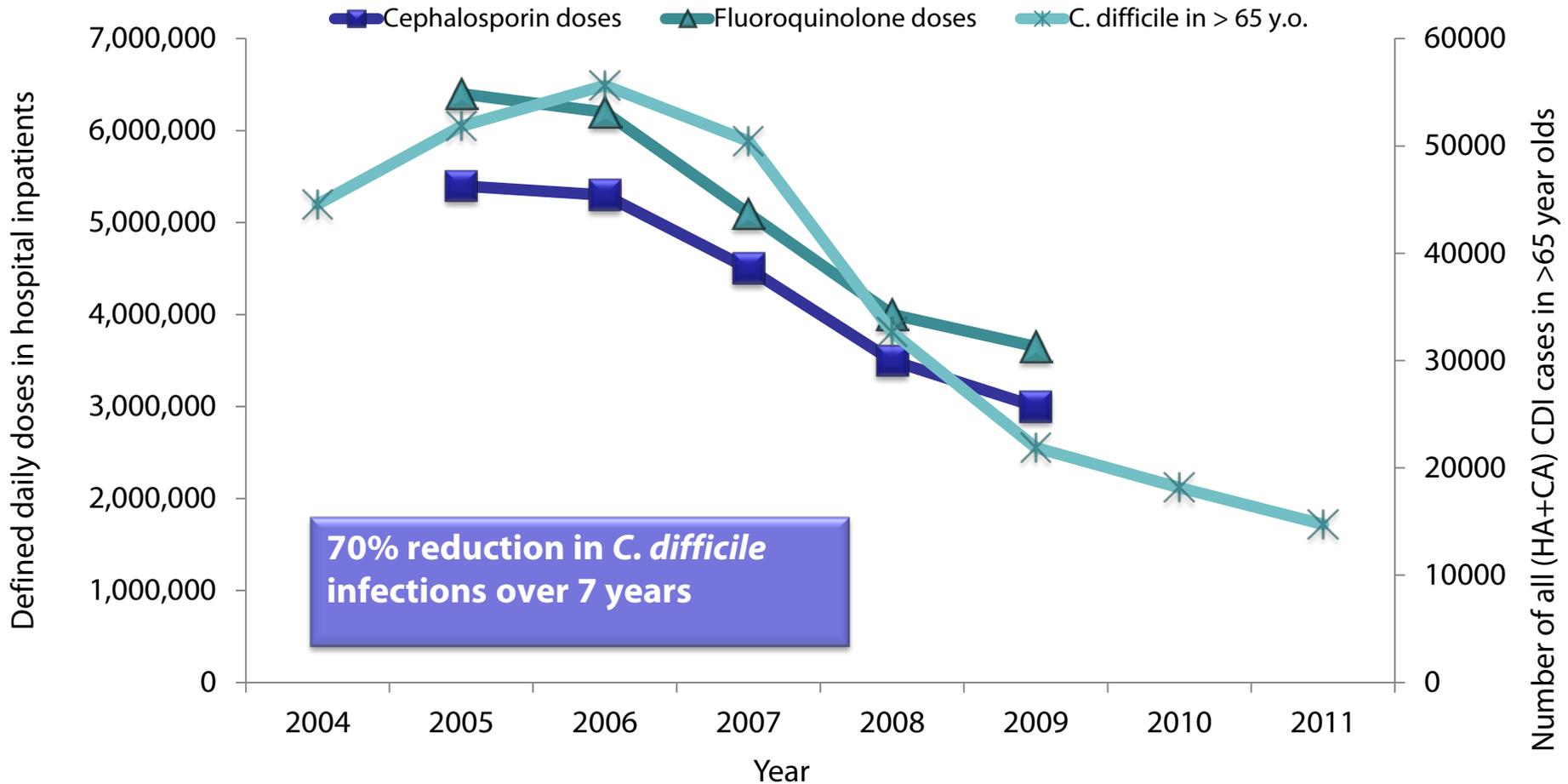
- It has been recognized for several decades that up to 50% of hospital antimicrobial use is inappropriate



Hospital Antibiotic Use and *C. difficile* Diarrhea

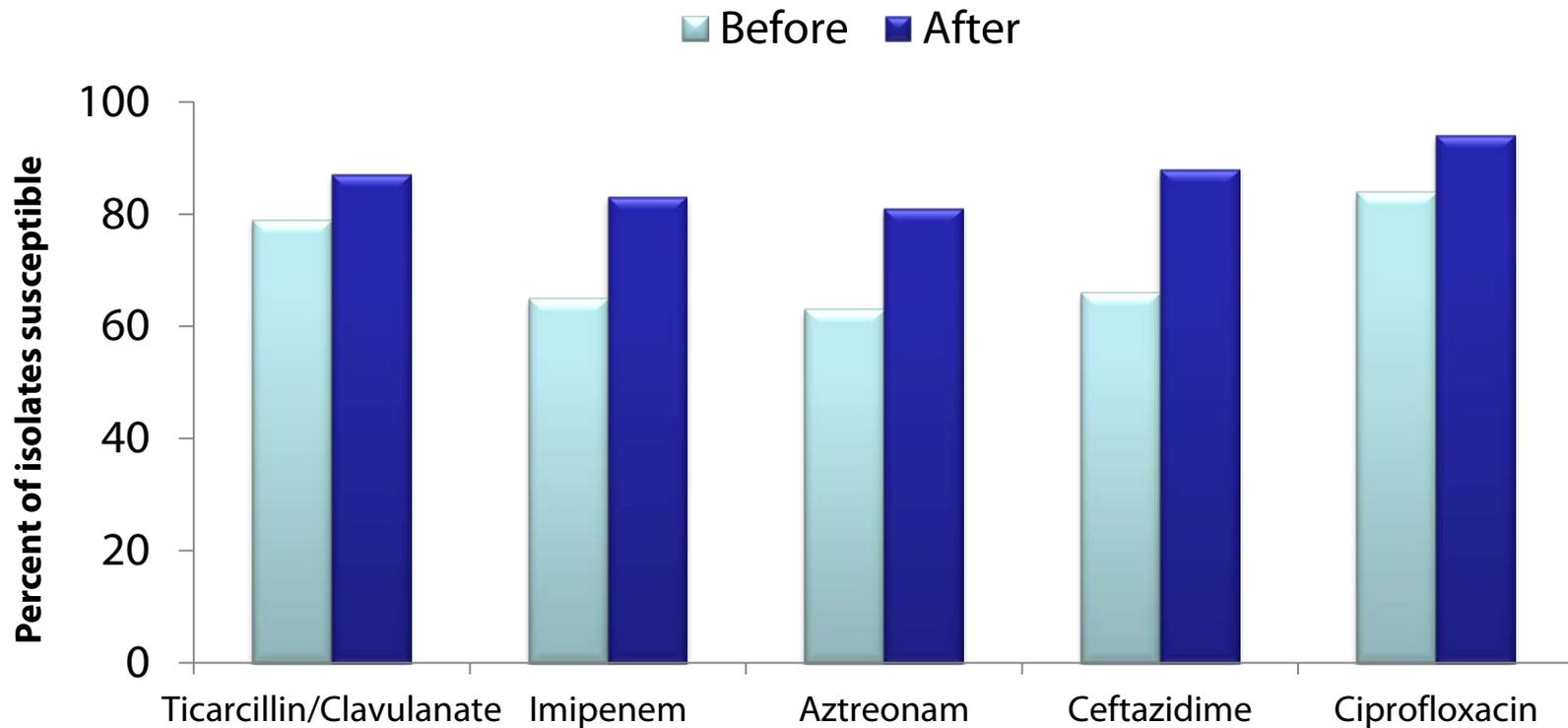
- ❑ One of the most serious adverse events from antibiotic use is *Clostridium difficile* associated diarrhea
- ❑ *C. difficile* can be spread within hospitals on patient care equipment and the hands of healthcare workers
- ❑ When patients who are exposed to *C. difficile* also get antibiotics that kill their normal gut bacteria, the risk of *C. difficile* associated diarrhea increases dramatically
- ❑ Improving antibiotic use could reduce *C. difficile*; this has been proven in several studies

Impact of Reductions in Antibiotic Prescribing on *C. difficile* in England



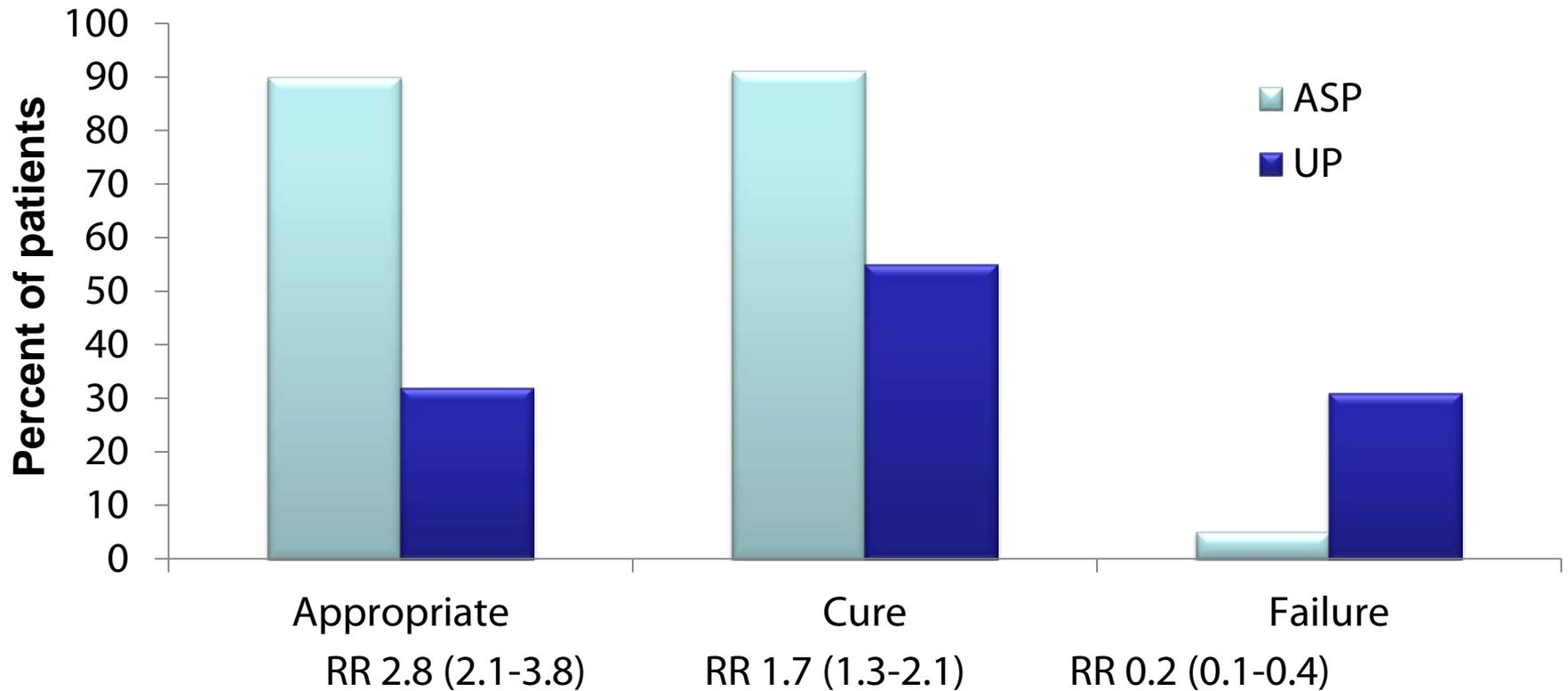
Ashiru-Oredope et al. J Antimicrob Chemother 2012; 67 Suppl 1: i51-i63
Wilcox MH et al. Clinical Infectious Diseases 2012;55(8):1056-63
www.hpa.org.uk/web/HPAweb&Page&HPAwebAutoListName/Page/1179745282388

P. aeruginosa Susceptibilities Before and After Implementation of Antibiotic Restrictions



$P < 0.01$ for all increases

For Hospitalized Patients, Clinical Outcomes Improve With Better Antibiotic Use



ASP: Antibiotic Stewardship Program
UP: Usual Practice
Fishman N. Am J Med. 2006;119:S53

Improving Antibiotic Use Can Save Hospitals Money

- ❑ **Comprehensive efforts to improve antibiotic use in hospitals have consistently demonstrated direct cost savings in reduced expenditures on antibiotics**
- ❑ **Savings may be hundreds of thousands of dollars per year for a single hospital**



Proven Ways to Improve Antibiotic Use and Patient Outcomes in Hospital Settings

- ❑ **Published data clearly show the benefits of improving antibiotic use in hospitals and show us various ways that can be done**
- ❑ **One of the most effective approaches is the creation of programs within hospitals focused on improving antibiotic use**
 - These are called “antimicrobial stewardship programs”

Antibiotic Stewardship Programs

- ❑ **CDC recommends that all hospitals should have antimicrobial stewardship programs**
 - Programs will look different in various hospitals, depending on the size and complexity of the patient population
- ❑ **CDC is working on resources to help hospitals implement antimicrobial stewardship programs**
 - Guidance that will define the structural elements and key functions of antimicrobial stewardship programs
 - Tools that will help support implementation of the programs
 - Antibiotic Use module of the National Healthcare Safety Network
 - Allows facilities to monitor antibiotic use electronically

Shifting The Way We Approach Improving Antibiotic Use

- ❑ **Antibiotic stewardship programs are important, but only one part of the solution**
- ❑ **We need all healthcare providers to be engaged in efforts to improve antibiotic use**
- ❑ **Public health can play a role in helping shift the way we think about improving antibiotic use**

Shifting The Way We Approach Improving Antibiotic Use

- ❑ **We need to learn from the successful model of hospital infection control**
- ❑ **For decades, preventing infections in hospitals was viewed as the primary responsibility of the infection control program**
- ❑ **Now, preventing infections is increasingly viewed as the primary responsibility of all healthcare providers**
 - Systems approach
 - Surveillance

How Can the Public Health Community Promote This Shift?

- ❑ **Raise awareness of the problems posed by antibiotic overuse and the measurable benefits that come from improving use**
- ❑ **Provide education to help facilities and providers improve antibiotic use in hospitals**
- ❑ **Engage new partners**
 - Hospitalists
 - State Health Departments

Hospitalists

- ❑ **Hospitalists are physicians whose specialty is treating hospitalized patients**
- ❑ **They are the fastest growing group of healthcare providers in the country**
- ❑ **Present in the majority of U.S. hospitals**
 - In 2006, >50% of all U.S. nonsurgical Medicare patients discharged from a hospital were cared for by hospitalists
- ❑ **Prescribe the majority of antibiotics in many hospitals**
- ❑ **View quality improvement work as a core function**

State Health Departments

- ❑ **Experience with prevention of healthcare associated infections demonstrates the important roles state health departments can play in improving care in hospitals**
 - Raising awareness
 - Providing education and training
 - Mandates and policies
- ❑ **These approaches can also be applied to improving antibiotic use**

State Health Departments

- ❑ **A recent survey by ASTHO showed several states are engaged in efforts to provide education on how hospitals can improve antibiotic use**
- ❑ **California passed legislation requiring that hospitals oversee the judicious use of antibiotics**
- ❑ **Other states are currently evaluating policy options to improve antibiotic use in hospitals**

Conclusion

- ❑ **Antibiotics are used commonly in hospitals**
- ❑ **Antibiotics are often mis-used in hospitals**
- ❑ **There are a number of important benefits to improving the use of antibiotics in hospitals**
- ❑ **Public health can play a key role in expanding efforts to improve antibiotic use in hospitals**

Using CMS Programs to Promote Appropriate Antibiotic Use



Shari M. Ling, MD
Deputy Chief Medical Officer
Centers for Medicare and Medicaid Services

Overview of Key Points

- ❑ **Reasons that appropriate antibiotic use is important to CMS, and to the healthcare system**
- ❑ **Numerous approaches and strategies are available to influence antibiotic use**
- ❑ **A balanced approach is needed that recognizes the realities of clinical practice**

CMS Strategy: Concurrently Pursue Three Aims

Better care

Improve overall quality by making health care more patient-centered, reliable, accessible, and safe

Healthy people, healthy communities

Improve population health by supporting proven interventions to address behavioral, social, and environmental determinants of health, in addition to delivering higher-quality care

Affordable care

Reduce the cost of quality health care for individuals, families, employers, and government

National Quality Strategy Promotes Better Health, and Healthcare, and Lower Costs

□ Six priorities

- **Making care safer by reducing harm caused in the delivery of care**
- Ensuring that each person is fully cared for and that appropriate antibiotic use is their care
- Promoting effective communication and coordination of care
- Promoting the most effective prevention and treatment practices for the leading causes of mortality, starting with cardiovascular disease
- Working with communities to promote wide use of best practices to enable healthy living
- Making quality care more affordable for individuals, families, employers, and governments by developing and spreading new health care delivery models

CMS Program Principles

- ❑ **Evidence supported measurement**
 - Clinical guidelines, research findings, best practices
- ❑ **CMS develops and implements measures originated by experts, including:**
 - Medical specialty societies
 - CDC
- ❑ **Data driven improvement and program refinement**

CMS Quality Programs

Hospital Quality Reporting	Physician Quality Reporting	PAC and Other Setting Quality Reporting	Payment Model Reporting	"Population" Quality Reporting
<ul style="list-style-type: none"> • Medicare and Medicaid EHR Incentive Program • PPS-Exempt Cancer Hospitals • Inpatient Psychiatric Facilities • Inpatient Quality Reporting • Outpatient Quality Reporting • Ambulatory Surgical Centers 	<ul style="list-style-type: none"> • Medicare and Medicaid EHR Incentive Program • PQRS • eRx quality reporting 	<ul style="list-style-type: none"> • Inpatient Rehabilitation Facility • Nursing Home Compare Measures • LTCH Quality Reporting • ESRD QIP • Hospice Quality Reporting • Home Health Quality Reporting 	<ul style="list-style-type: none"> • Medicare Shared Savings Program • Hospital Value-based Purchasing • Physician Feedback/Value-based Modifier* 	<ul style="list-style-type: none"> • Medicaid Adult Quality Reporting* • CHIPRA Quality Reporting* • Health Insurance Exchange Quality Reporting* • Medicare Part C* • Medicare Part D*

* The program did not meet the statutory inclusion criteria for pre-rulemaking, but was included to foster alignment of program measures.

CMS Programs that Focus on Antibiotic Use

❑ Quality Reporting (QR) Programs

- Inpatient QR
- Value Based Purchasing
- Outpatient QR
- PQRS
- EHR Incentive Program

❑ Conditions of Participation

- LTCs
- Hospitals

❑ Survey and Certification

- PSI - Hospital survey to:
 - Prevent transmission of multidrug-resistant organisms
 - Promote antibiotic stewardship programs

❑ Quality Improvement Organizations

- Encourage and facilitate antimicrobial stewardship
- LAN Activities

PQRS: Physician Quality Reporting System

EHR: Electronic Health Records

LTCs: Long-term care facilities

PSI: Patient Safety Indicators

LAN: Prevention Learning and Action Network

Hospital Value-Based Purchasing Program

- ❑ **Initially required in the Affordable Care Act and further defined in Section 1886(o) of the Social Security Act**
- ❑ **Quality incentive program built on the Hospital Inpatient Quality Reporting (IQR) measure reporting infrastructure**
- ❑ **Funded by an initial 1% withhold from participating hospitals' Diagnosis-Related Group (DRG) payments**
 - DRG: Payment categories used to classify patients for the purpose of reimbursing hospitals for each case in a given category

Hospital Value-Based Purchasing Program

- ❑ **Starting with Fiscal Year (FY) 2013 payment, 1% of IPPS base operating payment linked to performance on quality measures; percentage increases by 0.25% annually until FY 2017**
 - Current measures include heart attack, pneumonia, heart failure, surgical care, **HAIs**, and patient experience of care
- ❑ **January 2013 - CMS started paying 2,985 hospitals for FY 2013 Hospital VBP performance, retroactive to October 1, 2012 claims**

HAI Agency Priority Goal

- ❑ **Reducing CLABSI and CAUTI in hospitals nationwide represents a collaborative effort across the department**
- ❑ **CMS, CDC, OASH and AHRQ all have initiatives designed to synergize around the goal of reducing CLABSI by 25% and CAUTI by 20% in our nation's hospitals**
- ❑ **Multiple DHHS HAI prevention and reduction initiatives support this goal and use data to identify resource needs and drive results at the local level**
 - Quality Improvement Organization 10th Scope of Work (CMS)
 - Partnership for Patients Initiative (CMS)
 - State Health Department-based HAI programs (CDC)
 - Comprehensive Unit-based Safety Program (CUSP) for CLABSI and CAUTI (AHRQ)
 - The National Action Plan to Prevent Healthcare-Associated Infections (OASH)

HAI: healthcare-associated infection

CLABSI: central line-associated bloodstream infections

CAUTI: catheter-associated urinary tract infections

OASH: Office of the Assistant Secretary for Health

AHRQ: Agency for Healthcare Research and Quality

DHHS: Department of Health and Human Services

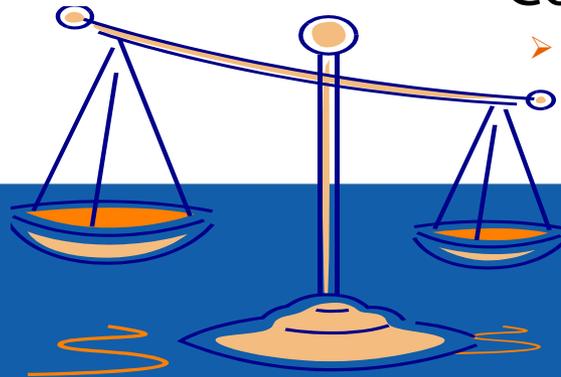
Policy Implications and Concerns: A Balancing Act

CONCERNS

- ❑ Quality reporting “boasts”
 - Efficient antibiotic starts
 - Sepsis detection
- ❑ Incentives to reduce HAIs
 - Value-based purchasing
- ❑ Payment adjustments for HAIs as Healthcare Acquired Conditions

RESPONSES

- ❑ Paired measures
 - Antibiotic stops
 - Failure to rescue
- ❑ *C. difficile* detection
 - Within setting
 - Across settings
- ❑ Antibiotic stewardship as a Condition of Participation
 - Conditions that health care organizations must meet in order to begin and continue participating in Medicare and Medicaid



Conclusion

- ❑ **Appropriate antibiotic use is an important aspect of achieving care that is safer, of higher quality and less costly**
- ❑ **Appropriate antibiotic use by healthcare providers and facilities across all care settings requires data-driven choice, refinement and balance**
- ❑ **Through quality improvement systems and measures, CDC and CMS, along with other partners, work to improve antibiotic use in hospitals and other healthcare settings**

CDC PUBLIC HEALTH GRAND ROUNDS

Combating Resistance: Getting Smart About Antibiotics

