Appropriateness of antibiotic prescription in the emergency department: Where are we?

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American Board in Internal Medicine, Geriatric and Infectious Diseases
Chairperson of HIV management team in MOH
Chairperson of national Antibiotic committee in Kingdom of Bahrain
Chairperson of the geriatric services in secondary care
Associate Professor in Arabian Gulf University

Outline

- 1. What is Antibiotic stewardship IN ER
- 2. The importance of It
- 3. The core elements of Antibiotic stewardship in ER
- 4. How to do it ?
- 5. lessons learned

Outpatient Antimicrobial Stewardship

Antibiotic Resistance

- Global public health crisis affecting more than 2 million people annually
- Accounts for at least 23,000 deaths annually
- Total economic burden exceeds $20 billion in direct healthcare costs

Overuse of Antibiotics

- Approximately 154 million outpatient visits lead to an antibiotic prescription annually
- An estimated 30% of outpatient antibiotics are unnecessary
- Total inappropriate prescribing for URI = 50%

Prescribing Barriers

- Patient knowledge gaps regarding antibiotic use
- Expectations of patients and care givers
- Patient satisfaction goals
- Unclear prescribing practices and guidelines for treatment

Why expand into ambulatory care?

Why do you rob banks?

That's where the money is...

Why expand into ambulatory care?

Fleming-Dutra, K., et al. (2016). JAMA. 315(17): 1864-1873.
CDC. MMWR Morb Mortal Wkly Rep. 2011;60(34):1153-6.
Pichichero ME. (2002) JAMA. 287(23):3133-5.
Shapiro DJ, et al. (2014). J Antimicrob Chemother. 69(1):234-40

Why do outpatient stewardship?

That's where the antibiotics are...

Where, When, and How We Care for People

Antibiotic Expenditures for Humans in the United States by Treatment Setting 2010-15: Total $56.0 billion

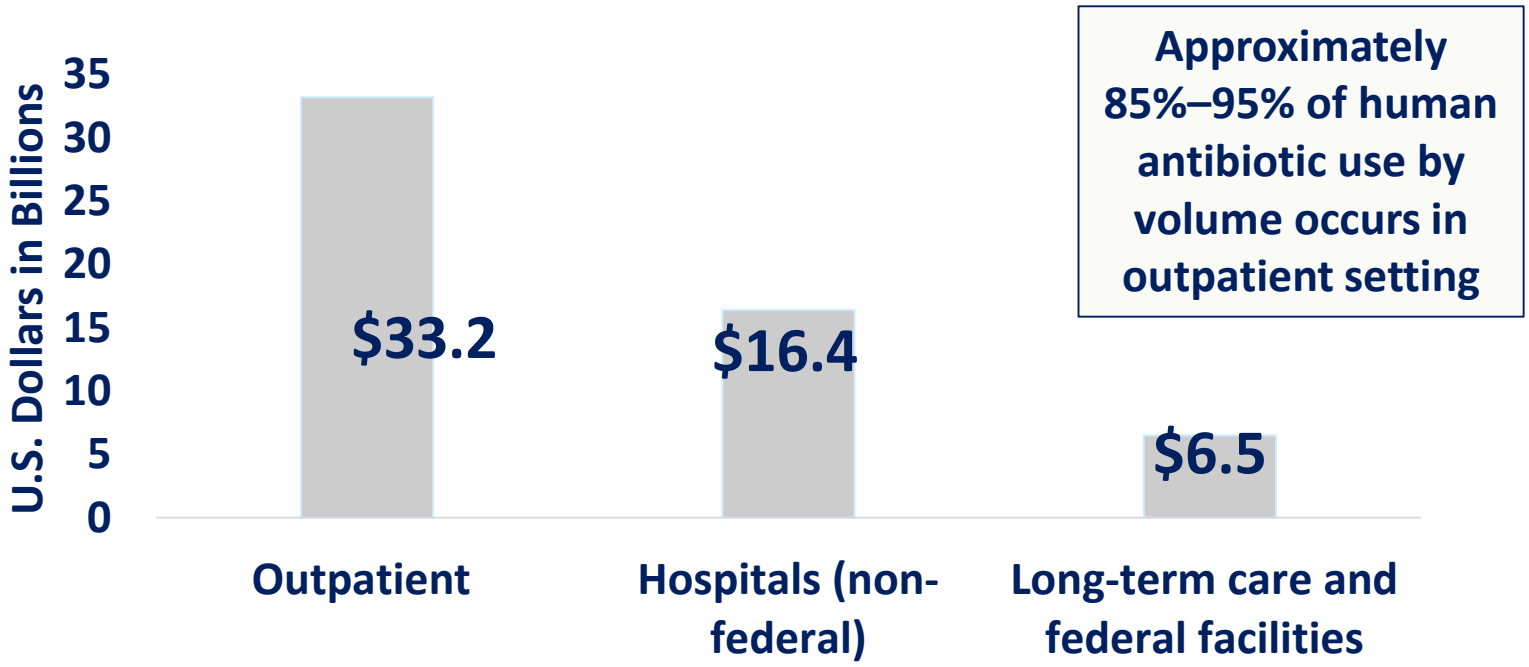
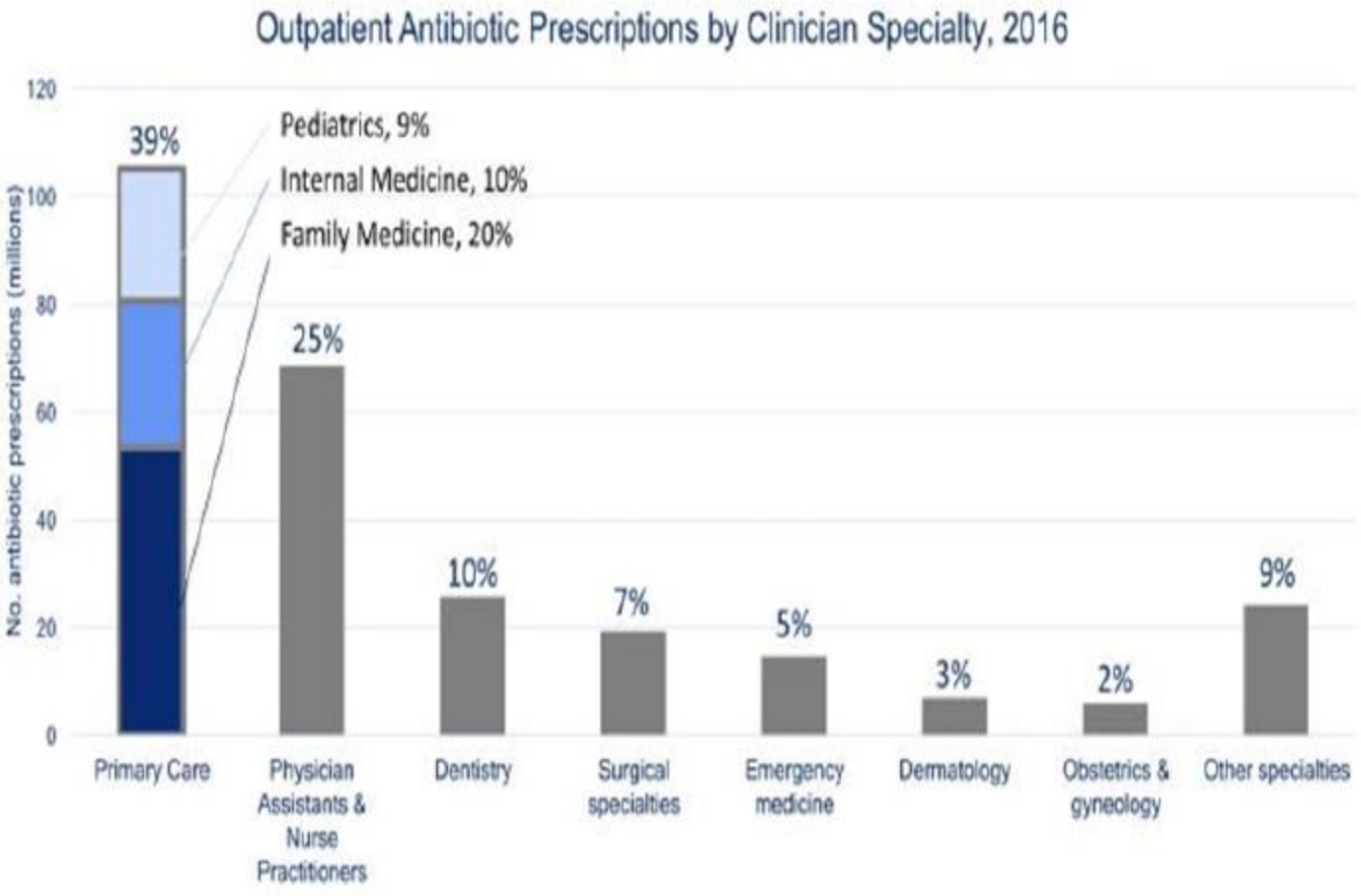


Figure created from data from: Suda et al. *Clin Infect Dis*. 2017; cix773.
Duffy et al. *J Clin Pharm Ther*. 2018; 43(1): 59-64.

Primary care physicians prescribe the greatest proportion of US outpatient antibiotics.



King et al. Clin Infect Dis 2019;pii:ciz225.

Antibiotic adverse events can be severe, including allergic reactions.

Antibiotic adverse events can lead to emergency department (ED) visits.

1 in 1000 antibiotic prescriptions leads to an ED visit for an adverse event

↓

200,000 ED visits/year in U.S.

Linder. *Clin Infect Dis*. 2008 Sep 15;47(6):744-6 Shehab, et al. *Clin Infect Dis*. 2008 Sep 15;47(6):735-43. Shehab et al. *JAMA* 2016:316:2115-25. Bourgeois, et al. *Pediatrics*. 2009;124(4):e744-50.

Antibiotic misuse in the community

- > 50% prescribed unnecessarily for URTI
- Poor adherence to guidelines

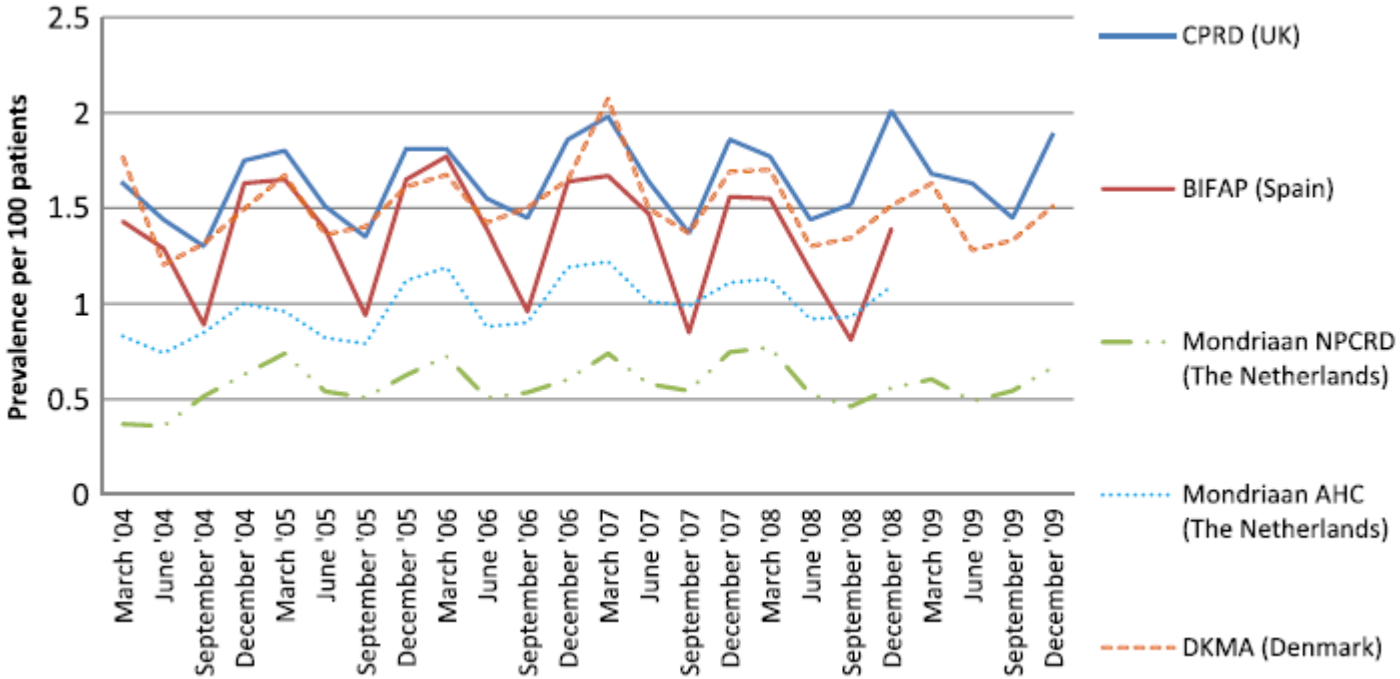
Infection	Patients receiving recommended first line antibiotics (Acceptable range over 80%)		
	Australian study[1]	US study[2]	
	Adults and children	Adults (20+ years)	Children (0-19 years)
Pharyngitis and/or tonsilitis	39%	37%	60%
Sinusitis	27%	37%	52%
Middle ear infection	51%	N/A	67%

1. Aura 2017 Second Australian report on antimicrobial use and resistance in human Health
2. CDC Report on Antibiotic Use in United States:Progress and Opportunities.2017

Indicators of antimicrobial misuse in the community

Higher consumption in winter months

Indicates treatment of viral infections, colds, 'flu



Bauer et al Pharmacoepidemiology and Drug Safety 2016;25 (Suppl.1):11-20

Indicators of quality of prescribing in the community

ECDC Quality Indicators

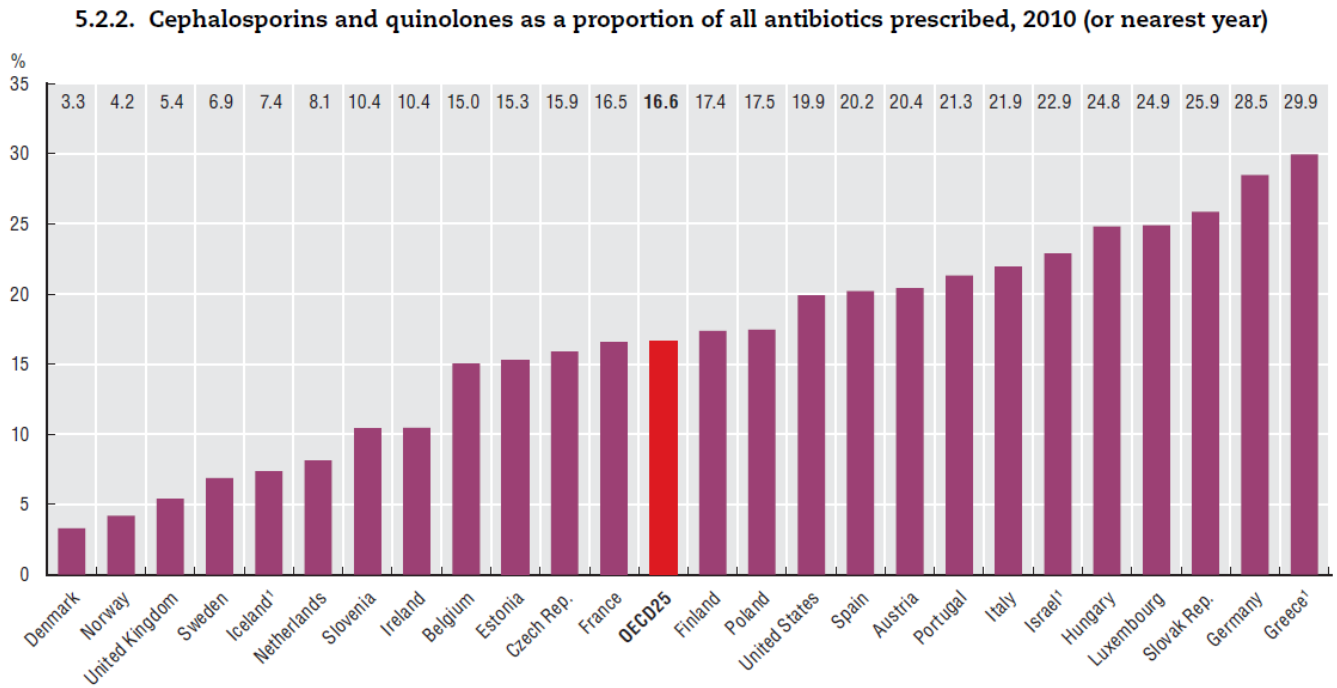
- Measure seasonal variation – winter quarters compared with summer quarters
- Variation between countries 2015

	Lowest seasonal variation	Highest seasonal variation
Total antibiotic use	12%	66%
Quinolone use	3%	63%

ECDC Quality indicators for antibiotic consumption in the community (primary care sector) in Europe 2015

Indicators of quality of prescribing in the community

High use of second line agents – OECD indicator



http://www.oecd-ilibrary.org/social-issues-migration-health/health-at-a-glance-2013/prescribing-in-primary-care_health_glance-2013-44-en

Indicators of quality of prescribing in the community

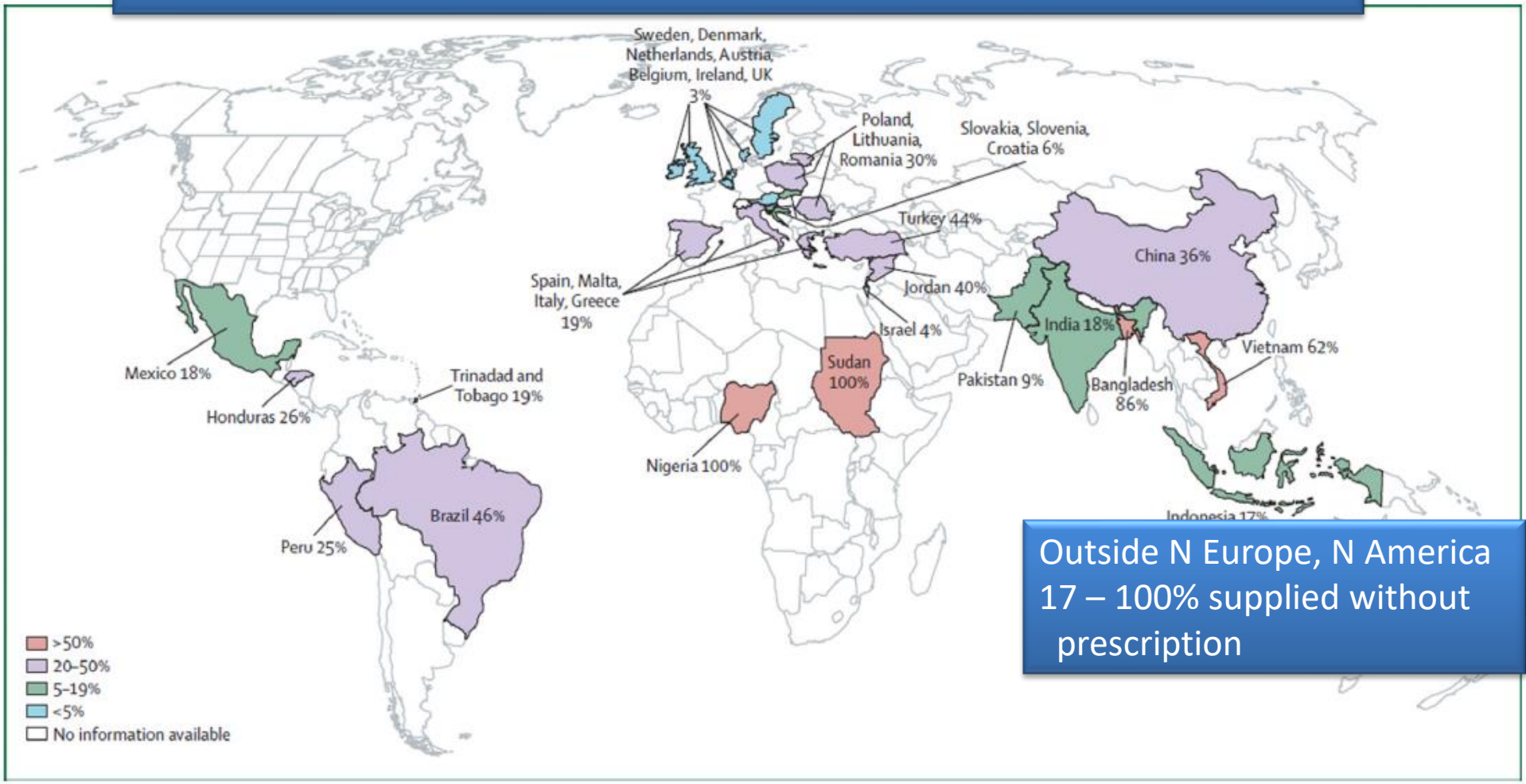
- High use of broad spectrum antibiotics
- ECDC Quality indicator 2015

  Ratio of consumption of broad spectrum agents to narrow spectrum agents

Countries	Broad/narrow spectrum ratio
Denmark, Finland, Norway, Sweden	< 1
Italy, Malta, Greece	>100

ECDC Quality indicators for antibiotic consumption in the community (primary care sector) in Europe 2015

Non prescription use in the community



Outside N Europe, N America 17 – 100% supplied without prescription

Figure 2. Frequency of non-prescription use of antimicrobials in the general population based on published works

Morgan et al. Non-prescription antimicrobial use worldwide: a systematic review. Lancet Infect Dis 2011;11(9):692-701

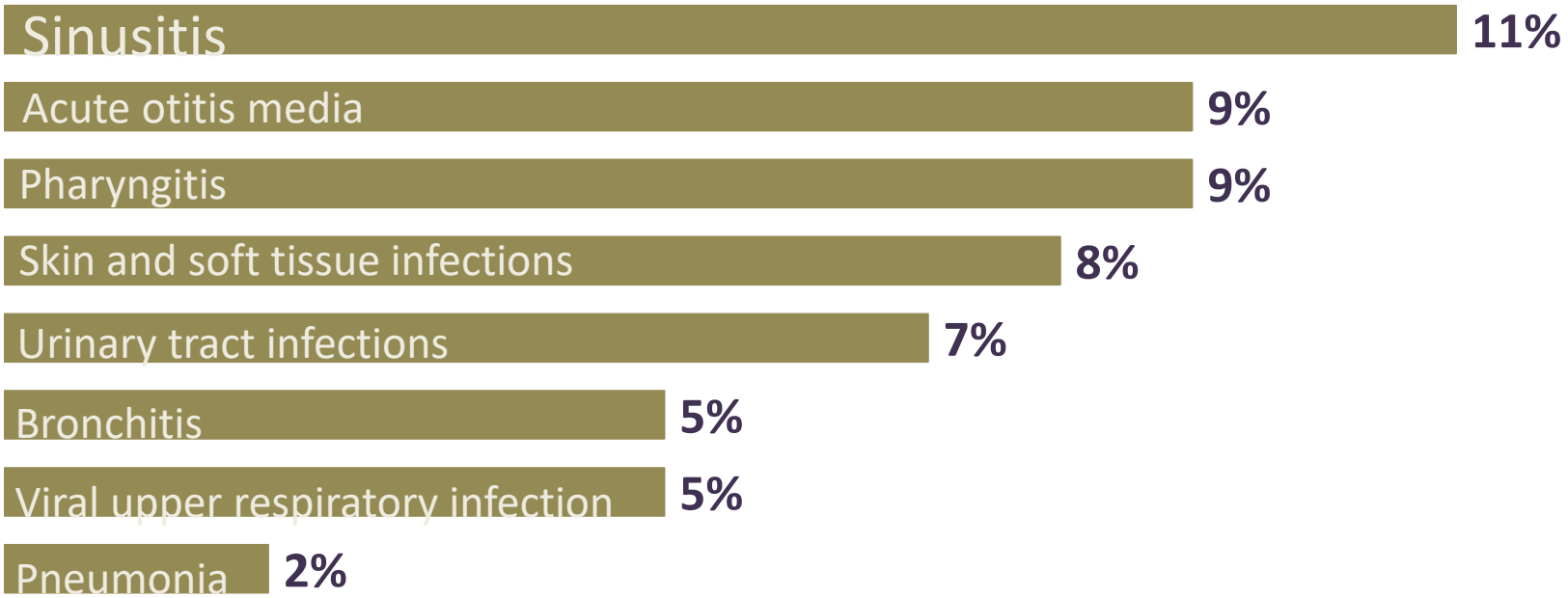
Non prescription use in the community

- Supplied for non bacterial infections
- Inappropriate drug choice
- Shorter duration than prescribed courses – often for single day
- Dose commonly lower than standard dose
- Substandard quality of product – expired or degraded
- Counterfeit products

Morgan et al. Non-prescription antimicrobial use worldwide: a systematic review. Lancet Infect Dis 2011;11(9):692-701

The top diagnoses leading to antibiotics in outpatient settings are not complex conditions.

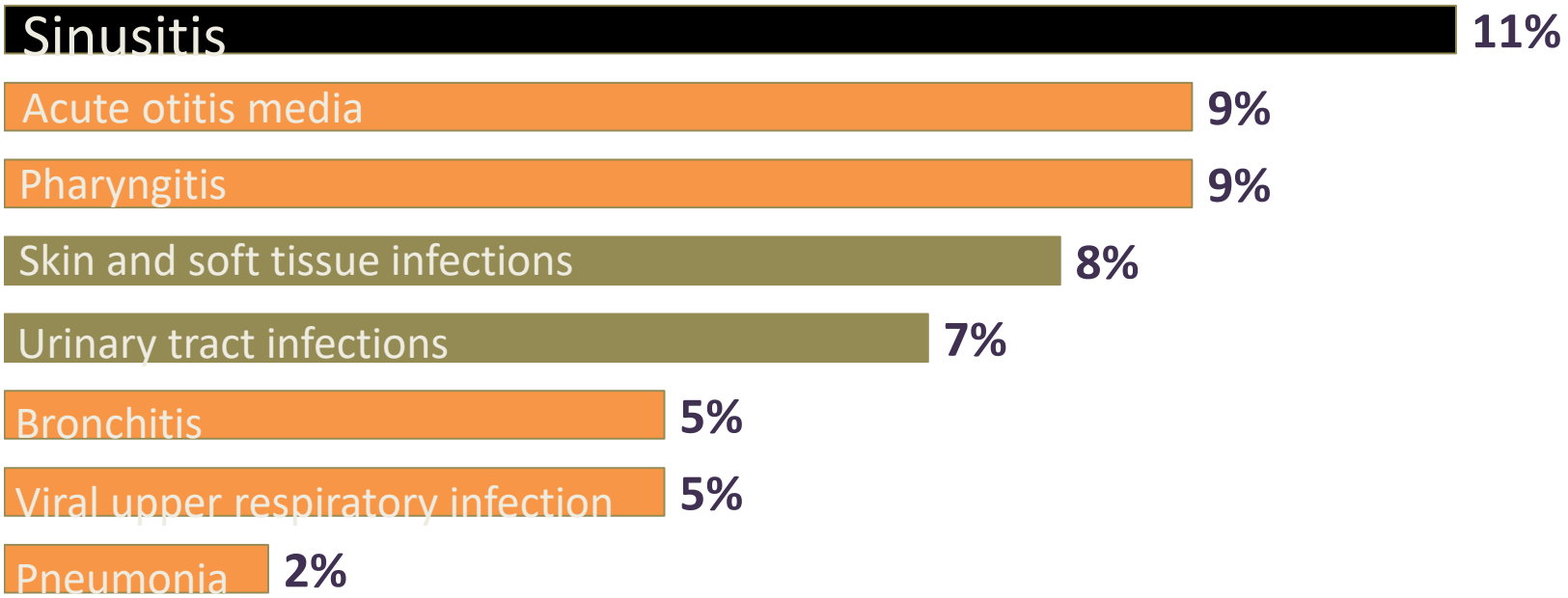
Top diagnoses leading to antibiotic prescriptions in US doctors' offices and emergency departments, 2010-2011



Fleming-Dutra et al. JAMA. 2016;315(17):1864-1873.

Respiratory infections are major drivers of antibiotic use in outpatient settings.

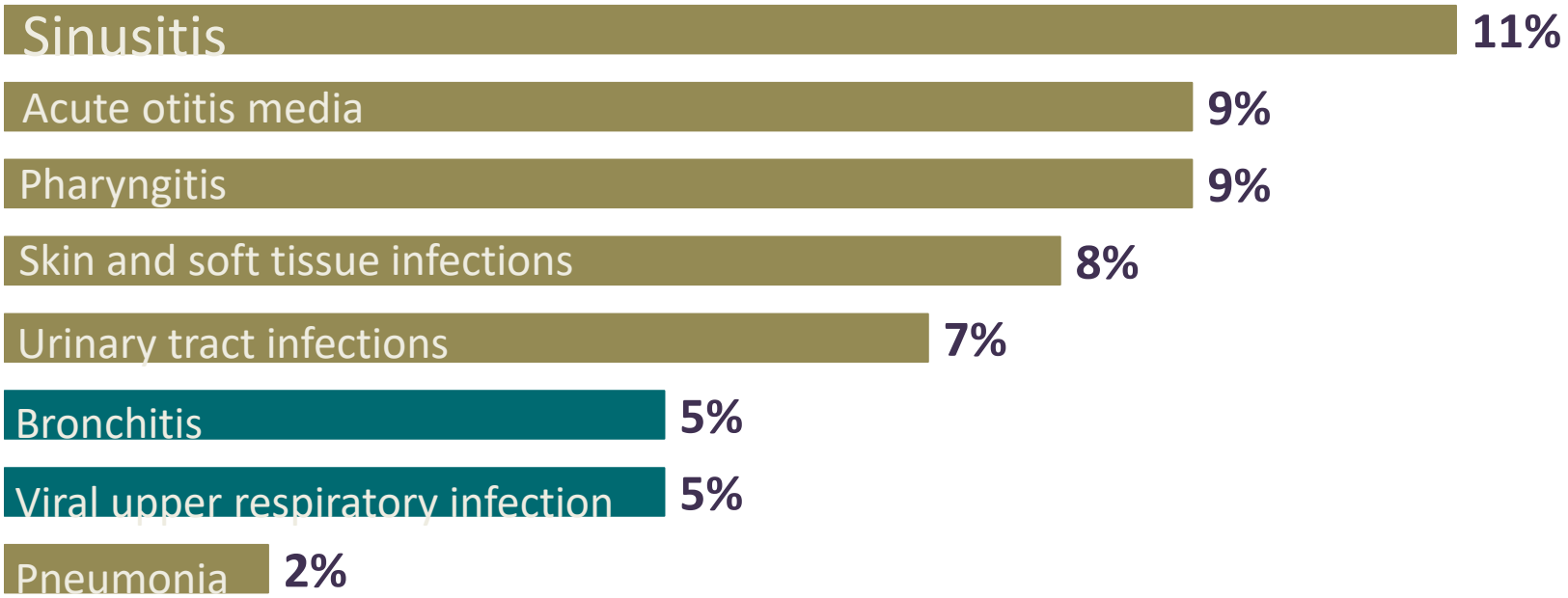
Top diagnoses leading to antibiotic prescriptions in US doctors' offices and emergency departments, 2010-2011



Fleming-Dutra et al. JAMA. 2016;315(17):1864-1873.

Acute bronchitis and viral upper respiratory infections should never receive antibiotics.

Top diagnoses leading to antibiotic prescriptions in US doctors' offices and emergency departments, 2010-2011

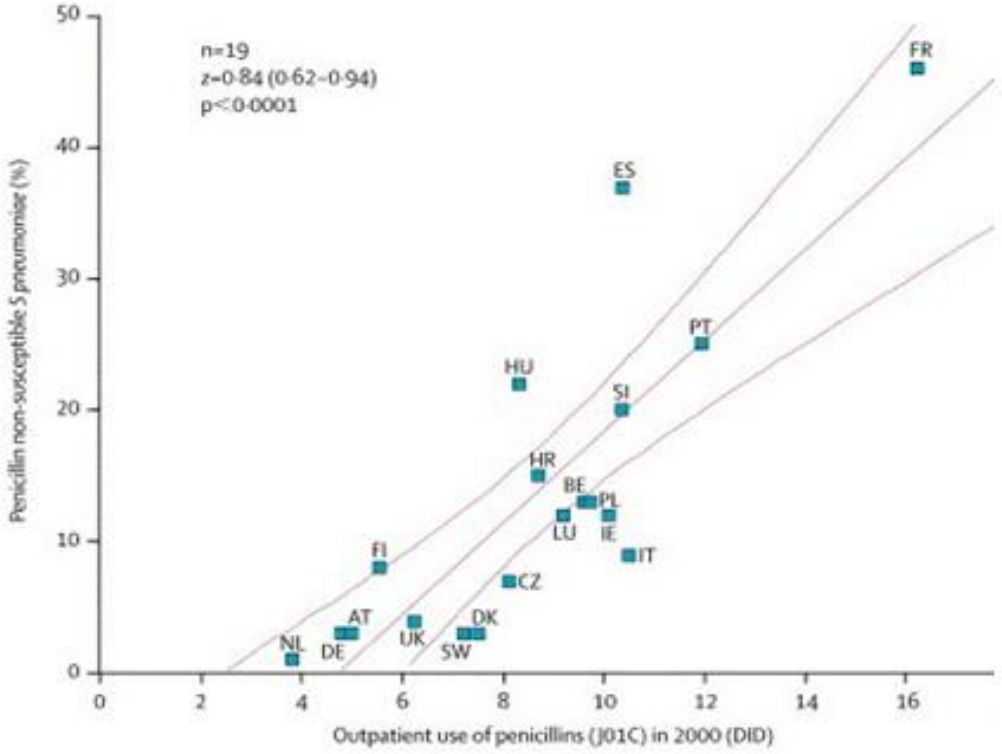


Fleming-Dutra et al. JAMA. 2016;315(17):1864-1873.

Associations Between Antibiotic Use and the Emergence of Resistance

- Changes in antimicrobial use are paralleled by changes in the prevalence of resistance
- Resistance is more common in health care-associated bacterial infections compared with community-acquired
- When compared with controls, patients harboring resistant organisms are more likely to have received prior antimicrobials
- Areas within hospitals (i.e. critical care units) that have the greatest rate of antimicrobial resistance also have the greatest rate of antimicrobial use
- Increasing the duration of patient exposure to antimicrobials increases the likelihood of colonization with resistant organisms

There is a high correlation between antibiotic use and resistance



Factors That Lead to Inappropriate Use of Antibiotics

Internal

- Lack of knowledge of infectious diseases, e.g., “more antibiotics are better”
- “Double coverage is better for killing”
- “Expanding” spectrum when consolidation is better
- Lack of knowledge about antibiotic spectrum of activity, e.g., “broader is easier (to prescribe) – one regimen for everything”
- Lack of knowledge about dosing, e.g., “low dose for longer is better”
- Lack of knowledge of antibiotic allergies and their implications
- Lack of knowledge about when to give and stop antibiotics
- Prophylaxis outside of surgical theater

External

- Lack of time to educate patients and prescribers about when antibiotics are not indicated
- Lack of microbiologic data (and acquisition of it)
- Fear of malpractice for not giving an antibiotic
- Misperception that antibiotics have only benefit and no harm
- Pharmaceutical detailing - new does not always equal better
- Critical access hospitals may not have availability of ID specialists

What can be done?

BMC Fam Pract. 2018 Jun 23;19(1):96. doi: 10.1186/s12875-018-0788-4
Antibiotics (Basel). 2017 Oct 31;6(4). pii: E23. doi: 10.3390/antibiotics6040023

Lasting thought...

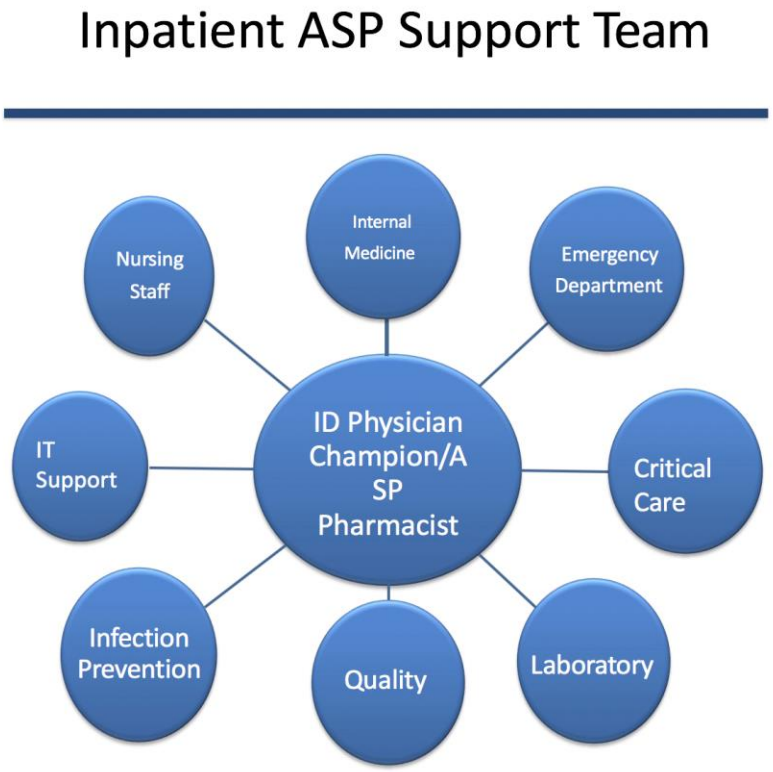
Antibiotics are the only medicine that we give to one person that can directly affect another

Considering Resistance/Risk When Prescribing

- Do they definitely need an antibiotic?
- Have they have had this type of infection before and been given antibiotics?
- What were the most recent sensitivities/resistance patterns if available (up to 12 months)?
- Do they have risk factors for resistance?
- Do they need treated immediately or if they are symptomatic (e.g. UTI) and at risk of resistance would it be appropriate to send a sample for culture and sensitivity?
- Do you need to get specialist advice (e.g. microbiology)?

Core Elements for Antimicrobial Stewardship Programs (ASP)

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



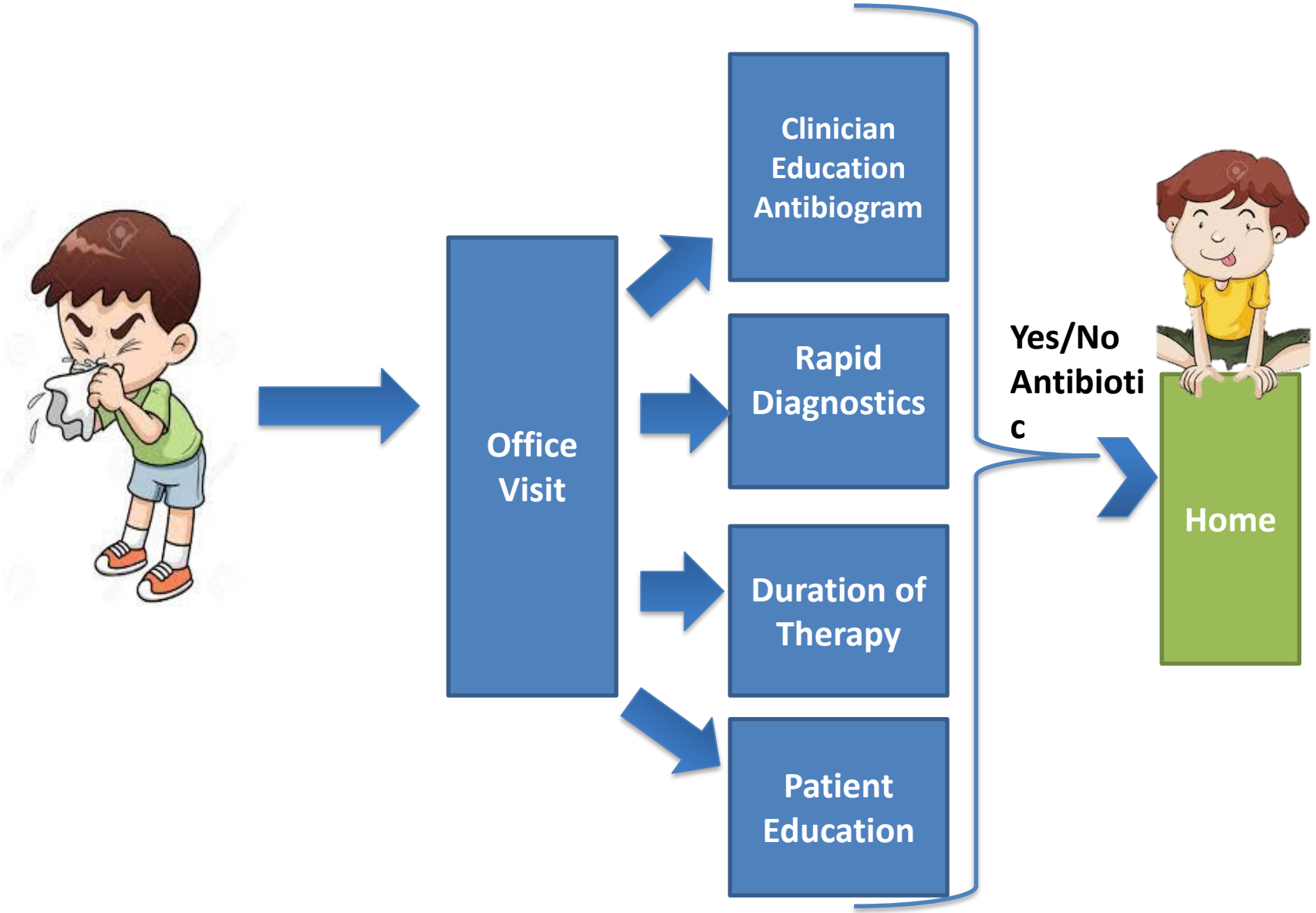
http://www.cdc.gov/getsmart/healthcare/implementation/core-elements.html

Outpatient Intervention for Antimicrobial Stewardship

- **Commitment:** demonstrate dedication to and accountability for optimizing antibiotic prescribing and patient safety
- **Action for policy and practice:** implement at least one policy or practice to improve antibiotic prescribing, assess whether it is working, and modify as needed
- **Tracking and Reporting:** monitor antibiotic prescribing practices and offer regular feedback to clinicians or have clinicians assess their own antibiotic use
- **Education and Expertise:** Provide educational resources to clinicians and patients on antibiotic prescribing and ensure access to needed expertise on antibiotic prescribing

https://www.cdc.gov/antibiotic-use/community/pdfs/16_268900-A_CoreElementsOutpatient_check_1_508.pdf

Antimicrobial Stewardship for Outpatient Intervention



Impact of an antimicrobial stewardship intervention on urinary tract infection treatment in the ED☆,☆☆,★

Kelly M. Percival, PharmD [a,*], Kristine M. Valenti, PharmD [a], Stacy E. Schmittling, PharmD [a], Brandi D. Strader, PharmD [a], Rebecka R. Lopez, MD [b], Scott J. Bergman, PharmD [c]

Clinician Education Antibiogram

- Pre-intervention and post-intervention study using education and the antibiogram (439 bed teaching hospital)
  - Created standard antibiotic prescribing with cefazolin and nitrofurantoin (cystitis) based on E. coli susceptibility from hospital antibiogram
- Intervention: implementation IDSA guidelines, PharmD education of physicians, and e-mail reminders
- Preliminary audit of prescribing at 2-months into the intervention and then feedback by e-mail to all providers as a reminder
- Results: the intervention improved appropriate selection of antibiotics for uncomplicated UTI from 44.8% to 83%

American Journal of Emergency Medicine 2015: 33;1129–1133

ED Specific Antibiogram

- Inpatient vs. outpatient data
- Cumulative institution results over-estimate local resistance patterns in community
- Logistical challenges
- Limited data

Outpatient Intervention for Antimicrobial Stewardship

Clinician Education
Antibiogram

- All physicians should be involved in the education process and learn how to use the antibiogram
- Begin with one intervention that will fit into your practice workflow
  - UTI, soft tissue, and respiratory tract
- Before introducing an intervention, be aware of patterns of antibiotic use and resistance within your practice
- Guidance from professional societies and local experts

IDSA
Infectious Diseases Society of America

American Academy of Pediatrics
DEDICATED TO THE HEALTH OF ALL CHILDREN™

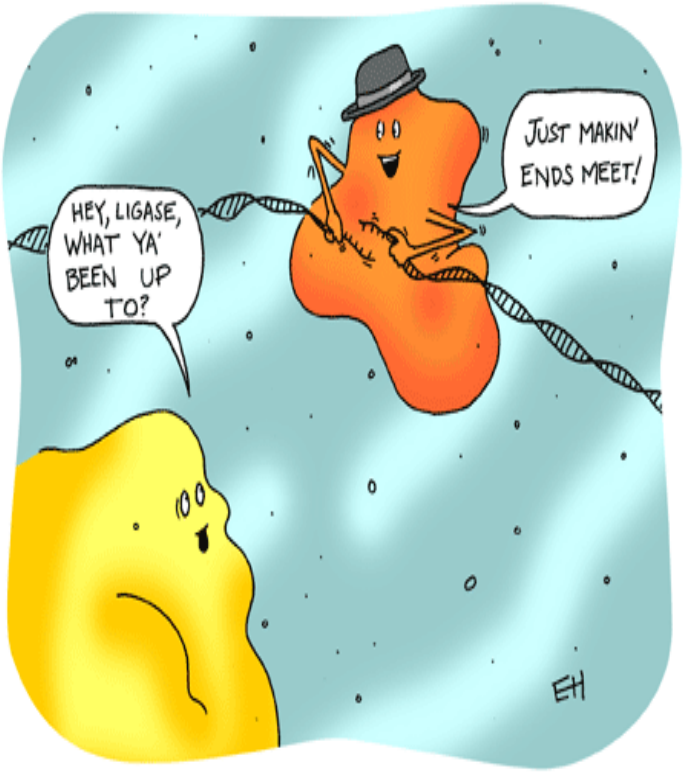
2. Rapid Diagnostic Testing

- Procalcitonin (PCT) Level
  - Diagnostic biomarker for bacterial infections
    - Best for respiratory tract infections and sepsis
    - Not useful for localized infections: cellulitis or endocarditis
    - PCT Levels <0.05 normal, >0.25-0.5 elevated, > 2 critical high
    - Caution: low volume states, severe pancreatitis, multiple trauma, major surgery, burns
  - Can shorten antibiotic duration dramatically
- Urinary antigen test
- Polymerase Chain Reaction (PCR)

Outpatient Intervention for Antimicrobial Stewardship

Rapid Diagnostics

- Reduce reliance on culture and provide initial preliminary rapid results
- Polymerase chain reaction (PCR)
  - Detect DNA or RNA of bacteria, fungi, or viruses
  - Detect bacterial resistance genes
- Examples: respiratory, stool, blood, CSF, STD, and skin/soft tissue



Limitations of PCR panels

- Poor specimen quality
- Unable to differentiate between a potential microorganism and microorganism causing disease
- Detection of multiple microorganisms from the respiratory tract or stool

Pediatric Respiratory

Adenovirus types 3, 4, 7, 21
Enterovirus group
Human bocavirus
Human coronavirus (4 types)
Human metapneumovirus
Influenza A - Human influenza
Influenza A - H1N1-09
Influenza B
Parainfluenza virus types 1, 2, 3, 4
Respiratory Syncytial Virus (A & B)
Rhinovirus

Bordetella pertussis
Chlamydophila pneumoniae
Haemophilus influenzae
Haemophilus influenzae (Type B)
Moraxella catarrhalis
Mycoplasma pneumoniae
Neisseria meningitidis
Streptococcus dysgalactiae (Group C, G)
Streptococcus pneumoniae
Streptococcus pyogenes (Group A)

Gastrointestinal

Campylobacter jejuni
Clostridium difficile (toxin B gene)
Enterohemorrhagic *E. coli* (EHEC)
– Shiga-like toxin gene (*stx1*)
– Shiga-like toxin gene (*stx2*)
Enteroinvasive *E. coli*/Shigella (EIEC)
Enteropathogenic *E. coli* (EPEC)
Enterotoxigenic *E. coli* (ETEC)
Salmonella enterica
Vibrio parahaemolyticus

Adenovirus types 40, 41
Norovirus
Rotavirus
Cryptosporidium parvum
Giardia lamblia

3. Duration

Shorter is Better

Syndrome	Short Course Studied (days)	Long Course Studied (days)	Result	Updated IDSA guidelines?
Acute bacterial sinusitis	5	10	Equal	2013
COPD exacerbation	≤5	≥7	Equal	2018 Gold guidelines
Intra-abdominal infection	4	10	Equal	2010, in development
CAP	3-5	7-10	Equal	2007, in development
HAP/VAP	≤5	10-15	Equal	2016
Cystitis/Pyelo	3-5/5-7	10-14	Equal	2011
SSTI	5-6	10-14	Equal	2014

Adapted from B. Spellberg. J Hosp Med 2018

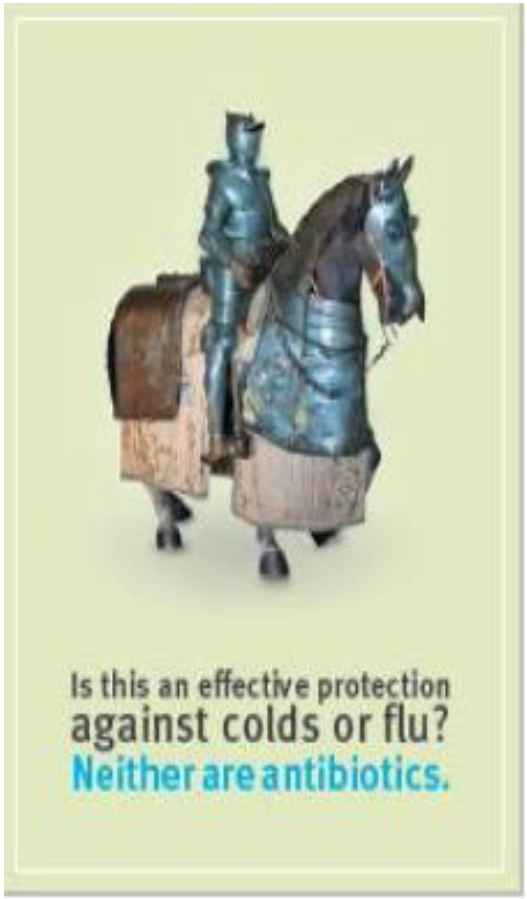
Treatment Durations

- Shortening treatment durations
  - Goal:
    - Sustaining efficacy while minimizing collateral damage
  - Strategies
    - Education
    - Protocols
- Compare site data versus guideline recommendations

4. Patient Education

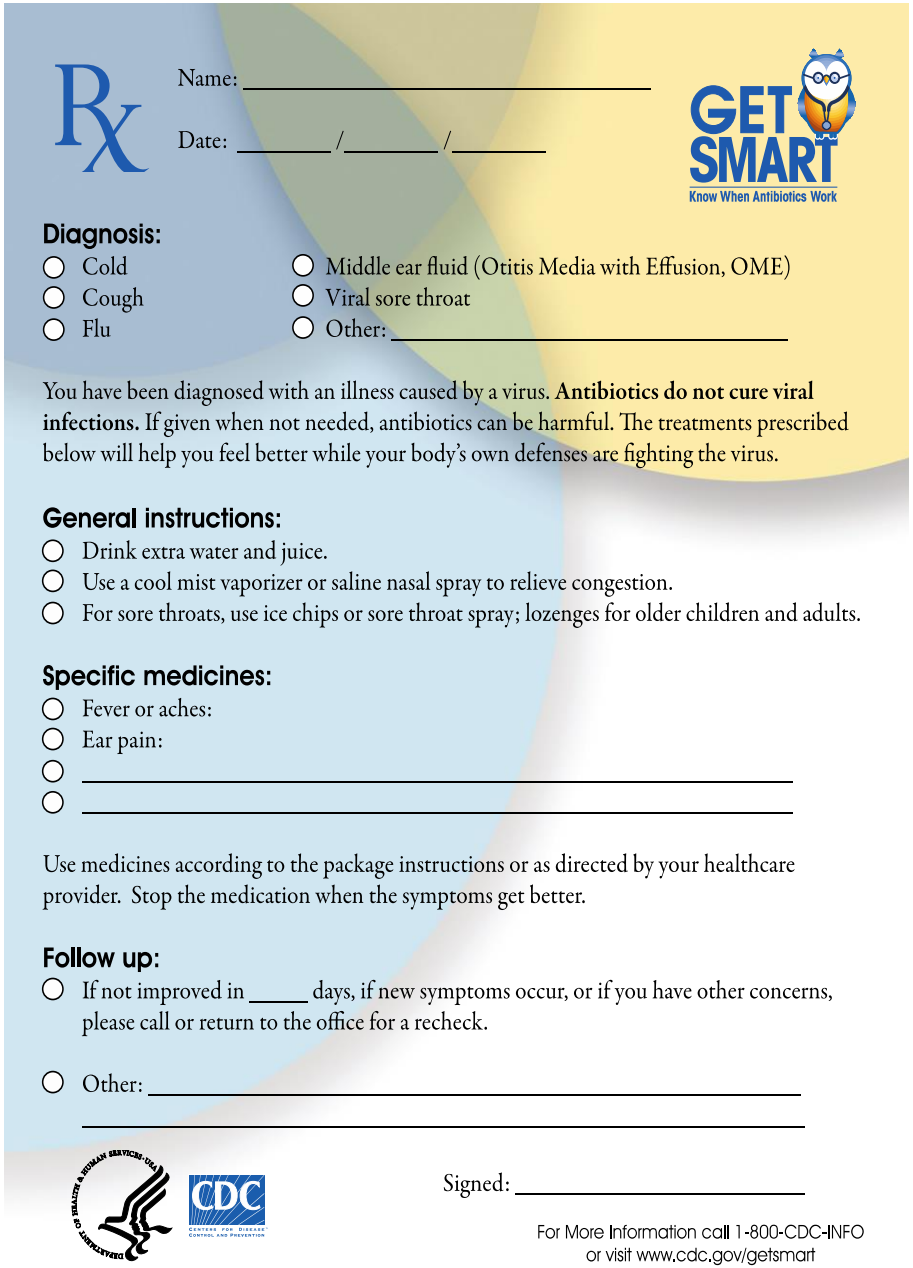
Patient Education

- If you prescribe antibiotics to your patient
  - Clear instructions about properly taking antibiotics
  - Potential harms of antibiotic use
  - Antibiotic resistance
- Educate staff about antibiotics and appropriate messaging
- Promoting vaccines
- Write and display public commitments by your practice in support of antibiotic stewardship
- CDC viral prescription and office poster displays



CDC Prescription Pad

- If you do not use antibiotics, provide guidance for symptom relief for common infections which do not require an antibiotic:
- CDC viral prescription pad
  - Use effective communication strategies to educate patients about when antibiotics are and are not needed and have a contingency plan for the family-sometimes its okay for "wait and see approach"



Rx

Name: _____

Date: _____ /_____ /_____

GET SMART
Know When Antibiotics Work

Diagnosis:

- ○ Cold
- ○ Cough
- ○ Flu
- ○ Middle ear fluid (Otitis Media with Effusion, OME)
- ○ Viral sore throat
- ○ Other: _____

You have been diagnosed with an illness caused by a virus. **Antibiotics do not cure viral infections.** If given when not needed, antibiotics can be harmful. The treatments prescribed below will help you feel better while your body's own defenses are fighting the virus.

General instructions:

- ○ Drink extra water and juice.
- ○ Use a cool mist vaporizer or saline nasal spray to relieve congestion.
- ○ For sore throats, use ice chips or sore throat spray; lozenges for older children and adults.

Specific medicines:

- ○ Fever or aches:
- ○ Ear pain:
- ○ _____
- ○ _____

Use medicines according to the package instructions or as directed by your healthcare provider. Stop the medication when the symptoms get better.

Follow up:

- ○ If not improved in _____ days, if new symptoms occur, or if you have other concerns, please call or return to the office for a recheck.
- ○ Other: _____
  _____

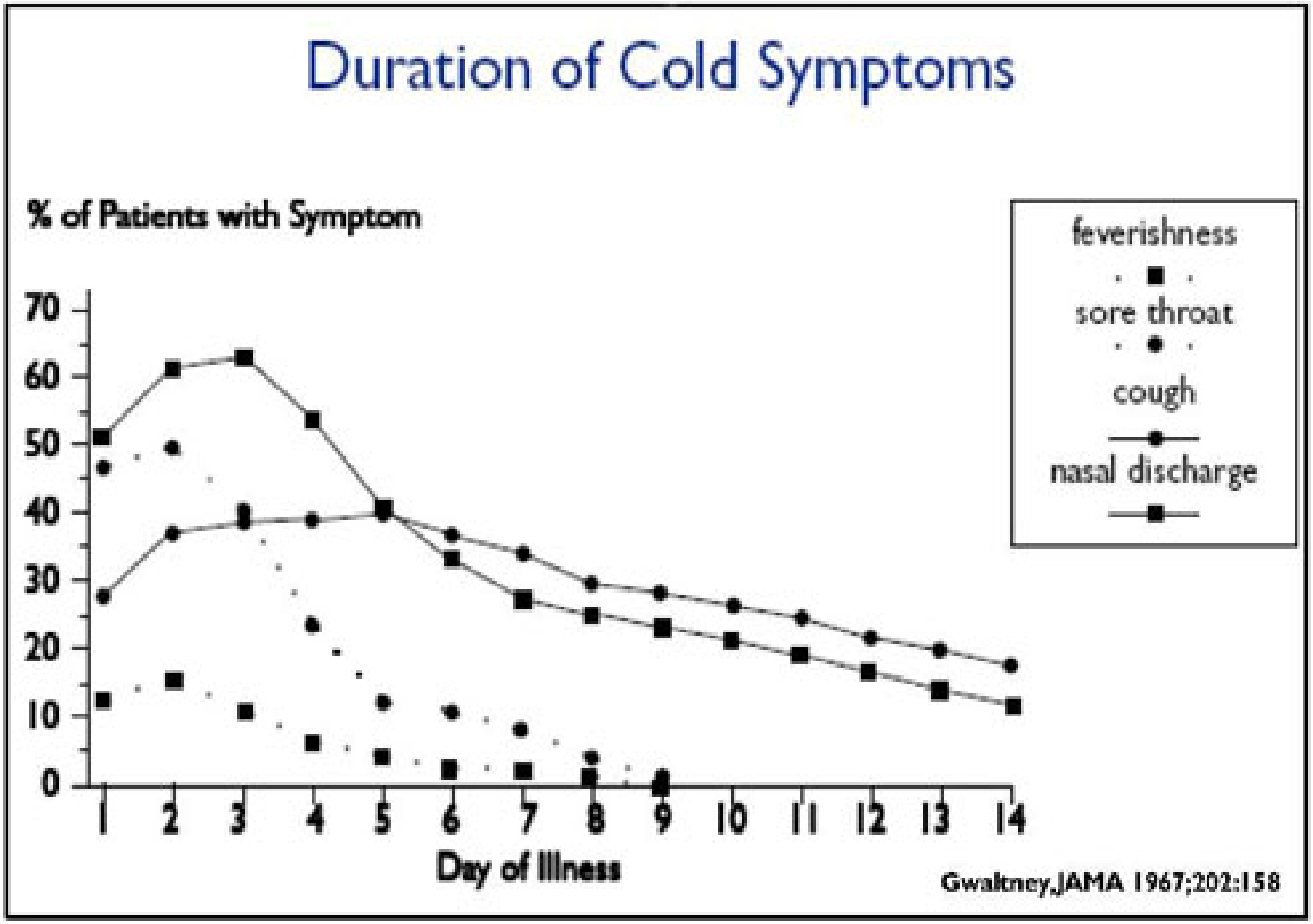
DEPARTMENT OF HEALTH & HUMAN SERVICES · USA

CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION

Signed: _____

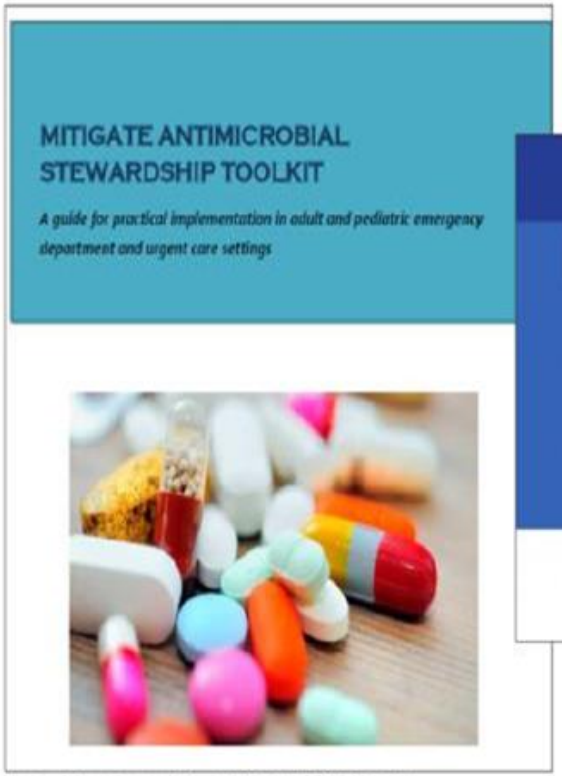
For More Information call 1-800-CDC-INFO
or visit www.cdc.gov/getsmart

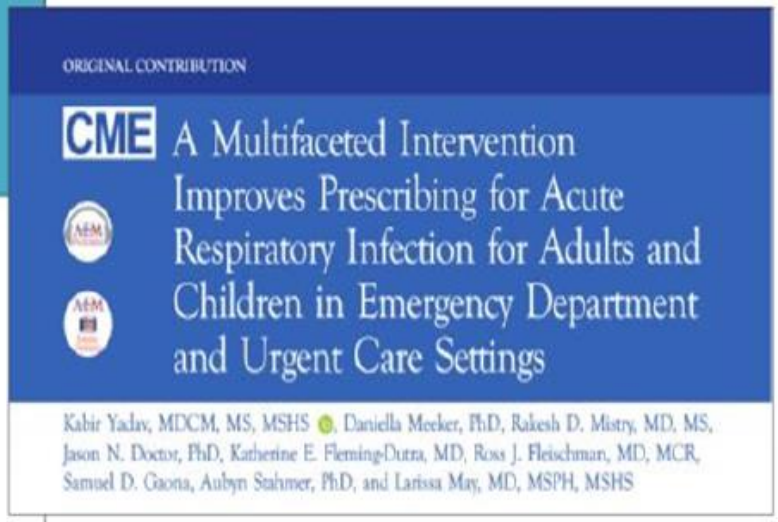
Posters: Duration of the Common



We know what works to improve antibiotic use in outpatient settings.

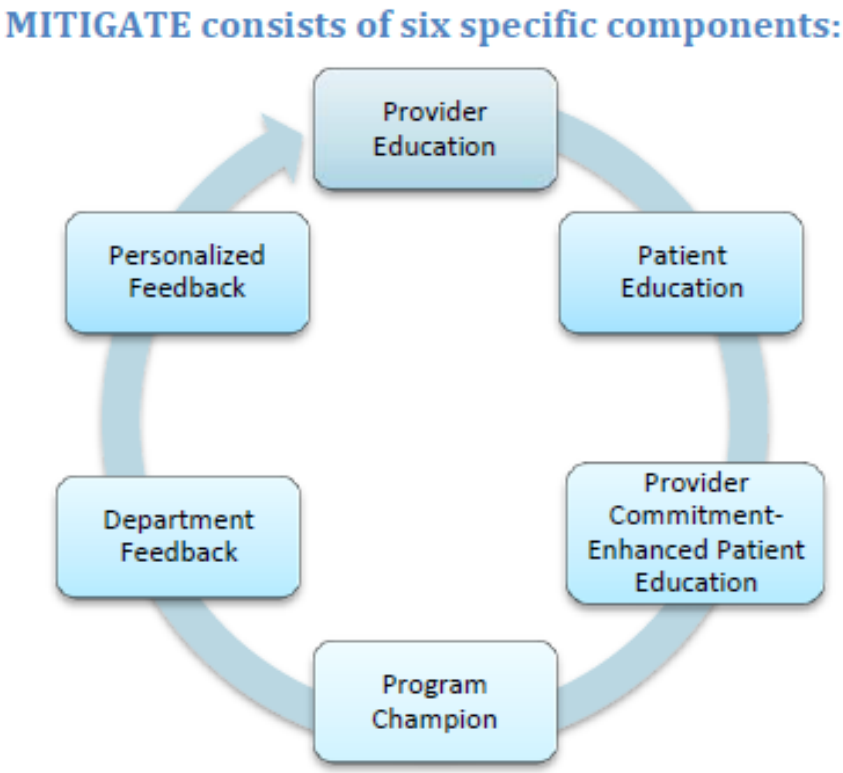
Core Elements work in EDs and urgent cares.





Yadav et al. Acad Emerg Med. 2019 Jul;26(7):719-731.

http://shea-online.org/images/priority-topics/MITIGATE_TOOLKIT_final.pdf



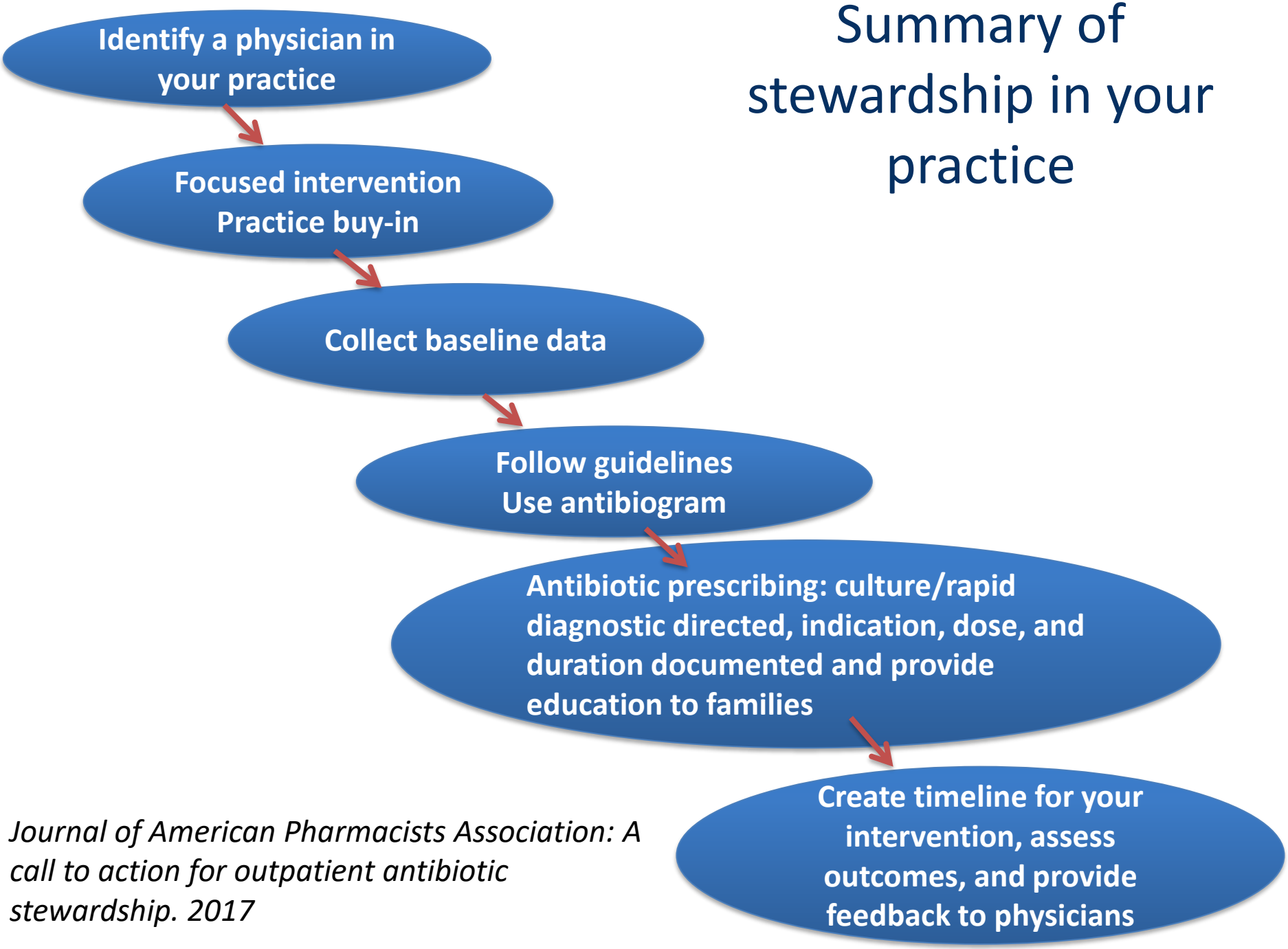
- MITIGATE consists of simple strategies to engage patients and providers in understanding appropriate antibiotic prescribing. These strategies can be individualized to each site to ensure they fit within the culture and workflow of the organization.

Take a moment

IMPLEMENTATION PREPARATION ACTION STEPS

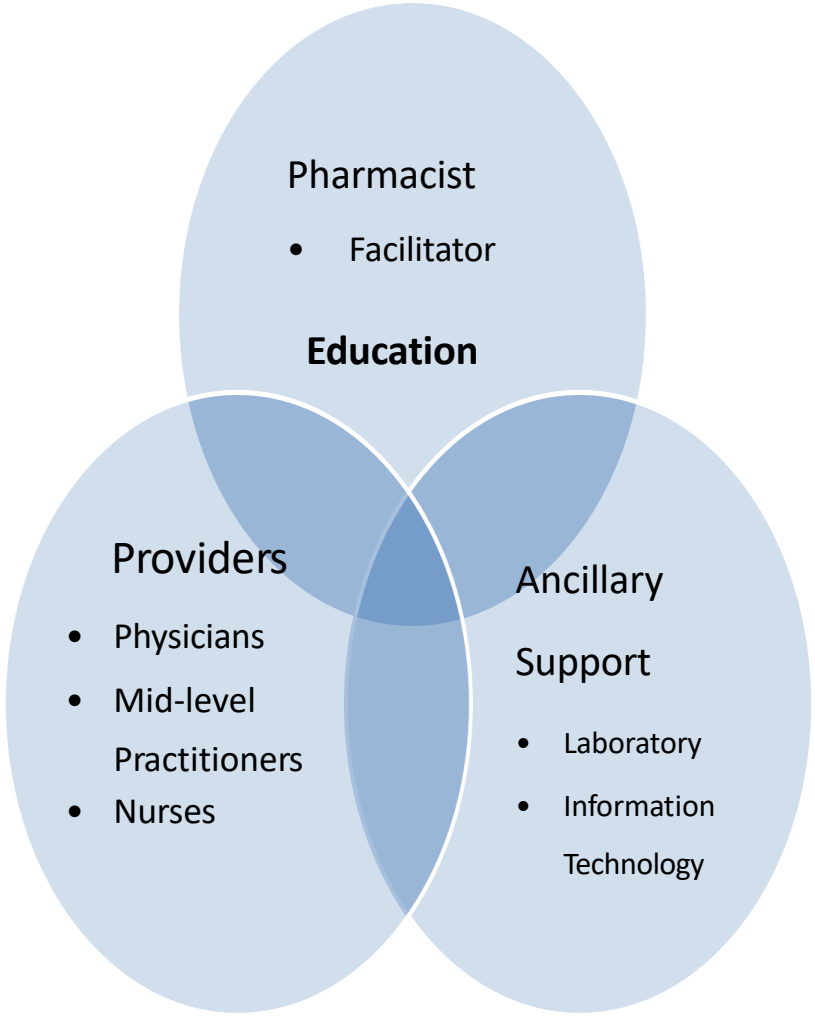
Component	Definition
Provider Education	Educational presentations, smartphone apps, CDC *Be Antibiotics Aware* brochures.
Patient Education	CDC *Be Antibiotics Aware* posters in waiting rooms, *Choosing Wisely* brochures, discharge handouts.
Provider Commitment	Physician-worn "flair" (pens, pins, badge reels, etc.) that are thematically consistent with the CDC *Be Antibiotics Aware* posters and brochures.
Departmental Feedback	Monthly aggregate of antibiotic prescribing practices for ARI from electronic health record data provided to departmental leadership.
Provider Feedback and Education	Case-based educational rounds with a stewardship consulting service (if available). Alternatively, ED pharmacists can provide consultations for patient-related issues.
Peer Comparison using Personalized Audit and Feedback	Personalized monthly performance rankings with each physician receiving a designation of being a "top performer" (top decile) or "not a top performer" for appropriate antibiotic Rx for ARI delivered by email.[18]*

Summary of stewardship in your practice



Journal of American Pharmacists Association: A call to action for outpatient antibiotic stewardship. 2017

Stewardship in the ED



ED Pharmacist Roles

- Promote appropriate antibiotic use
- Provide active feedback
- Continuous clinician education
- Perform pharmacotherapy consults
- Mitigate drug interactions & adverse effects
- Develop ED guidelines/protocols
- Culture follow-up & post-prescription review

ED Pharmacist Culture Follow-up #1

Reason for Unplanned Readmission to the Emergency Department			
Reason	**Physician - managed**	**Pharmacist - follow-up**	**P-value**
Treatment Failure	85	21	<0.001
Noncompliance due to cost	63	18	<0.001
Noncompliance for any reason other than cost	172	67	<0.001
Allergy to medication	39	4	<0.001
Adverse drug reaction	60	50	0.08
Other	13	5	0.08
Total (% of cases)	432 (19%)	165 (7%)	<0.001

Randolph TC, et al. Am J Health-Syst Pharm. 2011; 68:916-9

ED Pharmacist Culture Follow-up #2

Comparison of Inappropriate post-visit revisions in discharged adult ED visits*			
	Pre-Pharmacist	**Post-Pharmacist**	**P-value**
Positive Culture Needing Revisions w/ 1 or more inappropriate levels	34/73 (46.6%)	11/75 (14.7%)	N/A
Level 1: Incorrect antibiotic agent based upon culture & susceptibility	14 (19.2%)	1 (1.3%)	P<0.003
Level 2: Incorrect antibiotic regimen duration*	20 (27.4%)	9 (12%)	P<0.02
Level 3: Potential for abx/home med interaction w/o adjustment	1 (1.4%)	1 (1.3%)	P=0.99
Level 4: Lack of dose adjustment	4 (5.5%)	0 (0%)	P=0.04
Level 5: Regimen conflict w/ documented allergy history	0 (0%)	0 (0%)	N/A

Miller K, et al. Am J Emerg Med 2014; 32:1270-1274

**Based upon IDSA/CDC and clinical guidelines*

ED Pharmacist Culture Review

- Pharmacist managed culture follow-up
  - Decrease unplanned readmission
  - Decrease number of inappropriate regimens
  - Improve antibiotic selection, dosing, duration
  - Decrease median time to culture review and patient/Primary Care Provider notification
- Challenges

Am J Health-Syst Pharm. 2011; 68:916-9
Am J Emerg Med 2014; 32:1270-1274
J Pharm Pract 2012; 25(2):190-194

Clinical Infectious Diseases

INVITED ARTICLE

CLINICAL PRACTICE: Ellie J. C. Goldstein, Section Editor

The Critical Role of the Staff Nurse in Antimicrobial Stewardship—Unrecognized, but Already There

Richard N. Olans,[1] Rita D. Olans,[2] and Alfred DeMaria Jr[3]

- Allergy History
- Culture Acquisition
- Microbiology Results
- Antibiotic "Time Outs"
- Adverse Events
- Medication Reconciliation
- Drug Therapeutics
- IV to PO Transition
- Patient Education
- Provider Communication
- Device Management
- Preventing *C. difficile*

Clinical Decision Support

- IT system delivers patient data to providers
- Utilizes real-time patient data
  - Weight, height, laboratory testing, culture data, serology, etc
- Guides providers to use certain antibiotic therapies
  - Example: avoiding nitrofurantoin for UTI treatment in patients with low renal function

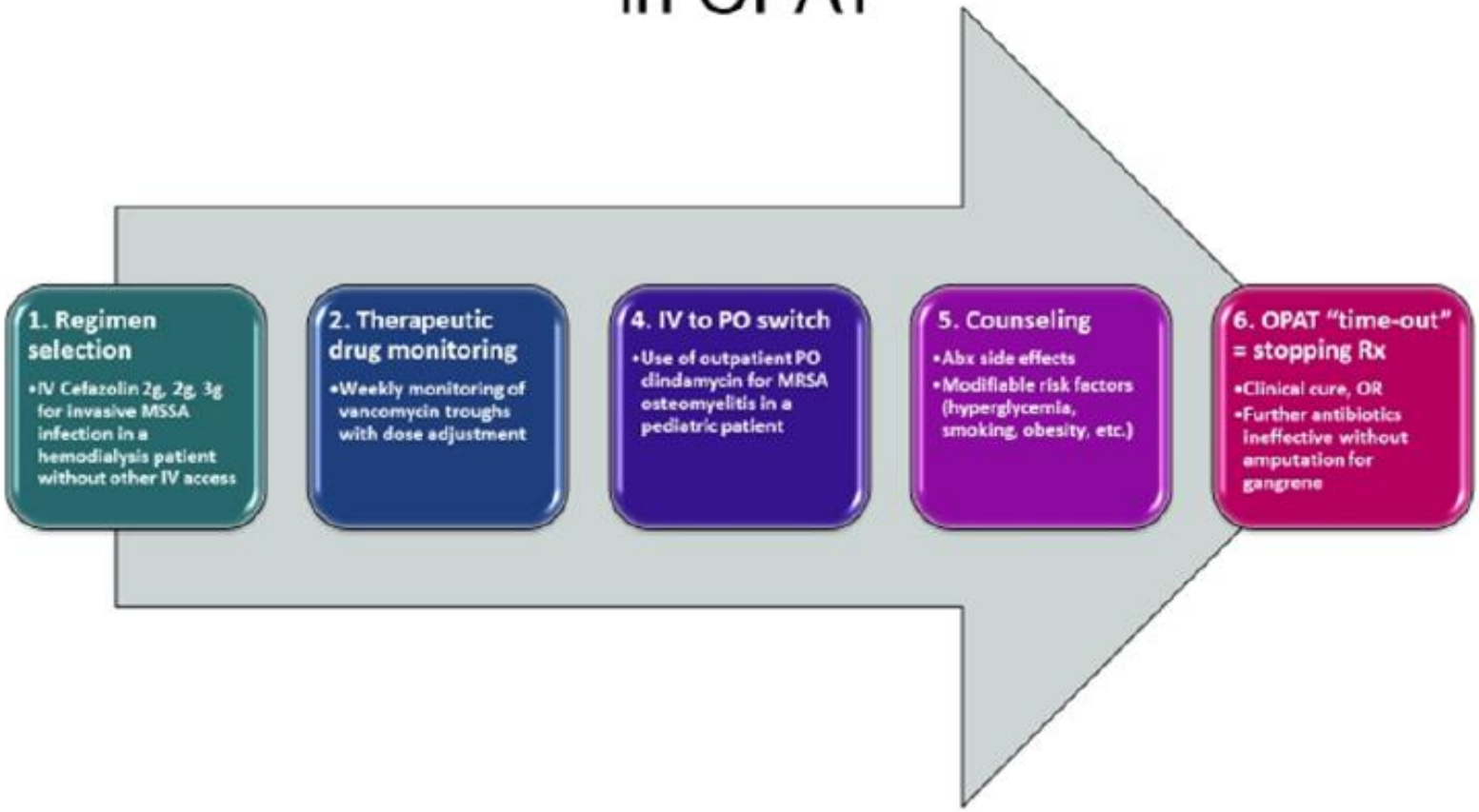
Dose Optimization

- Based upon individual characteristics
  - Weight, renal function, site of infection, minimum inhibitory concentrations
  - Pharmacokinetics/pharmacodynamics
- Alternative dosing strategies
  - Extended infusion beta-lactams
- Loading dosages in ED
- Appropriate initial dosing

Streamlining/De-escalation

- Narrow coverage as soon as possible
- Limited opportunity in ED
- Rapid diagnostics can help
- Restricting unnecessary empiric coverage
  - Avoiding gram negative and anaerobic activity for cellulitis

Continuum of Stewardship Activities in OPAT



BENEFITS OF ORAL PRESCRIBING

- lower treatment costs
- decreased nursing time
- reduced risk of infection from intravenous catheters
- reduced length of stay
- higher patient satisfaction

Benefits of prescribing oral antimicrobials(1)

OVIVA – Results

Oral therapy was noninferior even in the "worst-case" scenario

Outcome of interest	IV	PO
Treatment failure within 1 year	14.6%	13.2%
Early discontinuation of treatment	99/523 (18.9%)	67/523 (12.8%)
Patient preference	3.6%	0.9%
Possible or probably recurrence	0.2%	2.8%
At least one serious adverse event	27.7%	26.2%
Antibiotic-related serious adverse event	13.6%	6.7%
C. difficile infection	1.7%	1%
Duration of therapy (median, days)	78	71
Hospital length of stay (median, days)	14	11
Oxford Knee Score	Improved patient-reported outcome P=0.04 at Day 120 and 365 favoring PO therapy	

And Maybe Now…

Partial Oral versus Intravenous Antibiotic Treatment of Endocarditis (POET Study)

- **Can patients with left sided endocarditis be transitioned to oral antibiotics once stable?**

- Multicenter RCT in Denmark (400 patients)
- All patients received intravenous (iv) for 10 days
- 199 continue IV, 201 switch to oral
- Outcome: composite of all cause mortality, unplanned cardiac surgery, relapsed bacteremia, embolic events (follow-up 6 months after treatment)
- Micro: Streptococcus 49%, Enterococcus 22%, MSSA 22%, Other 7% (NO MRSA)

- Results: 24 (12.1%) IV group met primary outcome vs.18 (9.0%) oral group (95% CI, −3.4 to 9.6; P=0.40)

Iversen K, et al. N Engl J Med. 2019 Jan 31;380(5):415-424.

Disease Specific Issues

- Skin and Soft Tissue Infections
  - ED prescribing challenges
  - Incision & drainage +/- antibiotics
- Urinary Tract Infections
  - Resistance and empiric selection
    - Fluroquinolone/Bactrim resistance
  - Urinalysis (UA) interpretation
  - Appropriate UA/Culture & susceptibility ordering

Asymptomatic Bacteruria (ASB): Frequently Treated Unnecessarily

Study	Patient Population	Lack of Adherence to Guidelines
Dalen et al, 2005	• Ottawa hospital • 29 patients with catheter-associated ASB	52% prescribed antimicrobials inappropriately
Gandhi et al, 2009	• University of Michigan • 49 patients with UTI diagnosed	32.6% did not meet criteria for UTI (most due to lack of symptoms)
Cope et al, 2009	• Houston VA • 164 episodes of catheter-associated ASB	32% prescribed antimicrobials inappropriately

Dalen DM et al. Can J Infect Dis Med Microbiol. 2005;16:166.
Gandhi T et al. Infect Control Hosp Epidemiol. 2009;30:193.
Cope M et al. Clin Infect Dis. 2009;48:1182.

Prevalence of ASB

Population	Prevalence, %
Children	
Boys	<1
Girls	1 – 2
Healthy women	
Premenopausal	1 – 5
Pregnant	2 – 10
Postmenopausal	3 – 9
Diabetes mellitus	
Women	11 – 16
Men	1 – 11
Elderly in community	
Women	11 – 16
Men	4 – 19

Population	Prevalence, %
Elderly in LTCF	
Women	25 – 50
Men	15 – 50
Spinal cord injury	
Intermittent catheter	23 – 69
Kidney transplant	
First month after	23 – 24
1 month – 1 year after	10 – 17
>1 year after	2 – 9
Indwelling catheter use	
Short-term	3 – 5%/day
Long-term	100

Adapted from Nicolle LE. *Clin Infect Dis* 2019 Mar 21 [Epub ahead of print]

2019 Infectious Diseases Society of America Guideline Update

Screening for and treatment of ASB indicated for:

- Pregnant women
- Invasive urological procedures

Do NOT screen for or treat ASB:

- Elderly
- Diabetics
- Indwelling urinary catheters
- Spinal cord injury
- Long term care facility residents
- Elective, non-urologic surgeries including prosthetic joints*
- Neutropenia*
- Renal or other solid organ transplant*
- Children*

*** Not addressed in 2005 IDSA guideline**

Nicolle LE. *Clin Infect Dis* 2019 Mar 21 [Epub ahead of print]

Two key approaches to reduce antibiotic treatment of ASB

1) Prevent identification of ASB to begin with

- Eliminate inappropriate or unnecessary urinalyses and urine cultures

2) Prevent antibiotic treatment when ASB identified

- Increase recognition/diagnosis of ASB
- Understand antibiotics not indicated
- Appropriately withhold antibiotics

Utilizing Algorithms (With Recurrent Educational Sessions)

	3-Month Pre-Intervention	Initial 6 Months Post-Intervention	7 to 30 Months Post-Intervention
Urine cultures/ 1000 patient days	3.7	1.5	1.3
ASB treated	67.6%	69.2%	44%
Antibiotic days/ 1000 patient days	167.7	117.4	109.0

- Inappropriate urine cultures and total antibiotic days went down after setting up criteria for sending urine cultures and for the diagnosis of UTI.
- Required semi-annual follow-up educational sessions and individualized direct feedback in certain instances.

Zabarsky TF, et al. Am J Infect Control 2008 Sep;36(7):476-80.

American Journal of Emergency Medicine 33 (2015) 1129–1133

Contents lists available at ScienceDirect

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journal homepage: www.elsevier.com/locate/ajem

Original Contribution

Impact of an antimicrobial stewardship intervention on urinary tract infection treatment in the ED☆,☆☆,★

Kelly M. Percival, PharmD [a,*], Kristine M. Valenti, PharmD [a], Stacy E. Schmittling, PharmD [a], Brandi D. Strader, PharmD [a], Rebecka R. Lopez, MD [b], Scott J. Bergman, PharmD [c]

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ABSTRACT

Study objective: The study objective is to assess changes in treatment of uncomplicated urinary tract infections (UTIs) after implementation of recommendations based on national guidelines and local resistance rates.
Methods: This preintervention and postintervention study included patients discharged home from the emergency department (ED) with an uncomplicated UTI at a 439-bed teaching hospital. Emergency department prescribers were educated on how local antimicrobial resistance rates impact UTI practice guidelines. Empiric treatment according to recommendations was assessed as the primary outcome. Agreement between chosen therapy and isolated pathogen susceptibility was compared before and after education. Reevaluation in the ED or hospital admission within 30 days for a UTI was also evaluated.

Clinical Review & Education

JAMA Internal Medicine | Special Communication | LESS IS MORE

An Implementation Guide to Reducing Overtreatment of Asymptomatic Bacteriuria

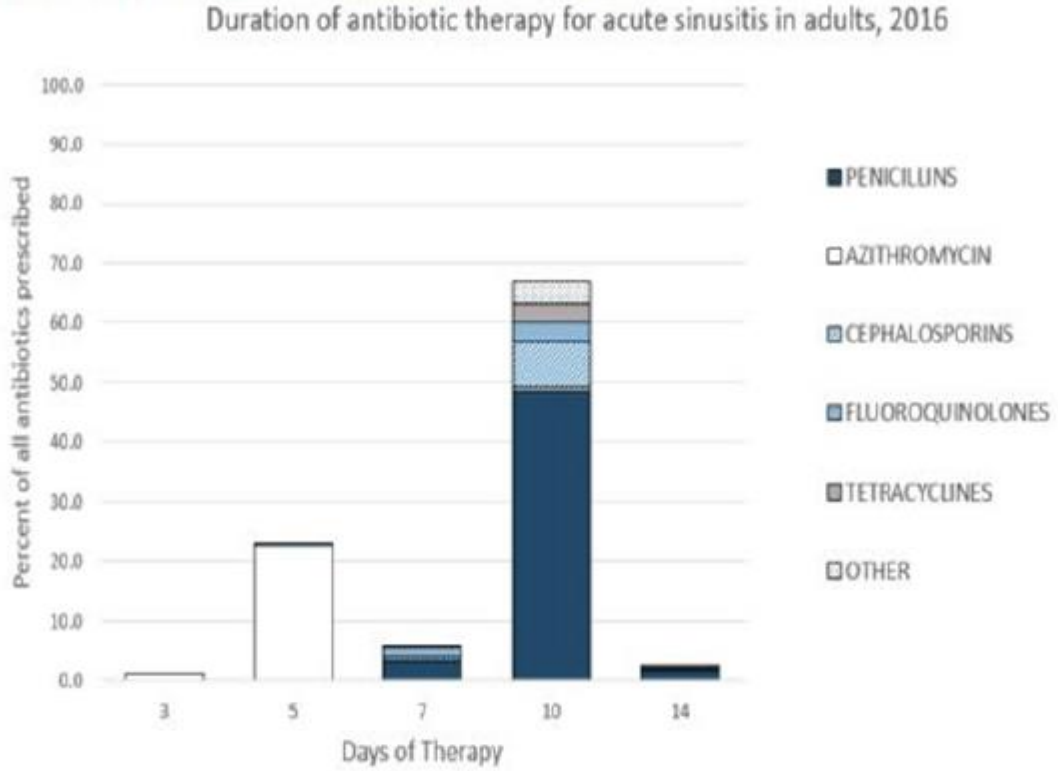
Michael Daniel, MD; Sara Keller, MD; Mohammad Mozafarihashjin, MD; Amit Pahwa, MD; Christine Soong, MD, MSc

1) Create a QI team and engage stakeholders
2) Provide education
3) Measure and share performance data in real time
4) Withholding routine urine test results*
5) Develop and adopt clinical decision tools and protocols

JAMA Intern Med 2018; 178:271

URTI

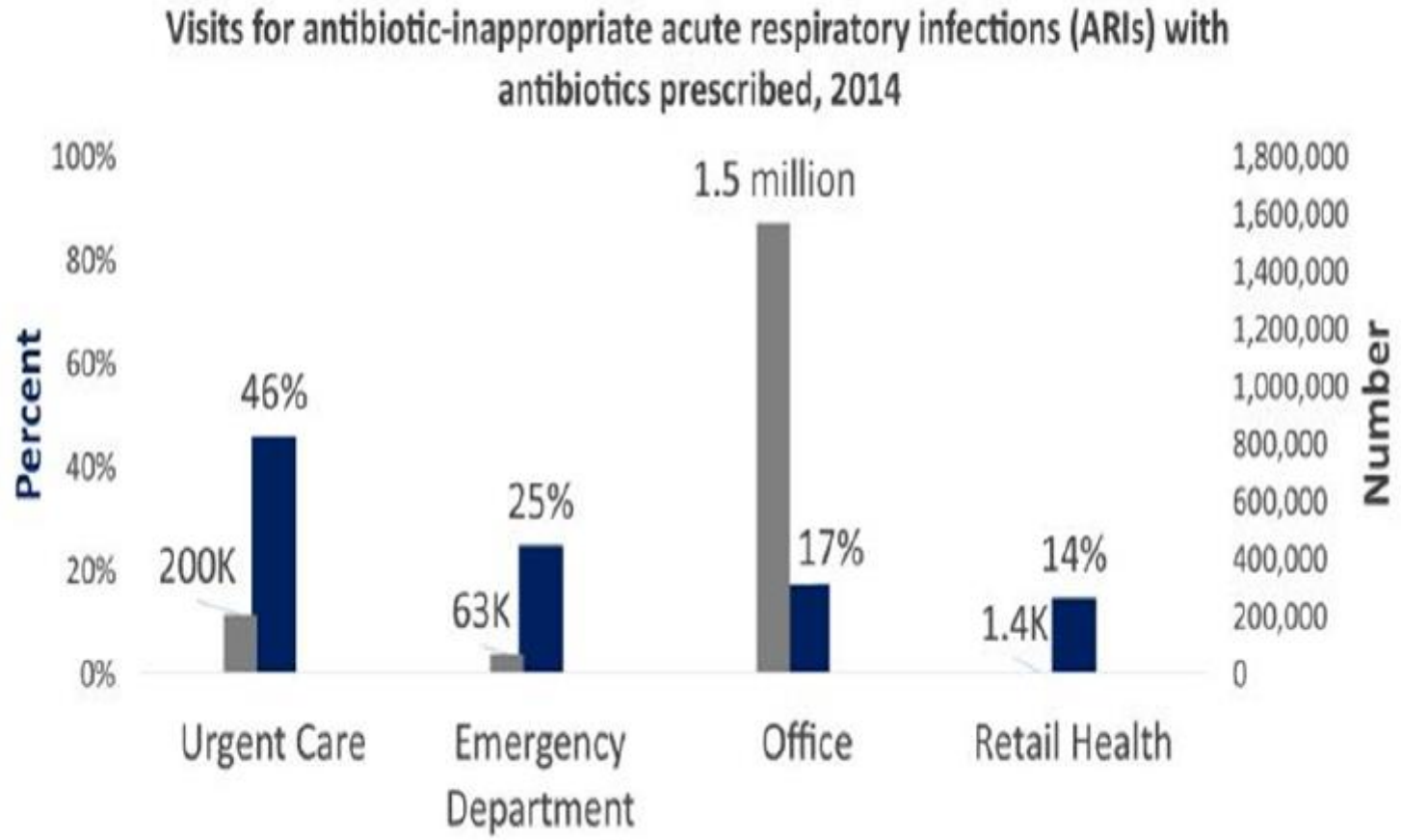
IDSA recommends 5-7 days of therapy for adults with uncomplicated acute sinusitis when antibiotics are needed



King et al. *JAMA Intern Med.* Published online March 26, 2018.

Chow (2012) Clin Infect Dis. Apr;54(8):e72-e112.

Medical offices prescribe the highest number of antibiotics for antibiotic-inappropriate ARIs (never events).



*Antibiotic-inappropriate ARIs include: Viral URI, bronchitis, bronchiolitis; influenza; nonsuppurative otitis media; viral pneumonia; asthma/allergy. Visits with additional diagnoses of concomitant bacterial infections (e.g. pneumonia, urinary tract infections, acute otitis media, sinusitis) were excluded.

Palms D, Hicks L, Hersh AL, et al. *JAMA Int Med.* 2018 Sep 1;178(9):1267-1269.

2019 Preliminary ADA Acute Oral Infections Guidelines[4]

- Emergent situations where source control **is** an immediate option
  - Immunocompetent adults with symptomatic irreversible pulpitis: ***Antibiotics not recommended***
  - Immunocompetent adults with pulp necrosis and symptomatic apical periodontitis or **localized** acute apical abscess: ***Antibiotics not recommended***
  - Immunocompetent adults with pulp necrosis and acute apical abscess with **systemic involvement**: ***Antibiotics recommended***

American Dental Association Clinical Practice Guideline on the Use of Antibiotics for the Emergency Management of Symptomatic Irreversible Pulpitis, Symptomatic Apical Periodontitis, and Localized Acute Apical Abscess. Unpublished guideline. 2019. Accessed January 15, 2019.

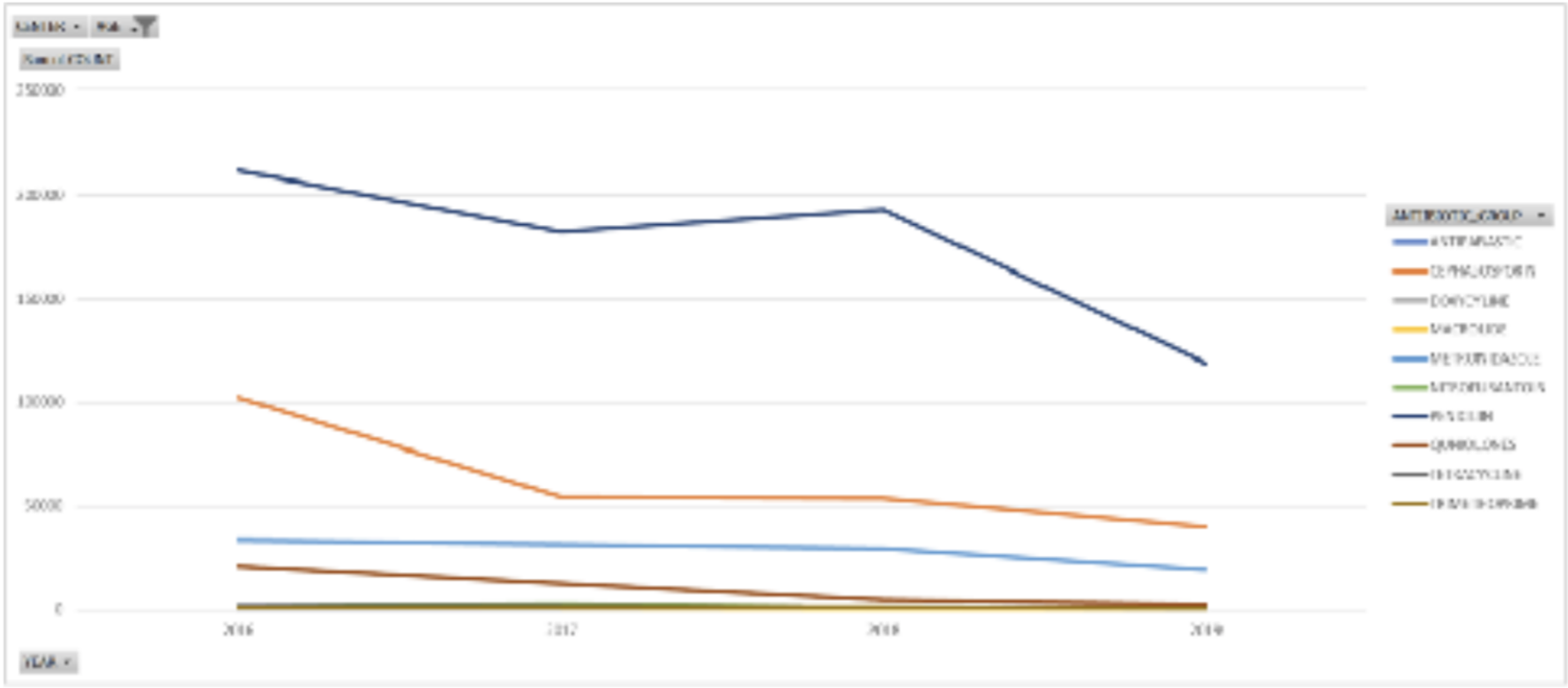
TRACK AND REPORT ANTIBIOTIC USE AND OUTCOME DATA

- Process Measure
  - How and why antibiotics are prescribed
- Antibiotic Use Measure
  - How often and how many antibiotics are prescribed
- Outcome Measure
  - Antibiotic related cost
  - Tracking adherence to antibiotic stewardship protocols/procedures (Example are as follows:)
  - Completeness of clinical assessment documentation at the time of antibiotic prescriptions
  - Completeness of antibiotic prescribing documentation
  - Antibiogram

Our Outpatient Stewardship

Total antibiotics prescriptions FOR ALL HELATH CENTERS

	ANTIPARASTIC	CEPHALOSPORIN	DOXYCYLINE	MACROLIDE	METRONIDAZOLE	NITROFURANTOIN	PENICILIN	QUINOLONES	TETRACYCLINE	TRIMETHOPRIME	Grand Total
2016	136	102204	268	1855	33882	1832	211208	20977	1747	937	375046
2017	181	54624	185	802	31779	2693	181964	12603	1754	1127	287712
2018	1148	53635	204	609	29905	927	192659	4985	1409	1135	286616
2019	250	39855	184	342	19407	897	118716	2572	745	540	183508
Grand Total	1715	250318	841	3608	114973	6349	704547	41137	5655	3739	113288


150000
100000
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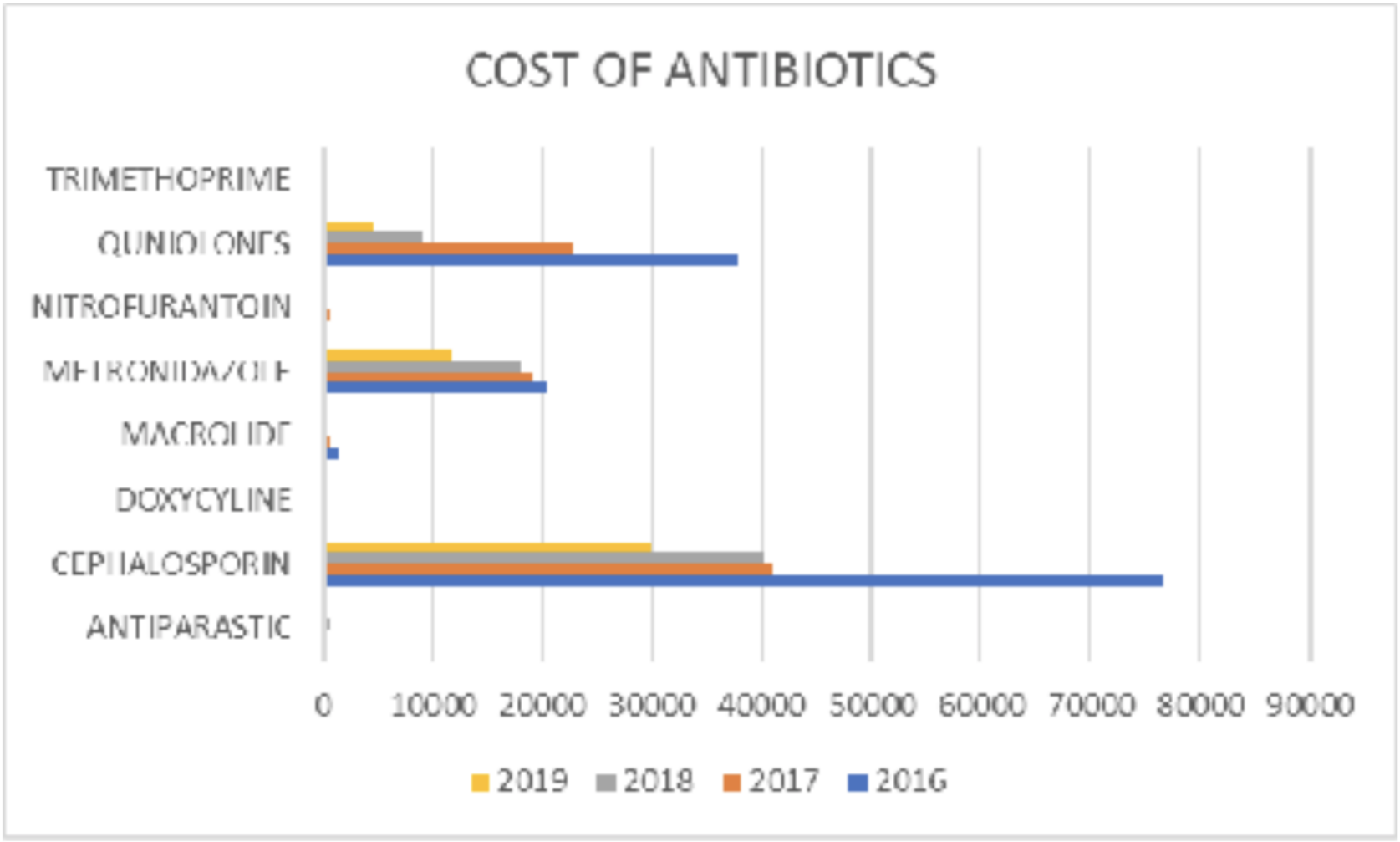
2016
2017
2018
2019
YEAR


COST OF ANTIBIOTICS
TRIMETHOPRIME
QUINOLONES
NITROFURANTOIN
METRONIDAZOLE
MACROLIDE
DOXYCYLINE
CEPHALOSPORIN
ANTIPARASTIC
0
10000
20000
30000
40000
50000
60000
70000
80000
90000
2019
2018
2017
2016

Bahrain Medical Bulletin, Vol. 34, No.4, December 2012

Trends of Empiric Antibiotic Usage in an Accident and Emergency Department in a Secondary Care Hospital

Jameela Al Salman, MD* Aysha Husain, MD** Muneer Mahdi, MD**

Objective: To evaluate the current practices of prescribing antibiotics at the time of admission and to assess the adequacy of empiric antibiotic use and to identify risk factors for inadequate treatment and targets for intervention.

Design: A prospective observational study.

Setting: Salmaniya Medical Complex.

Method: From November 2007 to March 2008, patients admitted in the medical department through the emergency and who received antibiotic therapy within 24 hours were included. Antibiotic therapy was considered adequate if the spectrum of coverage, dose, application mode and duration of therapy were appropriate according to local recommendations or published international guidelines.

Result: Two hundred admitted patients were evaluated. One hundred nineteen patients' records were traced and evaluated after patients were discharged. Twenty (16.8%) patients received antibiotics within 4 hours; 99 (83.2%) had their first dose of antibiotics within 24 hours of admissions. Empirical antibiotic therapy was inadequate in 14 (11.8%) patients. Initial therapy was adjusted in 61 (51.3%) patients.

Conclusion: We found a high rate of inappropriate empiric antibiotic use in our institution, which is similar to other studies. A well-structured and organized antimicrobial team has to be established to implement antimicrobial management program in the hospital. That will ultimately improve the rate of inadequate antibiotic use.

iMedPub Journals
http://journals.imed.pub

THE INTERNATIONAL ARABIC JOURNAL OF ANTIMICROBIAL AGENTS ISSN 2174-9094

2015
Vol. 5 No. 3:4
doi: 10.3823/776

Patterns of antibiotic prescriptions and appropriateness in the emergency room in a major secondary care hospital in Bahrain

Jameela Mohammed al Salman, Sughra Alawi, Ebtihal Alyusuf, Eman Albasri, Shurooq Almarzooq, Fatma Alnashaba, Ali alahmed, Zahra Ali, Rawdha fardan, Ebtihal alyusuf

Department of internal medicine

Table 2. Appropriateness in relation to the involved body sites and the prescribing physician's specialty

Variable	Appropriate				P-value
	Yes		No		
	No.	%	No.	%	
System					
Upper respiratory tract	11	3.1	347	96.9	<0.001
Urinary tract	110	37.9	180	62.1	
Skin & soft tissue	63	25.3	186	74.7	
Gastrointestinal tract	24	17.5	113	82.5	
No mentioned diagnosis	0	00.0	118	100.0	
Genital tract	4	7.8	47	92.2	
Lower respiratory tract	13	43.3	17	56.7	
Maxillofacial and oral	5	18.5	22	81.5	
Musculoskeletal	6	23.1	20	76.9	
Others[a]	1	3.7	26	96.3	
Prescribing physician's specialty					
Emergency	150	14.5	881	85.5	<0.001
Obstetrics and Gynecology	62	31.6	134	68.4	
General Surgery	11	25.6	32	74.4	
Internal Medicine	7	46.7	8	53.3	
Other specialties[b]	7	25.0	21	75.0	

[a] Including: Ophthalmology, central nervous system, hematology, oncology and infectious disease.
[b] Including: Ear, nose and throat, orthopedic, plastic, maxillofacial and oral, urology, neurology.

Bahrain Medical Bulletin, Vol. 39, No. 1, March 2017

Antibiotic Appropriateness for Urinary Tract Infection in the Emergency Room

Jameela Al Salman, American Board* Sughra Sayed Alawi, Arab Board, MD**
Ebtihal Yusuf Alyusuf, Arab Board, MD***

Objective: To evaluate the characteristics of UTI attending ER and to assess antibiotic prescription and inappropriate treatment implications.

Design: A Prospective Study.

Setting: Salmaniya Medical Complex, Bahrain.

Method: Patients aged more than 14 years who presented to the ER with UTI from 1 July 2014 to 31 July 2014 were reviewed. Data was obtained from patients' emergency records and classified according to the type of UTI as complicated, uncomplicated or UTI in pregnancy. Antibiotic treatment was considered appropriate if it followed the Local or International Guidelines.

Result: A total of 239 patients were included in the study; 83 (34.7%) were males, 75 (31.4%) were pregnant females and 81 (33.9%) were non-pregnant females, the mean age was 37.56 years. One hundred forty-five (60.7%) patients had complicated UTI. The most prescribed antibiotics were cefuroxime and ciprofloxacin. Seventy-two (30.1%) of inappropriate antibiotics prescription were mostly due to improper duration.

Inappropriate antibiotic treatment was significantly more common among males, 43 (17.9%) P-value <0.001; complicated UTI were 63 (26.4%), P-value <0.001. One hundred thirty-three (55.6%) prescriptions were written by emergency doctors, P- value <0.001. There was no significance among the different age groups.

Conclusion: High rate of inappropriate antibiotics use in UTI patients mostly in complicated UTI and in patients treated by emergency doctors physicians.

Bahrain Med Bull 2017; 39(1): 38 - 42

Appropriateness of Antibiotic Prescription for Upper Respiratory Tract Infections in Emergency Department in Bahrain

Jameela Al Salman

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The aim of this study is to evaluate the appropriateness of antibiotic prescription in adult patients diagnosed as URTI in a major emergency room in major secondary care hospital in the kingdom of Bahrain.

Methodology

The study was prospective observational study, conducted in Accident and Emergency department. Three-hundred fortynine patients aging 14 years and above, who were diagnosed with URTI and discharged on antibiotics from emergency room during one month period were studied. Patient demographics, clinical presentation, and prescribed antibiotics were reviewed to assess the appropriateness of antibiotic prescription.

Results

Out of 417 prescriptions, 83% of antibiotics were not indicated, while 16% only were an appropriate antibiotic choice. Duration of antibiotic was appropriate in 18 out of 48 patient prescriptions only. Cefuroxime axetil was the most commonly prescribed antibiotics. Prescription of unnecessary antibiotics was higher among male. No correlation – however- was noted between age and antibiotics appropriateness.

Conclusion

Antibiotics are unjustifiably overused for URTI. Antibiotics stewardship strategies are required to be implemented to decrease this high rate in emergency rooms settings.

Keywords

ED Stewardship Barriers

- Stressful environment
- Time
- High turnover
- Trust/Relationships
- Resources
- Support

Lessons Learned

- **Top 10 Ambulatory Antibiotic Stewardship Magic Implementation Tips**

1. Find a co-leader, clinical champion

- Find an engaged leader of a clinic/service line that has a similar vision (should be a practicing clinician)
- Co-lead an intervention, driven from the service line
- Build in accountability
- Lead by influence

2. Talk to the frontline clinicians!

- Ambulatory clinicians are the experts in ambulatory care (not you) – learn from them
- Begin to understand:
  - Their challenges
  - Their demands put on them
  - Their need for therapeutic relationships with their patients
- Focus on the “why” with patient stories

- Example: “Why would we change?”

3. Talk to Patients

- Understand patient expectations
  - What does value look like to them?
  - What are they seeking from Urgent Care vs. Primary Care?

- Example: importance of a contingency plan in Urgent Care

4. Understand the clinic environment and personnel

Utilize all of your resources
Activate ALL the clinic staff

5. Find time, protected or otherwise, you'll need it

- Intervention development
  - Guidelines
  - Media content
  - EHR tools
- Data acquisition
- Who will take over the inpatient stewardship interventions?

6. Provide SOLUTIONS to the challenges your clinicians face

- Add value
- There job is hard enough, don't make it harder

7. Provide actionable data

- Trustworthy – how did you pull the data?
- Timely – monthly
- Transparent – in process and in results

8. Have the long game in mind, not short term gains

9. Make yourself available as an ID expert (not just stewardship)

- Be willing to answer ID related questions
  - e.g., TB cases identified, epidural abscesses diagnosed
- Provide relevant ID education
  - Sinusitis
  - Influenza
  - UTI management
- Know your data for general topics

10. Get added benefits of integration

- ID/ASP and ambulatory care integration:
  - HIV Screening
  - Appropriate and timely ID referrals
  - Better care for your patients
  - Academic products
  - And much more!

Antibiotic Stewardship 101: An Intro for Emergency Physicians

Michael S. Pulia, MD FAAEM et al

- **Top 10 Ways to Improve Stewardship in Your ED**.
- 10. ***Post-prescription culture review***.
- 9. ***Antibiotic order sets and clinical decision support systems.***
- 8. ***A multidisciplinary, antibiotic usage, quality improvement process.***
- 7. ***An Antibiotic Stewardship Champion.***
- 6. ***Determine local antimicrobial susceptibilities.***
- 5. ***Consider cultures when initiating antibiotic therapy.***
- 4. ***Administer broad-spectrum antibiotics to patients with septic shock early.*** the *Surviving Sepsis Campaign* guidelines
- 3. ***Avoid antibiotics for uncomplicated abscesses*****.** Several studies conducted in the ED provide data to support withholding antibiotics after incision and drainage of uncomplicated abscesses
- 2. ***The modified Centor score.***
- 1. ***Withhold antibiotics for uncomplicated respiratory tract infections.*** Reducing the widespread, inappropriate use of antimicrobial agents for uncomplicated upper and lower respiratory tract infections, the majority of which are viral,

AAEM NEWS

Antibiotic Stewardship 101: An Intro for Emergency Physicians

Michael S. Pulia, MD FAAEM; Stephen Liang, MD; Larissa S. May, MD MSPH

Conclusion

- ED offers unique opportunities for ASP efforts
  - Inpatient and outpatient setting
  - Stressful environment with high turnover
- Pharmacists are key pieces in facilitating ASP
  - Prescribers, nurses, lab and IT integral to success
    - Clinical pathways, rapid testing and decision support are useful tools
- Utilize available resources/technology to guide antimicrobial use in your ED


If you want to go Fast, go alone.
If you want to go Far, go together.

Thank you for your attention