The Role of the Epidemiologist in Healthcare Antimicrobial Stewardship

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Disclosures: None



The ABCs of Prescribing Antibiotics for Healthcare Professionals



Infection Prevention

Learn more about antibiotic resistance at apic.org/ infectionpreventionandyou and cdc.gov/antibiotic-use.

sk Yourself

"Are these antibiotics necessary?" "What alternatives can we offer?"

acteria

Antibiotics do not kill viruses, they kill bacteria. When possible, get a culture to determine if antibiotics will be effective.

onserve

Conserve the antibiotics we have by only prescribing when appropriate, and for the shortest duration possible. Consult your facility's antibiogram for selection of appropriate antibiotics. Make sure your patients complete their course if you prescribe an antibiotic.

on't give in to pressure

Don't let patients pressure you into prescribing unnecessary antibiotics.

Do select the appropriate antibiotic, which could mean changing the medication based on the antibiogram.

ducate

Educate your patients on WHY antibiotics are not needed for:

- X Colds or flu;
- Most coughs and bronchitis;
- Sore throats not caused by strep;
- K Runny noses; or
- X Most ear aches.

Using antibiotics the wrong way can cause bacteria to grow into superbugs. This could make your next infection much harder to treat.





U.S. Antibiotic Awareness Week is November 13-19, 2017. U.S. Antibiotic Awareness Week (formerly "Get Smart About Antibiotics Week") is an **annual** one-week observance to raise awareness of the threat of antibiotic resistance and the importance of appropriate antibiotic prescribing and use. Oct 4, 2017

U.S. Antibiotic Awareness Week | CDC https://www.cdc.gov/antibiotic-use/week/index.html



 Image: World Health Organization
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World Antibiotic Awareness Week, 13-19 November 2017

Learn how to handle antibiotics with care

7 November 2017 -- Are you organizing an event or activity this World Antibiotic Awareness Week? Let the world know by adding your event to our interactive platform and find out what is happening in your country or region. Play the interactive game and learn about antibiotic resistance and how to prevent it. Help spread awareness by sharing messages from FAO, OIE and WHO on social media.

Interactive game and platform





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Home)

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World Antibiotic Awareness Week 2017

This year's theme: **Seek advice from a qualified healthcare professional before taking antibiotics**. Only take antibiotics after the prescription by a healthcare professional. Antibiotics are a precious resource, so it is important to get the right advice before taking them. This not only ensures you and your family get the best treatment, responsible use of antibiotics will also help reduce the threat of antibiotic resistance.



World Antibiotic Awareness Week 2017, 13-19 November





What Does An Epidemiologist Do?

Identify Relevant Sources, Collect by Appropriate Methods, Manage, Analyze, Interpret and Report <u>DATA</u> to Drive Efforts In Control and Prevention

 Populations (Groups) are focus rather than individuals

What Does An <u>Antimicrobial</u> <u>Stewardship</u> Epidemiologist Do?

Identify Relevant Sources, Collect by Appropriate Methods, Manage, Analyze, Interpret and Report DATA to Drive EFFORTS IN Healthcare Antimicrobial Stewardship (HAS) – Populations (Groups) are focus

rather than individuals

TJC Standards on Healthcare Antimicrobial Stewardship (HAS) Hospital collects, analyzes, and reports data on its HAS program Feedback on resistance patterns Strategies to counter resistance The hospital takes action on improvement opportunities identified in the HAS program

ANTIMICROBIAL STEWARDSHIP AND OTHER HEALTHCARE EPI OVERLAP

Safety

- Infection Control
- Employee ("Occupational") Health, Personnel Safety
- Antimicrobial Stewardship
- Quality Improvement/Promotion
 - Antimicrobial Stewardship

Value

- Technology Assessment, Product Evaluation, Resource Utilization
- Drug and Instrument Management

Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America Guidelines for Developing an Institutional Program to Enhance Antimicrobial Stewardship

Timothy H. Dellit,¹ Robert C. Owens,² John E. McGowan, Jr.³ Dale N. Gerding,⁴ Robert A. Weinstein,⁵ John P. Burke,⁶ W. Charles Huskins,⁷ David L. Paterson,⁸ Neil O. Fishman,⁹ Christopher F. Carpenter,¹⁰ P. J. Brennan,⁹ Marianne Billeter,¹¹ and Thomas M. Hooton¹²

The primary goal of antimicrobial stewardship is to optimize clinical outcomes while minimizing unintended consequences of antimicrobial use, including toxicity, the selection of pathogenic organisms (such as *Clostridium difficile*), and the emergence of resistance. Thus, the appropriate use of antimicrobials is an essential part of patient safety

Clin Infect Dis 2007; 44: 159-77

FOCUS OF <u>PRACTICAL</u> EPIDEMIOLOGY

Question 1 – What Should Be Done?

Collect analyze, interpret, and report population-based <u>DATA</u> to inform plans for treatment, control and prevention (BUT other team members involved in developing and implementing plan)

Question 2 – Is Plan Being Implemented?

Collect , analyze, interpret, and report population-based <u>DATA</u> on <u>process</u> measures to evaluate <u>implementation of plan elements</u> (BUT other team members involved in interpreting data and further action)

Question 3 – Is Plan Working?

Collect, analyze, interpret, and report population-based DATA on outcome measures to evaluate <u>effectiveness of the plan</u> (BUT other team members involved in using data and further action) These data lead back to Question 1 – "continuous loop"

FOCUS ON TEAM

Question 1 – What Should Be Done?

Collect analyze, interpret, and report population-based <u>DATA</u> to inform <u>plans</u> for treatment, control and prevention (BUT other team members involved in developing and implementing plan)

Question 2 – Is Plan Being Implemented?

Collect , analyze, interpret, and report population-based <u>DATA</u> on <u>process</u> measures to evaluate implementation of plan elements (BUT other team members involved in interpreting data and further action)

Question 3 – Is Plan Working?

Collect, analyze, interpret, and report population-based <u>DATA</u> on <u>outcome</u> measures to evaluate effectiveness of the plan (BUT other team members involved in using data and further action) These data lead back to Question 1 – "continuous loop"

TJC Standards on Healthcare Antimicrobial Stewardship Antimicrobial stewardship multidisciplinary team that includes pharmacist(s), infection preventionist(s), practitioner(s), an infectious diseases physician



The Epidemiologist As A <u>Team</u> Member **Epidemiologist** Team **Q1 What Should Be Done? Decides on Appropriate Provides DATA on** Actions **Occurrence**, **Trends**, **Risk Determinants**, Etc. **Q2 Is It Being Done? Decides on Appropriate Provides DATA on** Actions **PROCESS** Measures **Q3 Is It Working? Provides DATA on Decides on Appropriate OUTCOME** Measures

Actions RETURN TO Q1

SOME CURRENT ROLES FOR THE EPIDEMIOLOGIST IN HAS

1. Providing DATA to <u>Better</u> Define Problems

*For Team

For Public Education

Example: What Is "The Post-Antibiotic Era"?

The Epidemiologist as a <u>Team</u> Member -QUESTION 1

Epidemiologist

Q1 What Should Be Done?

1. Provides Descriptive DATA (Occurrence, Trends, Etc.)

2. Provides DATA on Risk
Determinants/Drivers
3. Provides DATA on Special
Populations and Settings of
Increased Risk

<u>Team</u>

1. Decides on Appropriate <u>Actions</u> 2. Defines <u>Indicators for</u> <u>Monitoring Implementation</u> for Question 2



Search NHSN

SEARCH

CDC A-Z INDEX V

National Healthcare Safety Network (NHSN)

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CDC's National Healthcare Safety Network is the nation's most widely used healthcare-associated infection tracking system. NHSN provides facilities, states, regions, and the nation with data needed to identify problem areas, measure progress of prevention efforts, and ultimately eliminate healthcareassociated infections.

In addition, NHSN allows healthcare facilities to track blood safety errors and important healthcare process measures such as healthcare personnel influenza vaccine status and infection control adherence rates.



https://www.cdc.gov/nhsn/index.html Accessed 11/13/17

IDSA GUIDELINE



Management of Adults With Hospital-acquired and Ventilator-associated Pneumonia: 2016 Clinical Practice Guidelines by the Infectious Diseases Society of America and the American Thoracic Society

Kalil AC et al. Clin Infect Dis 2016; 63: 575-583

SOME CURRENT ROLES FOR THE EPIDEMIOLOGIST IN HAS

1. Providing DATA to <u>Better</u> Define Problems

For Team

*****For Public Education

Example: What Is "The Post-Antibiotic Era"?

A return to the pre-antimicrobial era?

The effects of antimicrobial resistance will be felt most acutely in lower-income countries

Baker S. Science 2015; 347: 1064-1066

Outbreak of Colistin-Resistant, Carbapenemase-Producing *Klebsiella pneumoniae*: Are We at the End of the Road?

Van Duin D, Doi Y. J Clin Microbiol 2015; 53: 3116-3117

A Scary New Superbug Gene Has Reached at Least 19 Countries

Bacteria that resist last-resort drugs were identified two months ago in China. Now scientists are finding them all over.

http://www.bloomberg.com/news/articles/2016-01-22/a-scary-new-superbug-gene-has-

reached-at-least-19-countries

Jan 22, 2016



POST ANTIBIOTIC ERA 1992

Epidemiology of Drug Resistance: Implications for a Post-Antimicrobial Era

Mitchell L. Cohen

In the last several years, the frequency and spectrum of antimicrobial-resistant infections have increased in both the hospital and the community. Certain infections that are essentially untreatable have begun to occur as epidemics both in the developing world and in institutional settings in the United States. The increasing frequency of drug resistance has been attributed to combinations of microbial characteristics, selective pressures of antimicrobial use, and societal and technologic changes that enhance the transmission of drug-resistant organisms. Antimicrobial resistance is resulting in increased morbidity, mortality, and health-care costs. Prevention and control of these infections will require new antimicrobial agents, prudent use of existing agents, new vaccines, and enhanced public health efforts to reduce transmission.

Science 1992; 257; 1050-1055

НЕАLТН

POST ANTIBIOTIC ERA 1947

"It is for its power over grave Staphylococcal infections that we always have had most reason to be grateful for the discovery of penicillin, and that power is already on the wane."

Garrod LP. The waning power of penicillin. BMJ 1947; 2:874. In: Waterworth PM. LP Garrod on antibiotics. A selection of his British Medical Journal editorials. J Antimicrobial Chemother 1985; 15 Suppl B: 41.

POST ANTIBIOTIC ERA 1955

"Polymixin finds its clearest indication in serious infections due to *Ps. pyocyaneae*, an organism which is apt to be resistant to all other drugs whatsoever."

Garrod LP (panelist). Discussion on the use and abuse of antibiotics. Proc Roy Soc Med 1955; 48: 357-358.

POST-ANTIBIOTIC ERA – <u>PUBLIC</u> PERCEPTION?

1. Antibiotic Era = All bacterial infections treatable, so Post-Antibiotic Era = No bacterial infections treatable

PRE-ANTIBIOTIC ERA





ANTIBIOTIC

POST-ANTIBIOTIC

ERA

NONE TREATABLE ALL TREATABLE

NONE TREATABLE



POST-ANTIBIOTIC ERA - <u>REALISTIC</u> DEFINITION FROM <u>DATA</u>

2. Antibiotic Era = All bacterial infections treatable, so Post-Antibiotic Era = SOME bacterial infections not treatable

PRE-ANTIBIOTIC ERA



ANTIBIOTIC

ERA

POST-ANTIBIOTIC

ERA

NONE TREATABLE ALL TREATABLE SOME NOT TREATABLE (MOST TREATABLE)



Baker S. Science 2015; 347: 1064-1066

The CTEI (Can't Treat Every Infection) ERA



SOME CURRENT ROLES FOR THE EPIDEMIOLOGIST IN HAS

*2. Providing DATA on <u>Risk</u> <u>Determinants/Drivers</u> of Antimicrobial Resistance and its Consequences – Adjusting for Influential Variables

Emergence of Antibiotic Resistance in Hospitals, 1935-1975

• "The dominant factor in the emergence and spread of antibioticresistant bacterial pathogens, whether in hospital wards or in the community, is clearly the intensive use of the antibiotic agents to which resistance emerges and then spreads."

Finland M. Rev Infect Dis 1979; 1: 4-21



Antimicrobials: access and sustainable effectiveness 2

Understanding the mechanisms and drivers of antimicrobial resistance

Alison H Holmes, Luke S P Moore, Arnfinn Sundsfjord, Martin Steinbakk, Sadie Regmi, Abhilasha Karkey, Philippe J Guerin, Laura JV Piddock

"... although the link between human antimicrobial use and resistance seems clear cut, this association is complex. Confounding factors mean a uniform approach to understanding resistance cannot be taken. "These factors include pathogen-drug interactions, pathogen-host interactions, mutation rates of the pathogen, emergence of successful antimicrobial resistant clones, the transmission rates of pathogens between human beings, animals, and the environment, cross-resistance, and selection of co-resistance to unrelated drugs."

Holmes AH et al. Lancet 2016; 387: 176-187

<u>Adjustment</u> for Case Mix for Benchmarking

Prevention Status Report | 2013

Healthcare-Associated Infections

Georgia



Source: National and State Healthcare-Associated Infections Standardized Infection Ratio Report (4)

What is a standardized infection ratio (SIR)?

The SIR is a summary measure used to track HAIs over time. It adjusts for the fact that each healthcare facility treats different types of patients. The SIR compares the number of infections reported to the National Healthcare Safety Network in 2011 to the number of infections that would be predicted based on national, historical baseline data:

> SIR = Observed # of HAIs Predicted # of HAIs

http://www.cdc.gov/stltpublichealth/psr/hai/index.html accessed Jan 27, 2015

Central line-associated bloodstream infection-standardized infection ratio

Antimicrobial Use (AU) Option – Risk-Adjusted

1. Antimicrobial Use (AU) Option

Introduction: Rates of resistance to antimicrobial agents continue to increase at hospitals in the United States.¹ The two main reasons for this increase are patient-to-patient transmission of resistant organisms and selection of resistant organisms because of antimicrobial exposure.² Previous studies have shown that feedback of reliable reports of rates of antimicrobial use and resistance to clinicians can improve the appropriateness of antimicrobial usage.³⁻⁵

Objectives: The primary objective of the Antimicrobial Use (AU) Option is to facilitate riskadjusted inter- and intra-facility benchmarking of antimicrobial usage. A secondary objective is to evaluate trends of antimicrobial usage over time at the facility and national levels.

> http://www.cdc.gov/hai/surveillance/progressreport/faq.html accessed November 7, 2017

SOME CURRENT ROLES FOR THE EPIDEMIOLOGIST IN HAS

***3.** Providing DATA to <u>define</u> populations and settings of increased risk for antibacterial resistance, stratified by organism/drug group

Identifying Special Populations At Risk

"... epidemiology separates populations within epidemics into smaller and smaller groups at increasing risk of disease."

> Kuller L. Epidemiology – Then and Now. Am J Epidemiol 2016; 183: 372-380

IDENTIFYING THOSE AT SPECIAL RISK Quantitative Variable (Proportion Not Treatable in Given Population)



Resistance - Modern Medicine at Risk

Patients who receive specialized care will be at highest risk

- Cancer chemotherapy
- Complex surgery
- Joint replacements
- Organ transplants
- Chronic conditions (e.g., rheumatoid arthritis)
- Dialysis

CDC slide set at haiwinnablebattle_presentation-2015-final.pptx

The Epidemiologist As A Team Member – <u>QUESTION 2</u> <u>Team</u>

Q1 What Should Be Done? Provides DATA on Occurrence, Trends, Risk Determinants, Etc.

Q2 Is It Being Done? Provides DATA on PROCESS Measures Decides on Appropriate Actions
 Defines Indicators for Monitoring

Decides on Appropriate Actions

Q3 Is It Working? Provides DATA on OUTCOME Measures

Decides on Appropriate Actions RETURN TO Q1

SOME CURRENT ROLES FOR THE EPIDEMIOLOGIST IN HAS

*5. Providing DATA to monitor **PROCESS** of <u>Appropriate</u> <u>Antibacterial Use</u> – "Is It Being Done?"

- TEAM develops guides/indicators
- TEAM evaluates results

TJC Element 9

"Action: implementing recommended actions, such as systematic evaluation of ongoing treatment need, after a set period of initial treatment (for example, "antibiotic time out" after 48 hours

IS IT BEING DONE? – EXAMPLE 1

Implementation of antimicrobial stewardship interventions recommended by national toolkits in primary and secondary healthcare sectors in England: TARGET and Start Smart Then Focus

Results: The majority of CCGs and acute trusts reported reviewing national AMS toolkits formally or informally (60% and 87%, respectively). However, only 13% of CCGs and 46% of acute trusts had developed an action plan for the implementation of these toolkits.

Conclusions: The majority of healthcare organizations review national AMS toolkits; however, implementation of the toolkits, through the development of action plans to deliver AMS interventions, requires improvement.

Ashiru-Ordope D, et al. J Antimicrob Chemother 2016 doi:10.1093/jac/dkv492

Epidemiologist Q2 Is It Being Done? Provides DATA on PROCESS Measures

<u>Team</u> Focus on How to Implement Better Rather Than on Results

IS IT BEING DONE? – EXAMPLE 2 Six years of a national antimicrobial stewardship programme in Scotland: where are we now?

Clare Colligan¹, Jacqueline Sneddon^{1*}, Gwen Bayne¹, William Malcolm², Gill Walker³, Dilip Nathwani⁴ and on behalf of the Scottish Antimicrobial Prescribing Group

Findings: The survey was completed by 14 of the 15 AMTs (response rate 93 %). Results demonstrated good compliance with 9 of the 10 key European indicators included in the survey; 7 (50 %) of AMTs achieved all 9 indicators and 14 (100 %) of AMTs achieved at least 6 out of 9 indicators (67 %).

Antimicrob Resist Infect Control 2015 (June 29) doi:10.1186/s13756-015-0068-1

 Epidemiologist
 Team

 Q2 Is It Being Done?
 Focus on Question 3 – Did It

 Provides DATA on
 Work?

 PROCESS Measures
 Work?

SOME CURRENT ROLES FOR THE EPIDEMIOLOGIST IN HAS

*6. Providing DATA on effectiveness of control measures or new drugs – "Is It Working?"
* OUTCOME measures

Impact of Antimicrobial Stewardship -**Multiple OUTCOME Measurements** "Measurement for improvement is not focused on judging whether data meet a compliance threshold or target but rather is a means of determining whether the changes we make to improve are effective and to what degree."

Nathwani D, et al. Int J Antimicrob Agents 2011: 38: 16-26

Is It Working? NO

Universal Screening and Decolonization for Control of MRSA in Nursing Homes: A Cluster Randomized Controlled Study

RESULTS. NHs were randomly allocated to a control group (51 NHs, 2,412 residents) or an intervention group (53 NHs, 2,338 residents). Characteristics of NHs and residents were similar in both groups. The mean screening rates were 86% (range, 27%–100%) in control NHs and 87% (20%–100%) in intervention NHs. Prevalence of MRSA carriage averaged 8.9% in both control NHs (range, 0%–43%) and intervention NHs (range, 0%–38%) at baseline, and this rate significantly declined to 6.6% in control NHs and to 5.8% in intervention NHs after 12 months. However, the decline did not differ between groups (P=.66).

CONCLUSION. Universal screening followed by decolonization of carriers did not significantly reduce the prevalence of the MRSA carriage rate at 1 year compared with standard precautions.

Amer J Infect Control 2015 (April); 36: 401-408

Comparison of control strategies for methicillin-resistant *Staphylococcus aureus*

Mary T. Bessesen MD^{a,*}, Karla Lopez BSN^b, Karen Guerin MS^c, Karen Hendrickson BSN^d, Shavetta Williams MSPH^d, Susan O'Connor-Wright MS^d, Donald Granger MD^{d,e}

Conclusion: Significant reductions in MRSA HAI were associated with implementation of the MRSA control bundle. The bundle that included full contact precautions for colonized patients was no more effective in prevention of MRSA transmissions than a similar bundle that omitted the use of cover gowns.

Amer J Infect Control 2013; 41: 1048-1052

Is It Working? YES – and <u>Sustainable</u>

Strict Infection Control Leads to Low Incidence of Methicillin-Resistant Staphylococcus aureus Bloodstream Infection over 20 Years

Andreas F. Widmer, MD, MS;¹ Botond Lakatos, MD;¹ Reno Frei, MD²

Infect Control Hosp Epidemiol 2015; 36: 702-709

Time series analysis of the impact of an intervention in Tayside, Scotland to reduce primary care broad-spectrum antimicrobial use

Virginia Hernandez-Santiago*, Charis A. Marwick, Andrea Patton, Peter G. Davey, Peter T. Donnan and Bruce Guthrie

Conclusions: A real-world intervention to reduce primary care prescribing of antimicrobials associated with CDI led to large, sustained reductions in the targeted prescribing, largely due to substitution with guideline-recommended antimicrobials rather than by avoiding antimicrobial use altogether. Further research is needed to examine the impact on antimicrobial resistance.

J Antimicrob Chemother 2015; 70: 2397-2404

Is It Working? YES, And Not Just Cost-Effective – COST SAVING

Show Me the Money: Long-Term Financial Impact of an Antimicrobial Stewardship Program

James R. Beardsley, PharmD;¹ John C. Williamson, PharmD;¹ James W. Johnson, PharmD;¹ Vera P. Luther, MD;² Rebekah H. Wrenn, PharmD;¹ Christopher C. Ohl, MD²

The financial impact of an antimicrobial stewardship program in operation for more than 11 years was determined by calculating the reduction in antimicrobial expenditures minus program labor costs. Depending on the method of inflation adjustment used, the program was associated with average cost savings of \$920,070 to \$2,064,441 per year.

Infect Control Hosp Epidemiol 2012;33(4):398-400

SOME CURRENT ROLES FOR THE EPIDEMIOLOGIST IN HAS

*7. Providing Outcome DATA targeted to Action
*Example: Targeted Assessment for Prevention (TAP)



Centers for Disease Control and Prevention CDC 24/7: Saving Lives. Protecting People.™

A-ZINdex A B C D E F G H I J K L M N O P Q R S T U V W X Y Z #

Healthcare-associated Infections (HAIs)

The Five "W"s of the Targeted Assessment for Prevention (TAP) Strategy



WHAT is the TAP strategy?

The Targeted Assessment for Prevention (TAP) strategy is a method developed by the Centers for Disease Control and Prevention (CDC) to use data for action to prevent healthcare-associated infections (HAIs). The TAP strategy targets healthcare facilities and specific units within facilities with a disproportionate burden of HAIs so that gaps in infection prevention in the targeted locations can be addressed. The <u>TAP report</u> uses a metric called the cumulative attributable difference (CAD). The CAD is the number of infections that must be prevented to achieve a HAI reduction goal and is calculated by subtracting a numerical prevention target from an observed number of HAIs. The TAP report allows for the ranking of facilities, or locations within individual facilities, by the CAD to prioritize prevention efforts where they will have their greatest impact.

Cumulative Attributable Difference

http://www.cdc.gov/h ai/prevent/tap.html, accessed Nov 7, 2017

SEARCH

HAI: CAUTI Target SIR: 0.75 Number of Infections: 67 Number Predicted: -OR- Current SIR: 1.3
Compute
Need to prevent 29 infections to reach target SIR of 0.75

TAP report capability in NHSN for CLABSI, CAUTI, CDI

SOME CURRENT ROLES FOR THE EPIDEMIOLOGIST IN HAS

*8. Careful evaluation of new DATA methods and tools

Biased Reporting

UC Health nurse sues health system for covering up scope-related outbreak

Written by Shannon Barnet (Twitter | Google+) | June 22, 2016

A University of Cincinnati Health nurse has filed a whistle-blower lawsuit against the system, claiming UC Health failed to prevent the spread of multidrug-resistant bacteria and covered up its role in the outbreak, FOX 19 NOW reports.

According to the report, as many as 100 patients may have developed an infection as a result of the care they received at UC Health. The nurse's lawsuit claims UC Health launched an investigation after recording a spike in the number of infections in patients who had undergone a bronchoscopy. Allegedly, the nurse suggested reaching out to an outside agency to investigate the medical devices and infections, but was told "no" because the organization didn't want an audit.

Eric Deters, a spokesman for the law firm that took the nurse's case, told FOX 19 NOW the health system decided to simply deal with the patient infections rather than tackling the root of the problem — the bronchoscopes being used for the procedure.

"They stop checking the bronchoscopes," Mr. Deters told reporters. "They were culturing these scopes to check and see if they were causing an infection or if they were infected. Well, by no longer checking the scopes they weren't going to find any problems so there would be no need for an outside audit."

http://www.beckershospitalreview.com/quality/uc-health-nurse-sues-healthsystem-for-covering-up-scope-related-outbreak.html June, 2016 Antimicrobials: access and sustainable effectiveness 4

Exploring the evidence base for national and regional policy interventions to combat resistance

"The evidence base to determine the most costeffective systems for surveillance of antibiotic use and resistance remains weak worldwide."

Dar OA et al. Lancet 2016; 387: 285-295

The Healthcare Epidemiologist's Friend

Occurrence Measurement: PREVALENCE – A Major Focus in Healthcare Epidemiology

"Prevalence surveys of healthcare-associated infections offer advantages over incidence surveys, including the <u>relative ease of performance</u>, a <u>reduced</u> <u>requirement for resources</u>, the ability to include increased numbers of hospitals within a <u>shorter</u> period of time, and the possibility of <u>more rapid data</u> <u>analysis and feedback</u>. They also have been shown useful in monitoring the effectiveness of infection control programmes."

Humphreys H, et al. J Hosp Infect 2006; 12: 2-4

TWO ANTIMICROBIAL RESISTANT ORGANISMS (ARO) OF CDC INTEREST

CDC List:

- Group 1 Urgent
 - Example: Carbapenem-resistant Enterobacteriaceae
- Group 2 Serious
 - Example: MRSA
- Group 3 Concerning

CORECT TREATMENT?

https://www.cdc.gov/drugresistance/biggest_threats.html accessed Nov 7, 2017

WARD 6B

Prevalence of ARO Infections - 5/9

Prevalence of Staph Infections - 4/10

Prevalence of MRSA In Staph Infections – 3/4

Uses of a Prevalence Survey

Epidemiologist

Q1 What Should Be Done? Provides DATA on Occurrence, Trends, Risk Determinants, Etc.

Q2 Is It Being Done? Provides DATA on PROCESS Measures

Q3 Is It Working? Provides DATA on OUTCOME Measures

DATA for Team

What Is Current Pattern of Resistant Organism By Location?

How Complete is Observance of "Antibiotic Time-Out?

Has Requirement for "Antibiotic Time Out" Changed Pattern of Resistant Organisms?

MRSA Prevalence in 590 US Hospitals

Jarvis WR et al. Am J Infect Control 2012; 40: 194-200

HAI and Antibiotic Use Prevalence Survey

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This project examines the numbers and types of HAIs, the types of antimicrobial drugs (such as antibiotics), and the reasons antimicrobial drugs are used in hospitals and nursing homes. This information will help create policies and procedures to make healthcare safer for patients in U.S. healthcare facilities.

Phase 4 (2015-2016)

Data collection for this survey was expanded to be able to describe the quality of antimicrobial drug prescribing. About 200 acute cale hospitals in 10 EIP states participated. Hospital survey dates occurred between May and September 2015. Initial results are expected in 2017.

Objectives

- Estimate HAI number and frequency
- Identify HAIs by
 - · pathogen (including antimicrobial-resistant pathogens)
 - major infection site
- Describe the indications for antimicrobial use
- Identify changes in HAI and antimicrobial use prevalence, burden and epidemiology over time
- Describe the quality of antimicrobial drug prescribing in selected clinical circumstances

https://www.cdc.gov/hai/eip/antibiotic-use.html

Point-Prevalence of Healthcare-Associated Infection in China in 2010: A Large Multicenter Epidemiological Survey

hospitals) across mainland China in 2010. Of the 407,208 patients involved, 14,674 had developed 1 or more HAI (3.60% [95% confidence interval (CI), 3.54%-3.66%]). Lower respiratory tract infection was the most common type of HAI (8,739 [59.55%] of 14,674 cases) and included postoperative pneumonia (1,392 [9.49%] of 14,674 cases), followed by upper respiratory tract infection (2,169 [14.78%] of 14,674 cases), urinary tract infection (1,570 [10.70%] of 14,674 cases), surgical site infection (1,302 [8.87%] of 14,674 cases), skin and soft-tissue infection (909 [6.19%] of 14,674 cases), and gastrointestinal infection (753 [5.13%] of 14,674 cases). A total of 6,965 pathogens were isolated from patients with HAI. Pseudomonas aeruginosa was the most commonly isolated pathogen (1,196 [17.17%] of 6,965 isolates), followed by Escherichia coli (936 [13.44%] of 6,965), Acinetobacter baumannii (767 [11.01%] of 6,965), Klebsiella pneumoniae (747 [10.73%] of 6,965), and Staphylococcus aureus (615 [8.83%] of 6,965). The antimicrobial use prevalence (AUP) was 49.63% (202,085 of 407,208). Among the patients who re-

407,208!!

Li C et al. Infect Control Hosp Epidemiol 2014; 35: 1436-1438

TAKE-HOME

- Epidemiologist = DATA for Control and Prevention in Healthcare Antimicrobial Stewardship (HAS)
- Epidemiologist = Member of HAS TEAM
- Epidemiologist DATA for What Should We Do?, Is Plan Being Implemented? (PROCESS), and Is Plan Working? (OUTCOME)
- Prevalence Study useful in answering the three questions above in HAS