Minnesota Hospital Association

MHA/OHA HIIN Antibiotic Stewardship/MDRO Collaborative

July 11, 2017

CENTERS FOR MEDICARE & MEDICAID SERVICES
PARTNERSHIP FOR PATIENTS

OHIO HOSPITAL ASSOCIATION

Reminders

- For best sound quality, dial in at **1-800-791-2345** and enter code **11076**
- Please use the chat box to ask questions!

Please note – this webinar is being recorded.

Housekeeping

- Education Credit
  - Nursing Education Credit – 1 hour
  - Pharmacy Education Credit – 0.1
    - Pharmacists, please list your license number on the sign-in sheet to receive credit

Agenda

- Welcome
- Presentation:
  - Antimicrobial Stewardship: The Practical Aspects of Leveraging Technology by Kimberly Boeser, PharmD, MPH, BCPS AQ-ID
- Questions/discussion
- ASP 101 reminders
- Wrap-up

ANTIMICROBIAL STEWARDSHIP: THE PRACTICAL ASPECTS OF LEVERAGING TECHNOLOGY

KIMBERLY BOESER, PHARMD., MPH, BCPS AQ-ID

INFECTIOUS DISEASES CLINICAL PHARMACIST
ANTIMICROBIAL STEWARDSHIP COORDINATOR
DIRECTOR, PGY2 INFECTIOUS DISEASE RESIDENCY PROGRAM

THE CALL FOR STEWARDSHIP

Stewardship: the conducting, supervising, or managing of something; *especially*: the careful and responsible management of something entrusted to one's care

Antimicrobial Stewardship: coordinated interventions designed to improve and measure the appropriate selection, dosing, route and duration of antimicrobial therapy

- Primary Goal: optimize clinical outcomes, while minimizing unintended consequences of antimicrobial use
    - Toxicity
    - Selection of pathogenic organisms (MRSA, VRE, ESBL gram negative bacteria)
    - Emergence of RESISTANCE
- Secondary Goal: reduce health care costs w/out adversely impacting quality of care

ANTIMICROBIAL STEWARDSHIP

Growing body of evidence demonstrates that ASPs dedicated to improving antibiotic use,

- Improve the quality of patient care and patient safety
  - Increase infection cure rates
  - Reduce treatment failures
  - Reduce adverse events associated with antimicrobial therapy
- Decrease antibiotic resistance
  - significantly reduce hospital rates of (*Clostridium difficile* infections) (CDI)
    - Fairview quality initiative 2017
- Provide hospitals with opportunity for cost savings

2014 CDC recommended that all acute care hospitals implement Antibiotic Stewardship Programs

ASPs can be implemented effectively in a wide variety of hospitals

- SUCCESS is dependent on defined leadership and a coordinated multidisciplinary approach

Clinical Infectious Diseases

IDSA GUIDELINE

Implementing an Antibiotic Stewardship Program: Guidelines by the Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America

Tamar F. Barlam,[1,a] Sara E. Cosgrove,[2,a] Lilian M. Abbo,[3] Conan MacDougall,[4] Audrey N. Schuetz,[5] Edward J. Septimus,[6] Arjun Srinivasan,[7] Timothy H. Dellit,[8] Yngve T. Falck-Ytter,[9] Neil O. Fishman,[10] Cindy W. Hamilton,[11] Timothy C. Jenkins,[12] Pamela A. Lipsett,[13] Preeti N. Malani,[14] Larissa S. May,[15] Gregory J. Moran,[16] Melinda M. Neuhauser,[17] Jason G. Newland,[18] Christopher A. Ohl,[19] Matthew H. Samore,[20] Susan K. Seo,[21] and Kavita K. Trivedi[22]

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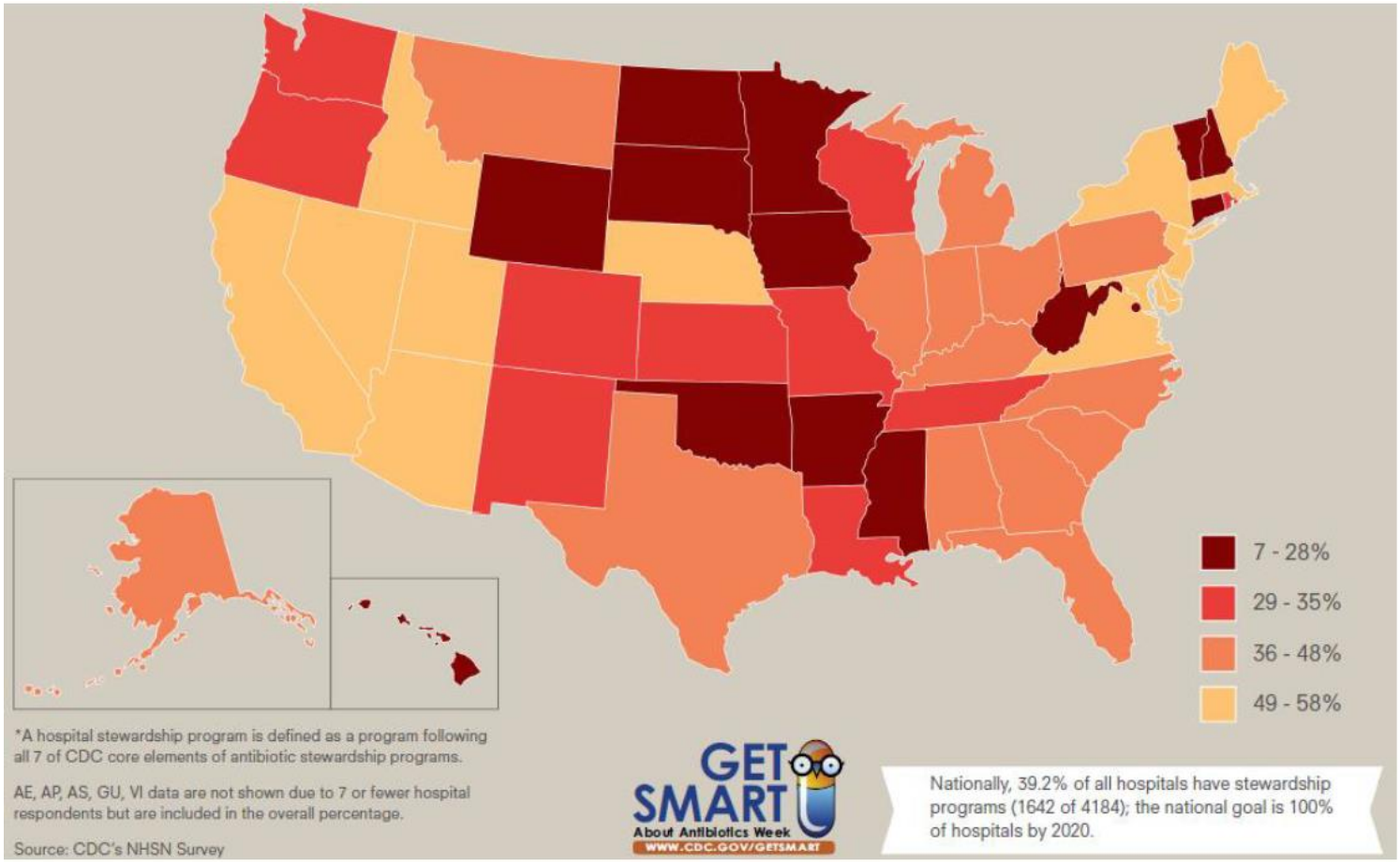
Evidence-based guidelines for implementation and measurement of antibiotic stewardship interventions in inpatient populations including long-term care were prepared by a multidisciplinary expert panel of the Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America. The panel included clinicians and investigators representing internal medicine, emergency medicine, microbiology, critical care, surgery, epidemiology, pharmacy, and adult and pediatric infectious diseases specialties. These recommendations address the best approaches for antibiotic stewardship programs to influence the optimal use of antibiotics.

Keywords. antibiotic stewardship; antibiotic stewardship programs; antibiotics; implementation.

HOSPITALS WITH ANTIBIOTIC STEWARDSHIP PROGRAMS BY STATE, 2014*



NATIONAL EFFORTS FOR ANTIMICROBIAL STEWARDSHIP

APPROVED: New Antimicrobial Stewardship Standard

The Joint Commission recently announced a new Medication Management (MM) standard for **hospitals**, **critical access hospitals**, and **nursing care centers**. Standard MM.09.01.01 addresses antimicrobial stewardship and becomes **effective January 1, 2017**.

Current scientific literature emphasizes the need to reduce the use of inappropriate antimicrobials in all health care settings due to antimicrobial resistance.

1.C.9 The hospital has written policies and procedures whose purpose is to improve antibiotic use (antibiotic stewardship).	○ Yes ○ No	
1.C.10 The hospital has designated a leader (e.g., physician, pharmacist, etc.) responsible for program outcomes of antibiotic stewardship activities at the hospital.	○ Yes ○ No	
1.C.11 The hospital's antibiotic stewardship policy and procedures requires practitioners to document in the medical record or during order entry an indication for all antibiotics, in addition to other required elements such as does and duration.	○ Yes ○ No	
1.C.12 The hospital has a formal procedure for all practitioners to review the appropriateness of any antibiotics prescribed after 48 hours from the initial orders (e.g., antibiotic time out).	○ Yes ○ No	
1.C.13 The hospital monitors antibiotic use (consumption) at the unit and/or hospital level.	○ Yes ○ No	

CMS
CENTERS FOR MEDICARE & MEDICAID SERVICES

No citation risk for 1.C.9 through 1.C.13; for information only.

Joint Commission Perspectives®, July 2016, Volume 36, Issue 7

NATIONAL STRATEGY GOALS

1. Slow the development of resistant bacteria and prevent the spread of resistant infections
2. Strengthen national one-health surveillance efforts to combat resistance
3. Advance development and use of rapid and innovative diagnostic tests for identification and characterization of resistance bacteria
4. Accelerate basic and applied research and development for new antibiotics, other therapeutics and vaccines
5. Improve international collaboration and capacities for antibiotic resistance prevention, surveillance, control and antibiotic research and development

CDC CORE ELEMENTS

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

Leadership Commitment	• Formal Statement • Designated resources: human, financial, IT
Accountability	• Single leader responsible for program outcomes
Drug Expertise	• Single pharmacist leader
Action	• Implement improvement
Tracking	• Regular reporting on antibiotic prescribing and resistance
Reporting	• Regular reporting on antibiotic use and resistance to doctors, nurses and relevant staff
Education	• Educating clinicians about resistance and optimal prescribing

Red box

STATE-WIDE COLLABORATIVE: MN ONE HEALTH ANTIMICROBIAL STEWARDSHIP

- **Multi-partner initiative to address antibiotic use**
- **Inter-agency approach by government**
  - Minnesota Department Health
  - Department of Agriculture
  - Pollution Control Agency
  - Board of Animal Health
- **Stakeholders from academia, clinical practice, health and agriculture advocacy groups**
- **Mission**
  - *Provide a collaborative environment to promote judicious antibiotic use and reduce the impact of antibiotic resistant pathogens*
- **Vision**
  - *Minnesota leaders in human, animal, and environment health will work together to raise awareness and change behaviors to preserve antibiotics and treat infections effectively*

One Health Antibiotic Stewardship

- One Health Antibiotic Stewardship Home
- About Us
- News and Events
- State Plan and Data
- Footprint Model
- Resource Library
  - for Everyone
  - for Human Healthcare
  - for Animal and Agriculture
  - for Environmental
- Contact Us

WORKING TOGETHER TO
PROTECT HEALTH & PRESERVE ANTIBIOTICS

Antibiotic Stewardship updates

Share This

Minnesota One Health Antibiotic Stewardship Collaborative

What is One Health Antibiotic Stewardship?

Antibiotics are powerful tools for fighting and preventing infections. However, widespread use of antibiotics has resulted in an alarming increase in antibiotic-resistant infections. Antibiotic stewardship consists of coordinated interventions that promote judicious antibiotic use and reduce the impact of antibiotic resistant pathogens. A One Health approach recognizes that human, agricultural and companion animal, and environmental health are interconnected, and issues such as antibiotic stewardship require a collaborative effort across multiple disciplines. We believe that a One Health approach will create an informed public and professionals that can communicate, and practice a more holistic approach to antibi

Workgroup member affiliations

Abbott Northwestern Hospital
Allina Health
Association for Professionals in Infection Control and Epidemiology – Minnesota
Blue Cross Blue Shield
Children's Hospitals and Clinics of Minnesota
Emergency Physicians Professional Association- Minnesota
HealthEast
HealthPartners
Hennepin County Medical Center
Land O'Lakes
Leading Age Minnesota
M Health
Mayo Clinic
Merck Research Labs
Metropolitan Council

About One Health Antibiotic Stewardship

Learn what antibiotic resistance is, its effect on humans, animals, and the environment, and why One Health Antibiotic Stewardship is important.

Current State P and Data

Review the state p its progress. Find Minnesota antibic (antimicrobial sus pathogens) and su data.

News and Events

Footprint Mode

Resource Library

RESOURCE LIBRARY FOR **Everyone**

RESOURCE LIBRARY FOR **Human Healthcare**

RESOURCE LIBRARY FOR **Animal Healthcare and Agriculture**

RESOURCE LIBRARY FOR **Environmental Sciences**

Stay Informed!

- Subscribe to Minnesota One Health Antibiotic Stewardship Collaborative Updates
- Contact Us

ANTIMICROBIAL STEWARDSHIP AT FAIRVIEW-UMMC

January 2007-UMMC implemented first Antimicrobial Stewardship Program

- Co-leadership with Dr. Susan Kline and Dr. Kimberly Boeser
    - 0.5 FTE ID staff physician support
    - 1.0 FTE Infectious Diseases Clinical Pharmacist
- Developed restricted antimicrobial guidelines and disease state guidelines
    - 2014 approved as system guidelines
- Expanded training
    - 2012 PGY2 ID resident
    - 2013 ID fellows training
    - 2015 added a second PGY2 ID resident
    - 2 U of MN College of Pharmacy students per block
- Maintained data collection from 2007-2014
    - Interventions and acceptance rates
    - ABX $/pt day
    - Tracking of MDR-pathogens and *C. difficile* (Infection Prevention)
    - Morbidity and Mortality (hospital-wide)

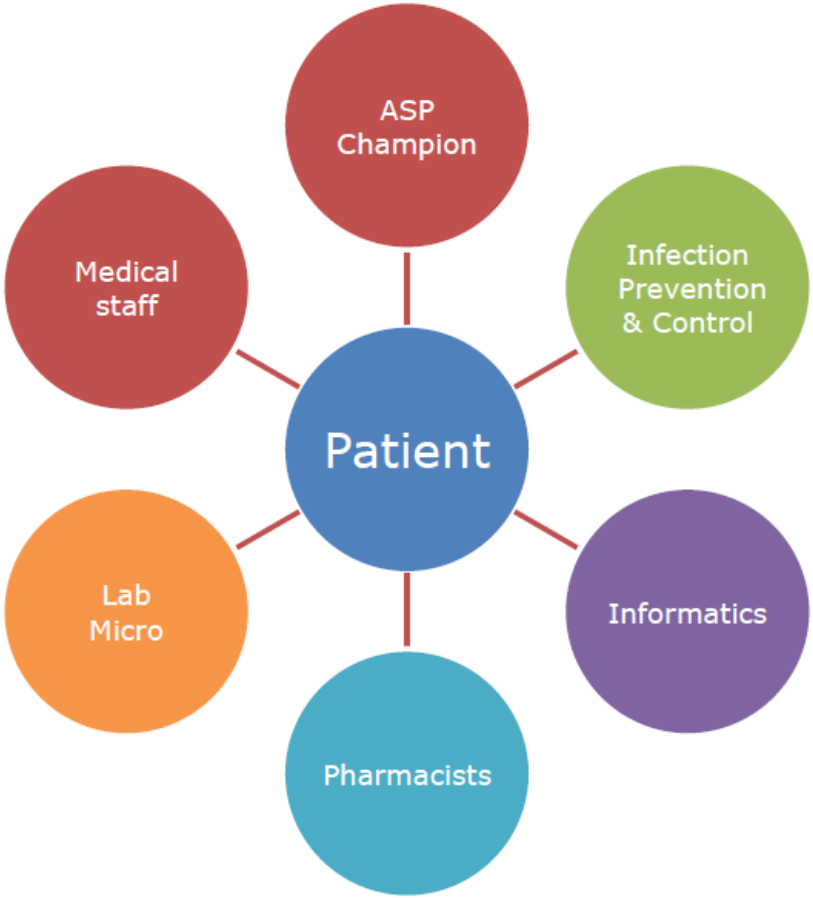
Janauary 2014-Fairview Southdale and Ridges Hospitals implemented ASPs

- Co-leadership with Dr. Steve Dittes and Dr. Michelle Borchart, Dr. Emily Medcraft and Dr. Ron Greenberg
- Round 2-3 days a week with ID staff on patients on restricted antimicrobials

STRUCTURE OF OUR ASP TEAM

- ID PharmD + ID staff (+/- Pharmacy resident(s)-PGY1 or PGY2 ID, ID fellow, pharmacy students)
- Patients are flagged by order for restricted antimicrobial (34) and focus on 12 standard interventions
- Pharmacy team reviews all patients and determine which patients to round on with ID staff
- Round daily with ID staff
- Review all pertinent labs, imaging, drug profile, and cultures and make determination for ongoing antimicrobial approvals
- Place a progress note in the electronic medical record (EMR)
- Communicate with primary teams
- Follow-up on recommendations and monitor for adverse effects and duration of therapy of antimicrobials

MULTIDISCIPLINARY APPROACH



Dellit TD, et al. Clin Infect Dis 2007;44:159-77
Drew RH, et al. Pharmacotherapy 2009;29:593-607

CURRENT EXPANSION EFFORTS

- Formal Antimicrobial Stewardship Programs at 3 out of 7 system hospitals
  - Joint efforts between Infectious Disease Providers, Pharmacists, and Infection Prevention
  - Active intervention with real-time feedback
- Current efforts to expand to all 7 hospitals
- Site Gap Analysis were completed 12/2016, updated 7/2017
- System-wide Antimicrobial Stewardship Steering Committee was developed & Project Plan Created
  - Kick-off meeting in May->Project time-line completion by 12/2017
- System Coordinator Role to take effect in May 2017
- Primary goal is to ensure regulatory compliance at all sites
- IT investments for Antimicrobial Stewardship and Infection Prevention (Epic ICON 500)
- Tracking and monitoring-Antibiotic Use and Antibiotic Resistance
  - CDC NHSN AUR module will be the gold standard for reporting and tracking
- Long-term goals->expansion to long term care/rehab facilities and ambulatory/clinic settings

LEVERING TECHNOLOGY AND THE EMR FOR AS PRACTICE

Leadership Commitment	• Formal Statement • Designated resources: human, financial, IT
Accountability	• Single leader responsible for program outcomes
Drug Expertise	• Single pharmacist leader
Action	• Implement improvement
Tracking	• Regular reporting on antibiotic prescribing and resistance
Reporting	• Regular reporting on antibiotic use and resistance to doctors, nurses and relevant staff
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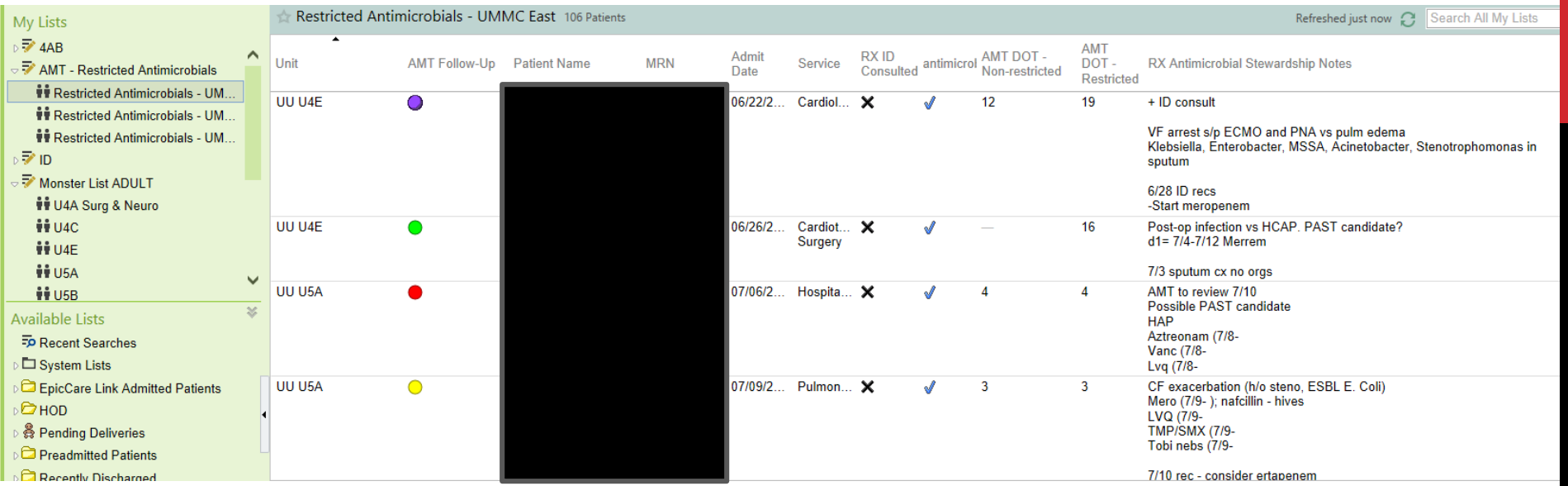
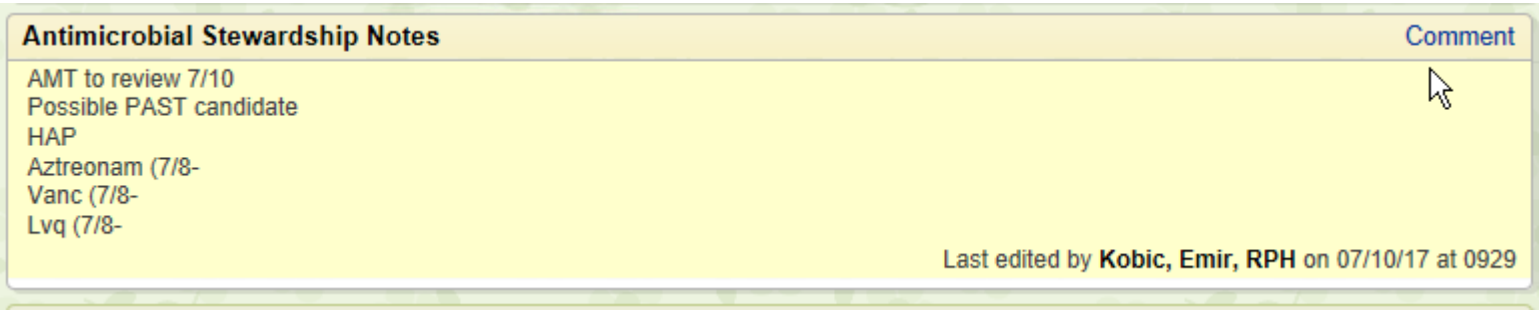
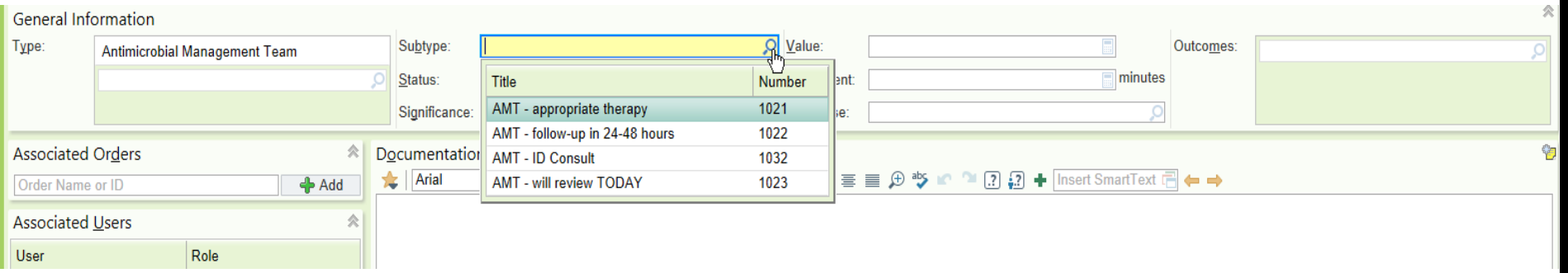
ACTION

- **Patient Identification and Assessment**
  - Report generated daily for patient started on a restricted antimicrobial
  - AS clinical tool built in Epic to gain efficiency in clinical review
  - Documentation in the EMR
  - Restricted Antimicrobial Guidelines and Disease State Guidelines
- **Verigene® Gram negative bacteremia AS Response Team**
  - AMT on-call 7days a week 8a-10p
  - Microlab pages AMT on-call for all positive blood cultures with gram negative pathogens
  - AMT/ID pharmacist makes assessment of patient, rounds on patient with ID staff or discusses over the phone
  - Treatment algorithm designed based on validation and antibiogram and order sets built for treating highly, multi-drug resistant bacteremias
  - Standard documentation via an AMT note is placed in the chart, primary medical team is paged
- **Cdiff Risk Assessment Tool**
  - Join effort with IP and EVS
  - 3 pronged approach to early intervention: pharmacist medication stewardship, provider, staff, patient and family education by IP, enhanced bleach cleaning by EVS
  - Physician champions-Dr. Susan Kline and Dr. Alison Galdys
- **Medication Use Evaluations**
  - ~6-8 completed annually, system-wide
  - Examples for 2017: carbapenems, fluoroquinolones, micafungin, vancomycin
  - Findings presented at our System Antibiotic Subcommittee with actions/recommendations for improvement of utilization
- **PCN Allergy Assessment/PAST**
  - Collaboration with ID Division
  - Physician champion- Dr. Pia Franco
  - Training received from ALK

EPIC PATIENT LISTS AND IVENTS







AS MONITORING TOOL

Gram stain [351709450] — Collected: 07/10/17 1945
Order Status: Completed — Specimen: Sputum — Updated: 07/10/17 2214

Specimen Description	Sputum
Special Requests	Screen
Gram Stain	-- <10 Squamous epithelial cells/low power field <25 PMNs/low power field Moderate Mixed gram positive and gram negative bacteria present.
Micro Report Status	FINAL 07/10/2017

Sputum Culture Aerobic Bacterial [351709449] — Collected: 07/10/17 1945
Order Status: Completed — Specimen: Sputum — Updated: 07/10/17 2117

Sputum Culture Aerobic Bacterial [351452341] — Collected: 07/08/17 1140
Order Status: Completed — Specimen: Sputum — Updated: 07/10/17 1302

Specimen Description	Sputum
Special Requests	Screen
Culture Micro	Moderate growth Normal flora
Micro Report Status	FINAL 07/10/2017

Strep pneumo Agn Ur greater or equal to 13yrs or CSF any age [351485336] — Collected: 07/08/17 1745
Order Status: Completed — Specimen: Urine — Updated: 07/09/17 0006

Specimen Description	Unspecified Urine
S Pneumoniae Antigen	-- Negative, no Streptococcus pneumoniae antigen detected by immunochromatographic membrane assay. A negative Streptococcus pneumoniae antigen result does not rule out infection with Streptococcus pneumoniae.
Micro Report Status	FINAL 07/09/2017

Gram stain [351479222] — Collected: 07/08/17 1140
Order Status: Completed — Specimen: Sputum — Updated: 07/08/17 1543

Specimen Description	Sputum
Special Requests	Screen
Gram Stain	-- <10 Squamous epithelial cells/low power field <25 PMNs/low power field Moderate Mixed gram positive and gram negative bacteria present.
Micro Report Status	FINAL 07/08/2017

Radiology (Last 504 hours)

07/08 1139	CT Chest Pulmonary Embolism w Contrast	Images
07/07 1841	XR Chest Port 1 View	Images
07/07 0711	CT Abdomen Pelvis w Contrast	Images
05/29 0000	US IMAGING - HIM SCAN	

EMR DOCUMENTATION

University of Minnesota Medical Center, Fairview
Antimicrobial Management Team (AMT) Note

Antimicrobial Stewardship Program-- *A joint venture between Fairview Pharmacy Services and UM Physicians to optimize antibiotic management*

NOT a formal Consult-Restricted Antibiotic Review

To:
Unit:
Allergies:
Infection History:

Brief Summary:

HPI:

Interval History:

Assessment:

Recommendation/Interventions:
1).
2).
3).

Intervention Examples:

1. **Change to more appropriate antibiotic based on lab data**
2. **Change to alternative unrestricted anti-infective**
3. **Discontinue one or more antibiotics (PO or IV)**
4. **Change from IV to PO antibiotics**
5. **Better empiric antibiotic therapy**
6. **Antibiotic dosage change**
7. **Consult recommended (eg. Infectious Disease, Pulmonary/Critical Care, Renal, Urology, etc.)**
8. **Additional/Further diagnostic testing recommended**
9. **Simplify antibiotic regimen (eg. Inpatients on redundant or excessively broad spectrum antibiotics)**
10. **Recommend change in post-op antibiotic duration**
11. **Other (Duration of Therapy)**
12. **Agree with management**

Discussed w/ ID Staff-Dr. XX

Current Antibitoic therapy:

Previous Antibiotic therapy:

Vital Signs and other clinical features:

Temperature

Imaging:

Culture Results:

Date	Culture Site	Organism

Meropenem (Merrem®) Use Guidelines:

Reasons for restriction: To prevent unnecessary use and preserve the efficacy for severe infections. Meropenem will be reserved for infections that are polymicrobial and/or contain resistant gram negative bacteria such as Pseudomonas, Enterobacter, Serratia or an ESBL producing E. coli or Klebsiella. It is also restricted due to costs. For example Pseudomonas susceptible to piperacillin/tazobactam should not be treated with meropenem unless the patient has an IgE mediated allergy noted (see page 2).

FDA Approved Indications:

- Skin or soft tissue infection
- Intra-abdominal infection
- Bacterial Meningitis
- Pediatric-bacterial meningitis

Fairview Indications:

- Multidrug resistant gram negative pathogens, e.g. Pseudomonas aeruginosa, Burkholderia cepacia, or Extended Spectru m Beta Lactamase (ESBL) gram negative bacteria which are only sensitive to meropenem
  - Ertapenem is a formulary carbapenem that has excellent susceptibility to ESBL producing organisms and may be considered an alternative over meropenem if Pseudomonal coverage is not necessary based on site of infection or documented cultures.
- A dose of 500mg IV Q6H is the approved dosing for all indication except Cystic Fibrosis patients and CNS infections.
  - Higher dose meropenem may be used if a documented pathogen has a higher MIC reported of ≥2.
  - 500 mg IV Q6H is our standard dosing as many of our gram negative pathogens maintain low susceptibility MICs to meropenem and utilizing lower dose but closer frequency (500 mg IV Q6H vs. 1 gm IV Q8H) optimizing time dependent killing

Dosing:

Adult:

Standard dose: 500 mg IV Q6H
Standard dosing for CF patients: 1 gm IV Q8 hours
Bacterial meningitis: 2 gm IV Q8H

Pediatric:

Bacterial meningitis ≥ 3 months = 40 mg/kg IV Q8 hours
Skin and/or SQ tissue= 10 mg/kg IV Q8 hours
Complicated abdominal infections= 20 mg/kg IV Q8 hours

Cost:

Antibiotic	Cost/dose	Cost/day	Alternative Agent	Cost/dose	Cost/day
Meropenem 500 mg vial	$6.40	$25.60			
Meropenem 1 gm vial	$12.81	$38.43			
			Primaxin (Imipenem/Cil) 500 mg vial	$7.50-8.50	$30.00-34.00
			Primaxin	$4.50	$18.00

VERIGENE®

GRAM-NEGATIVE BLOOD CULTURE ASSAY (BC-GN)

```
Cultured on the 1st day of incubation: Klebsiella pneumoniae
Critical Value/Significant Value, preliminary result only, called to and read
 back by  MARK O. RN @2312 4/1/17. CT
(Note)
POSITIVE for KLEBSIELLA PNEUMONIAE by Verigene multiplex nucleic acid
test. Final identification and antimicrobial susceptibility testing
will be verified by standard methods.

Specimen tested with Verigene multiplex, gram-negative blood culture
nucleic acid test for the following targets: Acinetobacter sp.,
Citrobacter sp., Enterobacter sp., Proteus sp., E. coli, K.
pneumoniae/oxytoca, P. aeruginosa, and the following resistance
markers: CTXM, KPC, NDM, VIM, IMP and OXA.
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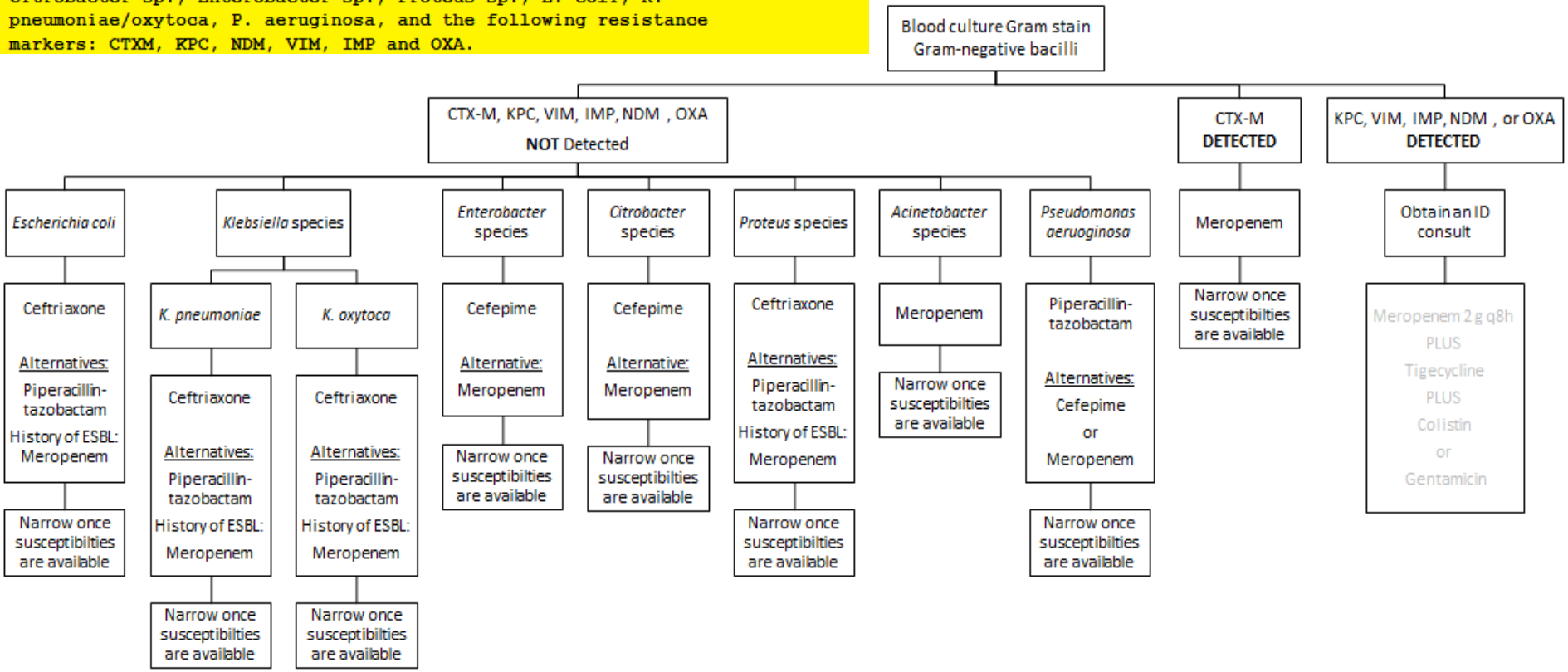
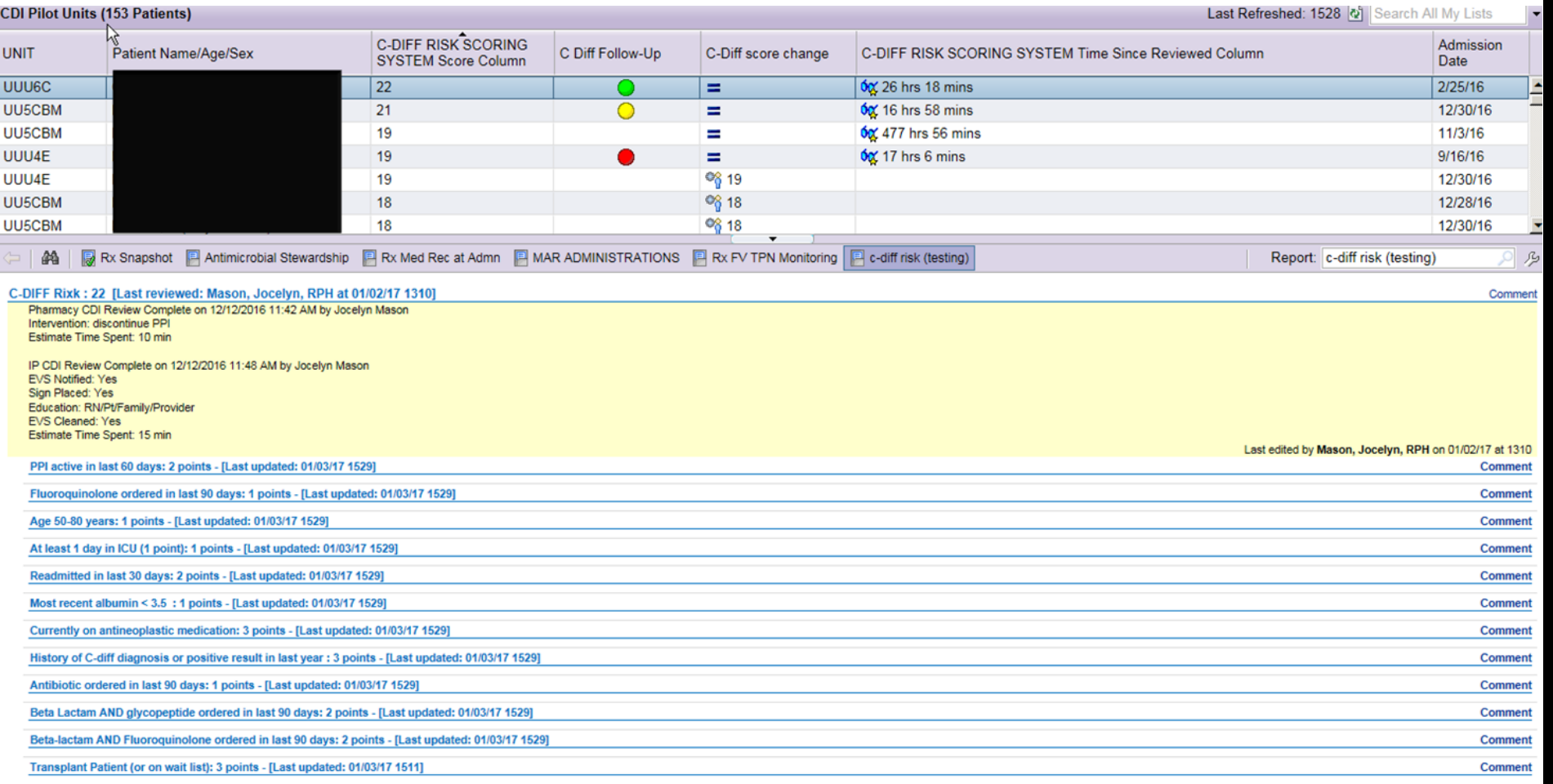


CDIFF RISK ASSESSMENT TOOL



PCN ALLERGY ASSESSMENT PROGRAM

Type: Progress Notes Service: Antimicrobial M: Date of Service: 7/11/2017 07:49 AM

☐ Cosign Required

Have you ever taken drugs similar to penicillin? Cephalosporins such as Cephalexin (Keflex), Cefepime (Maxipime), Ceftriaxone (Rocephin) Carbapenems such as Imipenem (Primaxin), Meropenem (Merrem), Etrapenem (Invanz)	***

Procedure was reviewed and discussed with the patient and or family member: {YES NO:124710::"Yes"}
The patient met University of Minnesota Medical Center Penicillin Skin Test Protocol for Penicillin Allergy Skin Testing: {YES NO:124710::"Yes"}

Step 1: Puncture Test Results:
The test was read after *** minutes of placement.

****Insert picture*

Histamine control response (+): {YES NO:124710::"Yes"} (***mm)
Normal saline control response (-): {YES NO:124710::"Yes"} (***mm)
PRE-PEN response (PRP): {YES NO:124710::"Yes"} (***mm)
Penicillin G response (PG): {YES NO:124710::"Yes"} (***mm)

Assessment:
The histamine response was {Positive / Negative:124514}, determining that the patient ***does or does not have the ability to mount an allergic reaction.
The normal saline response was {Positive / Negative:124514}, determining that the patient ***does or does not have skin too sensitive for testing.
The penicillin and PRE-PEN sites ***did or did not produce larger wheals than the controls or were {Positive / Negative:124514} for any reaction and therefore, the patient ***does or does not appear initially allergic and the testing ***can or cannot continue to the second portion of testing with intradermal testing.

Step 2: Intradermal Test Results:
The test was read after ***minutes of placement.

*** *Insert picture here*

Leadership Commitment	• Formal Statement • Designated resources: human, financial, IT
Accountability	• Single leader responsible for program outcomes
Drug Expertise	• Single pharmacist leader
Action	• Implement improvement
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Education	• Educating clinicians about resistance and optimal prescribing

EPIC ICON MODULE IMPLEMENTATION

- **Required the upgraded version of Epic in order to build the reporting structure**
- **Significant financial investment from Fairview and MHealth for IT infrastructure upgrades**
  - Epic upgrade
  - Currently undergoing Sunquest LIS (MicroLab) upgrade
- **Currently in the build and testing the functionality of the module components**
  - Goal is to utilize the module (Ivents) for total assessment, intervention and documentation->allows easy method for tracking and reporting
  - Leveraging our technology to gain efficiencies with clinical activities
- **Creating a AS Dashboard**
- **Hurdles: Technology upgrades take time, time intensive to build and test, many different groups involved and everyone has their own priorities**
- **Go-Live: October 2nd, 2017**

NATIONAL HEALTHCARE SAFETY NETWORK (NHSN) AU(R) MODULE

- AUR=Antibiotic Use and Resistance module
- Launched in 2012
- Goal=provide a mechanism for facilities to report and analyze antimicrobial use and/or resistance as part of local or regional efforts to reduce antimicrobial resistance
- Must coordinate with their laboratory and/or pharmacy information software providers to configure their system to enable the generation of standard formatted file(s) to be imported into NHSN
- Data can be system wide, hospital specific, and/or unit specific
- Ideal state=aggregate information of antibiotic use at a regional or national level->create antibiotic benchmarks

STANDARDIZE ANTIMICROBIAL ADMINISTRATION RATIO (SAAR)

- **Measurement for tracking and reporting continues to be difficult and facilities risk not being compliant with this core element**
- **SAAR could be used for benchmarking for antibiotic use**
  - Same concept as Standard Infection Ration (SIR) that Infection Prevention uses
  - Gives the observed antimicrobial use over predicted
  - May allow for risk adjusted comparisons
- **CDC has been collaborating with organization to make this module doable and helpful**
  - Grant was available from the CDC for Departments of Health
- **SAAR may be more helpful if reported by specific patient populations or grouped by antibiotics**
  - Agents mainly for healthcare associated pathogens
  - Agents mainly for community pathogens
  - Agents active against MRSA
  - Agents frequently use for surgical prophylaxis
  - All agents

CDC, Division of Healthcare Quality Promotion-Office of Antimicrobial Stewardship (2017). Neuhauser, M. NHSN Training. Retrieved: https://www.cdc.gov/nhsn/pdfs/training/2017/Neuhauser_March24.pdf

NHSN AUR MODULE

National Healthcare Safety Network
Rate Table - All Submitted AU Data - Antimicrobial Utilization Rates by Location
Rate per 1,000 Days Present
As of: February 3, 2012 at 3:52 PM
Date Range: All AU_RATESLOCATION

Org ID=10846 CDC Location=IN:ACUTE:CC:M Location=INMEDCC

Summary Yr/Mon	Antimicrobial Category	Antimicrobial Class	Antimicrobial Days	Days Present	Rate per 1000 Days Present
2011M01	Antibacterial	-- All --	90165	10000	9,016.500
2011M01	Antibacterial	Aminoglycosides	438	10000	43.800
2011M01	Antibacterial	Carbapenems	12	10000	1.200
2011M01	Antibacterial	Cephalosporins	57	10000	5.700
2011M01	Antibacterial	Fluoroquinolones	12	10000	1.200
2011M01	Antibacterial	Folate pathway inhibitors	6	10000	0.600

NATIONAL STRATEGY OBJECTIVES

- **95% of eligible hospitals report antibiotic use data to National Healthcare Safety Network Antibiotic Use & Resistance by 2020**
- **Reduce inappropriate inpatient antibiotic use by 20% from 2014 levels**
- **Reduce inappropriate outpatient antibiotic use by 50% from 2010 levels**

ONGOING IMPACT OF AN ANTIMICROBIAL STEWARDSHIP PROGRAM AT A LARGE ACADEMIC MEDICAL CENTER, 9 YEARS OF EXPERIENCE

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UNIVERSITY OF MINNESOTA HEALTH

A collaboration between University of Minnesota Physicians and University of Minnesota Medical Center.

ABSTRACT

Background:
The University of Minnesota Medical Center (UMMC), Fairview is a 300 bed tertiary care facility. UMMC has had a long-standing, comprehensive antimicrobial stewardship program (ASP).

Methods:
The stewardship team is comprised of a full-time PharmD. and part time ID staff members who rotate through the service. The team allows providers to order restricted antimicrobials, per hospital guidelines and policies, without upfront approval, followed by a chart review. Recommendations are placed in the electronic medical record as a progress note. Verbal recommendations may also be made. The number of patient on restricted antimicrobial, total number of interventions and acceptance rates, antimicrobial cost per pt day, antimicrobial utilization, and patient outcomes are evaluated annually.

Results:
There was a downward trend in Hospital Acquired (HA) C. difficile diarrhea from 2007 to 2014 from 1.2 to 0.5/1000 patient days (pt day). Rates appear stable from 2014-2016 with adjustment for change to NHSN lab based surveillance only. From 2009-2014 a decrease was seen in HA VRE infections from 0.53 to 0.22/1000 pt days and in HA MRSA infections from 0.2 to 0.08/1000 pt days. VRE and MRSA HAI rates increased in 2015 - first quarter 2016. Newly acquired HA ESBL infections increased from 2009-2016 at 0.09 to 0.20/1000 pt days. CRE is an emerging problem during the ASP history.

Cost savings, after adjusting for inflation, continued from year to year. The greatest cost savings was from 2006-08 in which antimicrobial doses/pt day declined by 7%, antibiotics costs declined by $7.40/pt day. In 2012, we observed our lowest antibiotic cost/pt day at $36.36 which is a difference of $19.03 before implementation of the program. From 2013-2015, we have observed a sustained average antibiotic cost per patient day of $42.84.

Conclusion:
The ASP has continued to cost justify the program. Our antibiotic costs/pt day have leveled off in the last 3 years and remained low despite rising antibiotic costs due to market inflation and drug shortages. We began to observe a decrease in HA VRE and C. difficile infections after 3 years of operation, and MRSA after 5 years. The effects of the program and the Infection Prevention Department appear to be synergistic. Future areas for focus include preventing rising multi-drug resistant organism HAIs, focus on non-restricted antibiotics that are overused and contribute to C. difficile diarrhea and use of the procalcitonin test to help optimize antibiotic use.

INTRODUCTION

Objective: To track and measure the impact of the antimicrobial stewardship program (ASP) on key outcome measures over time since implementation in 2007, compared to pre-intervention period of 2006.

- Interventions made by the ASP team (~1,900-2,400/year)
- Acceptance Rate (~ 80%/year)
- Morbidity, mortality, length of stay (LOS)
- Antibiotic costs
- Antimicrobial resistance trends
- Antibiotic usage (since institution of EPIC in 2011 downward trend)

CLINICAL OUTCOMES

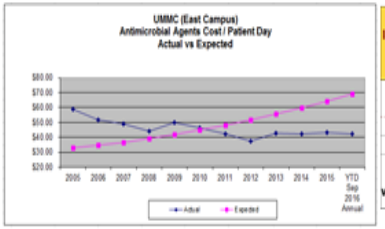
University HealthSystem Consortium Data

Discharge Year	Cases	Mean LOS Observed	Mean LOS Expected	LOS Index	% Deaths Observed	% Deaths Expected	Mortality Index	UHC Risk Model
2006	28,071	5.21	5.33	0.98	1.66	1.98	0.84	Pre-2012 model
2007	29,194	5.19	5.36	0.97	1.71	1.93	0.89	"
2008	31,194	5.12	5.31	0.97	1.41	1.67	0.85	"
2009	30,312	5.28	5.58	0.95	1.53	1.83	0.84	"
2010	28,709	5.39	5.78	0.93	1.58	2.07	0.76	"
2011	28,805	5.62	5.80	0.97	1.86	2.22	0.84	"
2012	28,216	5.71	5.99	0.95	1.76	2.05	0.86	2012 model
2013	28,302	5.98	5.80	1.03	1.97	1.85	1.07	2015 model, 2012 model mortality index = 0.81
2014	27,738	6.02	5.93	1.02	2.06	2.01	1.03	2015 model
2015	26,701	6.10	6.34	0.96	2.22	2.32	0.96	"
2016 (Jan.-Aug.)	18,584	6.30	6.76	0.93	2.07	2.43	0.85	"

ANTIMICROBIAL COSTS TABLE

Antimicrobial Agents Activity	University Campus										
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	YTD Sep 2016 Annual
Antimicrobial Agents Total Cost	$ 5,712,589	$ 4,954,776	$ 4,641,576	$ 4,596,985	$ 5,081,646	$ 4,553,510	$ 3,766,267	$ 3,281,557	$ 3,977,654	$ 4,059,296	$ 4,280,557	$4,564,555
Total Patient Days	99,731	95,709	95,910	99,090	103,948	97,692	89,311	87,479	93,545	95,404	96,672	103,780
Costs / Patient Day	$59.02	$51.77	$48.38	$44.37	$48.84	$46.40	$42.17	$37.51	$42.51	$42.55	$43.58	$43.25

From 2006 to 2009 there was a $3.47 increase in antimicrobial cost/patient day; primary expenditure increase was due to antifungal utilization and vancomycin resistant Enterococcus (VRE) treatment. Antibiotic cost was adjusted for percent inflation for the market. Inflation increased steadily from 2005-2011 (4.9%, 5.2%,5.1%, 7.5%, 6.4%, 7.5% and 7.5%) while the University ABX $/patient day decreased. By 2011, the ABX $/patient day was below the expected market cost. In 2012, we observed our lowest antibiotic cost/patient day, this was a difference of $19.03 before implementation of the stewardship program.

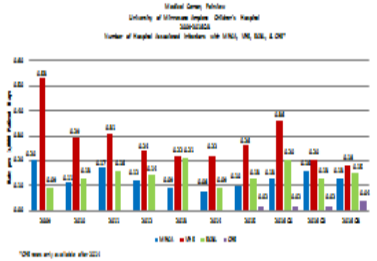


AMT Interventions & Acceptance Rates - Adult	University Campus						
	2007	2008	2009	2010	2011	2012	2013
Total Interventions	1,991	2,165	2,665	2,340	2,098	2,264	2,417
Total Accepts	1,153	1,235	1,626	1,381	1,267	1,376	1,531
Total Declines	468	518	541	439	453	458	423
Total Agree w/Management	370	412	498	520	378	430	463

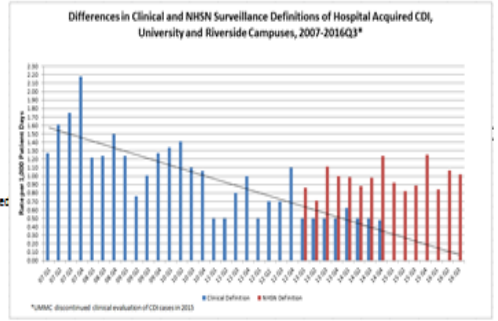
***HAI Definitions:** Beginning in 2009 all positive VRE, MRSA and ESBL cultures, which are identified on a patient for the first time, from all hospital units are evaluated to determine if the culture represents a hospital acquired infection (HAI) as defined by NSHN diagnostic criteria. HAI includes: BSI, UTI, SSTI, SSIs, pneumonias, bone and joint infections, cardiovascular, CNS. GI, EENT, LRIs, reproductive and systemic infections.

*Active surveillance cultures for VRE stool carriage are done in BMT patients
* and active surveillance for MRSA nasal carriage is done in ICUs.
*C. difficile HAI cases are also identified using NHSN criteria
Additional infection control interventions were taken for *C. difficile* with enhanced environmental cleaning in those rooms with patients with CDI

MULITDRUG RESISTANT HAI RATES



CDI RATE TREND 2007-2016



SUMMARY

1. HAI trends, MRSA and VRE rates have decreased during the intervention period but ESBL and CRE rates have increased.
2. C. difficile diarrhea rate has decreased during the intervention period.
3. Morbidity, mortality and LOS have remained stable since implementation of ASP.
4. Antibiotic costs decline over time of ASP. Cost of ASP is justified.
5. Effects of ASP and infection prevention appear to be synergistic.

WHAT DO WE DO NOW?

- Keep fighting!
- Leadership and Engagement
- Education and Training
- Protect our patients
  - Quick identification and treatment
  - Active Surveillance
- Support local and national efforts including legislation
- Work with industry
- Be Stewards…everyone…including you!

Resistance anywhere is resistance everywhere.
Antibiotic overuse increases the development
of drug-resistant germs and
limits treatment options for infections.
You have a role in preventing antibiotic resistance.

http://www.health.state.mn.us/divs/idepc/dtopics/antibioticresistance/index.html

QUESTIONS & DISCUSSION

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ASP 101 Reminders

MHA/OHA Acute Care ASP 101 Implementation Timeline

Phase 1: CDC Core Elements 1-3

June 2017

Events

- ☐ **June 20** - ASP 101 Kick off webinar - overview of ASP initiative across the continuum of care

Homework

- ☐ Review Kansas DOH ASP Toolkit for Rural and Critical Access Hospitals pg. 1-14

July 2017

Action Items

- ☐ **July 11 -** MHA/OHA collaborative webinar "Leveraging the EMR to Promote ASP activities" (Register online)
- ☐ Develop an ASP team
- ☐ Draft a leadership ASP statement of support (example provided)

Due

- ☐ ASP team in place
- ☐ Leadership ASP statement of support for your facility

Phase 2: CDC Core Element 4

August 2017

Events

- ☐ **Aug. 8 -** ASP 101 Sharing call and presentation, "TJC ASP Lessons Learned" (Register online)

Homework

- ☐ Review Kansas DOH ASP Toolkit for Rural and Critical Access Hospitals
  Pg. 15-24

September 2017

Action Items

- ☐ **Sept. 12 -** MHA/OHA Collaborative Webinar (Register online)
- ☐ Based on the facility ASP statement of support draft an ASP policy that supports optimal antibiotic use (example provided)

Due

- ☐ Facility specific ASP policy and procedure

MHA/OHA HIIN Contacts

- OHA
  - James Guliano, Vice President Quality Programs
  - Rosalie Weakland, Senior Director Quality Programs
  - Subcontractor – HSAG
    - Christine Bailey, Director, Quality Improvement and Patient Safety
- MHA
  - Tania Daniels, Vice President, Quality and Patient Safety
  - Lali Silva, Senior Director Quality and Process Improvement
  - Susan Klammer, Quality & Process Improvement Specialist

Thank you for joining us!

Next Webinar:

"TJC ASP Lessons Learned"

Tuesday, August 8 at 11:30am CST/ 12:30pm EST

Join online: https://zoom.us/j/537497272