# KEY COMPONENTS OF PROFESSIONAL EDUCATION FOR ANTIMICROBIAL STEWARDSHIP

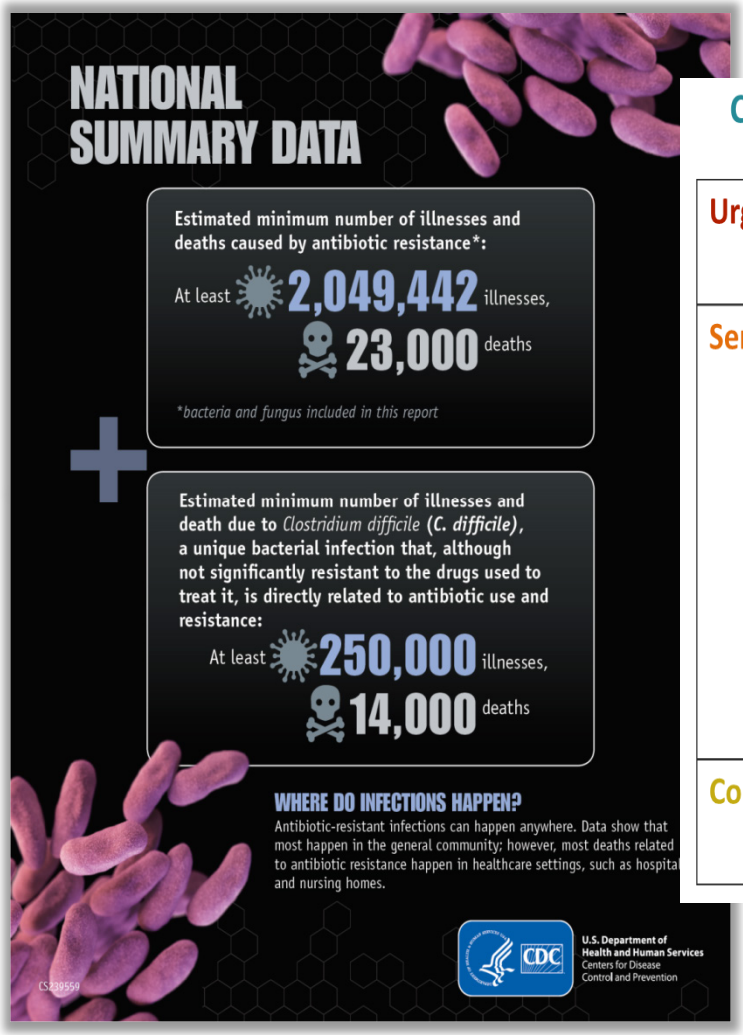
Kimberly Boeser, PharmD, MPH, BCIDP
Emily Medcraft, PharmD, BCPS

# Objectives

- Explain the regulatory requirements for Antimicrobial Stewardship (AS) education
- Discuss the strategy for education deployed within our health system
- Differentiate the components of education for pharmacist, providers and other professionals

# BACKGROUND

# Antibiotic Resistance in the United States

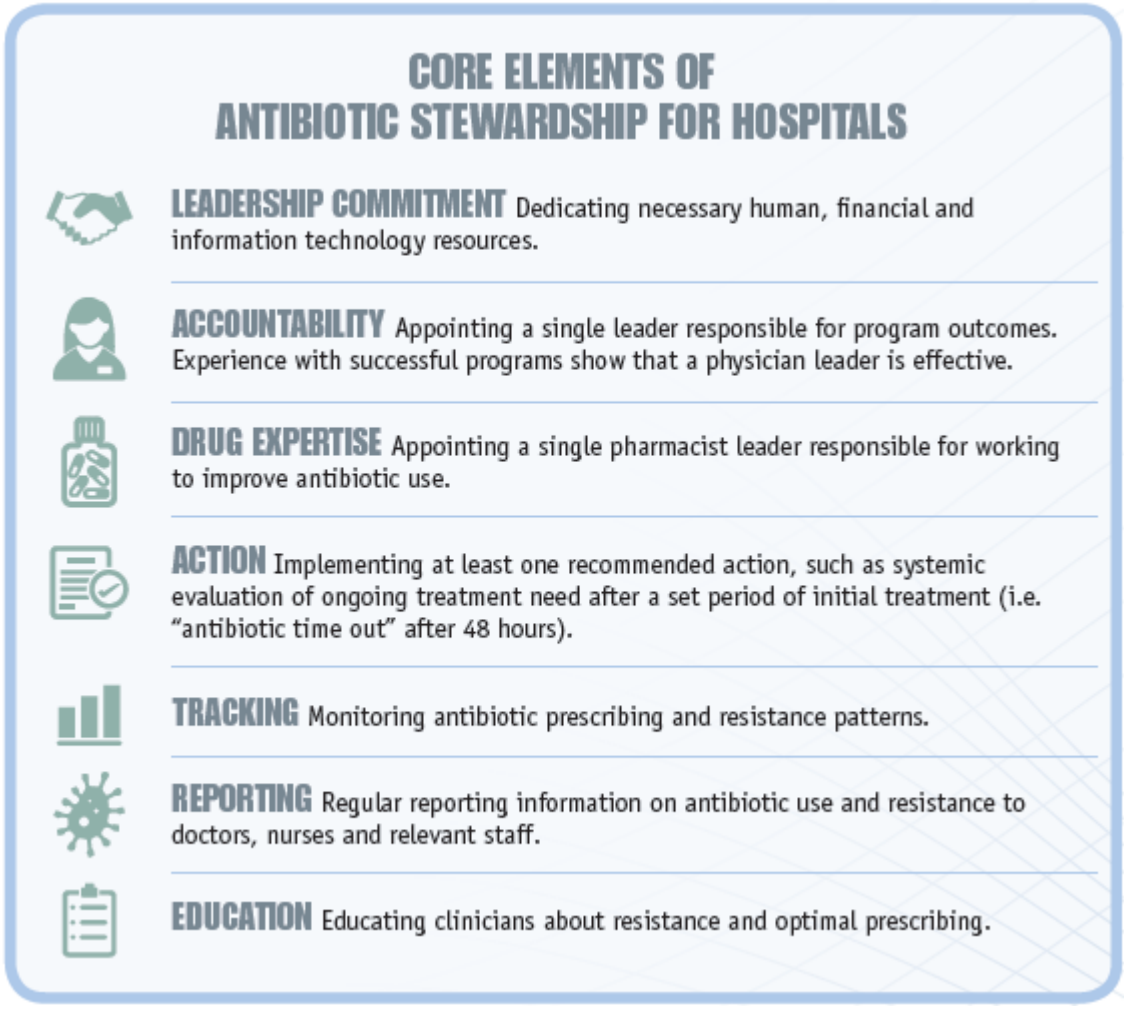



## Center for Disease Control Prioritization of Antibiotic Resistance Threats

| | |
|---|---|
| **Urgent Threats** | • *Clostridium difficile*<br>• Carbapenem-resistant *Enterobacteriaceae* (CRE)<br>• Drug-resistant *Neisseria gonorrhoeae* |
| **Serious Threats** | • Multidrug-resistant *Acinetobacter*<br>• Drug-resistant *Campylobacter*<br>• Fluconazole-resistant *Candida* (a fungus)<br>• Extended spectrum β-lactamase producing *Enterobacteriaceae* (ESBLs)<br>• Vancomycin-resistant *Enterococcus* (VRE)<br>• Multidrug-resistant *Pseudomonas aeruginosa*<br>• Drug-resistant Non-typhoidal *Salmonella*<br>• Drug-resistant *Salmonella Typhi*<br>• Drug-resistant *Shigella*<br>• Methicillin-resistant *Staphylococcus aureus* (MRSA)<br>• Drug-resistant *Streptococcus pneumoniae*<br>• Drug-resistant tuberculosis |
| **Concerning Threats** | • Vancomycin-resistant Staphylococcus aureus (VRSA)<br>• Erythromycin-resistant Group A Streptococcus<br>• Clindamycin-resistant Group B Streptococcus |

CDC, Antibiotic Resistance Threats in the United States (2013).
https://www.cdc.gov/drugresistance/pdf/ar-threats-2013-508.pdf [Accessed 12/16/16]

# Core Elements of AS for Hospitals




CDC, Core elements of hospital antibiotic stewardship programs (2015)
https://www.cdc.gov/antibiotic-use/healthcare/implementation/core-elements.html [Accessed 5/2019]

# Fairview Hospital Overview

11 hospitals across Minnesota

- Fairview Southdale Hospital (Edina)
- University of Minnesota Medical Center/University of Minnesota Masonic Children's Hospital (Minneapolis)
- Fairview Ridges Hospital (Burnsville)
- Fairview Lakes Medical Center (Wyoming)
- Fairview Northland Medical Center (Princeton)
- Fairview Range (Hibbing)
- Grand Itasca Clinic and Hospital (Grand Rapids)
- HealthEast St. Joseph's (St. Paul)
- HealthEast St. John's (Maplewood)
- HealthEast Bethesda LTAC (St. Paul)
- HealthEast Woodwinds Health Campus (Woodbury)


# Fairview Antimicrobial Stewardship

- Site-Based Antimicrobial Stewardship Programs (ASP) established at each hospital

- Multi-disciplinary System Antibiotic Subcommittee
  - *Scope:* antimicrobial formulary reviews, policies, institutional guidelines, drug utilization, antibiotic resistance, and antibiogram

# Fairview Hospital Historical AS Education

- Education pharmacy focused
  - System
  - Site specific

- Barriers in educating providers and non-pharmacist staff

# New Regulatory Requirements


- Medication Management Standard MM.09.01.01
- Education is one required “Element of Performance”

Joint Commission, New Antimicrobial Stewardship Standard (2016).
https://www.jointcommission.org/assets/1/6/New_Antimicrobial_Stewardship_Standard.pdf [Accessed 5/2019]

# Educational Requirements for MM.09.01.01

*"The [critical access] hospital educates staff and licensed independent practitioners involved in antimicrobial ordering, dispensing, administration, and monitoring about antimicrobial resistance and antimicrobial stewardship practices. Education occurs upon hire or granting of initial privileges and periodically thereafter, based on organizational need."*

Joint Commission, New Antimicrobial Stewardship Standard (2016).
https://www.jointcommission.org/assets/1/6/New_Antimicrobial_Stewardship_Standard.pdf [Accessed 5/2019]

# Fairview Compliance with Standard

- Fairview System Antibiotic Stewardship Steering Committee created in 2017
- Each hospital completed a gap analysis to assess compliance
- Formal education for AS was lacking and not standardized across the system

# AS EDUCATION METHODS

# AS Education Practices

*Open Forum Infectious Diseases*

MAJOR ARTICLE

## Structure of Antimicrobial Stewardship Programs in Leading US Hospitals: Findings of a Nationwide Survey

**Derrick Nhan,[1] Eric J. M. Lentz,[2] Marilyn Steinberg,[3] Chaim M. Bell,[1,3,4,5] and Andrew M. Morris[1,3,4,5]**

[1]University of Toronto, Toronto, ON, Canada; [2]Department of Medicine, McMaster University, Hamilton, ON, Canada; [3]Sinai Health System, Toronto, ON, Canada; [4]University Health Network, Toronto, ON, Canada; [5]Department of Medicine, University of Toronto, Toronto, ON, Canada

***Background.*** To examine antibiotic stewardship program (ASP) structure among high-performing hospitals and determine which components of the 2016 Infectious Diseases Society of America (IDSA)/Society for Hospital Epidemiology of America (SHEA) ASP guidelines are implemented at each site.

***Methods.*** A survey of the highest-ranking hospitals, compiled from the 2015–2016 US News and World Report's Best Hospital Rankings, was conducted from August to December 2016. This corresponded to 138 adult and 62 pediatric unique hospitals. We inquired as to which components of the 2016 IDSA/SHEA ASP guidelines were implemented at each site. Appropriate persons at each hospital were emailed surveys after telephone or email conversations confirmed that they belonged to that hospital's ASP.

***Results.*** Overall, 101 of 200 hospitals responded (51%). Of these, 82% (n = 83/101) had an active ASP, and 59% (n = 47/80) were active for more than 5 years. Most report to a committee rather than to an individual (n = 68/80, 85%), do not have their own budget (r
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administ
***Concl***
commitn
hospitals
**Keywo**

| Which of the following strategies (if any) does your ASP use to educate clinicians regarding resistance and optimal prescribing habits? (n = 69) | | |
|---|---|---|
| Didactic lectures/presentations | 61 | 88 |
| Web-based educational resources | 30 | 43 |
| Education pamphlets | 13 | 19 |
| Posters/flyers | 13 | 19 |
| Reviewing de-identified cases with providers | 8 | 12 |
| Other | 8 | 12 |
| None | 1 | 1 |

Nhan et al. OFID. 2019

# Utilizing Online-Learning for AS Education

*J Antimicrob Chemother* 2015; **70**: 3175–3177
doi:10.1093/jac/dkv336 Advance Access publication 1 October 2015

Journal of Antimicrobial Chemotherapy

## Educating healthcare professionals in antimicrobial stewardship: can online-learning solutions help?

**Nuno Rocha-Pereira[1], Natalie Lafferty[2] and Dilip Nathwani[3]***

*[1]Infectious Diseases Department of São João Hospital Centre and Faculty of Medicine of University of Porto, Alameda Prof. Hernâni Monteiro, 4200 Porto, Portugal; [2]Centre for Technology & Innovation in Learning, Library & Learning Centre, University of Dundee, Dundee DD1 4HN, UK; [3]Ninewells Hospital and Medical School, Dundee DD1 9SY, UK*

*Corresponding author. Tel: +44-1382-660111; Fax: +44-1382-385432; E-mail: dilip.nathwani@nhs.net

Education is widely recognized as one of the cornerstones of successful antimicrobial stewardship programmes. There is evidence of important knowledge flaws around antimicrobial prescribing among both medical students and clinicians. Educational interventions improve antimicrobial prescribing, but traditional tools may be insufficient to deliver training to meet the complex demands of global healthcare professionals working across a diverse range of healthcare and resource settings. The educational solutions increasingly need to be timely, efficient, pragmatic, high quality, aligned to the needs of the professional in a specific context, sustainable and cost-effective. Online learning has been playing a growing role in education about antimicrobial stewardship and the recent phenomenon of massive open online courses (MOOCs) offers novel and additional opportunities to deliver relevant information to a wide range of people. Additional research on MOOCs as an educational approach is needed in order to define their effectiveness, sustainability and the best ways to achieve the intended results. Although the precise value of new online strategies such as MOOCs is ill defined, they certainly will have an important place in increasing awareness and improving antimicrobial prescribing.

Rocha-Pereira et al. Educating healthcare professionals in antimicrobial stewardship: can online learning solutions help? J Antimicrob Chemother. 2015; 70:3175-3177

# Advantages and Disadvantages of E-learning

## Advantages

- Wide availability
- Reduced costs of delivery
- Flexibility of schedules
- Portability of content
- Access to experts and curricula otherwise inaccessible
- Self-paced
- Potential to learn in teams that may replicate the workplace

## Disadvantages

- Laborious preparation of educational content
- More time-consuming for students
- Lack of student-teacher interaction
- Possibility of isolation
- Inability to clarify doubts properly
- Lack of in-depth group discussion
- Difficulty of delivering some content without human interaction

Rocha-Pereira et al. Educating healthcare professionals in antimicrobial stewardship: can online learning solutions help? J Antimicrob Chemother. 2015; 70:3175-3177

# Fairview AS Education Plan

| What? | Who? | How? | When? |
| --- | --- | --- | --- |
| • Mandatory antimicrobial stewardship education | • Non-provider staff<br>• Providers<br>• Pharmacists | • Electronic Learning Management System (LMS) | • Spring 2018<br>• Content reviewed and assigned annually |

# LMS Development and Deployment

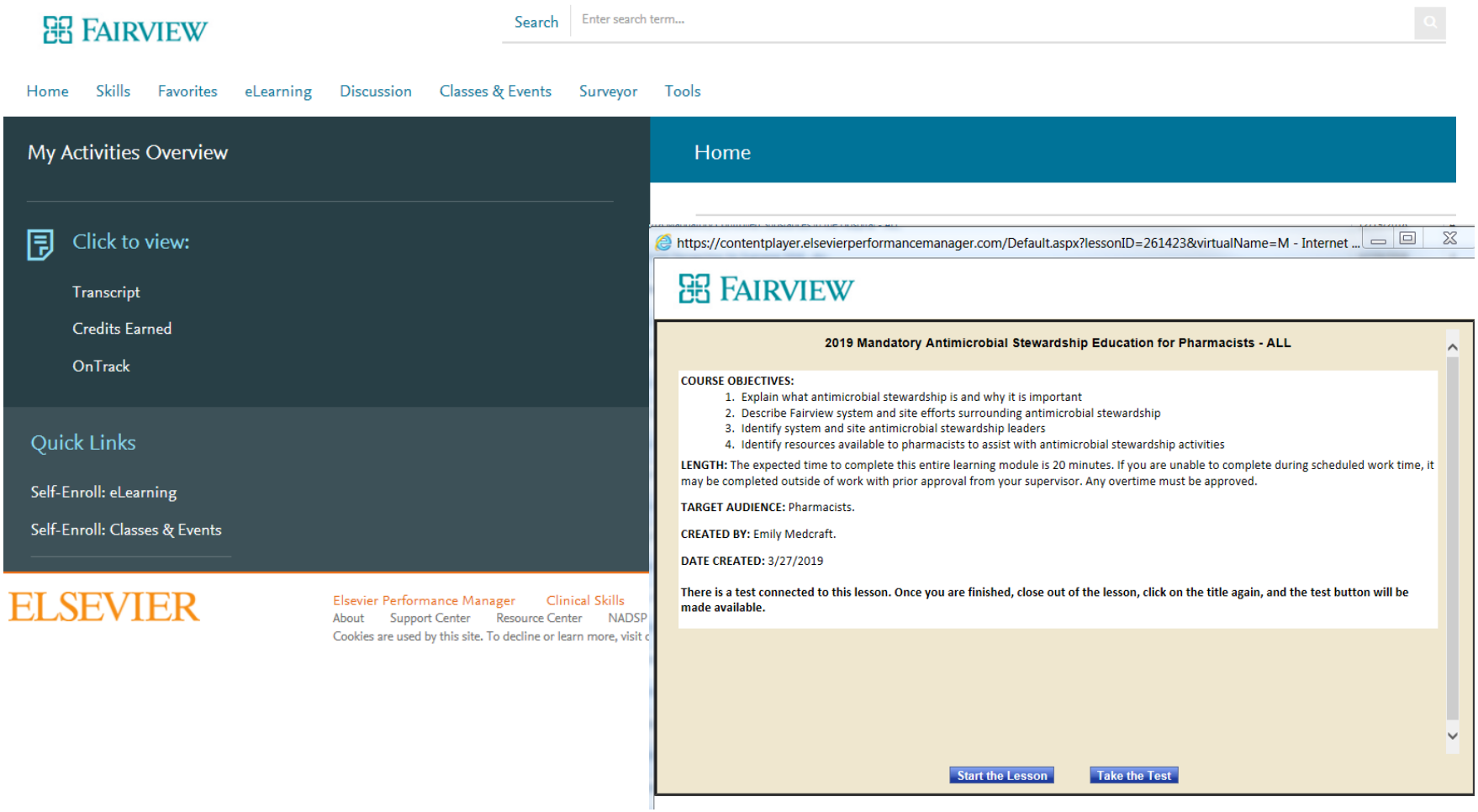
- Content developed by Subject Matter Experts
- Content submitted to LMS Technologist
- Module assigned to staff
  - Non-provider staff
  - Providers
  - Pharmacists

# Tracking Compliance

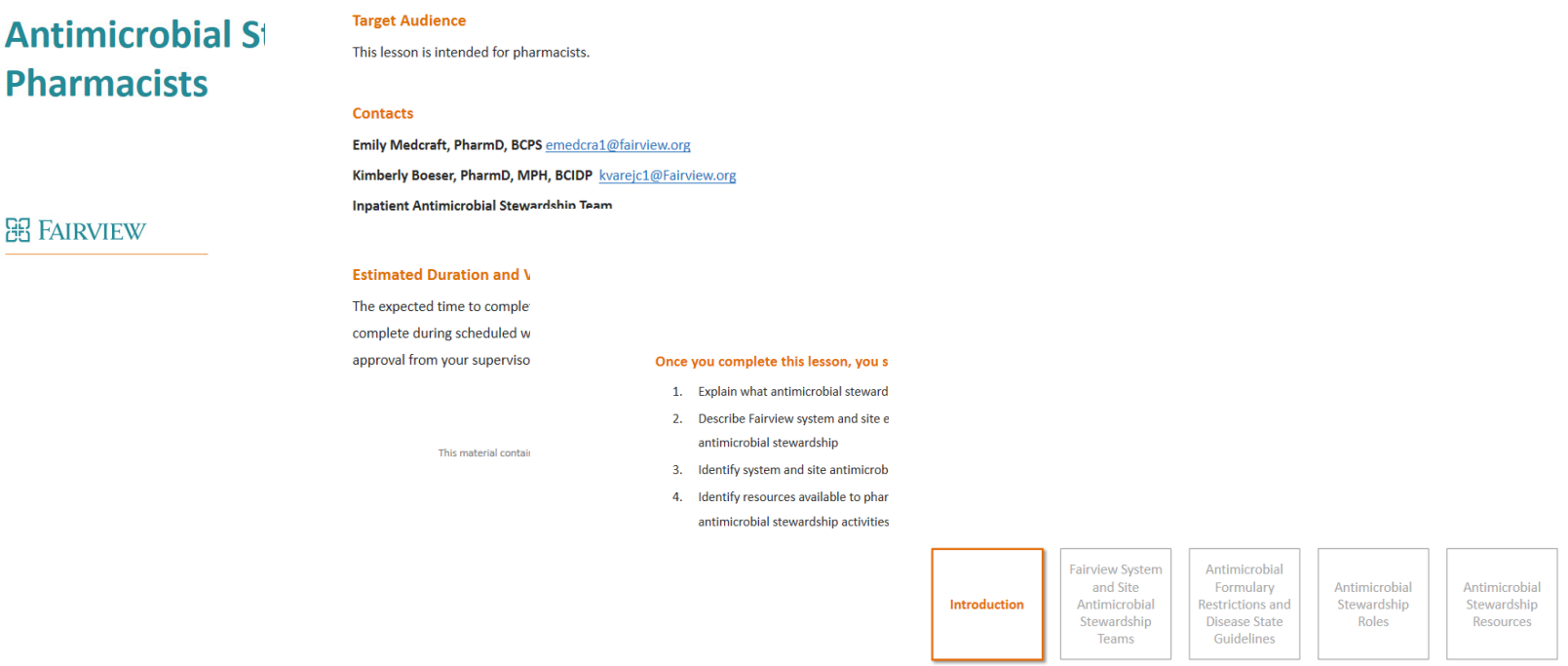
- Staff receive email notifications for lessons that are due
- Managers receive email notifications with a list of their due and overdue staff
- All learning completion is recorded on the employee's LMS transcript

# AS EDUCATION CONTENT

# Fairview LMS System



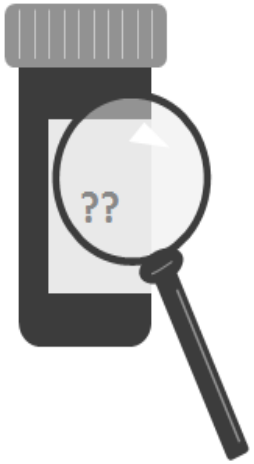
# Pharmacist LMS Lesson Screenshot



# Standard Education Content

- Defined Antimicrobial Stewardship
- Highlighted the need for Antimicrobial Stewardship and why it is important
- Goal was to be consistent with content
  - Followed the CDC 7 core elements
- Explained everyone has a role to play
- Clearly stated the role of the Antimicrobial Stewardship Team
- "*What can you do*" slide

# What is Antimicrobial Stewardship?




Antibiotic stewardship programs and interventions help ensure that patients receive antibiotics only when absolutely necessary; and when they are needed, the correct antibiotic is prescribed in a timely manner at the right dose and duration.

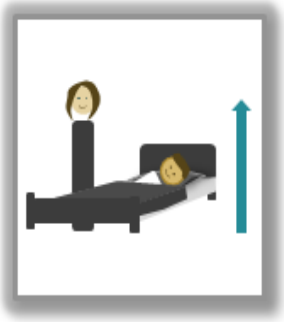
New regulatory requirements from CMS and the Joint Commission require antimicrobial stewardship programs be in place by the end of 2017 with a goal of 100% compliance from all hospitals and critical access hospitals by 2020.

**Antimicrobial Stewardship is a coordinated program that:**

- promotes the appropriate use of antimicrobials
- improves patient outcomes
- reduces antimicrobial resistance
- decreases the spread of infections caused by multidrug-resistant organisms

Barlam TF, Cosgrove SE, et al. Implementing an Antibiotic Stewardship Program: Guidelines by the Infectious Disease Society of America and the Society for Healthcare Epidemiology of America. Clin Infect Dis. 2016.

# Importance of Antimicrobial Stewardship



**Improve the quality of patient care and patient safety**

- Increase infection cure rates
- Reduce treatment failures
- Reduce adverse events associated with antimicrobial therapy

**Reduce use of inappropriate antimicrobials**

- 20-50% of all antibiotics prescribed in acute care hospitals are either inappropriate or unnecessary

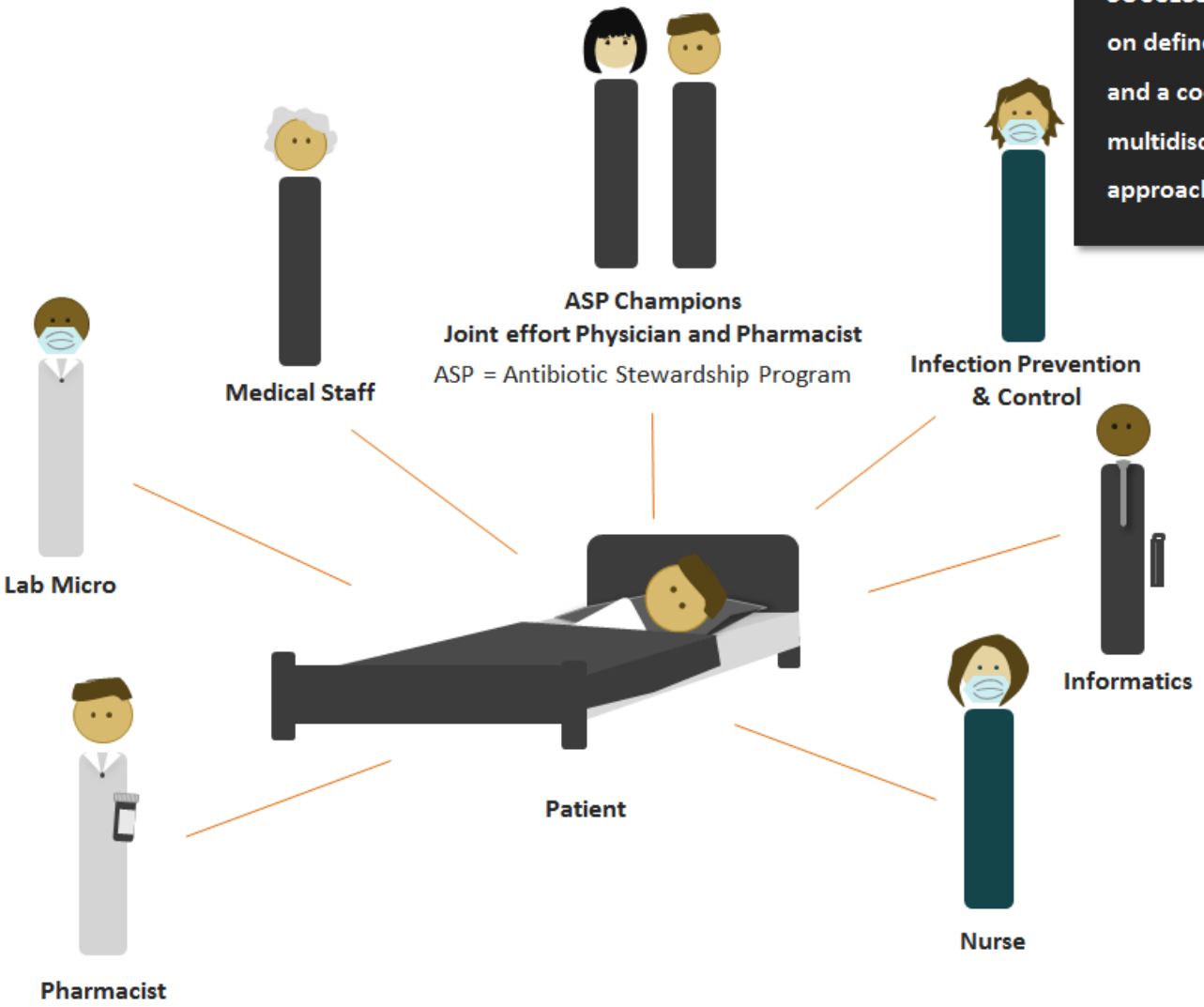
**Prevent collateral damage**

- e.g. Clostridium difficile infection

**Decrease antimicrobial resistance**

# Team Based Approach to Antibiotic Stewardship

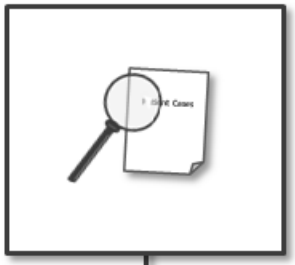
**SUCCESS is dependent on defined leadership and a coordinated multidisciplinary approach.**



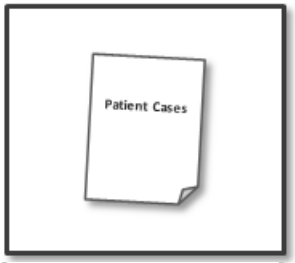
# Role of Antimicrobial Stewardship Pharmacist

**Identify patients on Restricted Antimicrobial Agents**

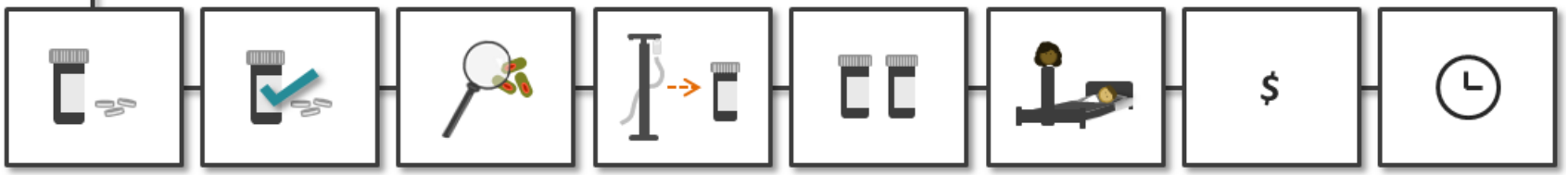
**Review patient cases to identify:**



**Present patients cases to ID provider**




**Provide written communication for any recommended interventions via Antimicrobial Stewardship Clinical Documentation in EPIC**


Antibiotic selection

Efficacy of dosing for indication

Cultures and sensitivities

IV to PO conversion

Duplicate therapy

Potential toxicities/ monitoring plan

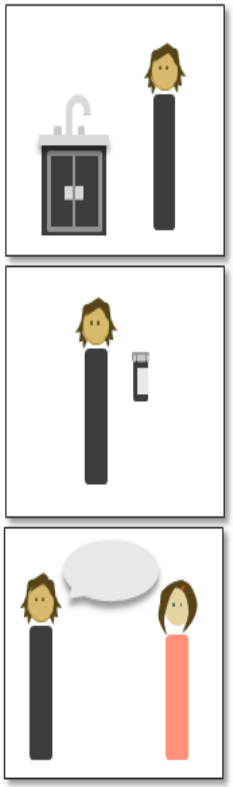
Cost effectiveness

Duration of therapy

# Focused Education Content: Non-Provider

- Included all standard education content
- Kept this pretty basic
- Added a “what you can do”
- Included the CDC patient education resource
- How to access AS intranet resources

## What You Can Do...

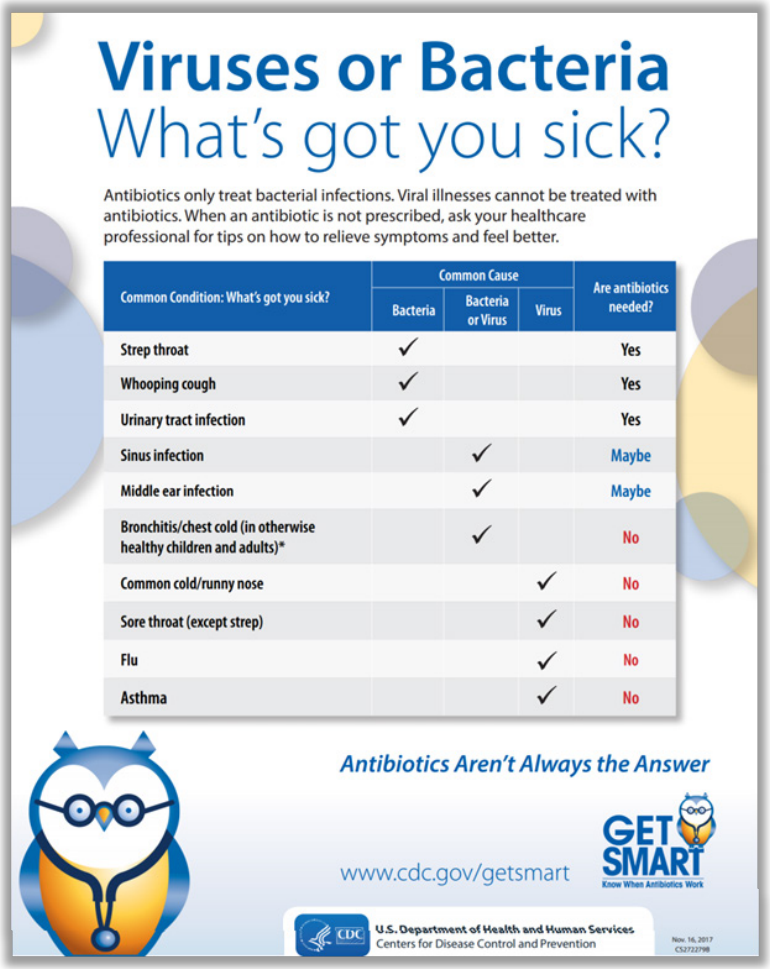


Practice good hand hygiene

Promote Antibiotic Best Practices

- Ensure all orders have a dose, duration, and indication
- Access restricted antimicrobial guidelines
- Get cultures before starting antibiotics
- Reassessing antibiotics after 48-72 hours
- Define a duration for antibiotic therapy

Help patients understand the "appropriate use" for antibiotics



# Viruses or Bacteria
## What's got you sick?

Antibiotics only treat bacterial infections. Viral illnesses cannot be treated with antibiotics. When an antibiotic is not prescribed, ask your healthcare professional for tips on how to relieve symptoms and feel better.

| Common Condition: What's got you sick? | Common Cause | | | Are antibiotics needed? |
|---|---|---|---|---|
| | Bacteria | Bacteria or Virus | Virus | |
| Strep throat | ✓ | | | Yes |
| Whooping cough | ✓ | | | Yes |
| Urinary tract infection | ✓ | | | Yes |
| Sinus infection | | ✓ | | Maybe |
| Middle ear infection | | ✓ | | Maybe |
| Bronchitis/chest cold (in otherwise healthy children and adults)* | | ✓ | | No |
| Common cold/runny nose | | | ✓ | No |
| Sore throat (except strep) | | | ✓ | No |
| Flu | | | ✓ | No |
| Asthma | | | ✓ | No |

*Antibiotics Aren't Always the Answer*

www.cdc.gov/getsmart

GET SMART
Know When Antibiotics Work

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

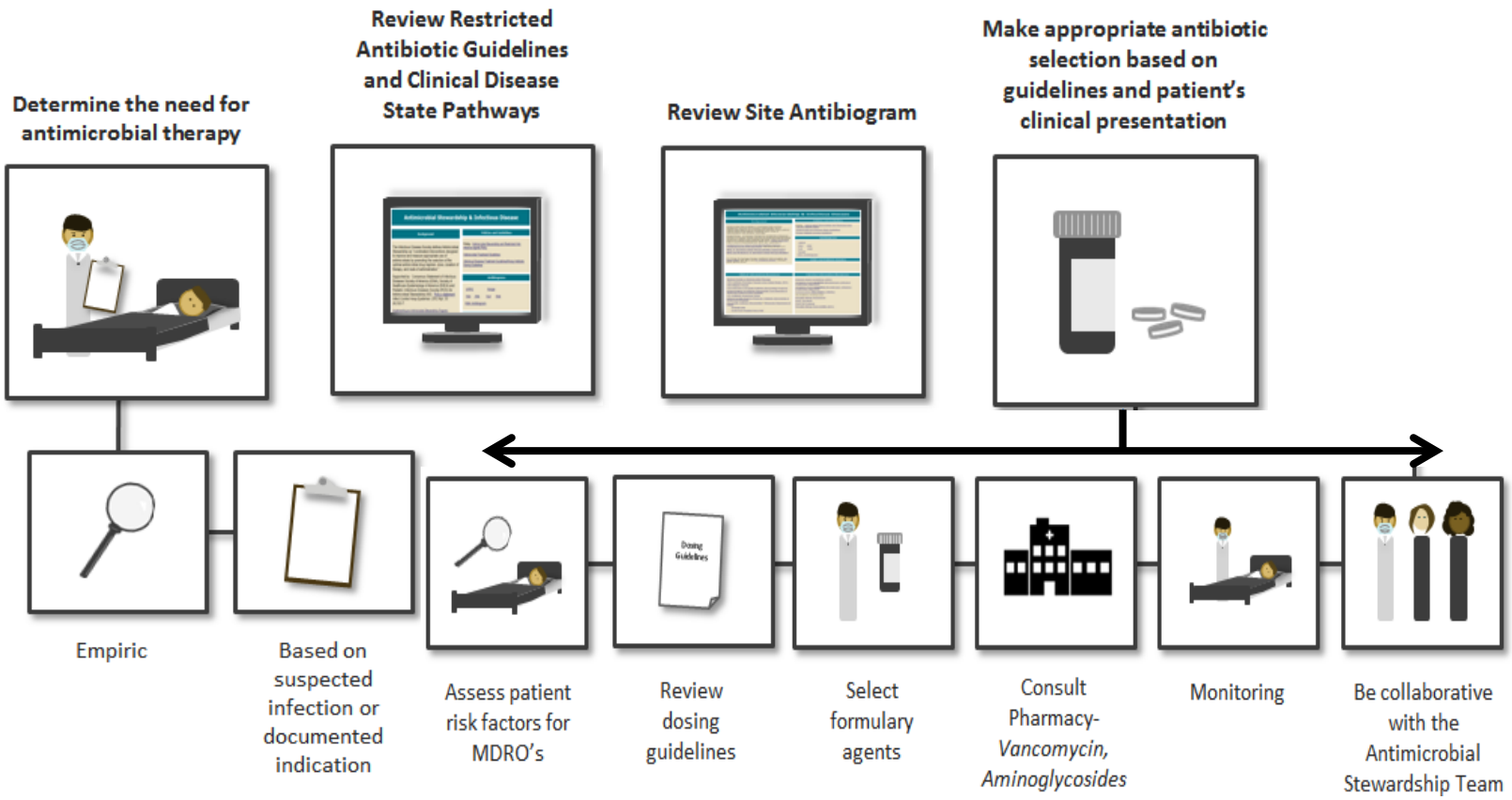
Nov. 16, 2017
CS272279B

CDC (2017). https://www.cdc.gov/antibiotic-use/community/pdfs/Viruses-or-Bacteria-Factsheet-Eng.pdf [Accessed 11/2017]

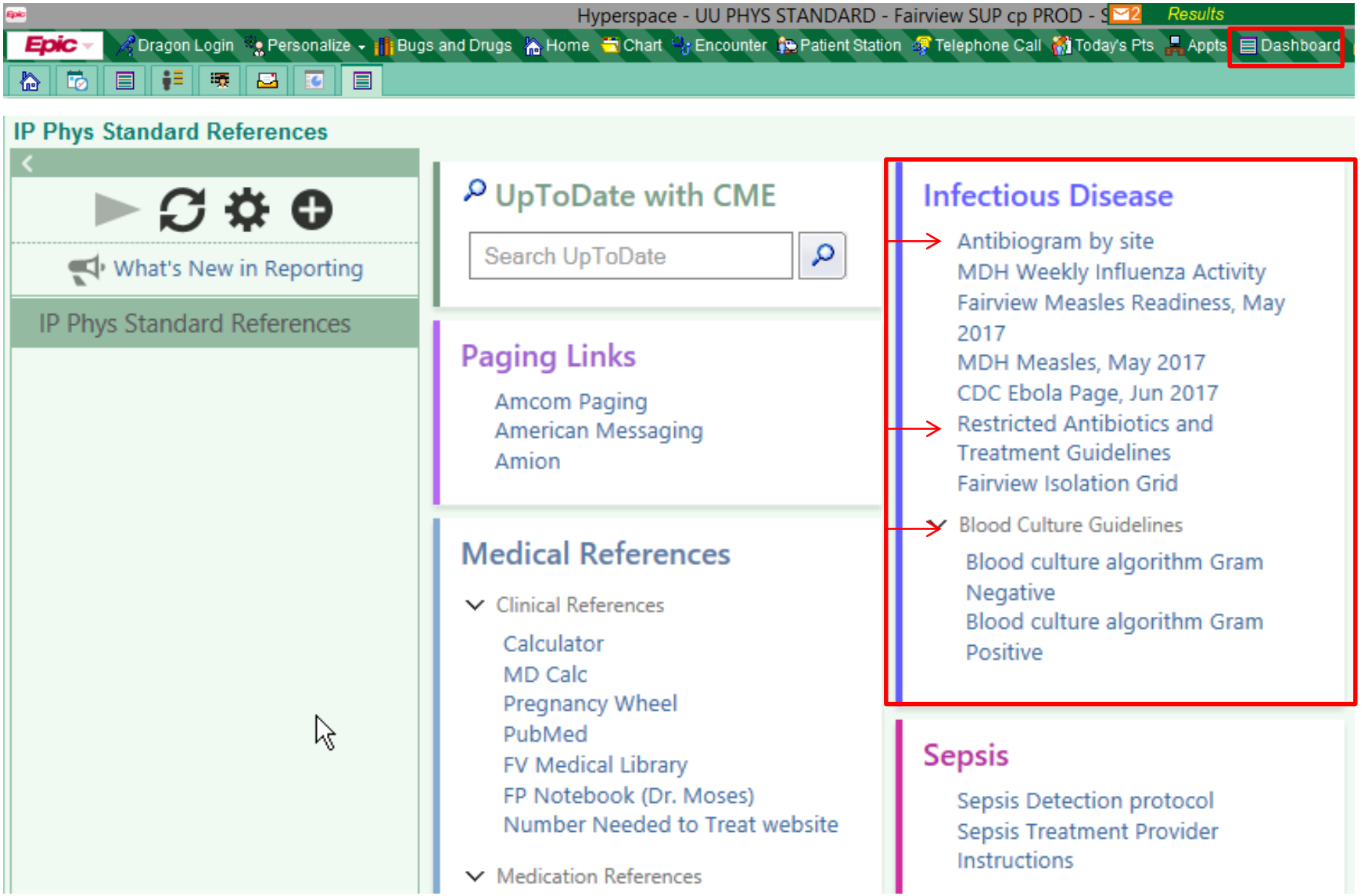
# Focused Education Content: Providers

- Defined the role of the primary provider
- Highlighted key resources for provider use
  - Antibiograms
  - Required indications
  - Restricted antimicrobial guidelines
  - Formulary selection
  - Pharmacy consults
- Encouraged collaboration with the Antimicrobial Stewardship Teams

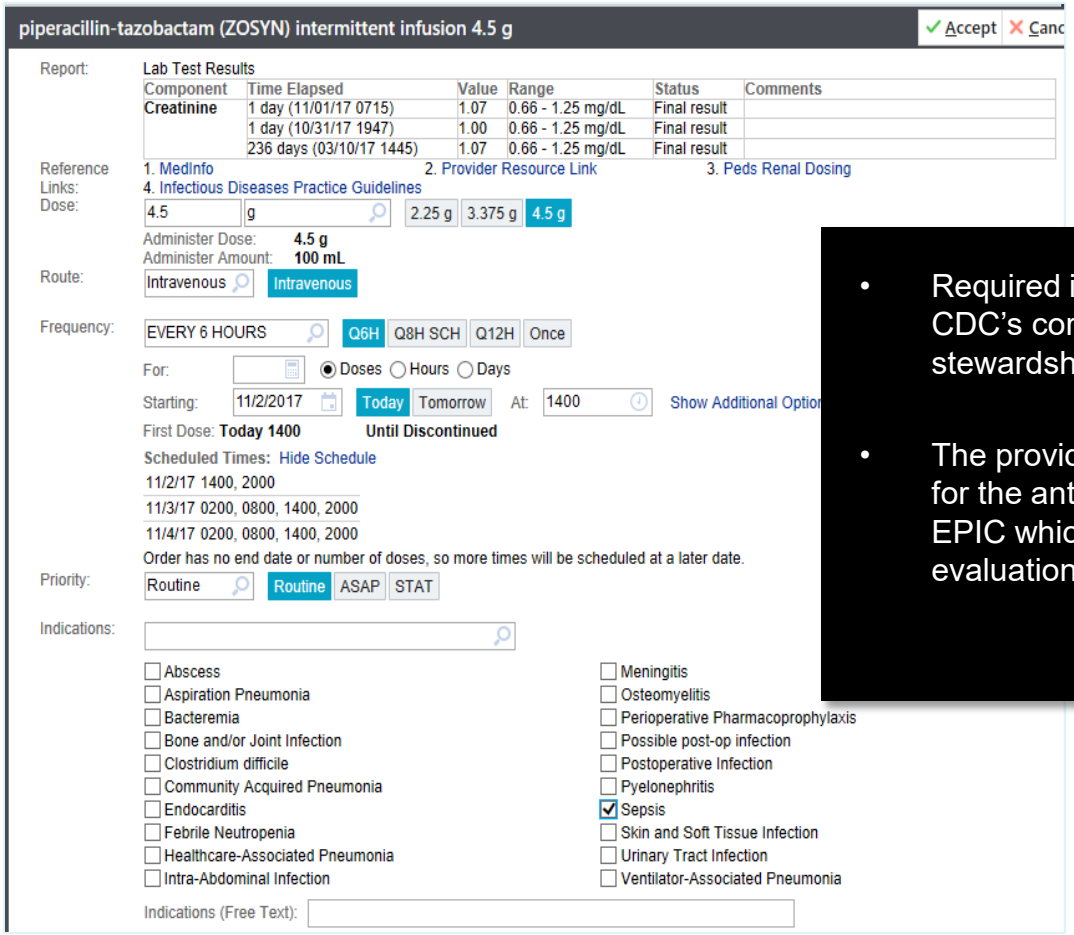
# Role of Primary Provider



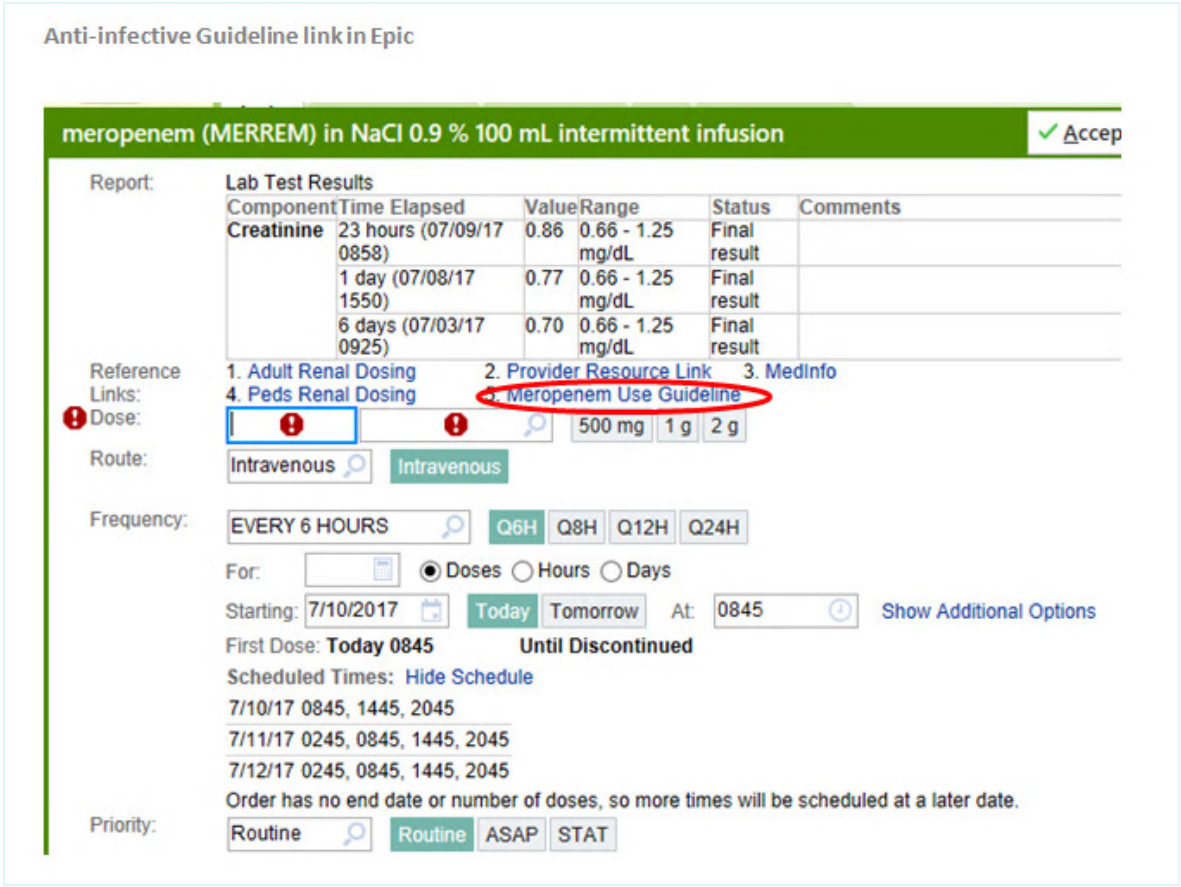
# Physician Dashboard



# Required Indications for Antimicrobials




- Required indications meets one of the CDC's core elements of antimicrobial stewardship.
- The provider must select the indication for the antimicrobial on ordering in EPIC which can assist with clinical evaluation of the order.




***Antimicrobial Use Guideline Hyperlink in EPIC Medication Order***

# Available Disease State Guidelines

- *C difficile* (update pending 2019)
- Candidemia
- Invasive Aspergillosis
- Blood Stream Infections
- Pneumonia
- Diabetic Foot Infections
- UTI/Asymptomatic Bacteriuria
- RSV Treatment Guidelines

# Example Disease State Guideline

## Fairview M Health Inpatient Services
## Adult and Pediatric *Clostridium difficile* Infection Guidelines

### Purpose

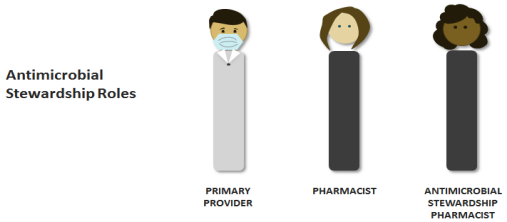
To help guide diagnosis, treatment and prevention of *C. difficile* infection (CDI) in patients at Fairview M Health Services.

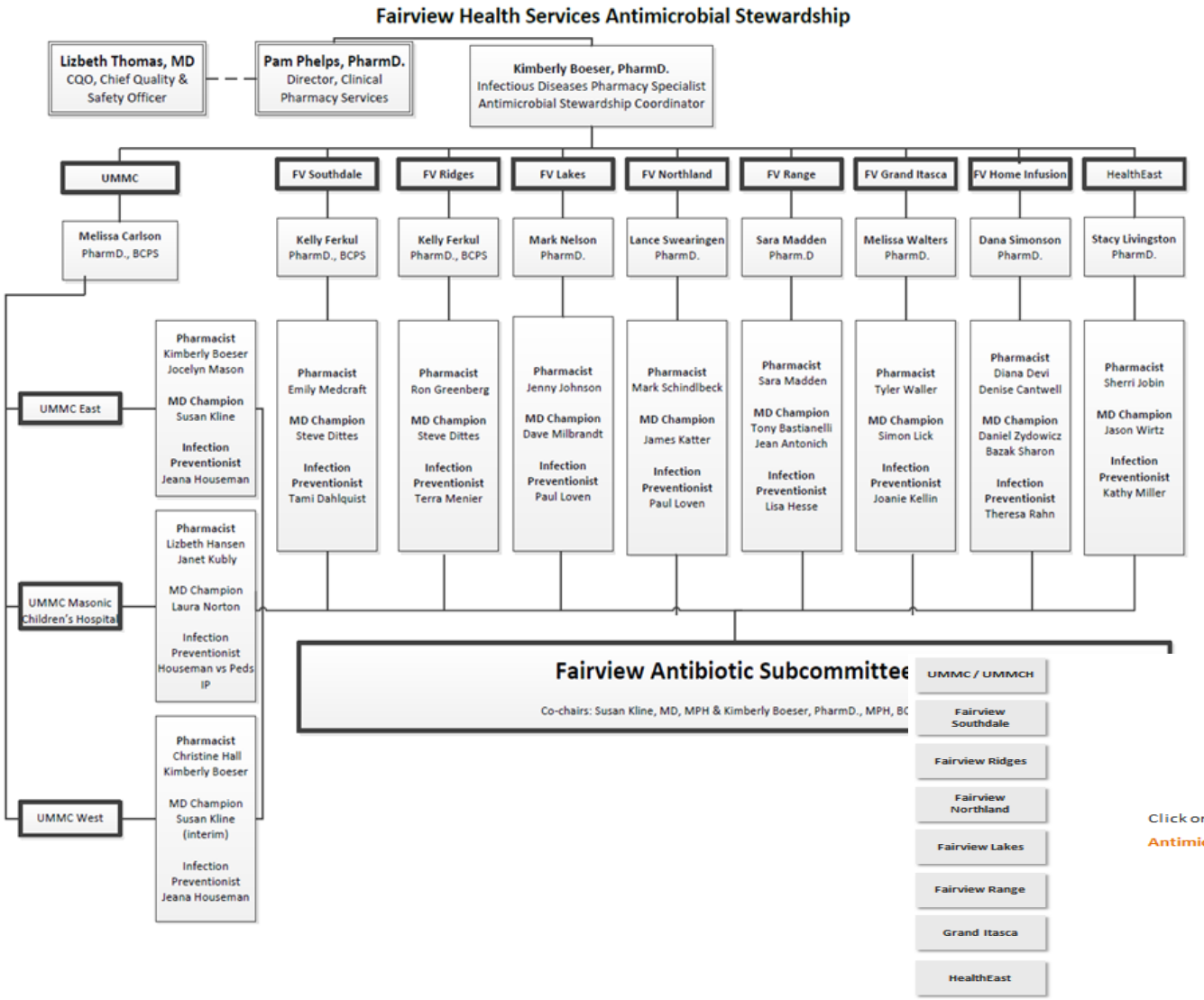
### Definitions

- ***C. difficile* Infection:** positive *C. difficile* PCR ***PLUS*** any of the following:
    - ≥ 3 unformed stools in < 24 hours without alternate explanation (i.e. tube feeds, laxative use)
    - Colonoscopic or histopathologic evidence of pseudomembranous formation
- **Non-Severe Disease**
    - CDI **PLUS** any of the following:
        - WBC < 15,000 cells/mm3 or unchanged
        - SCr ≤ 1.5 mg/dL
- **Severe Disease**
    - CDI ***PLUS*** any of the following:
        - WBC ≥ 15,000 cells/$mm^3$
        - SCr > 1.5 mg/dL
        - Albumin < 2.5 g/L
- **Fulminant Disease**
    - Same criteria as severe ***PLUS*** any of the following attributed to CDI:
        - Hypotension (SBP < 60 mmHg) or shock
        - ICU admission
        - Significant abdominal distension
        - Altered mental status
        - WBC ≥ 25,000 cells/$mm^3$
        - Serum lactate >2.2 mmol/L
        - Evidence of megacolon, ileus, colonic perforation, or severe colitis on imaging
- **Recurrence:** recurrent symptoms and positive testing for toxigenic *C. difficile* within 8 weeks of prior episode
- **Relapse:** recurrent symptoms with the same strain of *C. difficile* 3 weeks of prior episode

# Focused Education Content: Pharmacists

- Included organizational charts of the ASP teams for each site
- Defined the role of every pharmacist in daily antimicrobial stewardship activities
- Called out our restricted antimicrobial agents
- Highlighted key resources on our FV intranet
- Required post-test highlighting key concepts





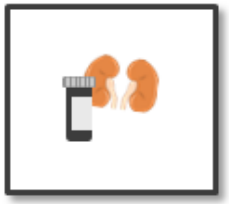

Click on your site and view your site's Antimicrobial Stewardship Team.

# Core Elements of Antimicrobial Review for all Pharmacists

**Review patient cases daily to assess:**

Antibiotic selection

Efficacy of dosing for indication



Renal dose adjustments

Cultures and sensitivities

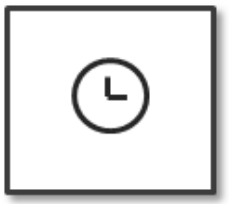
IV to PO conversion

Duplicate therapy

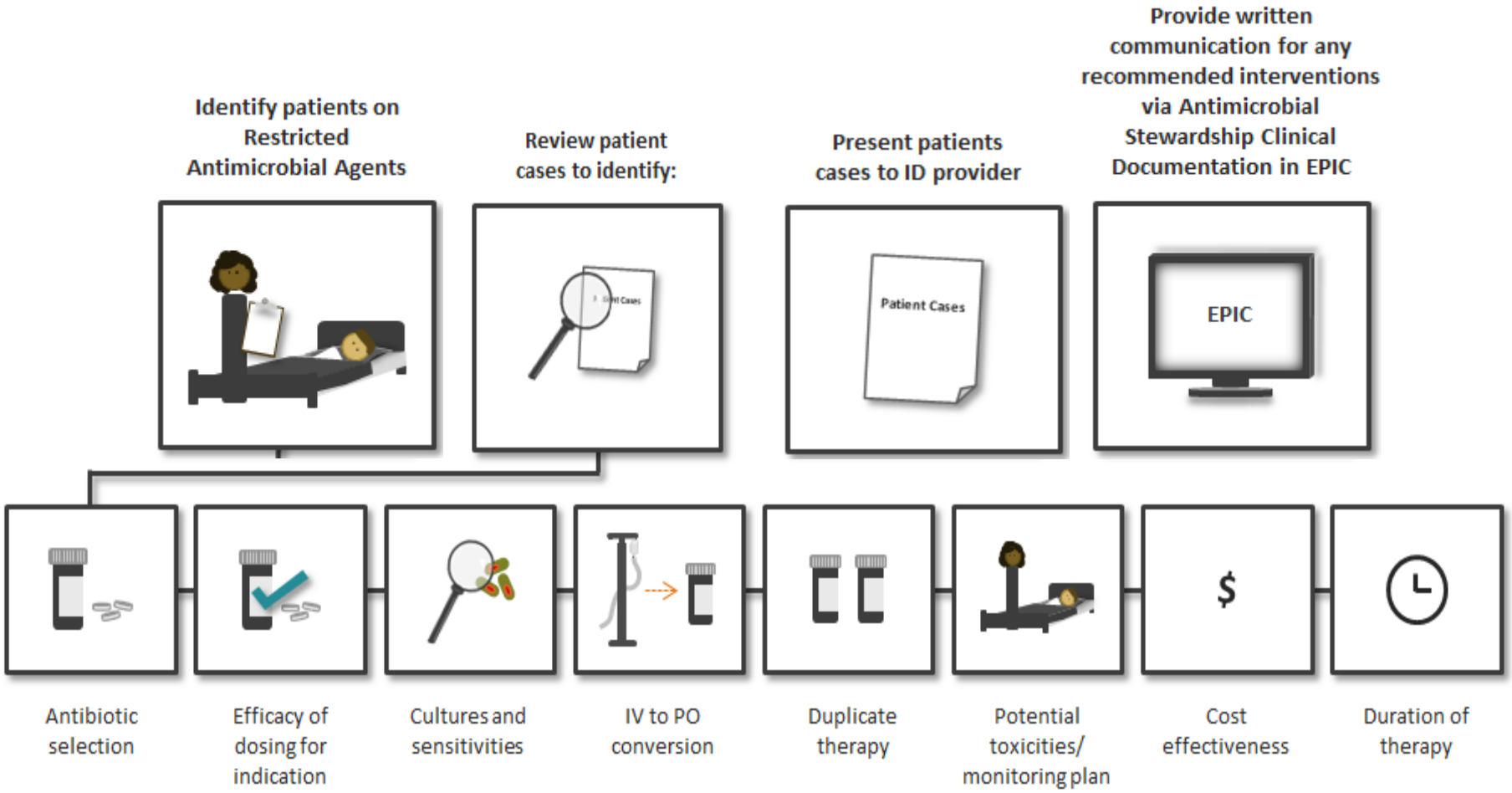
Potential toxicities and monitoring plan

Pharmacokinetic monitoring


Cost effectiveness



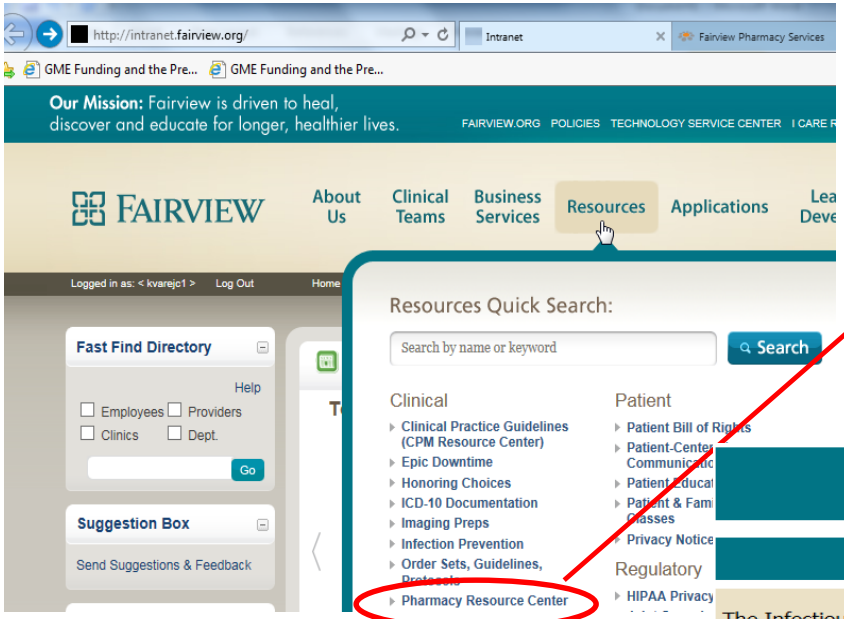
Duration of therapy

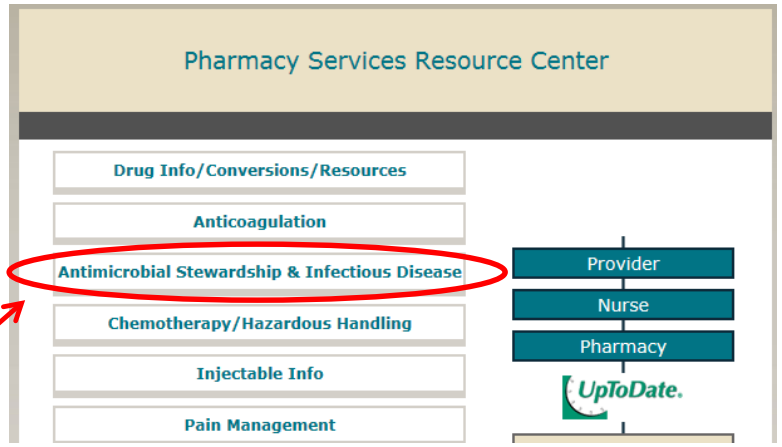

Identify patients on Restricted Antimicrobial Agents
Review patient cases to identify:
Present patients cases to ID provider
Provide written communication for any recommended interventions via Antimicrobial Stewardship Clinical Documentation in EPIC
Patient Cases
EPIC
$
Antibiotic selection
Efficacy of dosing for indication
Cultures and sensitivities
IV to PO conversion
Duplicate therapy
Potential toxicities/ monitoring plan
Cost effectiveness
Duration of therapy

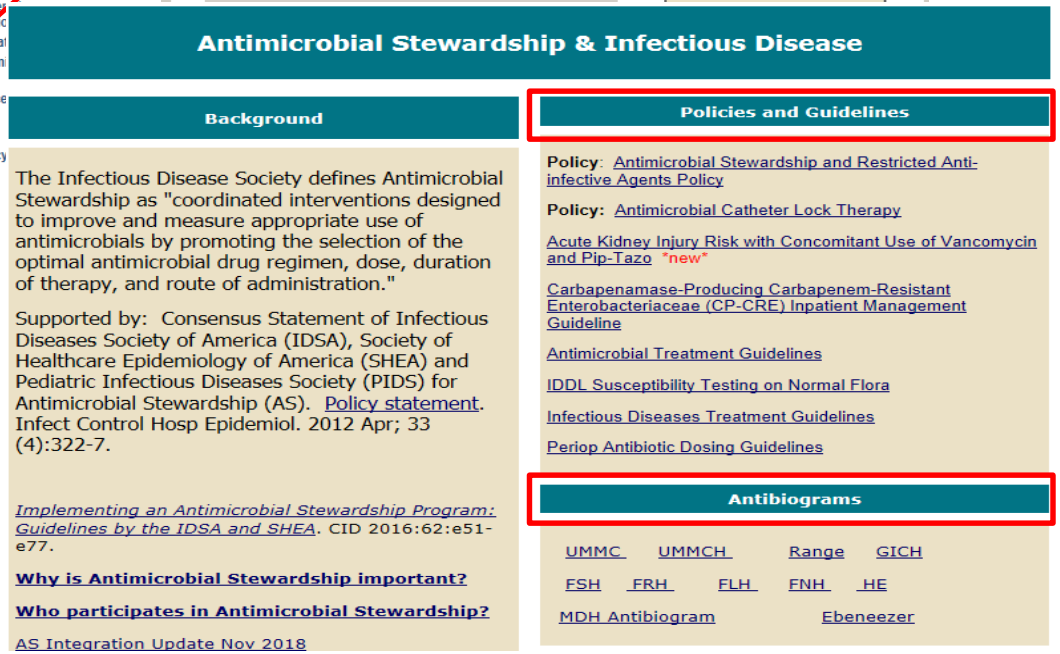
## Restricted Antimicrobials

- Abelcet/AmBisome
- Amikacin
- Aztreonam
- Baloxavir marboxil
- Bezlotoxumab
- Caspofungin
- Cefepime
- Ceftazidime
- Ceftazidime/avibactam
- Ceftaroline
- Ceftolozane/tazobactam
- Cidofovir
- CMV IgG (Cytogam)
- Colistin/Polymyxin B
- Dalbavancin
- Daptomycin
- Doripenem
- Fidaxomicin
- Foscarnet
- Imipenem/Cilastatin
- Isavuconazonium
- Itraconazole
- Letermovir
- Linezolid
- Meropenem
- Meropenem/vaborbactam
- Micafungin
- Oritavancin
- Plazomicin
- Posaconazole
- Quinupristin/dalfopristin
- Ribavarin *(inhalation and IV)*
- Telavancin
- Tigecycline
- Vancomycin
- Voriconazole

# Resources for Antimicrobial Stewardship and Infectious Diseases



# POST-IMPLEMENTATION

# Challenges

- Standardizing our system education in the midst of health system integration
- Prioritizing as mandatory
- Content selection
- Setting expectations for ALL staff
- Ensuring deployment
- Annual evaluation of content

# Next Steps

- Re-evaluation of content
  - Target areas of impact
- Clinical System Administrator for the Learning Management System (LMS) recommends pre-test
  - Pretests are passed with a score of 100%, anything less than 100%, the staff will be required to review the module and pass the posttest*
- Evaluating impact of education
- Continued integration of our health system policies and education

# Take Aways

- Limited literature to support optimal AS education practices
- Online learning format offers many advantages but some obstacles
- Highlight access to resources
- Consistency is key

# Questions

# References


- CDC, Antibiotic Resistance Threats in the United States (2013). https://www.cdc.gov/drugresistance/pdf/ar-threats-2013-508.pdf [Accessed 12/16/16]
- CDC, Core elements of hospital antibiotic stewardship programs (2015)
- https://www.cdc.gov/antibiotic-use/healthcare/implementation/core-elements.html [Accessed 5/2019]
- Joint Commission, New Antimicrobial Stewardship Standard (2016). https://www.jointcommission.org/assets/1/6/New_Antimicrobial_Stewardship_Standard.pdf [Accessed 5/2019]
- Nhan et al. Structure of Antimicrobial Stewardship Programs in Leading US Hospitals: Findings of Nationwide Survey. OFID. 2019
- Rocha-Pereira et al. Educating healthcare professionals in antimicrobial stewardship: can online learning solutions help? J Antimicrob Chemother. 2015; 70:3175-3177
- Barlam TF, Cosgrove SE, et al. Implementing an Antibiotic Stewardship Program: Guidelines by the Infectious Disease Society of America and the Society for Healthcare Epidemiology of America. Clin Infect Dis. 2016.
- CDC (2017). Viruses or Bacteria-What's Got You Sick? https://www.cdc.gov/antibiotic-use/community/pdfs/Viruses-or-Bacteria-Factsheet-Eng.pdf [Accessed 11/2017]
- CDC, Hand Hygiene in Healthcare Settings (2016). https://www.cdc.gov/handhygiene/ [Accessed 12/16/16]

# Contacts

Kimberly Boeser, PharmD, MPH, BCIDP
kvarejc1@fairview.org

Emily Medcraft, PharmD, BCPS
emedcra1@fairview.org