Antibiotic Stewardship

TJ Regional Health

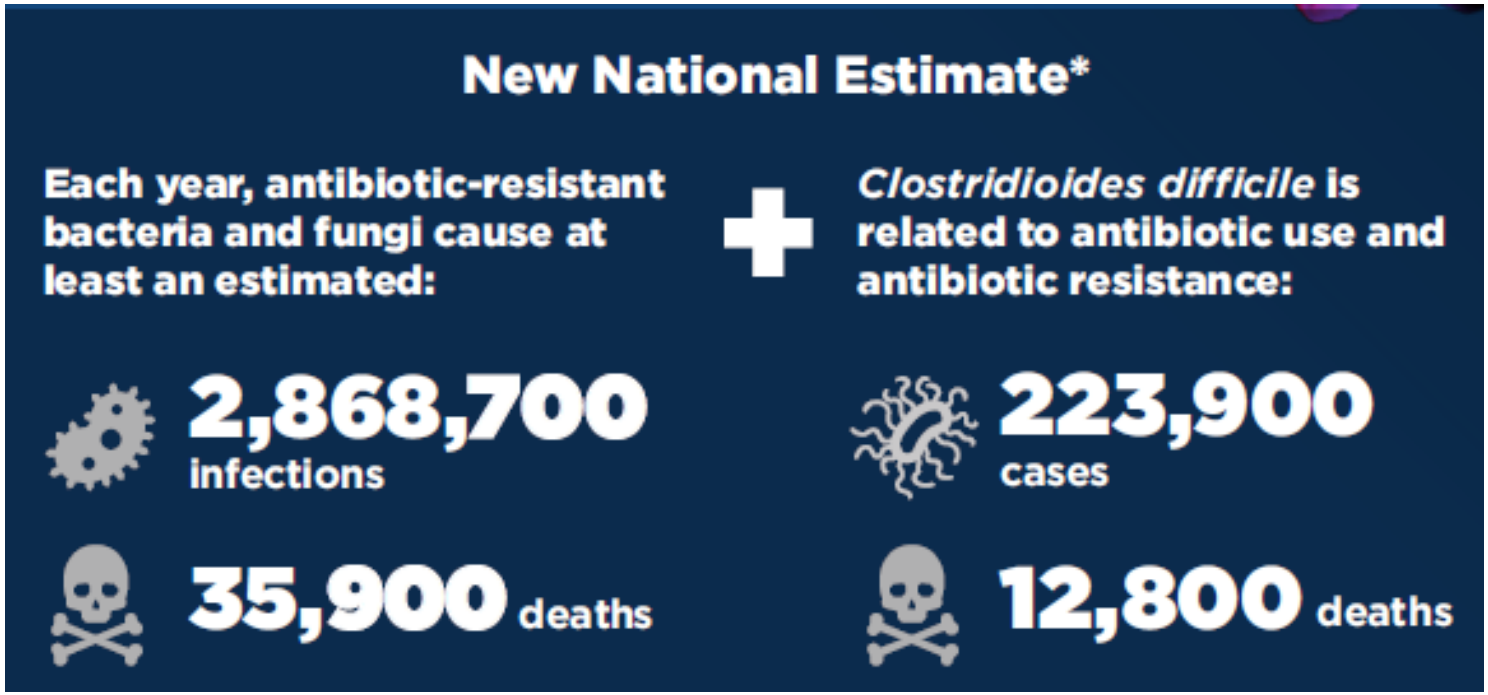
Objectives

- Recognize the threat of antibiotic resistance
- Review the purpose of antibiotic stewardship
- Review antibiotic stewardship regulatory requirements
- Describe current TJ Regional Health antimicrobial stewardship programs
- Understand the practical application of antimicrobial stewardship principles

Antibiotic Resistance Threat and Antibiotic Misuse

Antibiotic Resistance Threats in the US

According to the CDC, antibiotic resistance is one of the greatest global public health challenges of our time.



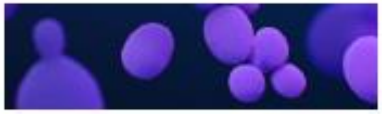
https://www.cdc.gov/drugresistance/biggest-threats.html

Antibiotic Resistance Threats in the US

Urgent Threats

These germs are public health threats that require urgent and aggressive action:

CARBAPENEM-RESISTANT
ACINETOBACTER



CANDIDA AURIS

CLOSTRIDIOIDES DIFFICILE

CARBAPENEM-RESISTANT
ENTEROBACTERIACEAE

DRUG-RESISTANT
NEISSERIA GONORRHOEAE

Serious Threats

- Drug-resistant *Campylobacter*
- Drug-resistant *Candida*
- ESBL-producing Enterobacteriaceae
- Vancomycin-resistant *Enterococci*
- Multidrug-resistant *Pseudomonas aeruginosa*
- Drug-resistant nontyphoidal *Salmonella*
- Drug-resistant *Salmonella* serotype Typhi
- Drug-resistant *Shigella*
- Methicillin-resistant *Staphylococcus aureus*
- Drug-resistant *Streptococcus pneumoniae*
- Drug-resistant Tuberculosis

Concerning Threats

- Erythromycin-resistant group A *Streptococcus*
- Clindamycin-resistant group B *Streptococcus*

Watch List

- Azole-resistant *Aspergillus fumigatus*
- Drug-resistant *Mycoplasma genitalium*
- Drug-resistant *Bordetella pertussis*

Threat categorization was based on clinical and economic impact (when available), incidence, 10-year projection of incidence, transmissibility, availability of effective antibiotics, and barriers to prevention.

https://www.cdc.gov/drugresistance/biggest-threats.html

Antibiotic Resistance Threat Estimates

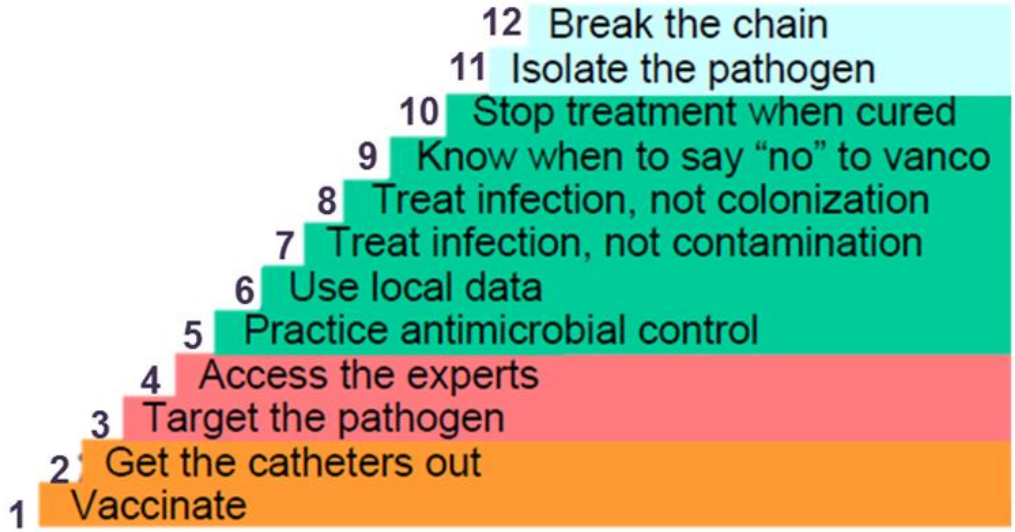
Key drivers for estimated deaths due to drug resistant bacteria:

Organism	Estimates from 2017		
	Deaths	Hospitalized Cases	Attributable Healthcare Costs
MRSA	10,600	323,700	$1.7B
ESBL	9,100	197,400	$1.2B
VRE	5,400	54,500	$539M
Pseudomonas aeruginosa (multidrug resistant)	2,700	32,600	$767M

2014: Drug-resistant *S. pneumoniae* estimates: 3,600 deaths and 90,000 infections

https://www.cdc.gov/drugresistance/biggest-threats.html

CDC: 12 Steps to Prevent Resistance in Hospitalized Adults



https://www.cdc.gov/media/pressrel/r020326.htm

Antibiotic Use in the U.S.

- About 30% of all antibiotics prescribed in U.S. acute care hospitals are either unnecessary or suboptimal.
- Various Types of Antibiotic Misuse
  - Given when not needed and/or when no longer necessary
  - Wrong antibiotic given to treat an infection
  - Broad spectrum antibiotics used to treat very susceptible bacteria
  - Given at the wrong dose or not given
  - Not monitored/documented appropriately
- Optimizing the use of antibiotics is critical to effectively treat infections, protect patients from harms caused by unnecessary antibiotic use, and combat antibiotic resistance.

https://www.cdc.gov/antibiotic-use/core-elements/hospital.html

Unnecessary and Inappropriate Antibiotic Use in Hospitals

- **Examples of unnecessary use include treatment of:**
  - Asymptomatic bacteriuria
  - Noninfectious lower respiratory tract conditions
  - Contaminated blood cultures

- **Examples of inappropriate prescribing include:**
  - Use of broad-spectrum empiric therapy when unwarranted for the clinical scenario
  - Failure to de-escalate therapy based on culture and sensitivity data
  - Unnecessary double anaerobic coverage
  - Prolonged duration of therapy

Antibiotic Stewardship Regulatory Requirements

The Joint Commission MM.09.01.01

The hospital has an antimicrobial stewardship program based on current scientific literature.
EP 1: Leaders establish antimicrobial stewardship as an organization priority
EP 2: The 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.
EP 4: The hospital has an antimicrobial stewardship multidisciplinary team
EP 5: The hospital's antimicrobial stewardship program includes the following core elements: Leadership commitment, Accountability, Drug expertise, Action, Tracking, Reporting, and Education
EP 6: The hospitals antimicrobial stewardship program uses organization-approved multidisciplinary protocols
EP 7: The hospital collects, analyzes, and reports data on its antimicrobial stewardship program
EP 8: The hospital takes action on improvement opportunities identified in its antimicrobial stewardship program
EP 9: For hospitals that use Joint Commission accreditation for deemed status purposes: An individual(s) who is qualified through education, training, or experience in infectious diseases and/or antibiotic stewardship, is appointed by the governing body as the leader(s) of the antibiotic stewardship program. The appointment is based on recommendations of medical staff leadership and pharmacy leadership.
EP 10: For hospitals that use Joint Commission accreditation for deemed status purposes: The antibiotic stewardship program demonstrates coordination among all components of the hospital responsible for antibiotic use and resistance, including, but not limited to, the infection prevention and control program, the quality assessment and performance improvement program, the medical staff, nursing services, and pharmacy services.
EP 11: For hospitals that use Joint Commission accreditation for deemed status purposes: The leader of the antibiotic stewardship program is responsible for the following: - Developing and implementing a hospitalwide antibiotic stewardship program, based on nationally recognized guidelines, to monitor and improve the use of antibiotics - Documenting antibiotic stewardship activities - Communicating and collaborating with the medical staff, nursing, and pharmacy leadership, as well as with the hospital's infection prevention and control and quality assessment and performance improvement programs on antibiotic use issues - Training and educating staff, including medical staff, on the practical applications of antibiotic stewardship guidelines, policies, and procedures

CMS CoP: Antibiotic Stewardship Program (ASP) Organization and Policies

(Effective March 30, 2020)

Hospitals must demonstrate the following:
1) A qualified ASP leader (via education, training, experience in Infectious Diseases and/or ASP) is appointed based on recommendations of medical staff leadership and pharmacy leadership.
2) Hospital-wide ASP must demonstrate the following: a. Coordination among all components of the hospital responsible for antibiotic use and resistance, including Infection Prevention & Control, Quality Assessment/Performance Improvement Program, Medical Staff, Nursing, and Pharmacy b. Documentation of the evidence-based use of antibiotics in all departments and services of the hospital c. Documentation of any improvements, including sustained improvements, in proper antibiotic use
3) The ASP adheres to nationally recognized guidelines, as well as best practices, for improving antibiotic use
4) The ASP reflects the scope and complexity of the hospital services provided.

https://www.federalregister.gov/documents/2019/09/30/2019-20736/medicare-and-medicaid-programs-regulatory-provisions-to-promote-program-efficiency-transparency-and

CMS CoP: Leadership Responsibilities

Governing Body	• Systems are in place to track antibiotic use activities in order to demonstrate implementation success, and sustainability of activities. • Antibiotic use issues identified by the ASP are addressed in collaboration with Quality Assessment/Performance Improvement Program (QAPI) leadership.
Infection Prevention/Control (IPC) Professional	• Communication and collaboration with the ASP
Antibiotic Stewardship Leader(s)	• Development and implementation of a hospital-wide ASP, based on nationally recognized guidelines, to monitor and improve the use of antibiotics
	• Documentation of all ASP activities
	• Communication and collaboration with medical staff, nursing, and pharmacy leadership, IPC, and QAPI programs, on antibiotic use issues
	• Competency-based training and education of hospital personnel and staff, including medical staff and, as applicable, contracted services on practical application of antibiotic stewardship guidelines, policies, and procedures

https://www.federalregister.gov/documents/2019/09/30/2019-20736/medicare-and-medicaid-programs-regulatory-provisions-to-promote-program-efficiency-transparency-and

Antibiotic Stewardship Program

Potential Benefits Of Hospital Antibiotic Stewardship Programs

- Improve patient outcomes by facilitating optimal treatment of infections
- Improve patient safety by decreasing side effects and toxicity
- Education of healthcare providers about antibiotic stewardship practices
- Minimize the development of antibiotic resistance by appropriately selecting antibiotics
- Reduce the rates of hospital-acquired infections
- Control of *Clostridium difficile* infections and the emergence of multidrug-resistant organisms
- Reduce length of stay and patient-associated hospitalization cost
- Reduce pharmacy expenditures on antibiotics

CDC. Core Elements of Hospital Antibiotic Stewardship Programs. Atlanta, GA: US Department of Health and Human Services, CDC; 2019. Available at https://www.cdc.gov/antibiotic-use/core-elements/hospital.html

CDC Core Elements of Hospital Antibiotic Stewardship Programs (ASPs): 2019

1. **Hospital Leadership Commitment**: Dedicate necessary human, financial and information technology resources.
2. **Accountability**: Appoint a leader or co-leaders, such as a physician and pharmacist, responsible for program management and outcomes.
3. **Pharmacy Expertise**: Appoint a pharmacist, ideally as the co-leader of the stewardship program, to lead implementation efforts to improve antibiotic use.
4. **Actionable Objectives**: Implement interventions, such as prospective audit and feedback or preauthorization, to improve antibiotic use.
5. **Tracking**: Monitor antibiotic prescribing, impact of interventions, and other important outcomes like *C. difficile* infection and resistance patterns.
6. **Reporting**: Regularly report information on antibiotic use and resistance to prescribers, pharmacists, nurses and hospital leadership.
7. **Education**: Educate prescribers, pharmacists, and nurses about adverse reactions from antibiotics, antibiotic resistance and optimal prescribing

CDC. Core Elements of Hospital Antibiotic Stewardship Programs. Atlanta, GA: US Department of Health and Human Services, CDC; 2019. Available at https://www.cdc.gov/antibiotic-use/core-elements/hospital.html

Antibiotic Stewardship Programs at TJRH

- **Purpose:** To ensure the proper and safe use of antimicrobials throughout the facilities. The objective is to improve patient outcomes through optimization of antimicrobial therapy by selection of appropriate antibiotic dose, route and duration of treatment.
  - The program is coordinated by the Antimicrobial Stewardship Committee
- **Responsibilities of the ASP team include:**
  - Compliance with TJC standards and CMS COPs related to antimicrobial stewardship
  - Coordination among all components of the hospital responsible for antimicrobial use and resistance
  - Documentation of the evidence based use of antimicrobials
  - Demonstration of improvements in proper antimicrobial use
  - Adherence to nationally recognized guidelines and best practices for improving antimicrobial use
  - Development or revision of policies, procedures, protocols and guidelines related to infectious diseases
  - Development and distribution of annual antibiogram and assessing antibiotic resistance trends
  - Providing recommendations to appropriate committees regarding antibiotic-related issues
  - Providing antibiotic stewardship education to hospital/medical staff
  - Monitoring antibiotic usage trends

Antibiotic Stewardship Program Team Members

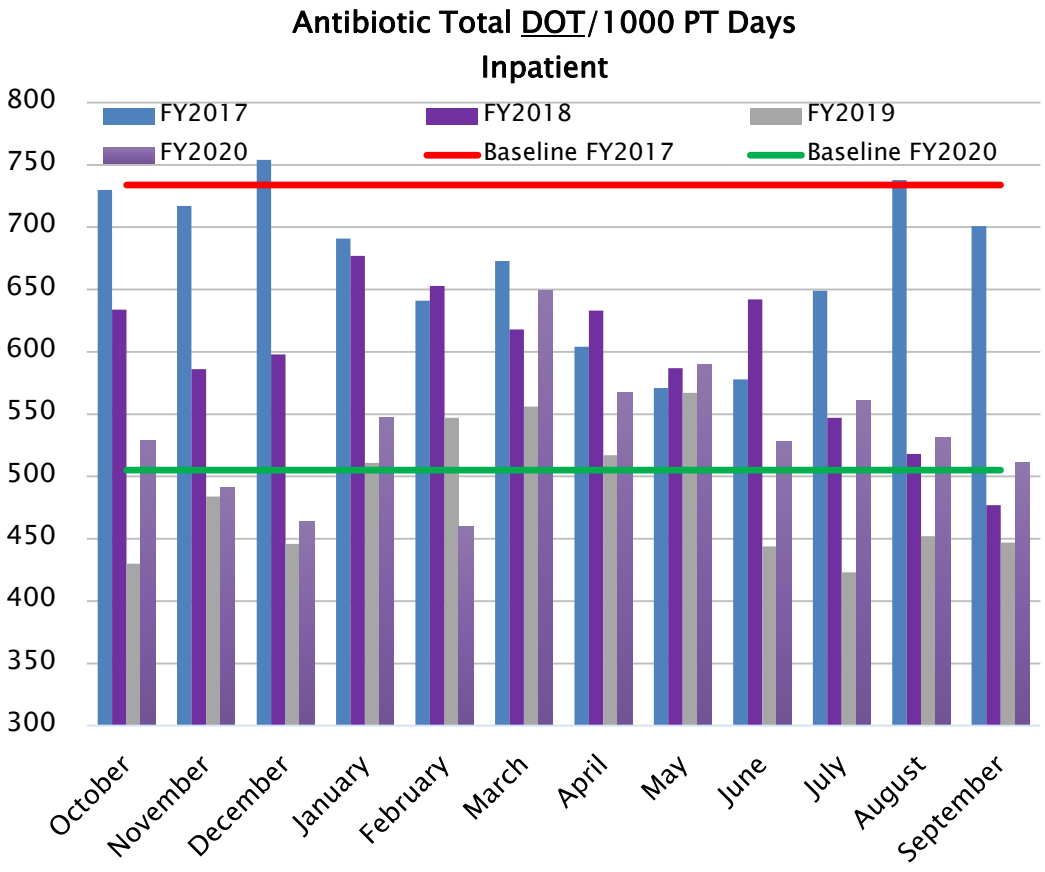
- Physician leader responsible for program outcomes of antibiotic stewardship activities
- Pharmacist leader responsible for providing drug expertise and coordinating antibiotic stewardship activities
- Microbiology Lab personnel for collaboration
- Infection Prevention and Control personnel for collaboration
- Information Technology support as needed
- Performance Improvement personnel for collaboration
- Nursing staff for collaboration
- Additional medical staff representatives as needed

What are we doing at TJRH to promote antibiotic stewardship?

Examples of our stewardship activities:

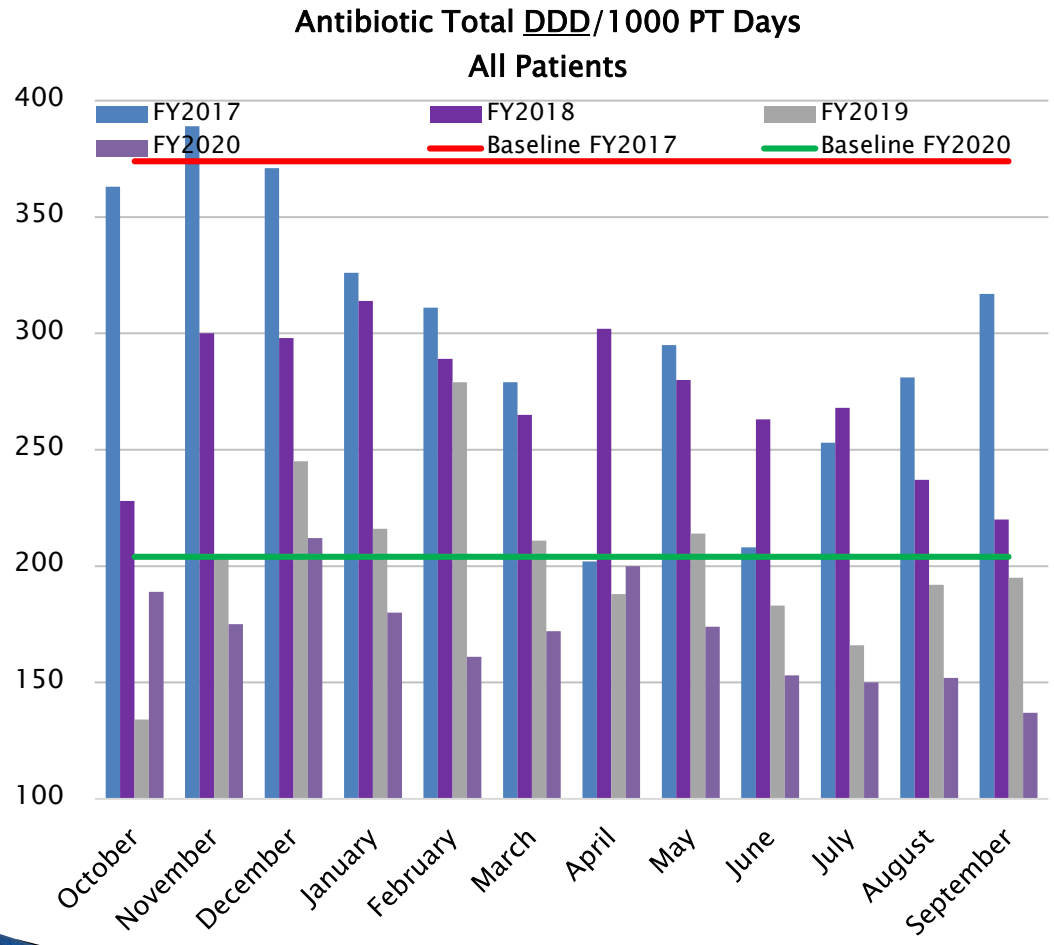
- Annual antibiogram (antibiotic susceptibility report)
- Empiric antibiotic guidelines to help guide initial antibiotic selection and length of therapy
- Evidence-based order sets
- Formulary restriction for select antimicrobials
- Adjustment of antibiotic doses by pharmacists based on renal function and pharmacokinetic parameters
- IV to oral conversion of antibiotics by pharmacists
- Antibiotic dose optimization protocols
- Pharmacist review of culture data to assist providers with antibiotic selection
- Requiring antibiotic indication at order entry
- Targeting unnecessary antibiotic use
- Appropriate antibiotics for surgical prophylaxis
- Staff education on antibiotic stewardship
- Tracking antibiotic usage, appropriate surgical prophylaxis, sepsis measures, pharmacists interventions and *C. difficile* infection rates

TJRH Antimicrobial Utilization/Consumption



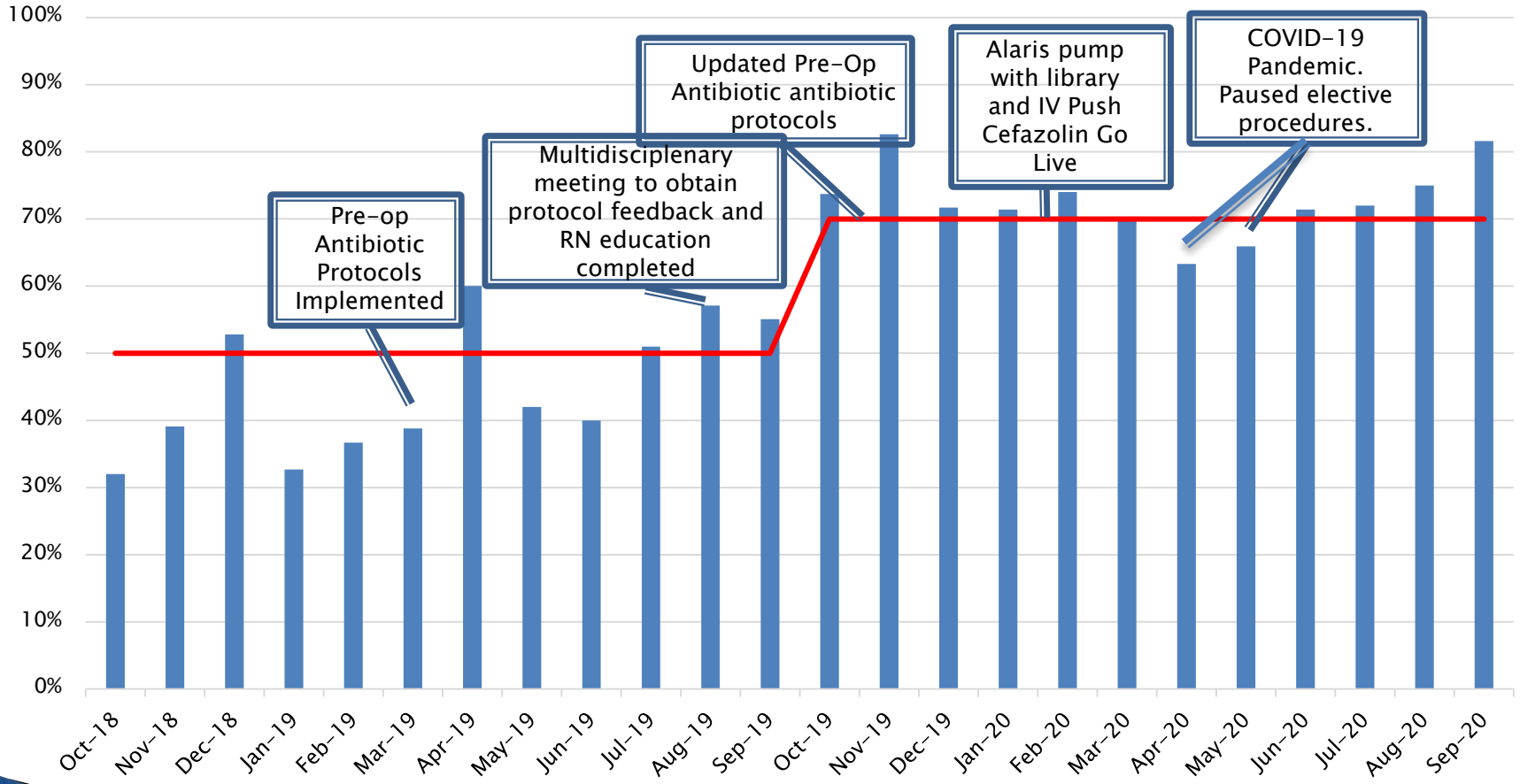
- Days of therapy (DOT)
  - Measures antimicrobial utilization, specifically the number of days a patient is receiving an antimicrobial
- TJRH reduced DOT by 30% from FY2017 baseline

TJRH Antimicrobial Utilization/Consumption



- Defined Daily Doses (DDD)
  - Assumed average maintenance dose per day for a drug used for its main indication in adults
  - Set by the World Health Org
  - Measures antimicrobial utilization of doses administered within the health system
- TJRH reduced DDD by 45% over FY17 baseline

Surgical Pre-Op Antibiotic Administration Compliance



Practical Application of Antibiotic Stewardship Principles for Healthcare Providers

General Principles of Appropriate Antibiotic Prescribing

- Follow evidence-based clinical guidelines when prescribing antibiotics.
- Properly assess reported penicillin allergy to determine if a beta-lactam antibiotic can be safely given.
- Be aware of antibiotic resistance patterns/use local antibiogram to guide empiric prescribing.
  - TJ Intranet > Forms > Antimicrobial Stewardship
- Document the indication for prescribed antibiotics in the medical record.
- Review the appropriateness of antibiotics after 48-72 hours based on patient's clinical condition and culture/sensitivity results.

The 4 Moments of Antibiotic Decision Making

Moment 1: Does my patient have an infection that requires antibiotics? +

Moment 2: Have I ordered appropriate cultures before starting antibiotics? What empiric therapy should I initiate? +

Moment 3: A day or more has passed. Can I stop antibiotics? Can I narrow therapy or change from IV to oral therapy? These questions should be asked every day that a patient is on antibiotics. +

Moment 4: What duration of antibiotic therapy is needed for my patient's diagnosis? +

https://www.ahrq.gov/antibiotic-use/acute-care/four-moments/index.html

Antibiotic Stewardship: Best Practice Examples for Common Infectious Diseases

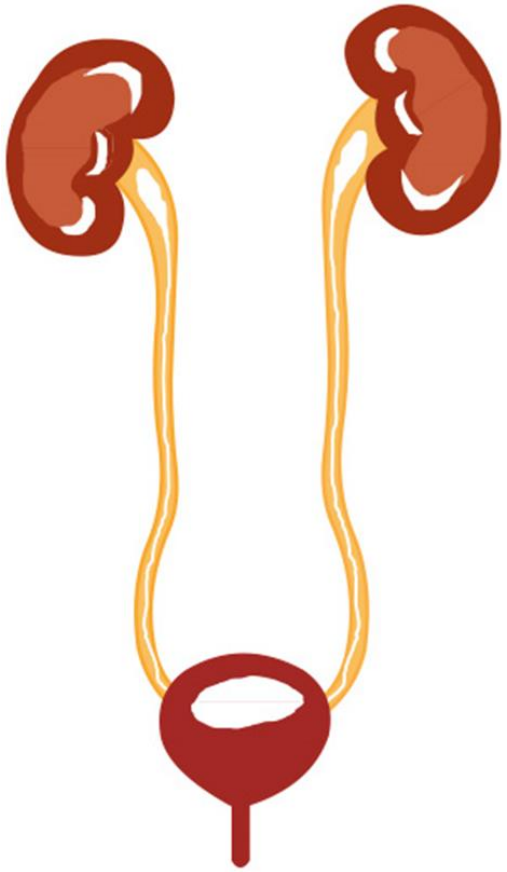
Best Practices for Treatment of Community-acquired Pneumonia

- Review at 48 hours to confirm pneumonia diagnosis vs. non-infectious etiology.
- Avoid use of antipseudomonal and/or MRSA agents unless clinically indicated.
- Limit treatment duration to 5 to 7 days in the setting of a timely clinical response.

Metlay, JP, et al. Diagnosis and treatment of adults with community-acquired pneumonia: an official clinical practice guideline of the ATS and IDSA. Am J Respir Crit Care Med, 200(7), pp e45-e67, Oct 1, 2019.

Best Practices for Treatment of Urinary Tract Infections

- Order urinalysis and urine cultures only when you suspect UTI based on clinical symptoms.
- Avoid antibiotics for asymptomatic bacteriuria (exceptions: pregnancy, invasive genitourinary tract procedures).
- Use the shortest duration of antibiotic therapy as clinically appropriate (uncomplicated cystitis- 3-5 days; complicated UTI- 7 days with prompt symptom resolution).



Nicolle LE, et al. Clinical practice guideline for the management of asymptomatic bacteriuria: 2019 update by the IDSA. *CID*, 2019; 68 (10), e83–e110.

Gupta K, et al. International clinical practice guidelines for the treatment of acute uncomplicated cystitis and pyelonephritis in women. *CID*, 2011;52(5):e103–e120

Hooton TM, et al. Diagnosis, prevention, and treatment of catheter associated urinary tract infection in adults: 2009 international clinical practice guidelines from the IDSA. *CID*, 2010; 50:625–663.

Best Practices for Treatment of Skin and Soft Tissue Infections (SSTIs)

- Avoid MRSA coverage for mild to moderate non-purulent SSTIs (target Streptococcus).
- Reserve MRSA coverage for purulent SSTIs and severe non-purulent SSTIs.
- Reserve Gram-negative and anaerobic coverage for complicated SSTIs with MDRO risk and severe non-purulent SSTIs (e.g. necrotizing fasciitis).
- Duration of treatment: 5-7 days with adequate improvement; 10-14 days may be needed for complicated SSTIs.

Stevens DL, et al. Practice guidelines for the diagnosis and management of skin and soft tissue infections: 2014 update by the IDSA. *CID*, 2014;59(2):e10–52.

Antibiotic Prophylaxis for Surgery

- Don't administer additional antibiotic doses after the surgical incision is closed in the OR. Postoperative administration has not been shown to further reduce the rate of surgical site infections, but longer durations of prophylaxis have been associated with antibiotic resistance and increased adverse events (e.g. *C. difficile* colitis).
- Avoid using vancomycin for prophylaxis unless patients are colonized with MRSA or methicillin-resistant coagulase negative Staphylococci (nasal swab or culture positive for one of these resistant organisms within the preceding month).

Berríos-Torres SI, et al. CDC Guideline for the Prevention of Surgical Site Infection, 2017. *JAMA Surg*. doi:10.1001/jamasurg.2017.0904, published online May 3, 2017.

Bratzler DW, et al. Clinical Practice Guidelines for Antimicrobial Prophylaxis in Surgery. *AJHP*. 2013; 70:195-283.

Summary

- Antibiotic stewardship is critical to effectively treat infections, protect patients from harms caused by unnecessary antibiotic use, and combat antibiotic resistance.
- Both CMS and TJC have established regulatory requirements for hospital antibiotic stewardship programs.
- TJRH has an antibiotic stewardship program devoted to promoting the appropriate use of antibiotics and monitoring outcomes and antibiotic usage.
- Providers should focus on the key moments of decision making: diagnostic considerations, choice of empiric therapy, time out to re-assess need for antibiotics/narrow coverage, and duration of therapy to reduce unnecessary and inappropriate antibiotic use.