ANTIMICROBIAL STEWARDSHIP

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MV-Health

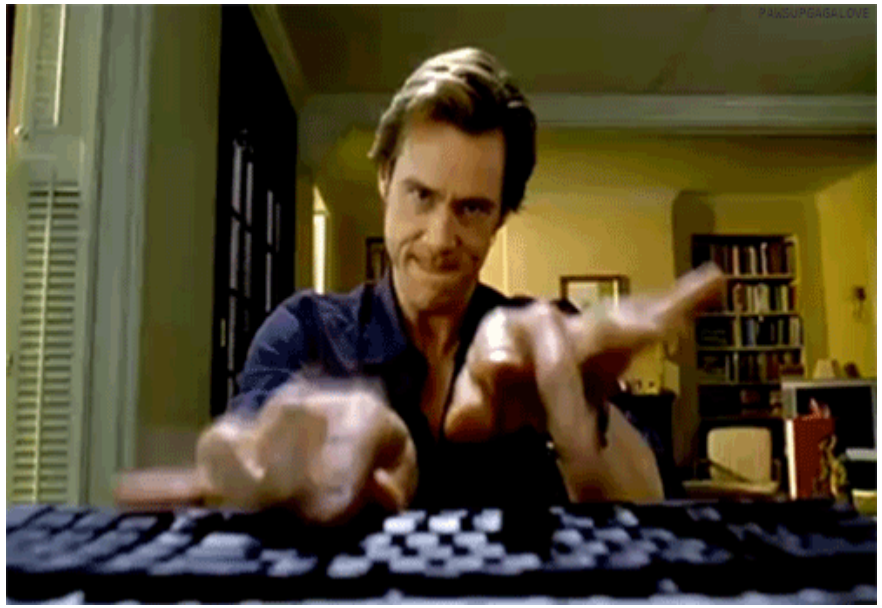
July 20, 2017

ANTIMICROBIAL STEWARDSHIP

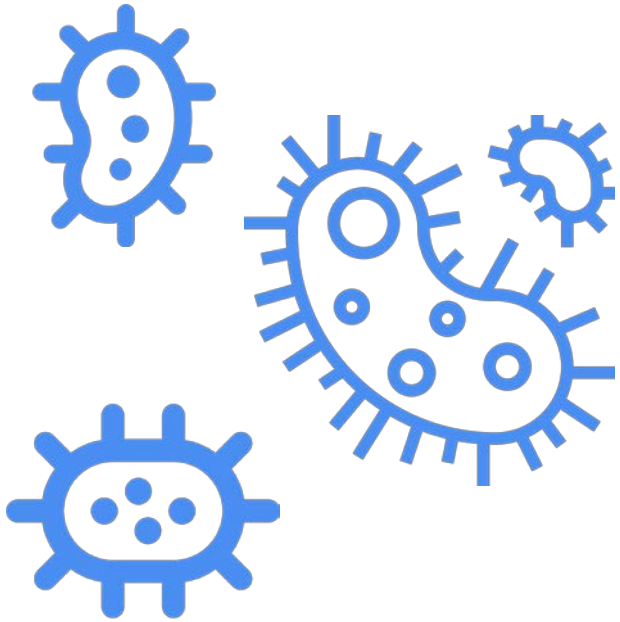
Taylor Cottano RN, BSN, CIC

BACKGROUND

DEFINITIONS



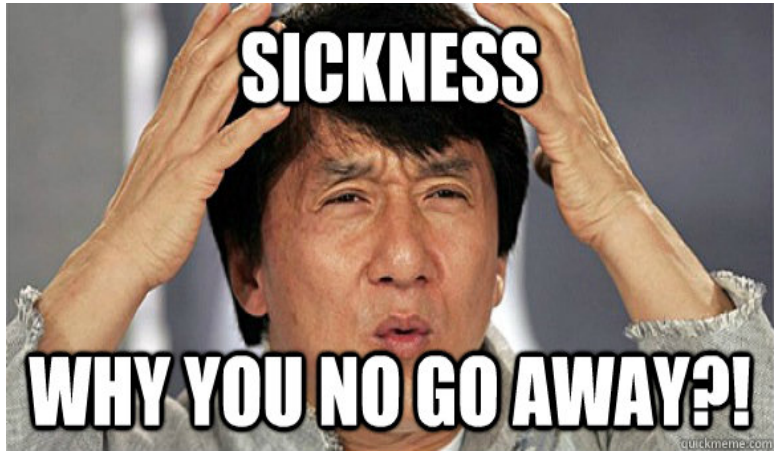
- Antimicrobial - an agent that kills microorganisms or inhibits their growth.
- Stewardship - being good stewards, preserving antibiotic effectiveness and restoring antibiotic effectiveness
- Antimicrobial Resistance - the ability of microbes to grow in the presence of a chemical (drug) that would normally kill them or limit their growth.



WHAT MAKES US SICK?

“MICROBES”

- Organisms too small for the eye to see and are found everywhere on Earth
- There are many types of Microbes:
  Bacteria, Viruses, Fungi, and Parasites
- While most microbes are harmless and even beneficial to living organisms, some can cause disease among humans, other animals and plants.
- The Disease causing microbes are called pathogens; sometimes referred to as “germs” or “bugs”
- All types of microbes have the ability to develop resistance to the drugs created to destroy them, becoming drug resistant organisms.



Examples of Disease-Causing Microbes

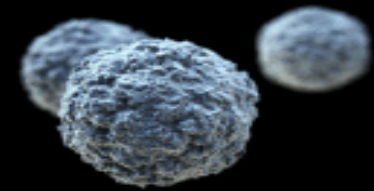
Strep throat

Bacteria
Group A *Streptococcus*

Food poisoning

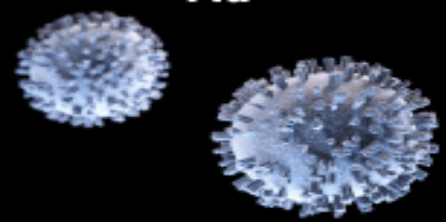
Bacteria
Salmonella

Common cold



Virus
Rhinovirus

Flu

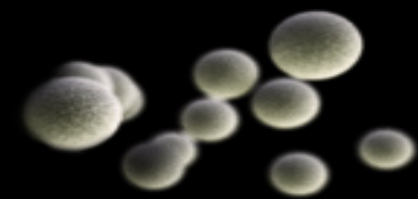


Virus
Influenza virus

Athlete's foot

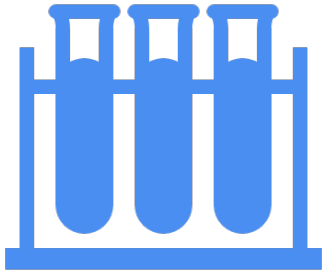
Fungi
Trichophyton

Malaria



Parasite
Plasmodium

WHAT ARE ANTIMICROBIALS?

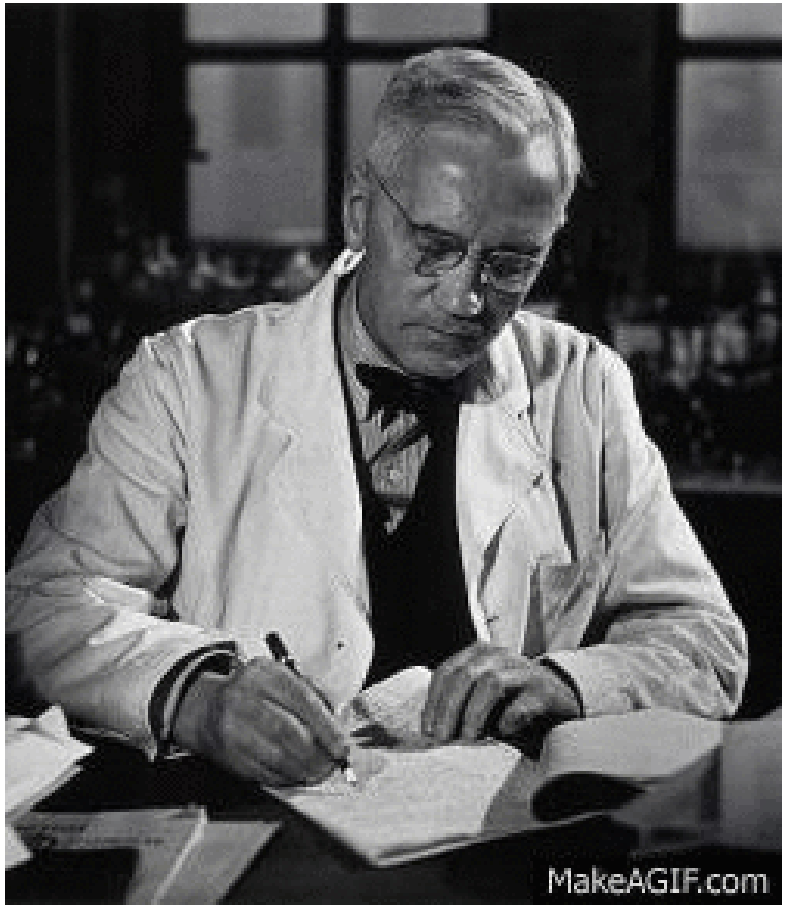


- Humans developed antimicrobials to destroy disease-causing microbes. The most commonly known antimicrobials are antibiotics, which target bacteria. Other forms of antimicrobials are antivirals, antifungals, and antiparasitics.
- Penicillin, the first commercialized antibiotic, was discovered in 1928 by Alexander Fleming. While it wasn't distributed among the general public until 1945, it was widely used in World War II for surgical and wound infections among the Allied Forces. It was hailed as a "miracle drug" and a future free of infectious diseases was considered. When Fleming won the Nobel Prize for his discovery, he warned of bacteria becoming resistant to penicillin in his acceptance speech.

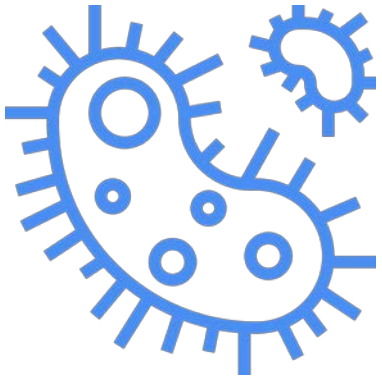
ALEXANDER FLEMING

New York Times
June 26, 1945

"The Microbes are educated to resist penicillin and a host of penicillin-fast organisms is bred out…In such cases the thoughtless person playing with penicillin is morally responsible for the death of the man who finally succumbs to infection with the penicillin-resistant organism. I hope this evil can be averted."



WHAT IS THE MAIN CAUSE OF RESISTANCE?



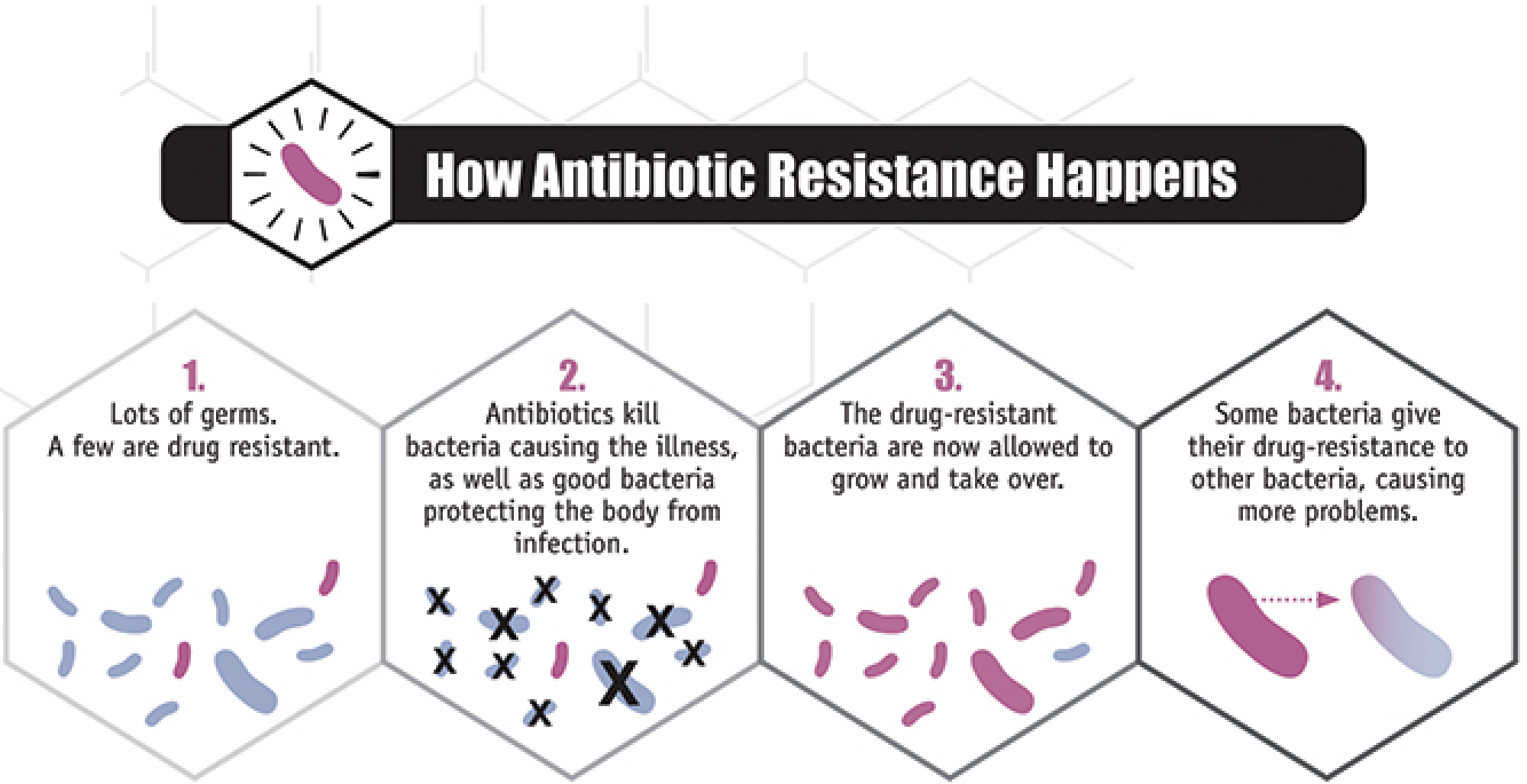
THE USE OF ANTIBIOTICS

This is the single most important factor leading to antibiotic resistance around the world. Simply using antibiotics creates resistance. These drugs should only be used to manage infections.

IN SHORT:

Huge number of people taking antibiotics for infections they do not have!!!

ANTIBIOTIC PRESSURE



TIMELINE LEADING TO ANTIMICROBIAL STEWARDSHIP

1930s

Sulfonamides, penicillin and streptomycin become available

Harnessing of antibacterial agents for clinical use begins

1940s

Penicillin resistance to Staph aureus is detected

1960s

Staph aureus resistance to methicillin emerges

1990s

MRSA is observed in over 53%of isolates obtained from ICU patients in a US surveillance system

IDSA/SHEA published "Guidelines for Antimicrobial Resistance in Hospitals"

ANTIBIOTIC FUN FACTS

- Antibiotics are among the most commonly prescribed drugs used in human medicine and can be lifesaving drugs.

- There are 141 antibiotics that have been created as of today.

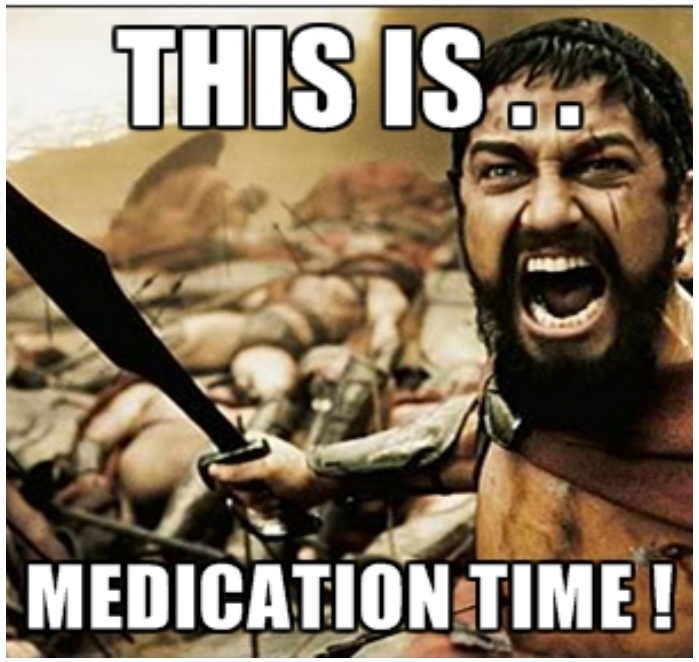
- While a new infectious disease has been discovered nearly every year over the past 30 years**, THERE HAVE BEEN NO NEW ANTIBIOTICS SINCE 1987 CREATED!!!!!**

ANTIBIOTIC RESISTANCE IS A THREAT

- **Nightmare germs called CRE** (carbapenem-resistant *Enterobacteriaceae*) can cause deadly infections and have become resistant to all or nearly all antibiotics we have today. CRE spread between health care facilities like hospitals and nursing homes when appropriate actions are not taken.
- **MRSA** (methicillin-resistant *Staphylococcus aureus*) infections commonly cause pneumonia and sepsis that can be deadly.
- The germ ***Pseudomonas aeruginosa*** can cause HAIs, including bloodstream infections. Strains resistant to almost all antibiotics have been found in hospitalized patients
- These germs are some of the most deadly resistant germs identified as **“urgent”** and **“serious”** threats

WHAT IS ANTIMICROBIAL STEWARDSHIP?

"Coordinated interventions designed to improve and measure the **APPROPRIATE USE OF ANTIMICROBIAL AGENTS** promoting the selection of the optimal antimicrobial drug regimen including dosing, duration of therapy, and route of administration"



-Society for Healthcare Epidemiology of America (SHEA).

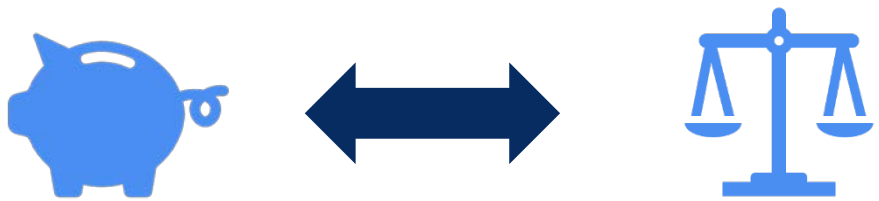
The Infectious Diseases Society of America (IDSA)

and the Pediatric Infectious Diseases Society (PIDS)

WHAT IS THE PURPOSE?

- The Primary Goal is to optimize clinical outcomes while minimizing unintended consequences of antimicrobial use.

- The Secondary Goal is to reduce health-care costs without adversely impacting quality of care.

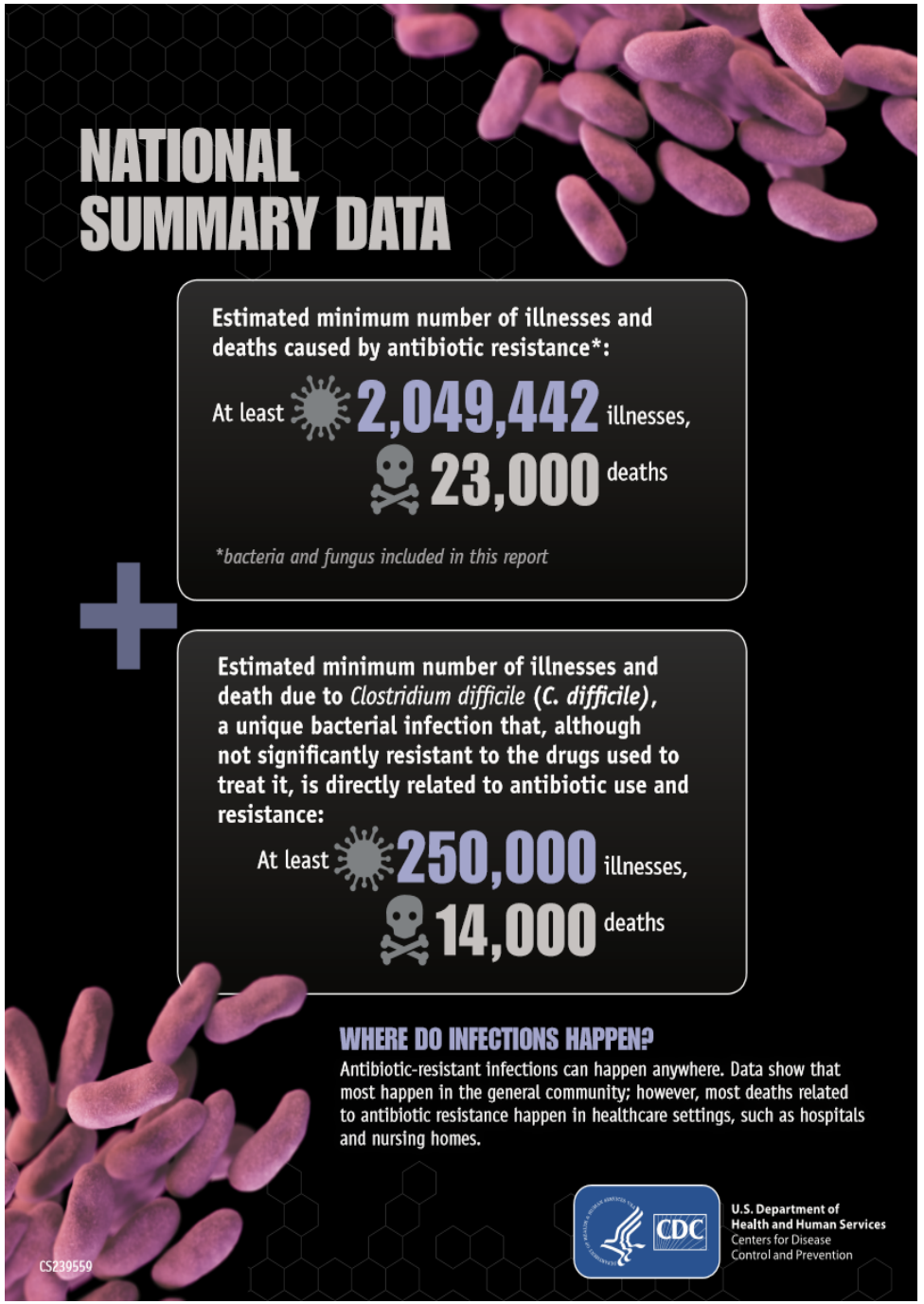


RESISTANCE

ANTIBIOTIC RESISTANCE

- CDC/US
  - More than 2 Million Infections per year
  - More than 23,000 deaths per year
  - Excess Cost of $20 Billion per year

- CDC: **“A PUBLIC HEALTH CRISIS”**
- WHO: **“A MAJOR THREAT TO HUMAN HEALTH”**
- DOD: **“A THREAT TO NATIONAL SECURITY”**



CLINICAL PRACTICE

TYPICAL INPATIENT ADMISSION

1) Timely Antibiotic Initiation

- The nurse receives the orders.
- Reviews the dose/time for accuracy
- Checks for allergies
- Administers and records the antibiotics

TYPICAL INPATIENT ADMISSION

2) Early and Appropriate Cultures

- The nurse obtains the cultures before starting antibiotics.
- Sends the cultures to the microbiology laboratory.
- Monitors the culture results and reports results to the physician

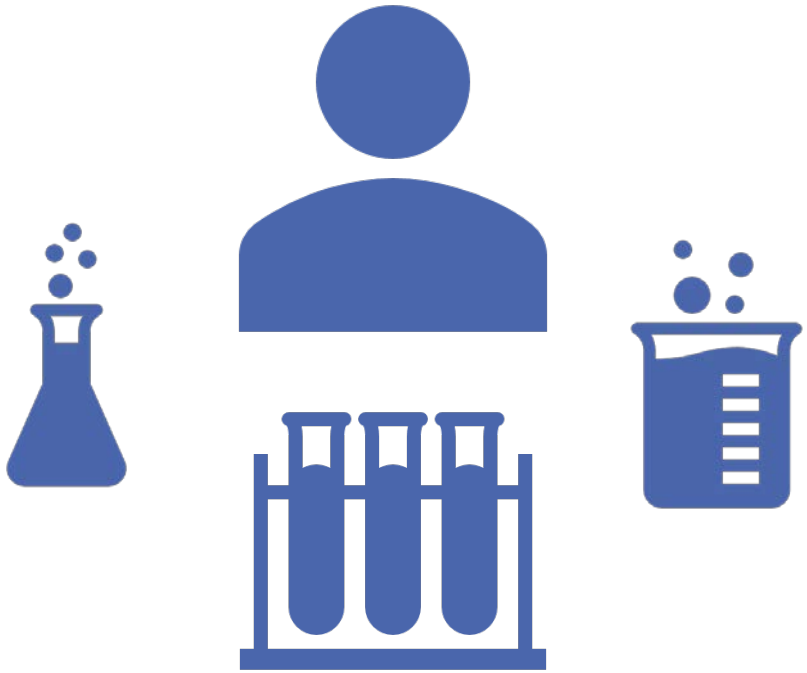
TYPICAL INPATIENT ADMISSION

3) Med Rec: Accurate Antibiotic Allergy History

- The nurse takes the allergy history
- Performs Medication Reconciliation and records this in the medical record.

TYPICAL INPATIENT STAY
Daily 24hr Clinical Progress Monitoring

4) Antibiotic adjustment based on microbiology reports



- Laboratory and radiology reports “chase” the patient and are typically first received by the bedside nurse.
- Results are coordinated by the nurse and communicated to treating physicians.

TYPICAL INPATIENT STAY
Daily 24hr Clinical Progress Monitoring

5) Antibiotic dosing, culture and sensitivity reporting, de-escalation

- The nurse updated clinical and laboratory results (renal function, drug levels, etc.) and preliminary/final microbiology results.

TYPICAL INPATIENT STAY
Daily 24hr Clinical Progress Monitoring

6) Adverse Events

- The nurse monitors and reports to the physician and pharmacist any adverse events

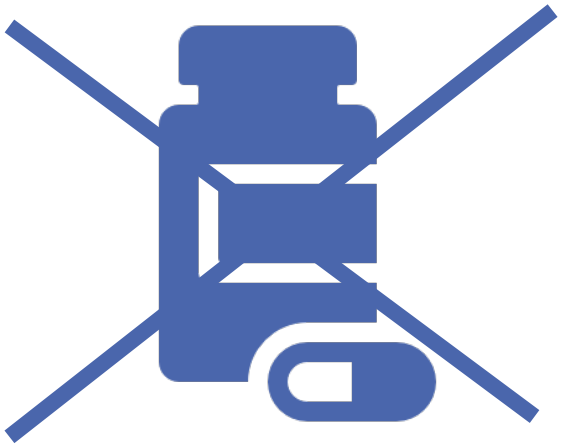
TYPICAL INPATIENT STAY
Daily 24hr Clinical Progress Monitoring

7) Antibiotic Orders

- The nurse reviews any changes of medications based on the patient's clinical status.

TYPICAL INPATIENT STAY
Daily 24hr Clinical Progress Monitoring

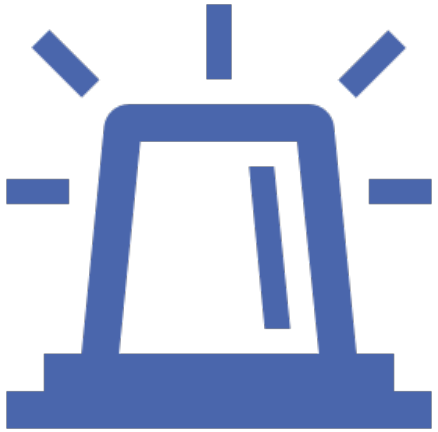
8) Antibiotic resistance



- The nurse reviews culture and sensitivity results and reports bug/drug mismatches.

TYPICAL INPATIENT STAY
Daily 24hr Clinical Progress Monitoring

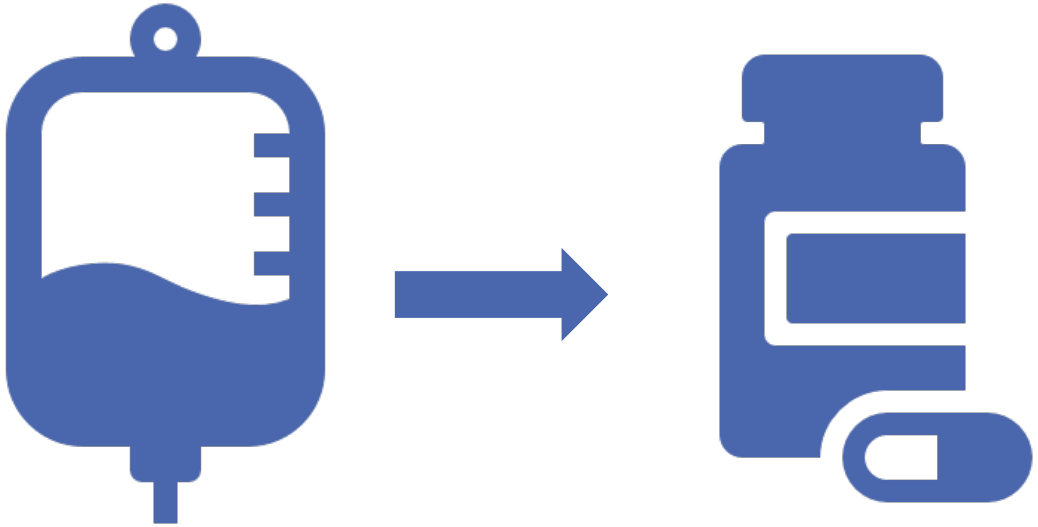
9) Superinfection /Resistant Infection



- The nurse monitors changes in patient response and initiates appropriate changes in isolation precautions.

TYPICAL INPATIENT DISCHARGE

10) Transition I.V. to P.O. Antibiotic, Out Patient Antibiotic Therapy (OPAT)



- The nurse monitors clinical progress and patient's capacity to take oral medications.

TYPICAL INPATIENT DISCHARGE

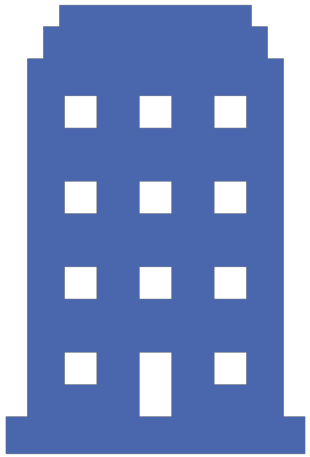
11) Length of Stay

- The nurse appraises the physician and case managers of the patient's status.

TYPICAL INPATIENT DISCHARGE

12) Out-patient Visiting Nurse Association (VNA)/Skilled Nursing Facility (SNF)/ Long Term Care Facility (LTCF) transition management, readmission to hospital

- The nurse communicates the patient's diagnosis, management, and medications to the nurse at the VNA/SNF/LTCF.



Are Nurses ABX prescribers? NO
ABX Stewards? YEEEESSSS

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

GOOD NURSING IS GOOD STEWARDSHIP

and

ANTIMICROBIAL STEWARDSHIP IS GOOD NURSING

Every time antibiotics are prescribed:

1. Order recommended cultures before antibiotics are given and start drugs promptly.

2. Make sure indication, dose, and expected duration are specified in the patient record.

3. Reassess within 48 hours and adjust Rx if necessary or stop Rx if indicated.

Specific recommendations for common prescribing situations:

Rx for urinary tract infections

- Make sure that culture results represent true infection and not just colonization.
  - Assess patient for signs and symptoms of UTI.
  - Make sure that urinalysis is obtained with every urine culture.
- Treat for recommended length of time and ensure that planned post-discharge treatment takes into account the antibiotics given in the hospital.

Rx for pneumonia

- Make sure that symptoms truly represent pneumonia and not an alternate, non-infectious diagnosis.
- Treat for the recommended length of time and ensure that planned post-discharge treatment takes into account the antibiotics given in the hospital.

Rx for MRSA infections

- Verify that MRSA is growing in clinically relevant cultures. Do not use vancomycin to treat infections caused by methicillin-susceptible staph (and not MRSA).

Patient/Family Education

1. Speak up
2. Keep Hands Clean
3. Get Smart
4. Know Signs and Symptoms
5. Watch Out
6. Protect Yourself

WHERE DO YOU START?

CORE ELEMENTS

LEADERSHIP COMMITMENT

- Leadership support is critical to the success of antibiotic stewardship programs and can take a number of forms, including:
  - Formal statements that the facility supports efforts to improve and monitor antibiotic use.
  - Including stewardship-related duties in job descriptions and annual performance reviews.
  - Ensuring staff from relevant departments are given sufficient time to contribute to stewardship activities.
  - Supporting training and education.
  - Ensuring participation from the many groups that can support stewardship activities.
- Financial support greatly augments the capacity and impact of a stewardship program and stewardship programs will often pay for themselves, both through savings in both antibiotic expenditures and indirect costs

ACCOUNTABILITY AND DRUG EXPERTISE

- Stewardship program leader: Identify a single leader who will be responsible for program outcomes. Physicians have been highly effective in this role.

- Pharmacy leader: Identify a single pharmacy leader who will co-lead the program.

CLINICIANS AND DEPARTMENT HEADS

As the prescribers of antibiotics, it is vital that clinicians are fully engaged in and supportive of efforts to improve antibiotic use in hospitals.

Infection Preventionists and Hospital Epidemiologists

Coordinate facility-wide monitoring and prevention of healthcare-associated infections and can readily bring their skills to auditing, analyzing and reporting data. They can also assist with monitoring and reporting of resistance and CDI trends, educating staff on the importance of appropriate antibiotic use, and implementing strategies to optimize the use of antibiotics

QUALITY IMPROVEMENT STAFF

Can also be key partners given that optimizing antibiotic use is a medical quality and patient safety issue.

LABORATORY STAFF

Can guide the proper use of tests and the flow of results. They can also guide empiric therapy by creating and interpreting a facility cumulative antibiotic resistance report, known as an antibiogram.

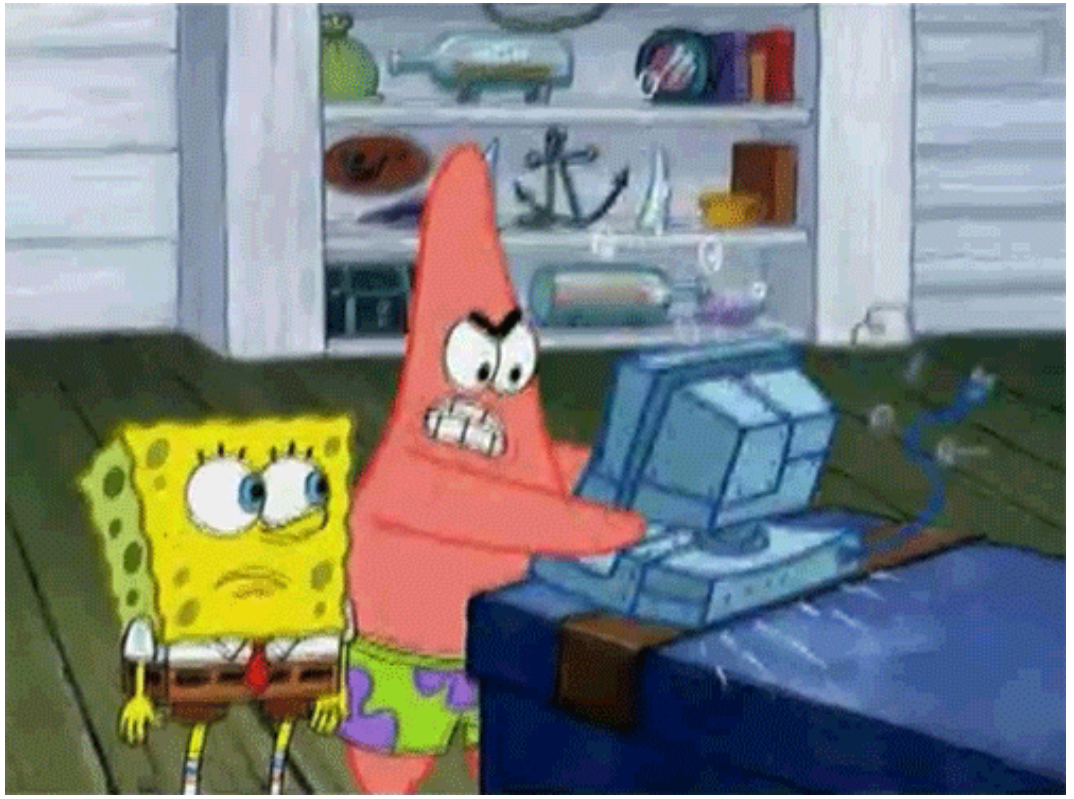
Lab and stewardship staff can work collaboratively to ensure that lab reports present data in a way that supports optimal antibiotic use.

INFORMATION TECHNOLOGY STAFF

Critical to integrating stewardship protocols into existing workflow.

Examples include

- Embedding relevant information and protocols at the point of care (e.g., immediate access to facility-specific guidelines at point of prescribing)
- Implementing clinical decision support for antibiotic use
- Creating prompts for action to review antibiotics in key situations and facilitating the collection and reporting of antibiotic use data.



NURSING STAFF

Can assure that cultures are performed before starting antibiotics. In addition, nurses review medications as part of their routine duties and can prompt discussions of antibiotic treatment, indication, and duration.

ACTION

Implement policies that support optimal antibiotic use.

Utilize specific interventions that can be divided into three categories: broad, pharmacy driven and infection and syndrome specific.

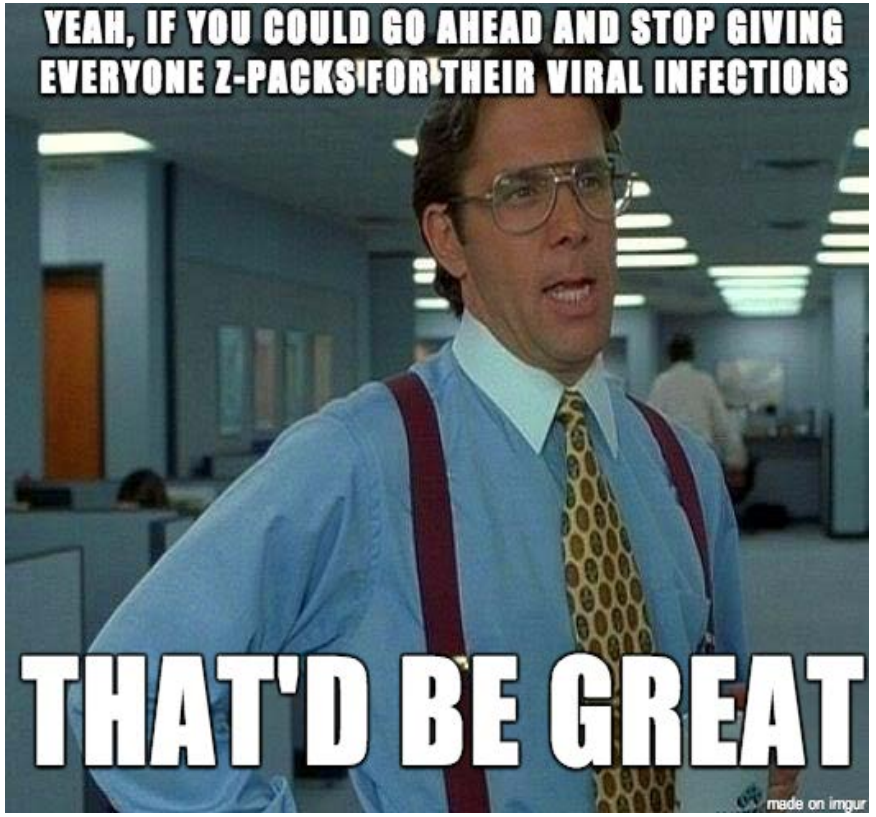
Avoid implementing too many policies and interventions simultaneously; always prioritize interventions based on the needs of the hospital as defined by measures of overall use and other tracking and reporting metrics.

POLICIES THAT SUPPORT OPTIMAL ANTIBIOTIC USE

- Document dose, duration, and indication.
  - Specify the dose, duration and indication for all courses of antibiotics so they are readily identifiable.
  - Making this information accessible helps ensure that antibiotics are modified as needed and/or discontinued in a timely manner.
- Develop and implement facility specific treatment recommendations.
  - Facility-specific treatment recommendations, based on national guidelines and local susceptibilities and formulary options can optimize antibiotic selection and duration
  - Community-acquired pneumonia, urinary tract infection, intra-abdominal infections, skin and soft tissue infections and surgical prophylaxis.

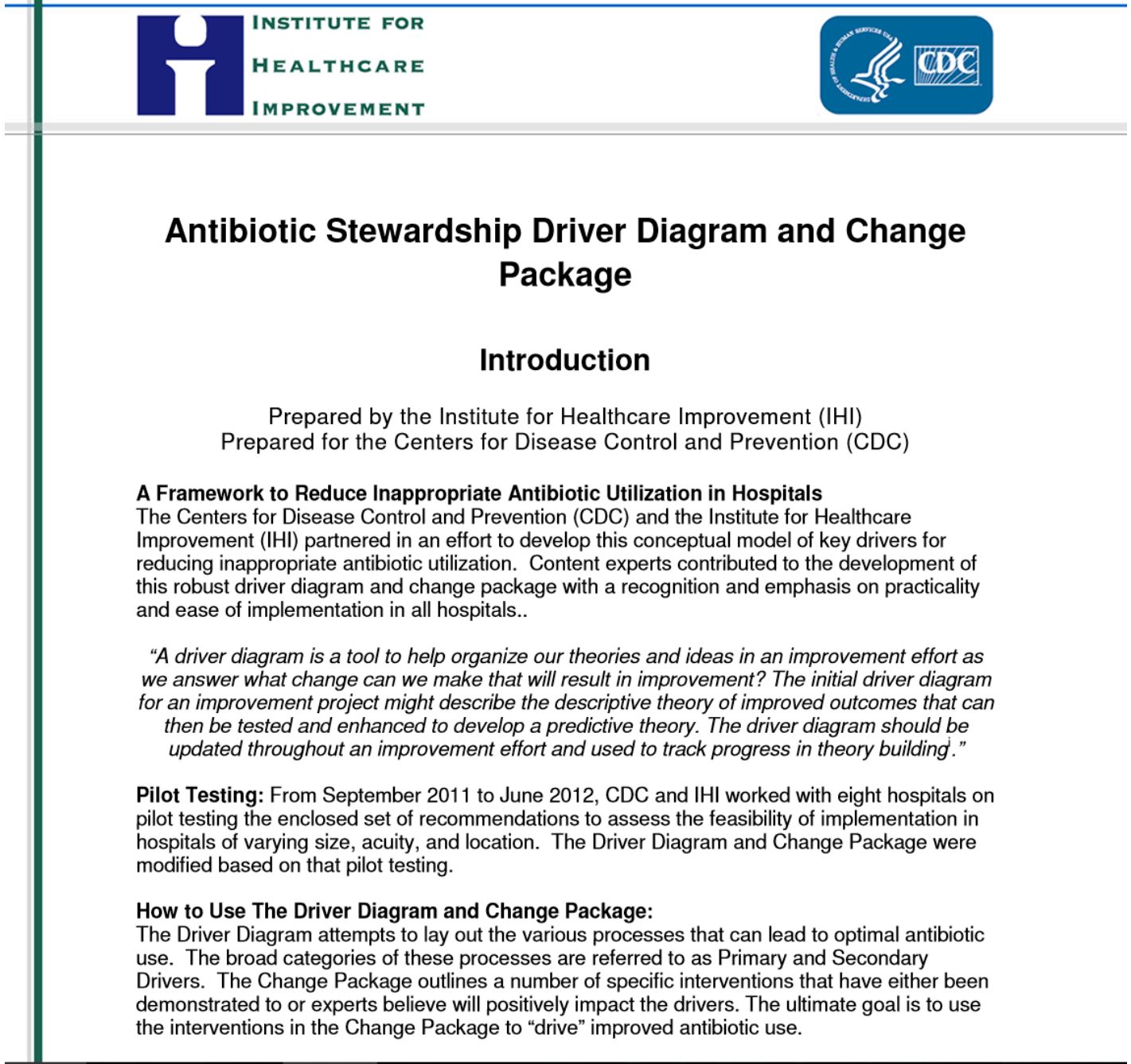
INTERVENTIONS TO IMPROVE ANTIBIOTIC USE

- Choose interventions based on the needs of the facility as well as the availability of resources and content expertise
- Be careful not to implement too many interventions at once.
- CDC/Institute for Healthcare Improvement "Antibiotic Stewardship Driver Diagram and Change Package."
- Stewardship interventions are listed in three categories broad, pharmacy-driven, and infection and syndrome specific.



CDC-ABS DRIVERS

- https://www.cdc.gov/getsmart/healthcare/pdfs/antibiotic_stewardship_change_package_10_30_12.pdf



INSTITUTE FOR HEALTHCARE IMPROVEMENT

CDC

Antibiotic Stewardship Driver Diagram and Change Package

Introduction

Prepared by the Institute for Healthcare Improvement (IHI)
Prepared for the Centers for Disease Control and Prevention (CDC)

A Framework to Reduce Inappropriate Antibiotic Utilization in Hospitals
The Centers for Disease Control and Prevention (CDC) and the Institute for Healthcare Improvement (IHI) partnered in an effort to develop this conceptual model of key drivers for reducing inappropriate antibiotic utilization. Content experts contributed to the development of this robust driver diagram and change package with a recognition and emphasis on practicality and ease of implementation in all hospitals..

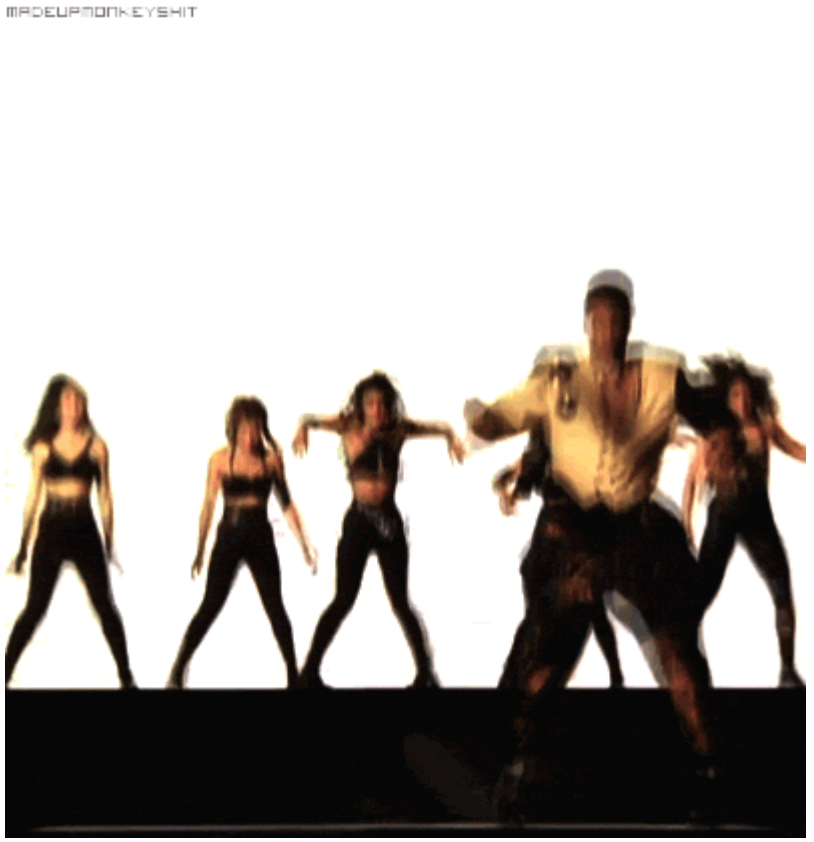
"A driver diagram is a tool to help organize our theories and ideas in an improvement effort as we answer what change can we make that will result in improvement? The initial driver diagram for an improvement project might describe the descriptive theory of improved outcomes that can then be tested and enhanced to develop a predictive theory. The driver diagram should be updated throughout an improvement effort and used to track progress in theory building[i]."

Pilot Testing: From September 2011 to June 2012, CDC and IHI worked with eight hospitals on pilot testing the enclosed set of recommendations to assess the feasibility of implementation in hospitals of varying size, acuity, and location. The Driver Diagram and Change Package were modified based on that pilot testing.

How to Use The Driver Diagram and Change Package:
The Driver Diagram attempts to lay out the various processes that can lead to optimal antibiotic use. The broad categories of these processes are referred to as Primary and Secondary Drivers. The Change Package outlines a number of specific interventions that have either been demonstrated to or experts believe will positively impact the drivers. The ultimate goal is to use the interventions in the Change Package to "drive" improved antibiotic use.

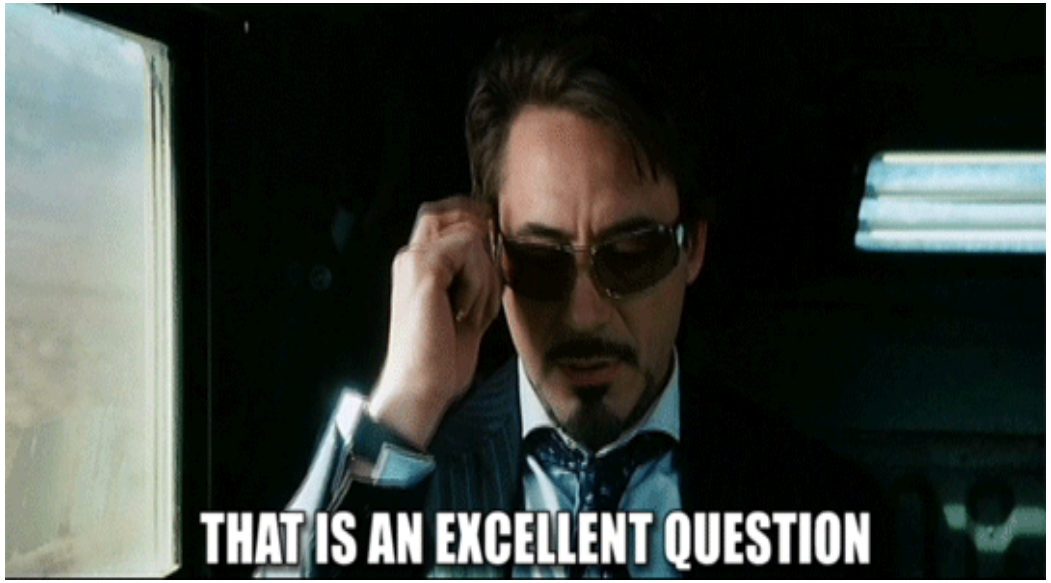
BROAD INTERVENTIONS

- Antibiotic “Time outs.”
  - Antibiotics are often started empirically in hospitalized patients while diagnostic information is being obtained
  - Providers often do not revisit the selection of the antibiotic after more clinical and laboratory data (including culture results) become available.
  - An antibiotic “time out” prompts a reassessment of the continuing need and choice of antibiotics when the clinical picture is clearer and more diagnostic information is available.
  - All clinicians should perform a review of antibiotics 48 hours after antibiotics are initiated to answer these key questions:



TELL ME SOMETHING…….

- Does this patient have an infection that will respond to antibiotics?
- If so, is the patient on the right antibiotic(s), dose, and route of administration?
- Can a more targeted antibiotic be used to treat the infection (de-escalate)?
- How long should the patient receive the antibiotic(s)?

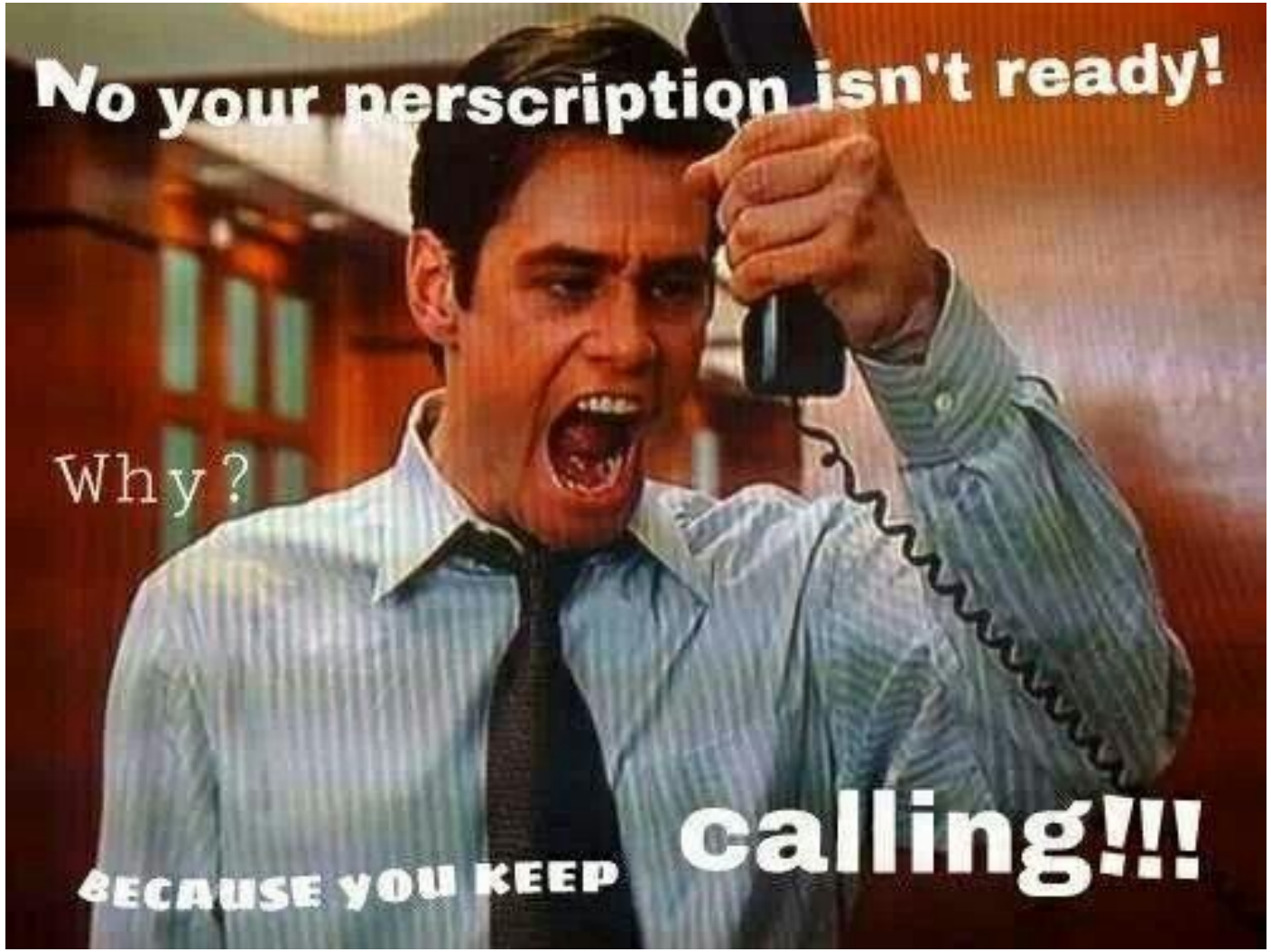


BROAD INTERVENTIONS

- Prior authorization
  - Some facilities restrict the use of certain antibiotics based on the spectrum of activity, cost, or associated toxicities.
  - Ensure that use is reviewed with an antibiotic expert before therapy is initiated.
  - Have to have expertise in antibiotic use and infectious diseases and authorization needs to be completed in a timely manner.
- Prospective audit and feedback
  - External reviews of antibiotic therapy by an expert in antibiotic use have been highly effective in optimizing antibiotics in critically ill patients and in cases where broad spectrum or multiple antibiotics are being used.
  - Different from an antibiotic ”time out”
  - Audit and feedback requires the availability of expertise or by engaging external experts to advise on case reviews.

PHARMACY DRIVEN INTERVENTIONS

- Automatic changes from intravenous to oral antibiotic therapy
  - For appropriate situations and for antibiotics with good absorption (e.g., fluoroquinolones, trimethoprim-sulfamethoxazole, linezolid, etc.) which improves patient safety by reducing the need for intravenous access.
- Dose adjustments in cases of organ dysfunction
  - (e.g. renal adjustment).
- Dose optimization
  - Dose adjustments based on therapeutic drug monitoring, optimizing therapy for highly drug-resistant bacteria, achieving central nervous system penetration, extended-infusion administration of beta-lactams, etc.
- Automatic alerts
  - For situations where therapy might be unnecessarily duplicative including simultaneous use of multiple agents with overlapping spectra•
- Time-sensitive automatic stop orders
  - For specified antibiotic prescriptions, especially antibiotics administered for surgical prophylaxis.
- Detection and prevention of antibiotic-related drug-drug interactions
  - e.g. interactions between some orally administered fluoroquinolones and certain vitamins.


No your perscription isn't ready!
Why?
BECAUSE YOU KEEP
calling!!!

INFECTION AND SYNDROMIC INTERVENTIONS

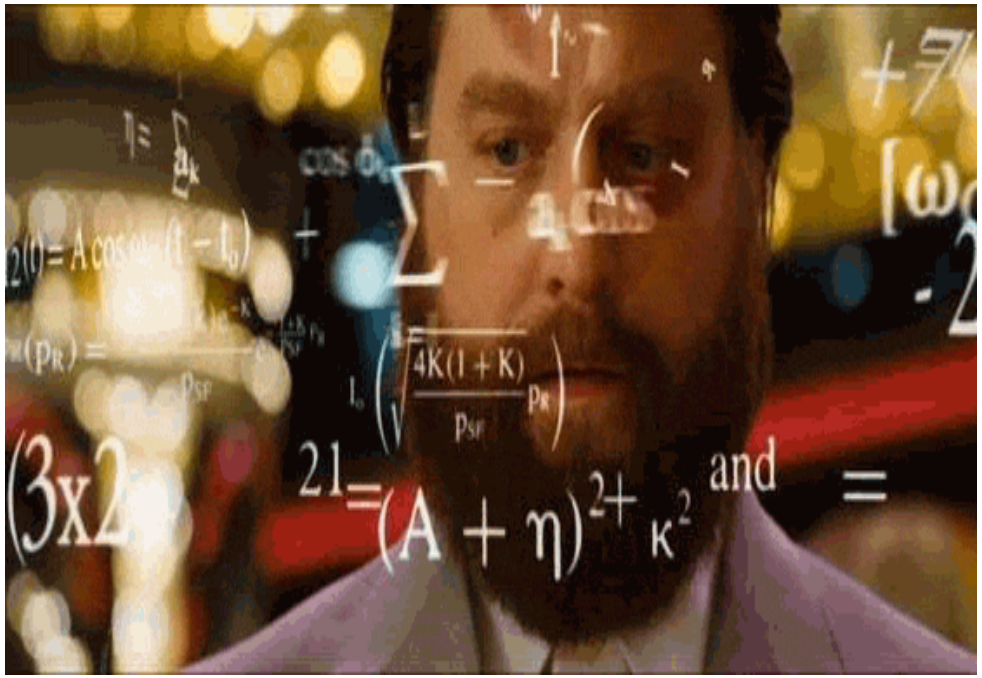
- Community-acquired pneumonia.
  - Interventions for community-acquired pneumonia have focused on correcting recognized problems in therapy
  - Improving diagnostic accuracy, tailoring of therapy to culture results and optimizing the duration of treatment to ensure compliance with guidelines.
- Urinary tract infections (UTIs).
  - Many patients who get antibiotics for UTIs actually have asymptomatic bacteriuria and not infections.
  - Interventions for UTIs focus on avoiding unnecessary urine cultures and treatment of patients who are asymptomatic and ensuring that patients receive appropriate therapy based on local susceptibilities and for the recommended duration.
- Skin and soft tissue infections.
  - Interventions for skin and soft tissue infections have focused on ensuring patients do not get antibiotics with overly broad spectra and ensuring the correct duration of treatment.

INFECTION AND SYNDROMIC INTERVENTIONS

- Empiric coverage of methicillin-resistant Staphylococcus aureus (MRSA)
  - In many cases, therapy for MRSA can be stopped if the patient does not have an MRSA infection or changed to a beta-lactam if the cause is methicillin-sensitive Staphylococcus aureus.
- Clostridium difficile infections.
  - Treatment guidelines for CDI urge providers to stop unnecessary antibiotics in all patients diagnosed with CDI, but this often does not occur.
  - Reviewing antibiotics in patients with new diagnoses of CDI can identify opportunities to stop unnecessary antibiotics which improve the clinical response of CDI to treatment and reduces the risk of recurrence.
- Treatment of culture proven invasive infections.
  - Invasive infections (e.g. blood stream infections) present good opportunities for interventions to improve antibiotic use because they are easily identified from microbiology results.
  - The culture and susceptibility testing often provides information needed to tailor antibiotics or discontinue them due to growth of contaminants.

TRACKING AND REPORTING

- Monitoring antibiotic prescribing
  - Measurement is critical to identify opportunities for improvement and assess the impact of improvement efforts.
  - For antibiotic stewardship, measurement may involve evaluation of both process (Are policies and guidelines being followed as expected?) and outcome (Have interventions improved antibiotic use and patient outcomes?).



ANTIBIOTIC USE PROCESS MEASURES

ANTIBIOTIC AUDIT REPORT

Patient Information

Name _____ Admit Date _____

Record No. _____ Unit _____

DOB/Age _____ Service _____

Gender _____ Admit Source _____

Age _____ Allergies _____

Weight (kg) _____ _____

Clinical Information

Admitting Diagnosis _____

Prior Medical History _____

_____

_____

Recent Antibiotics Y / N _____

Immunocompromised Y / N _____ Septic Y / N

Suspected Site of Infection: Lungs Abdomen Urine/Bladder Bloodstream

Other: _____

Tmax _____ WBC _____ CrCl _____

Culture Results Date Site Pathogen

_____

_____

_____

_____

Antibiotic Information

Date Agent Dose Route Prescriber

_____

_____

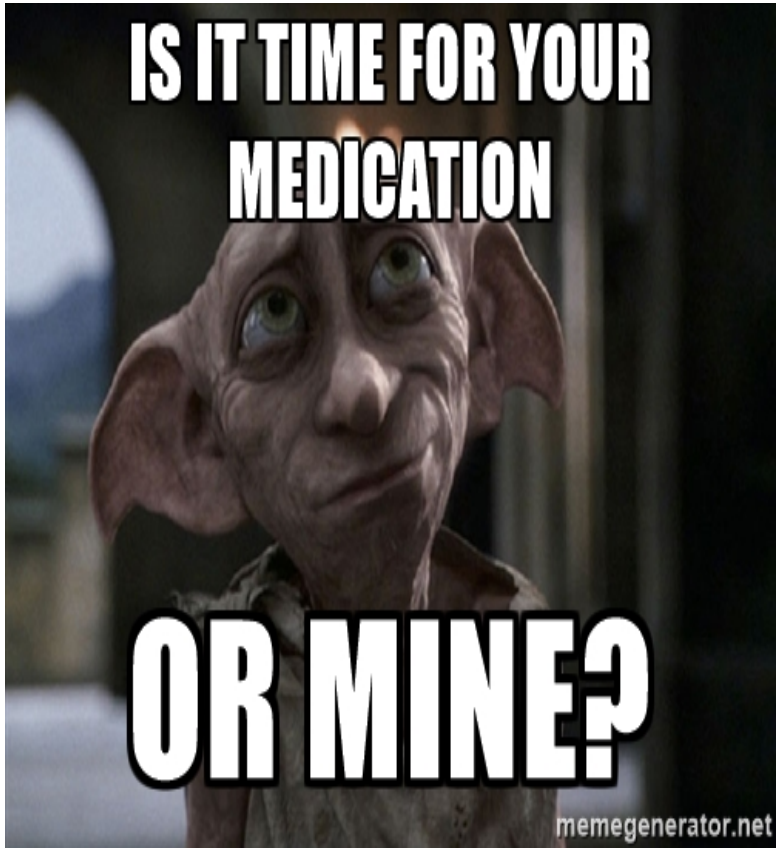
_____

_____

- Perform periodic assessments of the use of antibiotics or the treatment of infections to determine the quality of antibiotic use.
  - Determining if prescribers have:
    - Accurately applied diagnostic criteria for infections
    - Prescribed recommended agents for a particular indication
    - Documented the indication and planned duration of antibiotic therapy
    - Obtained cultures and relevant tests prior to treatment
    - Modified antibiotic choices appropriately to microbiological findings.
    - Standardized tools such as those for drug use evaluations or antibiotic audit forms are available on the CDC website

ANTIBIOTIC USE PROCESS MEASURES

- Likewise, assess if antibiotics are being given in a timely manner and assess compliance with hospital antibiotic use policies such as the documentation of dose, duration and indication or the performance of reassessments of therapy (antibiotic time outs).
  - These reviews can be done retrospectively on charts which could be identified based on pharmacy records or discharge diagnoses.
  - If conducted over time, process reviews assess the impact of efforts to improve use.
  - For interventions that provide feedback to clinicians, it is also important to document interventions and track responses to feedback (e.g., acceptance).



ANTIBIOTIC USE MEASURES
DAYS OF THERAPY

- DOT is an aggregate sum of days for which any amount of a specific antimicrobial agent is administered or dispensed to a particular patient (numerator) divided by a standardized denominator (e.g., patient days, days present, or admissions).
- If a patient is receiving two antibiotics for 10 days, the DOT numerator would be 20.

AMOUNT OF ANTIMICROBIAL AGENT ADMINISTERED

STANDARDIZED DENOMINATOR
(patient days, days present, admissions etc.)

ANTIBIOTIC USE MEASURES
DEFINED DAILY DOSE

This metric estimates antibiotic use in hospitals by aggregating the total number of grams of each antibiotic purchased, dispensed, or administered during a period of interest divided by the World Health Organization-assigned DDD.

90 DDDs are often available in facilities with pharmacy systems that cannot calculate DOTs.

Compared to DOT, DDD estimates are not appropriate for children, are problematic for patients with reduced drug excretion such as renal impairment, and are less accurate for between-facility benchmarking

In addition to measuring overall hospital antibiotic use, antibiotic stewardship programs should also focus analyses on specific antibiotic(s) and hospital locations where stewardship actions are implemented.

TOTAL NUMBER OF GRAMS OF EACH ANTIBIOTIC PURCHASED DISPENSED OR ADMINISTERED (for period of time)

WORLD HEALTH ORGANIZATION ASSIGNED DDD

ANTIBIOTIC USE

- As part of the National Healthcare Safety Network (NHSN), CDC has developed an Antibiotic Use (AU) Option that automatically collects and reports monthly DOT data, which can be analyzed in aggregate and by specific agents and patient care locations.
- The AU module is available to facilities that have information system capability to submit electronic medication administration records (eMAR) and/or bar coding medication records (BCMA) using an HL7 standardized clinical document architecture.

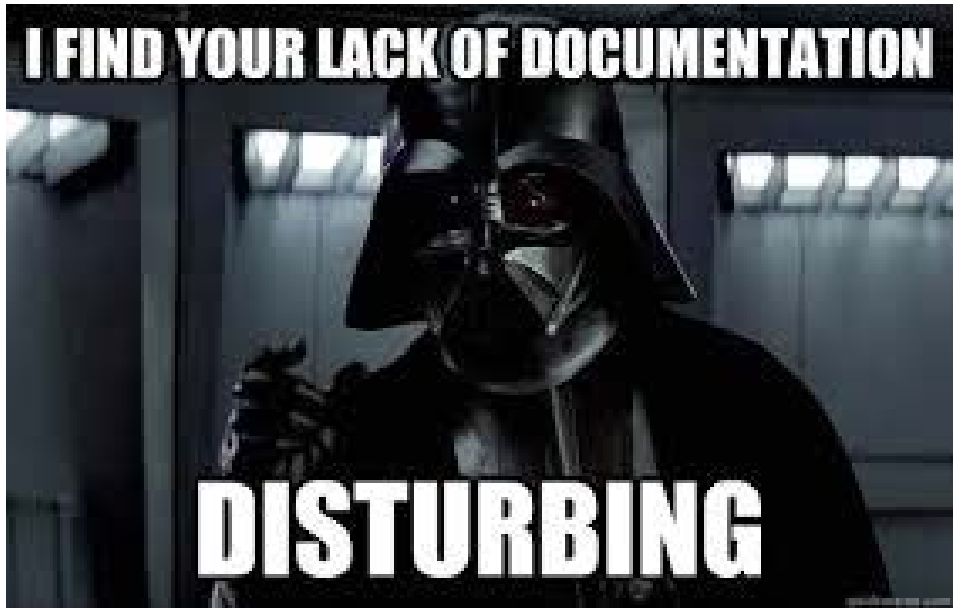
Nurses using an E-Mar

HOW DO I DO THIS?

- To participate in the AU option, facility personnel can work with their IT staff and potentially with their pharmacy information software providers to configure their system to enable the generation of standard formatted file(s) to be imported into NHSN.
- As more facilities enroll in the AU option, CDC will begin to establish risk adjusted facility benchmarks for antibiotic use.

BENCHMARKING = Improved Outcomes for Hospital IC = High Priority in the U.S.

OUTCOME MEASURES



- Tracking clinical outcomes that measure the impact of interventions to improve antibiotic use.
- Most facilities are already monitoring and reporting information on different conditions to NHSN as part of the Centers for Medicare and Medicaid Services Hospital Inpatient Quality Reporting Program.

REDUCING ANTIBIOTIC RESISTANCE

- The development and spread of antibiotic resistance is multi-factorial and studies assessing the impact of improved antibiotic use on resistance rates have shown mixed results.
- The impact of stewardship interventions on resistance is best assessed when measurement is focused on pathogens that are recovered from patients after admission (when patients are under the influence of the stewardship interventions).
- Monitoring resistance at the patient level (i.e. what percent of patients develop resistant super-infections) has also been shown to be useful.

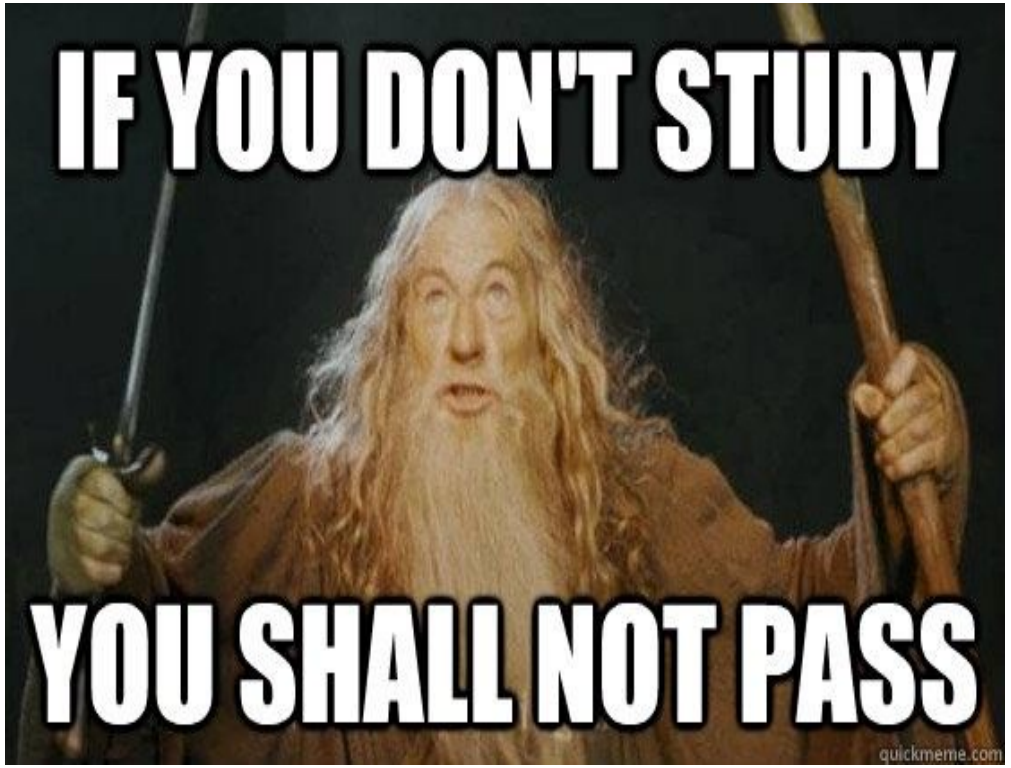
MONEY MONEY MONEY!!!!

- THE GOOD
  - Stewardship programs can result in significant annual drug cost savings and even larger savings when other costs are included!!!
  - These savings have been helpful to support antibiotic stewardship programs.
  - Don’t forget to give consideration to assessing the pace at which antibiotic costs were rising before the start of the stewardship program if you are going to monitor cost.
- THE KINDA BAD
  - After an initial period of marked costs savings, antibiotic use patterns and savings often stabilize, so continuous decreases in antibiotic use and cost should not be expected.
  - But Remember, if program ceases so do cost savings.


Dollar, dollar, bills y'all

EDUCATION

- Antibiotic stewardship programs should provide regular updates on antibiotic prescribing, antibiotic resistance, and infectious disease management that address both national and local issues.
- Sharing facility-specific information on antibiotic use is a tool to motivate improved prescribing.
- There are many options for providing education on antibiotic use:
  - Didactic presentations which can be done in formal and informal settings
  - Messaging through posters and flyers and newsletters or electronic communication to staff groups
  - Reviewing de-identified cases with providers where changes in antibiotic therapy could have been made
  - A variety of web-based educational resources



THANK YOU!!!

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Questions?

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