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Antibiotic Drug Resistance

Rupal Shah, PharmD.

Objectives

1. Define antibiotic resistance and discuss the concerns associated with the increase of resistant strains
2. Review CDC guidelines and explore which patients may warrant antibiotic treatment.
3. Describe current efforts to reduce improper antibiotic prescribing
4. Discuss health plan's role in helping reduce antibiotic resistance

What is Antibiotic Resistance?

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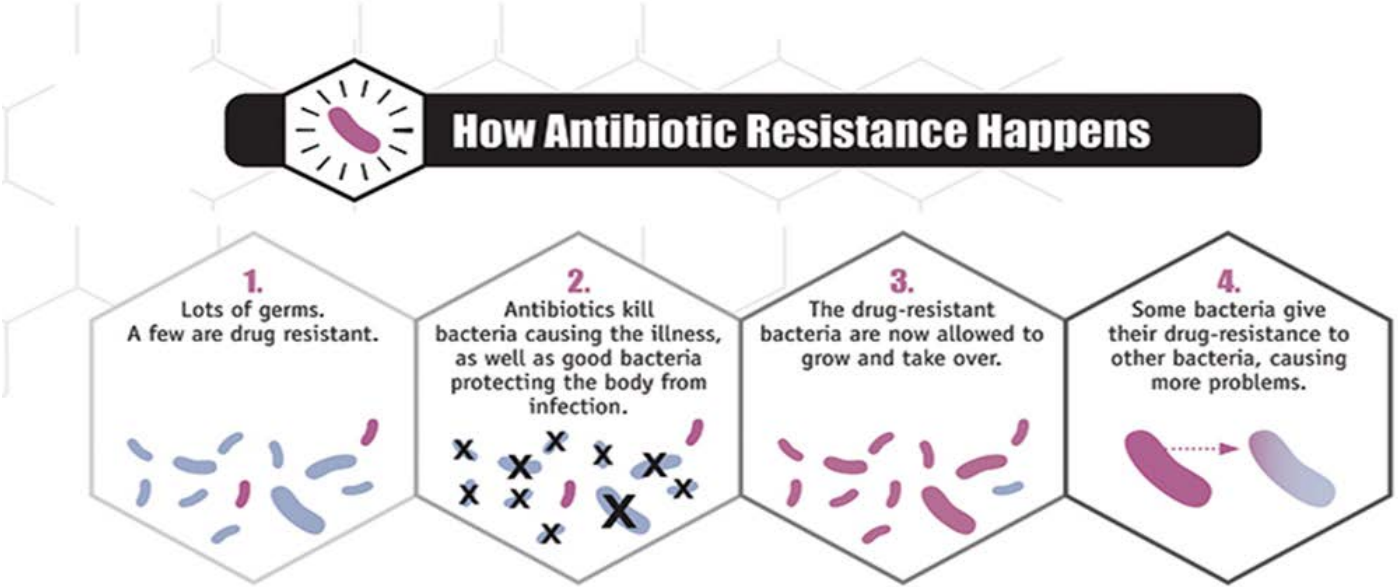
- The ability of bacteria to resist the effects of drugs
- Resistant bacteria survive exposure to antibiotics and continue to multiply in the body, potentially causing more harm and spreading to other animals or people.

How do bacteria become resistant to antibiotics?

- Selective Pressure - In the presence of an antibiotic, microbes are either killed or, if they carry resistance genes, survive. These survivors will replicate, and their progeny will quickly become the dominant type throughout the microbial population.



Why do we care?

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- Causes more than 2 million illnesses per year [1]
- Kills at least 23,000 people in the US alone yearly [1]
- Estimated 300,000 deaths in North America by 2050
- Adds an estimated $20 to $35 billion in excess direct healthcare costs (2008 dollars) [1]

[1] Centers for Disease Control and Prevention website. https://www.cdc.gov/drugresistance/threat-report-2013/pdf/ar-threats-2013-508.pdf. Accessed October 2, 2017.

Why do we care?

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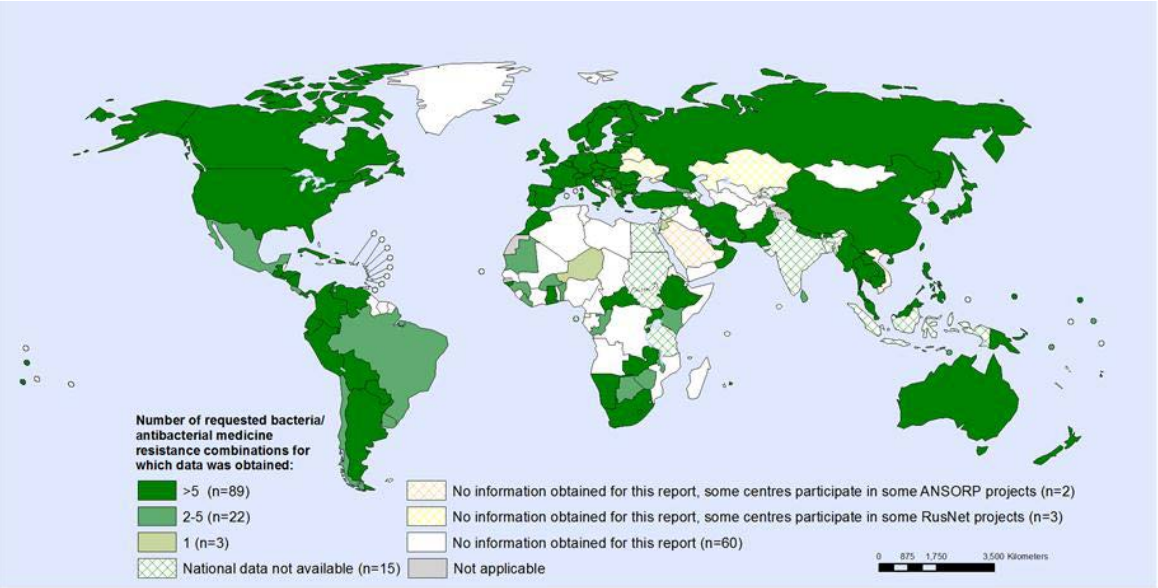
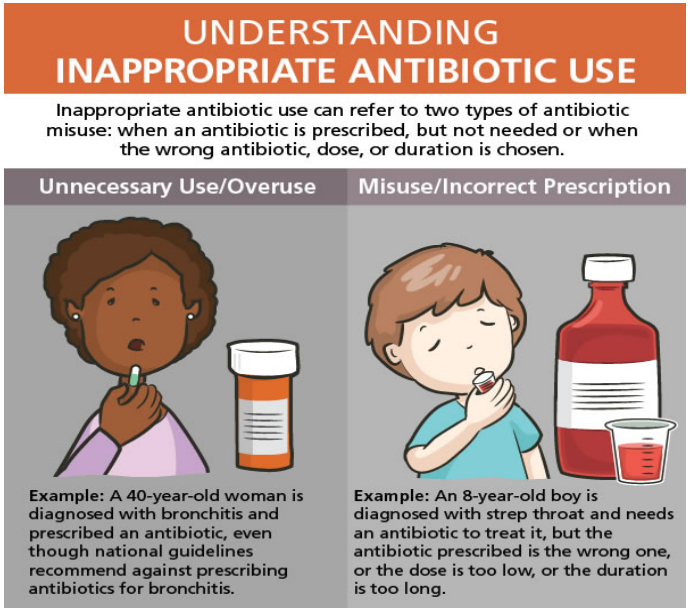
Antibiotic resistance is present in every country



How is it spread?

- Inappropriate Use or Overuse - 50% of all antibiotic courses prescribed are unnecessary or not optimally effective as prescribed. [1]



How is it spread? (cont.)

- Hospital Use
  - Critically ill patients are more susceptible to infections. However, the heavier use of antibiotics in these patients can worsen the problem by producing bacteria with even greater ability to survive in the presence of our strongest antibiotics
  - Half of hospitalized patients received at least 1 dose of antibiotics during their stay

How is it spread? (cont.)

- Agricultural Use - The practice of adding antibiotics to agricultural feed promotes drug resistance
- Animal feed- Mixed with antibiotics to prevent infections and promote growth

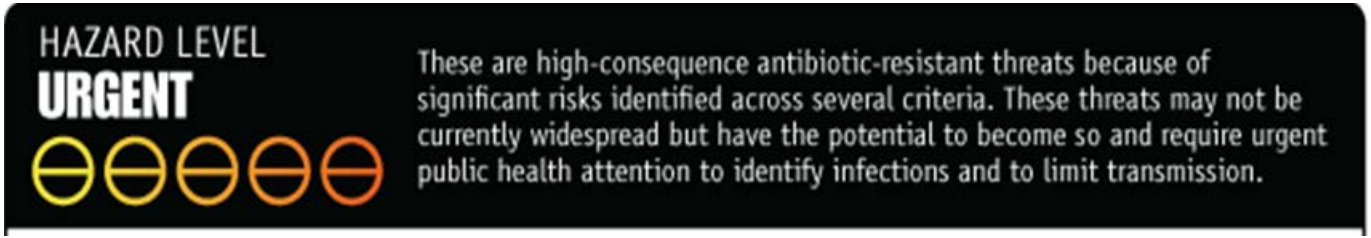
Implications

- Unnecessary exposure diminishes future effectiveness
- Increased risk of adverse events such as *C. difficile*
- Increased drug-drug interactions
- Emergence of multidrug resistance bacteria

The World is Running Out of Antibiotics

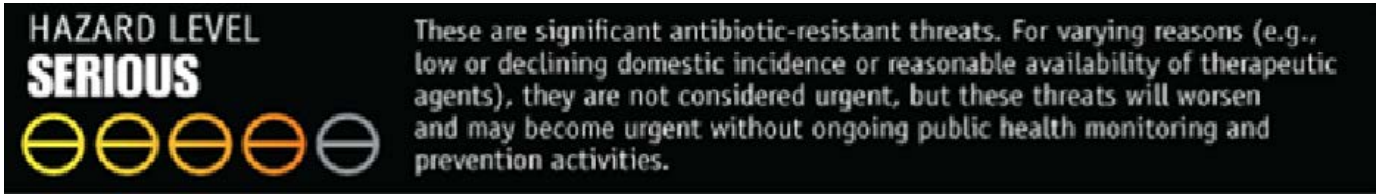
- World Health Organization (WHO) in September 2017 released a report that identifies 51 new antibiotics and biologicals in clinical development to treat priority antibiotic resistance… Among all these only 8 are classed by WHO as innovative treatments that will add value

Top 18 drug resistance threats – URGENT!



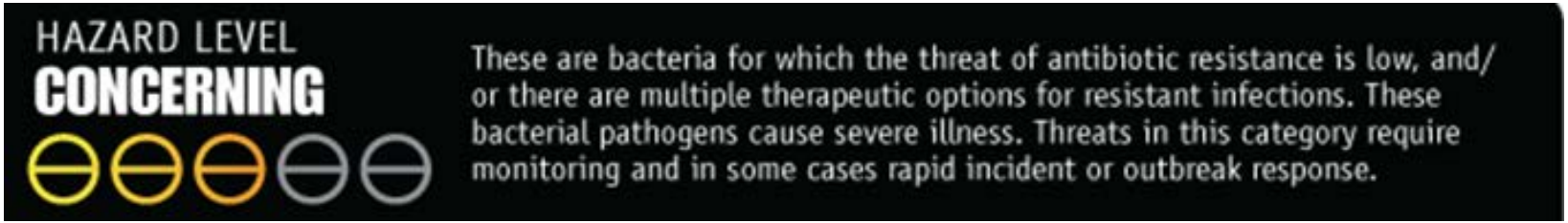
- Clostridium difficile (C. diff)
- Carbapenem-Resistant Enterobacteriaceae (CRE)
- Neisseria gonorrhoeae (cephalosporin resistance)

Top 18 drug resistance threats - Serious



- Multidrug-Resistant Acinetobacter
- Drug-Resistant Campylobacter
- Fluconazole-Resistant Candida
- Extended Spectrum Enterobacteriaceae (ESBL)
- Vancomycin-Resistant Enterococcus (VRE)
- Multidrug-Resistant Pseudomonas Aeruginosa
- Drug-Resistant Non-Typhoidal Salmonella
- Drug-Resistant Salmonella Serotype Typhi
- Drug-Resistant Shigella
- Methicillin-Resistant Staphylococcus Aureus (MRSA)
- Drug-Resistant Streptococcus Pneumoniae
- Drug-Resistant Tuberculosis

Top 18 drug resistance threats - Concerning



- Vancomycin-Resistant Staphylococcus Aureus
- Erythromycin-Resistant Group A Streptococcus
- Clindamycin-Resistant Group B Streptococcus

What are we doing now?

- Four Core Actions to Fight Resistance [1]
  - Prevent infections
  - Tracking
  - Improve antibiotic prescribing
  - Developing new drugs and diagnostic tests.

Prevention

- Promote good hygiene by regular hand washing and preparing food hygienically
- Healthcare professional – ensure instruments and environment are clean
- Vaccines
  - ACIP recommends that FluMist Quadrivalent (LAIV4) **NOT** be used during the 2017–18 season (it was found not to work very well).

Improve Antibiotic prescribing

- Identify barriers/high priority conditions-those for which clinicians commonly deviate from best practices.
- Establish standards for antibiotic prescribing
- Use watchful waiting with conditions that usually resolve without treatment

Do Health Plans Have a Role In Limiting Antibiotic Resistance?

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- CDC calls antibiotic resistance the world's most pressing public health threat, saying it requires collaborative action from all stakeholders: physicians, hospital administrators — and health plans
- According to the National Committee for Quality Assurance (NCQA)-Managed care organizations have an important role in collecting data that hospitals, nursing homes, and physicians can use to manage antibiotics

Healthcare Effectiveness Data and Information Set (HEDIS) Measures

HEDIS measures having to do with ABX:

- Avoidance of Antibiotic Treatment in Adults With Acute Bronchitis (AAB)
- Appropriate Treatment for Children With Upper Respiratory Infection (URI)
- Appropriate Testing for Children with Pharyngitis (CWP)
- Antibiotic Utilization

Avoidance of Antibiotic Treatment in Adults with Acute Bronchitis

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- Assesses adults 18-64 years of age with a diagnosis of acute bronchitis who were not dispensed an antibiotic prescription (a higher rate is better).
- Current guidelines recommend against antibiotic treatment for acute bronchitis in adults who are healthy because:
  - Overuse can lead to antibiotic resistance
  - Avoid harmful side-effects

AVOIDANCE OF ANTIBIOTIC TREATMENT IN ADULTS WITH ACUTE BRONCHITIS					
	Commercial		Medicaid	Medicare	
Year	HMO	PPO	HMO	HMO	PPO
2015	27.6	25.8	28.1	–	–
2014	27.7	25.9	28.5	–	–
2013	26.1	23.8	26.5	–	–
2012	24.6	21.4	24.2	–	–
2011	23.5	21.5	24.3	–	–
2010	22.5	21.3	23.5	–	–
2009	24.0	22.6	25.6	–	–
2008	24.6	26.8	25.8	–	–
2007	25.4	29.3	25.9	–	–
2006	28.7	29.7	28.0	–	–

Appropriate Treatment for Children with Upper Respiratory Infection

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- Assesses children 3 months-18 years of age who were given a diagnosis of upper respiratory infection (URI) and were not dispensed an antibiotic prescription. A higher rate indicates appropriate treatment of children with URI

- Also known as the common cold-caused by viruses that require no antibiotic treatment

APPROPRIATE TREATMENT RATE					
	Commercial		Medicaid	Medicare	
Year	HMO	PPO	HMO	HMO	PPO
2015	88.3	86.7	87.8	–	–
2014	87.1	85.3	87.0	–	–
2013	85.2	83.2	85.2	–	–
2012	84.0	82.3	85.1	–	–
2011	83.9	82.0	85.3	–	–
2010	85.1	83.7	87.2	–	–
2009	84.1	82.5	86.0	–	–
2008	83.9	83.3	85.5	–	–
2007	83.5	83.0	84.1	–	–
2006	82.8	82.1	83.4	–	–
2005	82.9	81.9	82.4	–	–
2004	82.7	–	79.9	–	–

Appropriate Testing For Children With Pharyngitis

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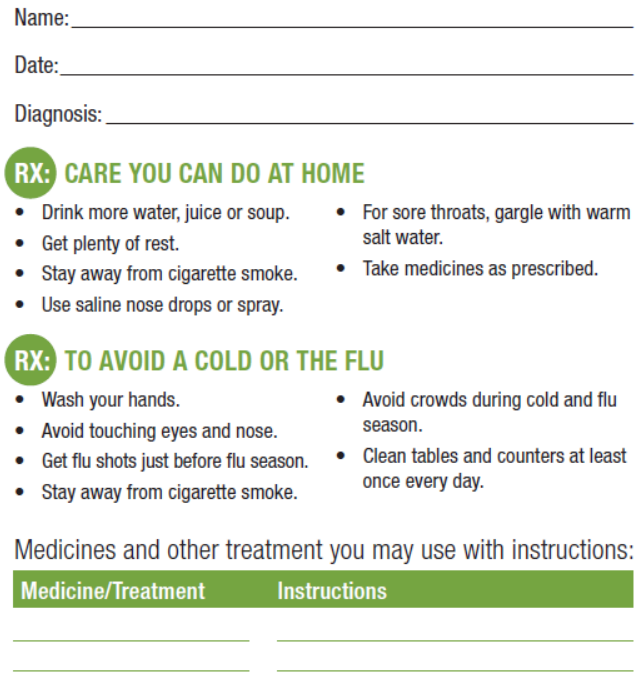
- Assesses children 2-18 years of age who were diagnosed with pharyngitis, dispensed an antibiotic and received a group A streptococcus test for the episode. A higher rate represents better performance

- Viral pharyngitis does not require antibiotic treatment, but antibiotics continue to be inappropriately prescribed. Proper testing and treatment of pharyngitis would prevent the spread of sickness, while reducing the unnecessary use of antibiotics

APPROPRIATE TESTING RATE					
	Commercial		Medicaid	Medicare	
Year	HMO	PPO	HMO	HMO	PPO
2015	82.8	81.1	71.1	–	–
2014	82.4	80.4	69.5	–	–
2013	80.7	78.4	66.5	–	–
2012	80.2	78.9	68.0	–	–
2011	80.2	79.3	66.7	–	–
2010	77.6	76.6	64.9	–	–
2009	77.4	75.5	62.3	–	–
2008	75.6	74.1	61.4	–	–
2007	74.7	73.5	58.7	–	–
2006	72.7	69.4	56.0	–	–
2005	69.7	64.5	52.0	–	–
2004	72.6	–	54.4	–	–

AWARE

- Physicians over prescribing are sent an AWARE tool kit which includes:
  - Pediatric guideline
  - Adult guideline
  - Prescription pad
  - CDC flyers and patient education material
- In 2017 UTI guidelines have been added to toolkit in addition to the adult URI guideline summary



Name: _____

Date: _____

Diagnosis: _____

RX: CARE YOU CAN DO AT HOME

- Drink more water, juice or soup.
- Get plenty of rest.
- Stay away from cigarette smoke.
- Use saline nose drops or spray.
- For sore throats, gargle with warm salt water.
- Take medicines as prescribed.

RX: TO AVOID A COLD OR THE FLU

- Wash your hands.
- Avoid touching eyes and nose.
- Get flu shots just before flu season.
- Stay away from cigarette smoke.
- Avoid crowds during cold and flu season.
- Clean tables and counters at least once every day.

Medicines and other treatment you may use with instructions:

Medicine/Treatment	Instructions

Possible Interventions

- Prior authorization- restrict the use of certain antibiotics based on the spectrum of activity, cost, or associated toxicities to ensure that use is reviewed with an antibiotic expert before therapy is initiated
  - Do not want to restrict the appropriate use of antibiotics.
- Letters mailings-writing to physicians to counsel patients about the appropriate use of antibiotics.
  - sending letters after the fact may not have as strong an effect

“Nudging” Physicians- A USC study

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- Researchers at USC studied a psychological approaches known as "nudges" on 248 physicians
- Intervention 1: "peer comparison" in which physicians were updated by a monthly email about their rate of inappropriate prescribing and informed whether they were a "top performer" in comparison to their peers.
- Intervention 2: "accountable justification" required clinicians to report the reason for prescribing antibiotics in the patient's record.
- The interventions prevented 1 inappropriate prescription for every 8 patients
- What would happen when the interventions were removed? **Would bad habits return?**
- The study shows that 12 months after the peer comparison intervention had ended, clinicians increased their antibiotic prescription rate from 4.8% to 6.3%

How you can help

- Educate patients to:
  - Not skip doses.
  - Complete the prescribed course of treatment even if they are feeling better.
  - Be aware of the expected response to treatment and notify the prescriber if that expected response is not occurring.
- Encouraging patients to use the antibiotic as instructed.

How you can help

- Prescribing an antibiotic only when it is likely to benefit the patient.
- Prescribing an antibiotic that targets the bacteria that is most likely causing their patient's illness when an antibiotic is likely to provide benefit.
- Collaborating with each other, office staff, and patients to promote appropriate antibiotic use.

Common URI Infections

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Variable	Acute Bronchitis	Pharyngitis	Acute Rhinosinusitis	Common Cold
Case definition	Productive or nonproductive cough that lasts up to 6 wk, with mild constitutional symptoms	Sore throat (often worse with swallowing) with a usual duration of 1 wk, with possible associated constitutional symptoms	Nasal congestion, purulent nasal discharge, maxillary tooth pain, facial pain or pressure, fever, fatigue, cough, hyposmia or anosmia, ear pressure or fullness, headache, and halitosis Symptoms have a variable duration (1 to 33 d) and sometimes take longer to resolve completely	Mild upper respiratory viral illness with sneezing, rhinorrhea, sore throat, cough, low-grade fever, headache, and malaise that lasts up to 14 d
Causes	Most cases are caused by viruses: influenza, rhinovirus, adenovirus, human metapneumovirus, coronavirus, parainfluenza, and respiratory syncytial virus. Nonviral causes include *Mycoplasma pneumoniae* and *Chlamydophila pneumoniae*.	Most cases are caused by viruses. Nonviral causes occur in <15% of cases and include group A β-hemolytic streptococci (most commonly) and groups C and G streptococci. Rare causes include *Arcanobacterium haemolyticum*, *Fusobacterium necrophorum*, *Neisseria gonorrhoeae*, *Corynebacterium diphtheriae*, *Staphylococcus aureus*, *Francisella tularensis*, *Yersinia pestis*, *Yersinia enterocolitica*, and *Treponema pallidum*.	Most cases are caused by viruses, allergies, or irritants. Nonviral causes occur in <2% of cases and include *Streptococcus pneumoniae*, *Haemophilus influenzae*, *Streptococcus pyogenes*, *Moraxella catarrhalis*, and anaerobic bacteria.	All causes are viral. Leading causes include rhinovirus (up to 50%); coronavirus (10% to 15%); influenza (5% to 15%); respiratory syncytial virus (5%); parainfluenza (5%); and, less commonly, adenovirus, enterovirus, human metapneumovirus, and probably other unknown viruses (20).
Benefits of using antibiotics	No benefit	If the patient has a streptococcal infection, antibiotics may shorten the duration of illness and prevent acute rheumatic fever or suppurative complications.	Limited benefit	No benefit
Harms of using antibiotics	Mild reactions: diarrhea and rash	Mild reactions: diarrhea and rash Severe reactions:	Mild reactions: diarrhea and rash Severe reactions: Stevens-Johnson	Mild reactions: diarrhea and rash

How you can help

- Continue reviewing and following the latest clinical practice guidelines for common infections, such as CDC's Adult and Pediatric Academic Detailing Sheets.
- Click on the following link:
  - CDC guidelines

Surveillance of Antimicrobial Resistance

"Antimicrobial resistance is a global health emergency that will seriously jeopardize progress in modern medicine."

- Dr. Tedros Adhanom Ghebreyesus, Director of WHO

"The most expensive antibiotic is the one that does not work!"

Resources

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1.Centers for Disease Control and Prevention website. https://www.cdc.gov/drugresistance/threat-report-2013/pdf/ar-threats-2013-508.pdf. Accessed October 2, 2017.

2. World Health Organization website. http://www.who.int/mediacentre/factsheets/fs194/en/. Accessed October 5, 2017.

3. Center for Disease Control and Prevention website. https://www.cdc.gov/getsmart/community/about/antibiotic-resistance-faqs.html. Accessed October 2,2017.

4. National Institute of Allergy and Infectious Diseases (NIAID) website. https://www.niaid.nih.gov/research/antimicrobial-resistance. Accessed October2,2017

5. Infectious Disease Society of America (IDSA) website. http://www.idsociety.org/View_All_Antimicrobial_Resistance__for_Professionals/. Accessed October 6, 2017.

6. Alliance for Prudent use of Antibiotics (APUA) websites. http://emerald.tufts.edu/med/apua/about_issue/about-the-issue---the-cost-of-resistance.shtml. Accessed October 6, 2017

7. Lagasse, J. *Physicians need nudging to change old prescribing habits.* October 2017. Available from: http://www.healthcarefinancenews.com/news/physicians-need-nudging-change-old-prescribing-habits. Accessed November 2017.

8. Holubar, Marisa, et. Al. Antimicrobial stewardship in outpatient settings. Uptodate. Waltham,MA:UpToDate Inc. http://www.uptodate.com Accessed December 5, 2017.