Antimicrobial Stewardship

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ASCENSION

Learning Objectives

1. Describe the importance of antimicrobial stewardship in the acute care setting.
2. Evaluate the principles and objectives of antimicrobial stewardship programs.
3. Identify methods for implementation of a successful stewardship program within a community health system.

What is Antimicrobial Stewardship?

Antimicrobial stewardship refers to coordinated interventions designed to improve and measure the appropriate use of **antibiotics** by promoting the selection of the optimal drug regimen, dose, duration of therapy, and route of administration.

AMS – Why does it matter?

- CDC estimates that more than 2.8 million antibiotic-resistant infections occur in the U.S. each year.
- 30% of all antibiotics prescribed in U.S. acute care hospitals are either unnecessary or suboptimal.
- Hospital AMS programs have been shown to increase infection cure rates while reducing:
  - Treatment failure
  - Hospital costs and LOS
  - Antibiotic resistance

CDC. *Core Elements of Hospital Antibiotic Stewardship Programs*. Atlanta, GA: US Department of Health and Human Services, CDC; 2019.

Core Elements of AMS

Hospital Leadership Commitment

- Support from senior leadership: CMO, CNO, Pharmacy Director
- Integral for ensuring resource availability
  - Time allocation
  - Effective staffing
- Appointing a “champion” for the stewardship program

Accountability

- Designated leader or co-leaders
- Focus on program management and outcome
- Clear delineation of roles and responsibilities
- Examples:
  - Regular stewardship rounds
  - “Handshake” stewardship

Pharmacy Expertise

- Pharmacist role as leader or co-leader of most successful stewardship programs
- Daily intervention and de-escalation efforts
- Regular prescriber communication

Action

- Regular assessments of prescribing habits to identify intervention targets
- Prospective audit and feedback
  - Post-prescription review
- Preauthorization

Tracking

- Measurement of stewardship interventions and antibiotic use
  - Pharmacy tracking tools
- Outcome measures:
  - *C. difficile* infections
  - Antibiotic resistance
- Financial Impact

Reporting

- Programs should provide regular updates to all those involved in patient care.
- Updates addressing both national and local issues
- Collaboration with the hospital's microbiology lab
- Examples:
  - Local antibiogram
  - MUE findings

Education

- A key component of comprehensive efforts to improve antibiotic use
- Most effective when paired with interventions and measurement of outcomes
- Case-based approaches for active learning

How are we implementing these practices at St. Vincent's?

- System-wide approach
  - Birmingham
  - East
  - Blount
  - St. Clair
  - Chilton
- AMS Committee
  - Meetings every third Wednesday of the month
  - 7:30 – 8:30 AM

Resources and More Information

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

1. Dellit TH, Owens RC, McGowan JE et al. Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America guidelines for developing an institutional program to enhance antimicrobial stewardship. *Clin Infect Dis* 2007;44:159–177. https://doi.org/10.1086/510393

1. Barlam TF, Cosgrove SE, Abbo LM, et al. Implementing an antibiotic stewardship program: Guidelines by the Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America. *Clin Infect Dis* 2016;62(10):e51-77. doi: 10.1093/cid/ciw118.

INFECTIOUS DISEASES UPDATE

3 MAR 2020

INFECTIOUS DISEASES UPDATE

- C DIFF
- ASIAN LONGHORNED TICK
- Chronic pulmonary aspergillosis
- StrS FOR PEP (SINGLE-TABLET REGIMENS FOR HIV POSTEXPOSURE PROPHYLAXIS)
- Antimicrobial stewardship

INFECTIOUS DISEASES UPDATE

- Due to the ongoing sars-cov-2 outbreak, Other topics have been pre-empted for a discussion of CORONAVIRUSES

CORONAVIRUSES

- FIRST DESCRIBED IN 1965
- NAMED FOR THE CROWNLIKE APPEARANCE OF THE SURFACE PROJECTIONS ON ELECTRON MICROSCOPY

CORONAVIRUSES

- SINGLE-STRANDED RNA
- ENVELOPE WITH GLYCOPROTEIN SURFACE PROJECTIONS

CORONAVIRUSES

- PRIMARILY RESPIRATORY PATHOGENS IN HUMANS
- ALSO A CAUSE OF VIRAL DIARRHEA in humans

CORONAVIRUSES

- CAUSE A WIDE VARIETY OF DISEASES IN ANIMALS (respiratory, enteric, hepatic and neurologic)
- MUTATE FREQUENTLY
- READILY INFECT NEW SPECIES

CORONAVIRUSES

- RESPIRATORY DISEASE IN HUMANS OCCURS MORE OFTEN IN THE WINTER AND SPRING
- CAUSE ABOUT 15% OF COMMON COLDS IN ADULTS
- REINFECTION with some coronaviruses IS COMMON (THERE IS A RAPID DIMINUTION OF ANTIBODY LEVELS AFTER INFECTION)

SARS-COV

- SEVERE ACUTE RESPIRATORY SYNDROME
- BEGAN IN CHINA NOV 2002
- CASE FATALITY RATE 7 – 17%
- CASE FATALITY RATE IN THE CHRONICALLY ILL AND THOSE > 65 YEARS OF AGE UP TO 50%

SARS-COV

- WORLD HEALTH ORGANIZATION CONTROL PROGRAM:
  - ISOLATION OF CASES
  - INFECTION CONTROL PRECAUTIONS (CONTACT, DROPLET, AIRBORNE)
  - QUARANTINE
  - TRAVEL ADVISORIES

SARS-cov

- GLOBAL TRANSMISION CEASED BY JUL 2003

SARS-cov

- ORIGINATED IN HORSESHOE BATS
- INTERMEDIATE HOSTS: PALM CIVET, RACCOON DOG (KEPT IN CAGES AND SLAUGHTERED IN MARKETS)

SARS-COV

- PERSON TO PERSON SPREAD: DROPLET TRANSMISSION, DIRECT CONTACT
- MOST INDIVIDUALS TRANSMITTED TO FEW OTHERS (ESTIMATE: 3)
- "SUPERSPREADING EVENTS" DID OCCUR VIA SMALL PARTICLE AIRBORNE TRANSMISSION

SARS-COV

- SPREAD IN HOSPITALS WAS EFFICIENT
- DROPLET AND CONTACT PRECAUTIONS WERE EFFECTIVE IN SUPPRESSING HOSPITAL TRANSMISSION

MERS-COV

- CAUSED SEVERE RESPIRATORY DISEASE OUTBREAKS IN THE MIDDLE EAST IN 2012

SARS-COV-2

- CLUSTERS OF PATIENTS WITH PNEUMONIA OF UNKNOWN CAUSE THAT WERE EPIDEMIOLOGICALLY LINKED TO A WHOLESALE MARKET WERE REPORTED IN DEC 2019 IN WUHAN, CHINA

SARS-COV-2

- STATISTICS 24 FEB 2020
  75,000 CASES
  - 2.7% MORTALITY

SARS-COV-2

- THE ILLNESS WAS FIRST CALLED "NOVEL CORONAVIRUS-INFECTED PNEUMONIA"
- NOW CALLED COVID 19, CAUSED BY SARS-COV-2
- The other coronaviruses that infect humans are as follows:
  - 229E, oc43, nl63, hku1
  - Typically cause common cold symptoms in immunocompetent individuals

SARS-COV-2

- PNEUMONIA OF UNKNOWN ETIOLOGY CASE DEFINITION
  - NO PATHOGEN IDENTIFIED
  - FEVER
  - CXR WITH EVIDENCE OF PNEUMONIA
  - LOW OR NORMAL WBC
  - LOW LYMPHOCYTE COUNT
  - NO IMPROVEMENT AFTER 3 – 5 DAYS STANDARD TREATMENT

SARS-COV-2

- AS THE NUMBER OF CASES GREW, TRAVEL HISTORY WAS ADDED TO THE CASE DEFINITION

SARS-COV-2

- 29 JAN 2020 NEJM (early transmission dynamics in wuhan, china)
- PATIENT CHARACTERISTICS (n=425)
  - MEDIAN AGE 59
  - 56% MALE
  - MEAN INCUBATION 5.2 DAYS

SARS-COV-2

- EACH PATIENT SPREAD INFECTION TO APPROXIMATELY 2.2 OTHER PEOPLE (basic reproductive number based on epidemiologic analysis)

SARS-COV-2

SPREAD SEEMS TO OCCUR MOSTLY BY LARGE DROPLETS AND CONTACT

SUPERSPREADING EVENTS HAVE BEEN IMPLICATED

SARS-COV-2

- The impact of an epidemic depends on the following:
  - The number of people with infection
  - The transmissibility of the infection
  - The spectrum of clinical severity

Sars-cov-2

- How transmissible is it?

Sars-cov-2

- An analysis of 14 patients who had visited wuhan, china, studied sars-cov-2 quantitation (nejm 19 feb 2020 - correspondence)
- One of the patients reported no clinical symptoms (he had fever on initial screening but no symptoms)
- The asymptomatic patient had a similar viral load ANALYSIS to that of the symptomatic patients

SARS-COV-2

- HIGHER VIRAL LOADS WERE DETECTED IN THE NOSE RATHER THAN THE THROAT
- THE VIRAL LOAD FINDINGS IN THE ASYMPTOMATIC PATIENT SUGGEST THAT DISEASE TRANSMISSION MAY OCCUR EARLY IN THE COURSE OF INFECTION

SARS-COV-2

- HOW VIRAL LOAD CORRELATES WITH CULTURABLE VIRUS REMAINS TO BE DETERMINED

SARS-COV-2

- PREVENTION AND TREATMENT

THERE IS CURRENTLY NO VACCINE AVAILABLE

SARS-COV-2

- PREVENTION AND TREATMENT - cdc

THE BEST WAY TO PREVENT INFECTION IS TO AVOID BEING EXPOSED TO THE VIRUS

SARS-COV-2

- PREVENTION AND TREATMENT - CDC:
- WASH YOUR HANDS OFTEN WITH SOAP AND WATER
- AVOID TOUCHING YOUR EYES, NOSE AND MOUTH WITH UNWASHED HANDS
- AVOID CLOSE CONTACT WITH PEOPLE WHO ARE SICK
- STAY HOME WHEN YOU ARE SICK
- CLEAN AND DISINFECT FREQUENTLY TOUCHED OBJECTS AND SURFACES

SARS-COV-2

- CORONAVIRUS EVACUEES IN ALABAMA
  - CENTER FOR DOMESTIC PREPAREDNESS (Anniston, al)
  - Located at the former site of fort mcclellan
  - Opened in 1998
  - Currently managed by the federal emergency management agency

Sars-cov-2

- Coronavirus evacuees in Alabama
  - The center for domestic preparedness trains first responders in disaster preparedness and response
  - Fema announced a plan on sat 22 feb to transport an unknown number of patients from the diamond princess (a cruise ship docked in japan) to the Anniston facility

Sars-cov-2

- Coronavirus evacuees in Alabama
  - By Sunday 23 feb, gov ivey and others announced that the plan to transport evacuees to Alabama had been scuttled
  - The center for domestic preparedness is a training facility, not a quarantine site

Sars-cov-2

- Other Alabama connections

Dr Richard whitley, a virologist at uab, has a grant from the national institutes of health to develop antiviral agents

Sars-cov-2

- One of the promising agents under investigation is remdesivir
  - An adenosine nucleotide analogue prodrug with broad-spectrum activity against several rna viruses
  - The active metabolite interferes with viral rna polymerase

Sars-cov-2

- Based on pre-clinical studies of remdesivir against sars-cov and mers-cov, a randomized, controlled, double-blind trial has been designed to evaluate the efficacy and safety of remdesivir in patients hospitalized with severe sars-cov-2 respiratory disease

Sars-cov-2

- Remdesivir trial
  - 452 participants
  - Start date 6 feb 2020
  - Estimated study completion date 1 may 2020

Sars-cov-2

- Remdesivir trial
  - Rdv 200mg loading dose on day 1, followed by 100mg iv daily doses for 9 days
  - Rdv placebo 200mg loading dose on day 1, followed by 100mg iv daily doses for 9 days

Sars-cov-2

- Remdesivir trial outcome measures
  - Death
  - Icu requiring ecmo and/or invasive mechanical ventilation
  - Icu/hospitalization requiring non-invasive ventilation or high flow oxygen administration
  - Hospitalization requiring supplemental oxygen
  - Hospitalization not requiring supplemental oxygen
  - Hospital discharge

Sars-cov-2

- Remdesivir trial inclusion criteria
  - 18 years and older
  - Rt-pcr confirmed infection with sars-cov-2
  - Lung involvement confirmed with chest imaging
  - Hospitalized with hypoxemia
  - 12 days or fewer since illness onset

Sars-cov-2

- Remdesivir study exclusion criteria
  - Physician decision that trial involvement is not in the patient's best interest
  - Severe liver disease
  - Pregnant or breastfeeding
  - Severe renal impairment or on dialysis
  - Patient will be transferred to a non-study site hospital within 72 hours
  - Receipt of any experimental treatment for sars-cov-2 within 30 days of enrollment

PRECAUTIONS

- STANDARD/UNIVERSAL
- AIRBORNE
- DROPLET
- CONTACT

STANDARD PRECAUTIONS

- EYE, MOUTH, NOSE PROTECTION: FOR ACTIVITY LIKELY TO GENERATE A SPLASH, SPRAY OR AEROSOL
- GOWNS: FOR ACTIVITY LIKELY TO GENERATE A SPLASH OR SPRAY
- GLOVES: FOR CONTACT WITH ANY BODY FLUID, MUCOUS MEMBRANE, OR NONINTACT SKIN
- HAND HYGIENE: BEFORE AND AFTER PATIENT CONTACT

CONTACT PRECAUTIONS

- SINGLE-PATIENT ROOM, DOOR MAY REMAIN OPEN
- DISPOSABLE PATIENT-CARE EQUIPMENT OR DEDICATE TO A SINGLE PATIENT
- GOWNS: FOR ENTERING THE ROOM
- GLOVES: FOR ENTERING THE ROOM

DROPLET PRECAUTIONS

- SINGLE-PATIENT ROOM
- DOOR MAY REMAIN OPEN
- SURGICAL MASK FOR ENTERING THE ROOM
- SURGICAL MASK ON PATIENT FOR TRANSPORT OUT OF THE ROOM

AIRBORNE PRECAUTIONS

- NEGATIVE PRESSURE, SINGLE-PATIENT ROOM WITH AIR EXHAUSTED OUTSIDE OR THROUGH HEPA FILTERS
- DOOR REMAINS CLOSED

AIRBORNE PRECAUTIONS

- N95 OR PORTABLE RESPIRATOR FOR ENTERING THE ROOM
- SURGICAL MASK ON PATIENT FOR TRANSPORT

Infectious diseases update

- questions