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Sepsis Wave II

Balancing Antibiotics Stewardship with Sepsis

TCPi | Transforming Clinical
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TCPi

Transforming Clinical
Practices Initiative



American College of
Emergency Physicians®

ADVANCING EMERGENCY CARE 

Antibiotics.

Easy.

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ACEP E-QUAL SEPSIS Steering Committee

ACEP liaison to IDSA for workgroup on antibiotic selection in sepsis

I have no financial relationships of any kind with any of the manufacturers of the drugs or the software discussed in this presentation and the opinions expressed are mine alone.

[P T.](#) 2015 Apr; 40(4): 277–283.

The Antibiotic Resistance Crisis

Part 1: Causes and Threats

C. Lee Ventola, MS

**Dose Adjustments/
Medication
Interactions**

C. Diff

**Nausea / Vomiting
Diarrhea**



Increased Risk of Sepsis During Hospital Readmission Following Exposure to Certain Antibiotics During Hospitalization

James Baggs, PhD; John Jernigan, MD, MS; Kelly McCormick, MSPH; Lauren Epstein, MD, MSc; Alison S. Laufer-Halpin, PhD; L. Clifford McDonald, MD, FSHEA

Open Forum Infect Dis (2016) 3 (suppl_1): 73. DOI: <https://doi.org/10.1093/ofid/ofw194.08>

Published: 24 October 2016

Ventola CL. The Antibiotic Resistance Crisis: Part 1: Causes and Threats. *Pharmacy and Therapeutics*. 2015;40(4):277-283.

Things we all need

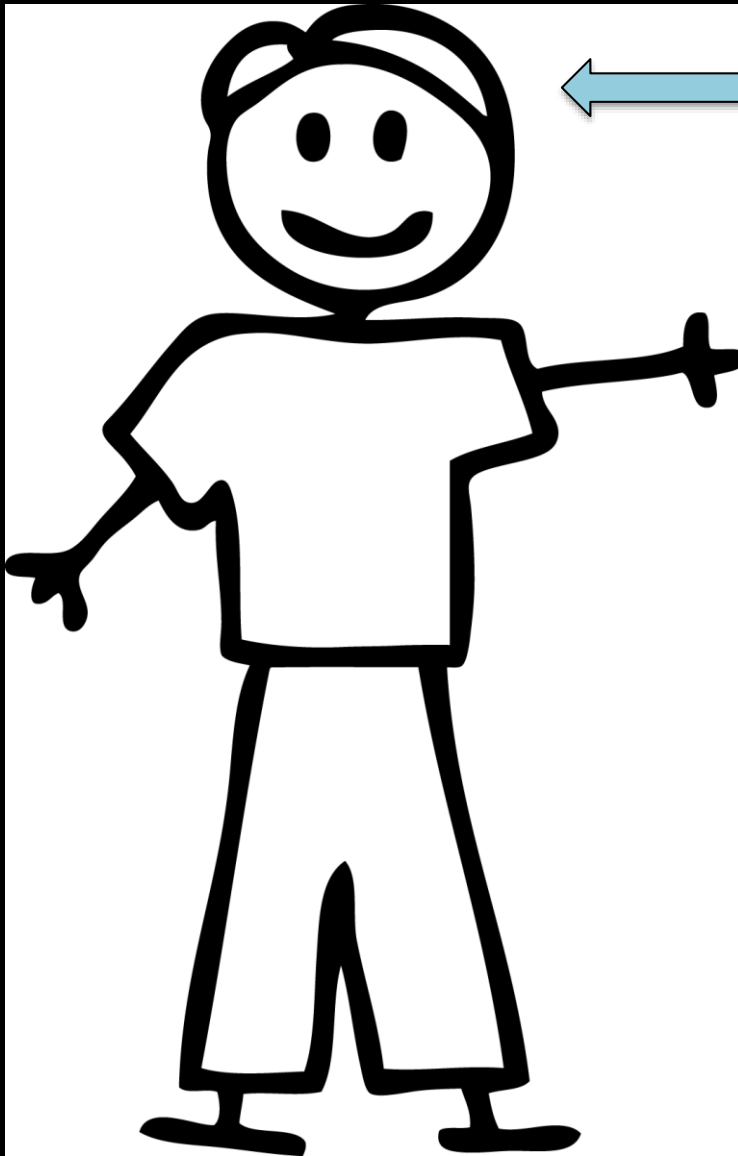
Working knowledge (How to get smart)
overview today

Pearls and Pitfalls (How to practice smart)
high risk and common mistakes

Resources (How to stay smart)
antibiograms and pocket brain resources

Updated Information (How to look smart)
new antibiotics in the news

GETTING SMART - OVERVIEW



Meningitis:

vancomycin
cefdirir (Rocephin)
+/- ampicillin

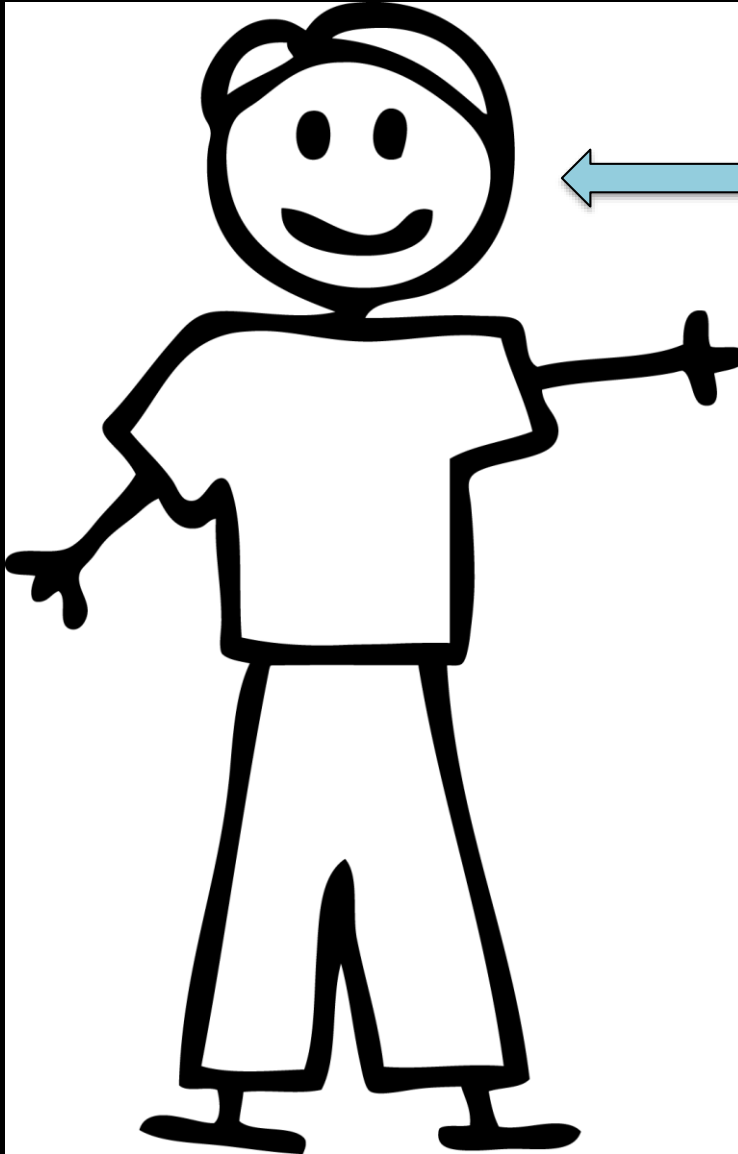
Pearl:

acyclovir
steroids prior to antibiotics

Pitfall:

delay
early bacterial meningitis can look viral

Van de Beek, D et. al. Clinical features and prognostic factors in adults with bacterial meningitis. N Engl J Med. 2004 Oct 28;351(18):1849-59.



Ears/ Sinuses/ Pharynx:

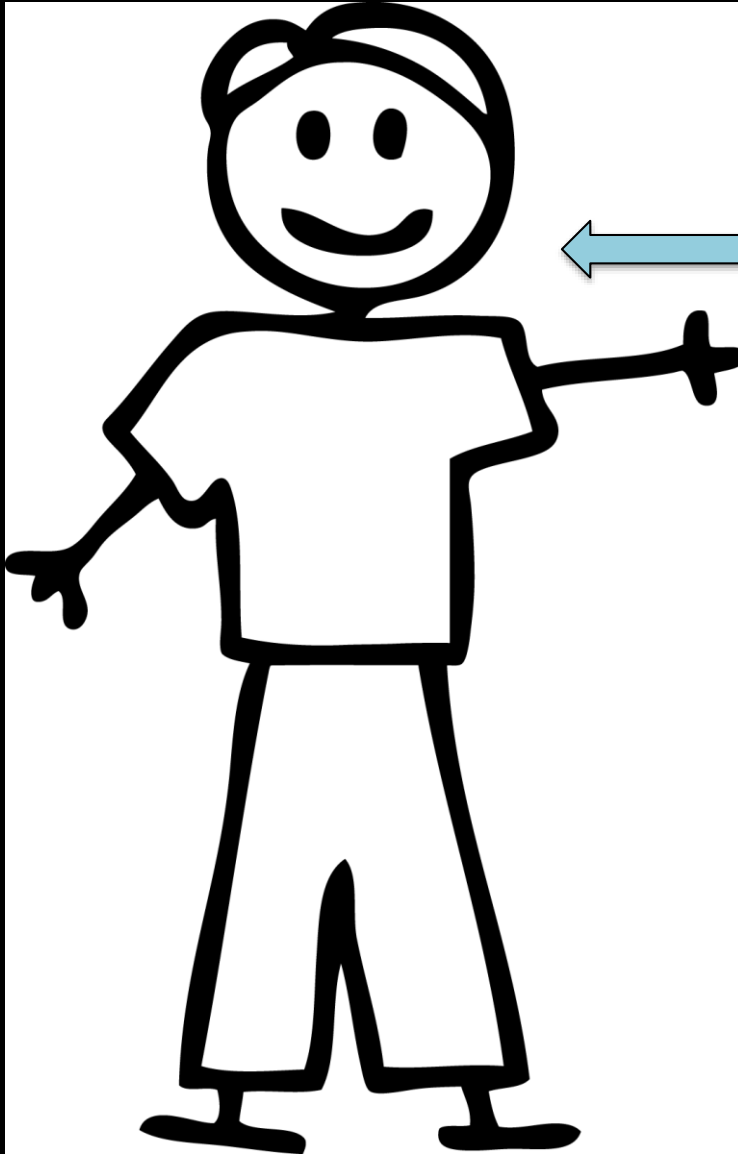
amoxicillin/ clavulanate (Augmentin)
cephalosporins
trimethoprim/sulfamethoxazole (Bactrim)
doxycycline
macrolides (*) / azithromycin/ clarithromycin

Pearl:

Steroids make people feel better

Pitfall:

Growing resistance against azithromycin
MRSA



Mouth:

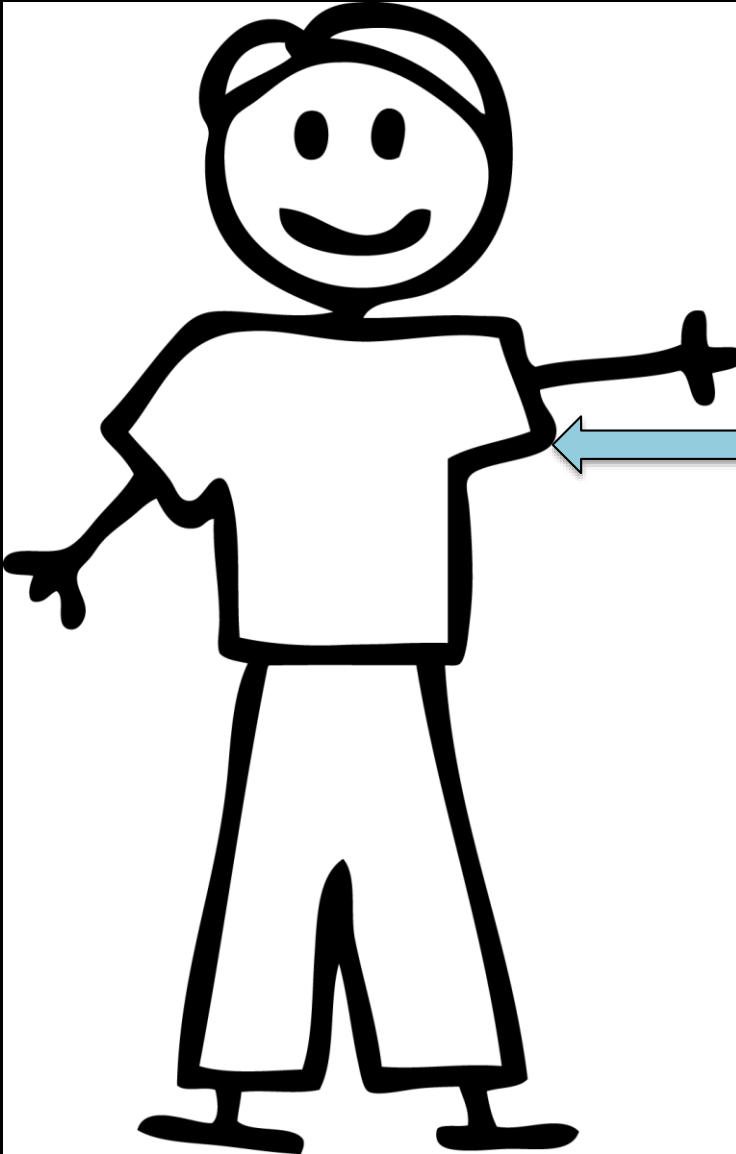
amoxicillin/ clavulanate (Augmentin)
clindamycin
pen Vee K
cefdinir (Rocephin)

Pearl:

Source control

Pitfall:

MRSA



Lungs:

Bronchitis:

doxycycline
azithromycin, clarithromycin

Pneumonia: (above +)

amoxicillin/ clavulanate (Augmentin)
cephalosporins
trimethoprim/sulfamethoxazole (Bactrim)
Or
levofloxacin (Levaquin) / moxifloxacin

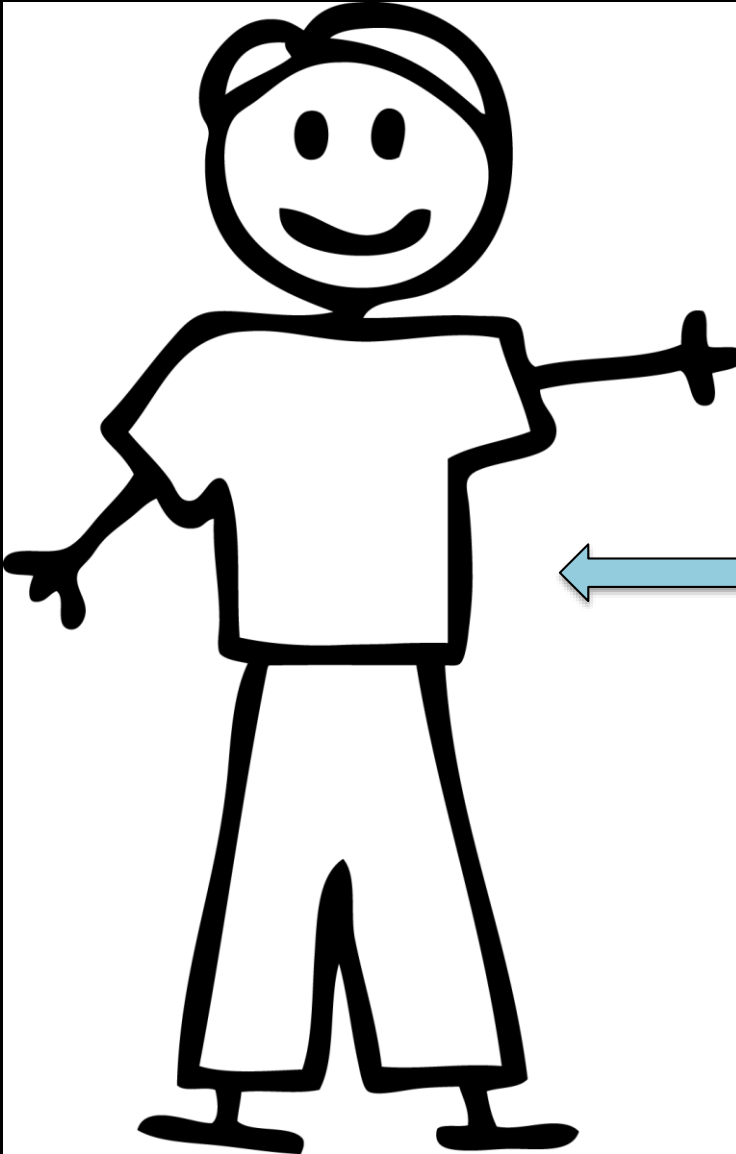
Hospital Acquired: (*Pseudomonas*, MRSA)
Zosyn/ Levaquin/ Meropenem/ cefepime

Pearl:

remember atypicals (Mycoplasma)

Pitfall:

PE



Abdomen:

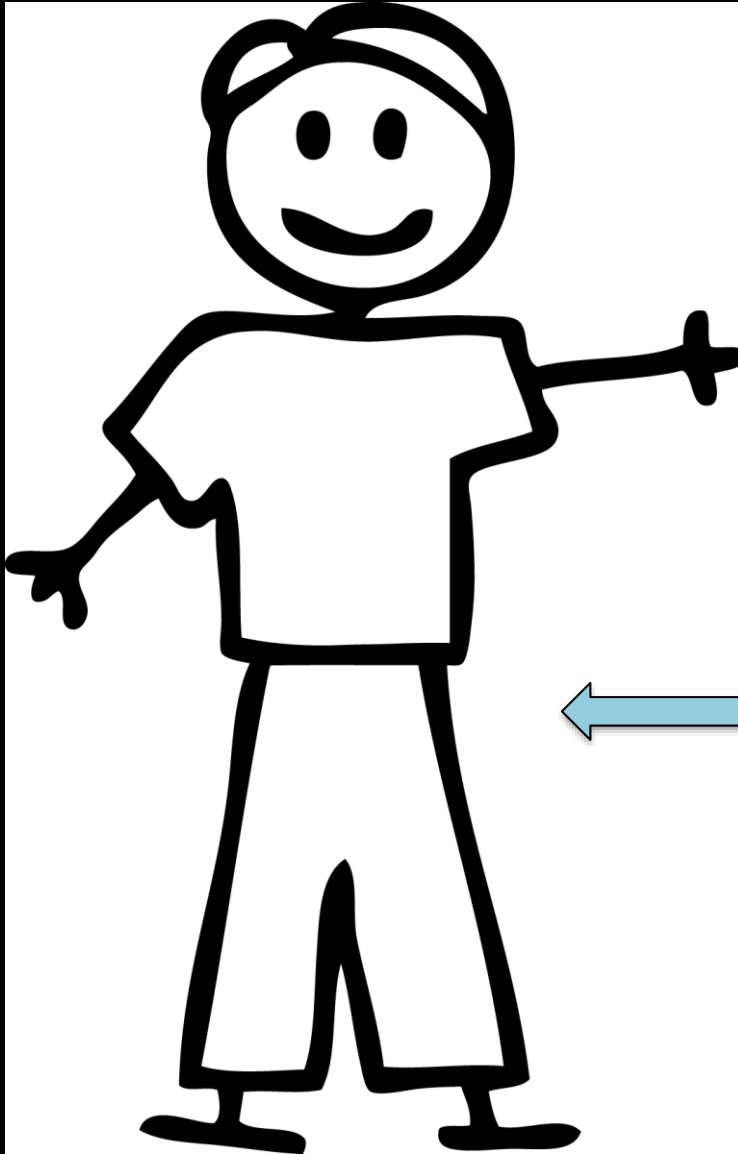
piperacillin + tazobactam (Zosyn)

levofloxacin (Levaquin) / cipro
+ metronidazole (Flagyl)
amoxicillin/ clavulanate (Augmentin)
+ metronidazole (Flagyl)

metronidazole (Flagyl) / oral vancomycin for C. Diff

Pearl:
probiotics

Pitfall:
appendicitis is an infection; may be sepsis



Bladder:

trimethoprim/sulfamethoxazole (Bactrim)
macrobid
cephalosporins
amoxicillin/ clavulanate (Augmentin)

Pearl:

Consider doxycycline or azithromycin

Pitfall:

fluoroquinolones NOT recommended 1st line

"Guidelines for Antimicrobial Treatment of Acute Uncomplicated Cystitis and Pyelonephritis in Women"
Clin Inf Dis; 2011 ; 52 : e103 -e120



When you have no idea what's going on...

... then use vancomycin and
piperacillin + tazobactam (Zosyn)

OR

Carbapenem +/- MRSA coverage



Don't forget fungal infections, viral infections, autoimmunity

trimethoprim/sulfamethoxazole (Bactrim)– renal failure, SJS

azithromycin – long QT

fluoroquinolones – tendinopathies, long QT, seizures

clindamycin – C. Diff

metronidazole (Flagyl) – disulfiram-like reaction

STAYING SMART – ANTIBIOGRAMS AND RESOURCES

Antibiogram



BEH ANTI BIOGRAM 2016 PERCENT SUSCEPTIBLE

Gram Positive

Organism	# Isolates Tested	% Interpretation	Penicillin	Ampicillin	Oxacillin	Amox/Clav & Amp/Sulb	Cefazolin	Ceftriaxone	Ciprofloxacin	Levofloxacin	Trimeth/sulfa	Clindamycin	Daptomycin	Azithromycin	Nitrofurantoin	Linezolid	Vancomycin	Tetracycline
MSSA	411	S	21	-	100	100	100	100	81	85	100	85	99	100	100	100	100	93
MRSA	535	S	--	-	--	--	--	--	46	42	95	63	99	33	100	100	100	92
Total Staph aureus	946	S	9	-	43	44	43	43	61	61	97	73	99	60	100	100	100	92
Staph (coag. neg.)	239	S	15	-	42	43	42	42	52	54	65	66	82	36	100	100	100	82
Strep pneumoniae	88	S	59	-	--	98	--	98	--	91	69	88	--	50	--	--	99	74
E. faecalis	283	S	98	98	--	--	--	--	61	70	--	--	100	--	98	99	96	26
E. faecium	27	S	30	30	--	--	--	--	19	22	--	--	67	--	50	100	33	15

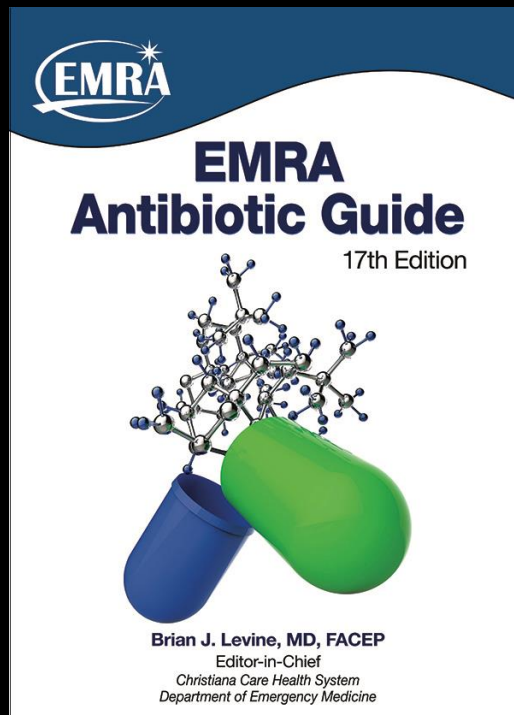
Gram Negative

Organism	# Isolates Tested	% Interpretation	Ampicillin	Amp/Sulb	Pip/Tazo	Cefazolin	Cefuroxime	Ceftazidime	Ceftriaxone	Cefepime	Cefoxitin	Aztreonam	Meropenem	Amikacin	Gentamicin	Tobramycin	Ciprofloxacin	Levofloxacin	Trimeth/sulfa	Nitrofurantoin	Tetracycline
Escherichia coli	966	S	44	50	96	84	80	85	85	87	95	85	100	99	88	88	62	63	68	96	74
Klebsiella pneumoniae	270	S	3	84	97	100	90	98	99	99	100	97	100	99	99	99	95	98	94	48	81
Klebsiella oxytoca	67	S	6	75	95	--	81	98	97	100	--	90	100	100	97	97	94	98	94	92	90
Proteus mirabilis	136	S	69	78	98	--	79	85	85	84	100	83	99	100	89	90	50	59	63	--	--
E. aerogenes	52	S	12	66	92	--	62	72	84	100	--	84	100	100	96	96	96	96	98	17	90
E. cloacae	140	S	13	28	83	100	38	78	77	93	--	81	100	100	98	98	92	95	92	25	83
Serratia marcescens	67	S	5	3	83	--	--	72	91	100	--	78	97	97	95	91	95	95	95	--	3
P. aeruginosa	239	S	--	--	95	--	--	87	--	84	--	70	91	98	78	89	70	70	--	--	--
A. baumannii	49	S	--	60	--	--	--	48	27	42	--	--	50	52	50	46	46	48	42	--	46
Stenotrophomonas	41	S	--	--	--	--	--	45	--	--	--	--	--	--	--	--	--	88	100	--	--

Usually obtain through pharmacy

Favorite Resources

(Tools for staying smart)



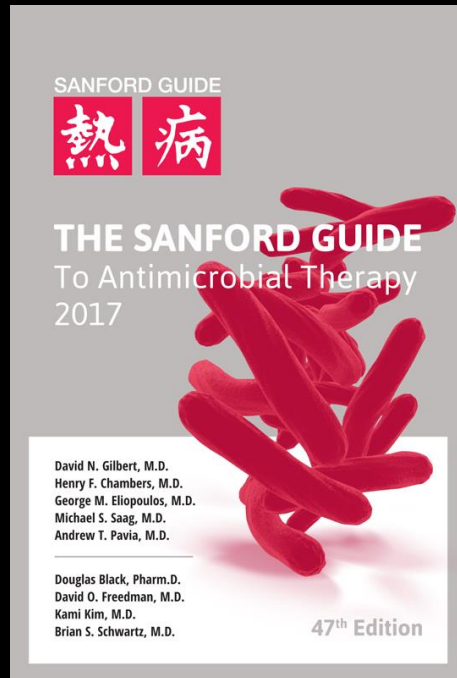
Why I love it:

Clear and concise
evaluate by organism, body part or drug
not overwhelming
accurate

\$17 app

Favorite Resources

(Tools for staying smart)



Why I love it:

comprehensive
accurate

Why I don't love it:


overwhelming
difficult to navigate

\$30 app subscription 1 yr

Favorite Resources

(Tools for staying smart)

Medscape

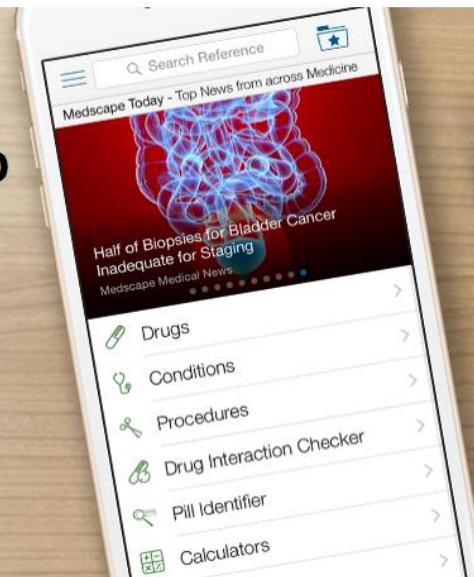
 **Medscape App**

Now optimized for
point-of-care decision making

 Download on the
App Store

 Get it on
Google play

Update available for iPhone & iPad with IOS 7 or later



Why I love it:

comprehensive
evaluate by disease or drug
read more about disease

Why I don't love it:

sometimes buggy/ updates

free

LOOKING SMART – NEW STUFF

New Stuff

(Tools for looking smart)

Dalbavancin (Dalvance)

Glycopeptide (same class as vancomycin)

Approved for treatment of uncomplicated soft tissue infections by Gram + bacteria

Effective against MRSA

Dilute in sterile water or D5W; can dialyze



Estimated CrCl	Single Dose Regimen	Two-Dose Regimen
≥ 30 mL/min or on regular hemodialysis	1500 mg	1000 mg followed one week later by 500 mg
< 30 mL/min and not on regular hemodialysis	1125 mg	750 mg followed one week later by 375 mg

New Stuff

(Tools for looking smart)

Oritavancin (Orbactiv)

Glycopeptide (same class as vancomycin)

Approved for treatment of uncomplicated soft tissue infections by Gram + bacteria

Effective against MRSA

1200mg single dose in 3 hour infusion

No adjustment for mild/ mod renal impairment

Never studied in severe renal or hepatic impairment

Must be in D5W

Falsely elevated pTT for 5 days



New Stuff

(Tools for looking smart)

ESBL

Extended Spectrum Beta-Lactamase Producing

E. coli

Enterobacteriaceae

Resistant to penicillins, cephalosporins, aztreonam , and Fluoroquinolones

Usually susceptible to Carbapenems , fosfomycin

Sepsis, Antibiotic Stewardship and the Emergency Department

Lauren Epstein, MD, MSc

Sepsis Lead

**Epidemiology Research and Innovations Branch
Division of Healthcare Quality Promotion
Centers for Disease Control and Prevention**

Objectives

- Review the importance of antibiotic stewardship
- Discuss how antibiotic stewardship and sepsis treatment align
- Discuss public health and sepsis prevention and identification activities

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Antibiotics

- More than half of all hospitalized patients receive an antibiotic during their hospitalization
- However, 20-50% of all antibiotics prescribed in U.S. acute care hospitals are either unnecessary or inappropriate
- ED has a role to play in improving antibiotic prescribing

Inpatient Antibiotics

- 4 antibiotics made up approximately 45% of all antibiotic treatment
 - Vancomycin
 - Piperacillin-tazobactam
 - Ceftriaxone
 - Levofloxacin

What is Antibiotic Stewardship?

- Measure antibiotic prescribing
- Improve antibiotic prescribing so that antibiotics are only prescribed and used when needed
- Minimize misdiagnoses or delayed diagnoses leading to underuse of antibiotics
- Ensure that the **right drug, dose, and duration** are selected when an antibiotic is needed



It's about patient safety and delivering high-quality healthcare.

Antibiotic Stewardship – why?

- In the context of other medications, antibiotics are generally well-tolerated medications
 - Difficult to stop antibiotics if a patient is doing well or if a patient is doing poorly
 - Antibiotics are life-saving medicines that have risks and benefits

Antibiotic Resistance

Estimated minimum number of illnesses and deaths caused annually by antibiotic resistance*:

At least  **2,049,442** illnesses,
 **23,000** deaths

**bacteria and fungus included in this report*

\$20 billion in excess direct healthcare costs annually

Antibiotics and Patient Safety

1. Antibiotic adverse events can be severe, examples:
 - Antibiotic-associated diarrhea (e.g., *C. difficile* infection)
 - Life-threatening allergic reactions (e.g., anaphylaxis)
2. Antibiotic adverse events can lead to ER visits
 - 1 in 1000 antibiotic prescriptions leads to an ER visit for an adverse event
 - **~200,000 estimated ER visits/year in U.S.**
3. Antibiotic may have long-term consequences through disruption of microbiome

Antibiotic Stewardship Infrastructure

- Infrastructure within a facility should help providers choose appropriate antibiotic therapy and facilitate rapid administration of antibiotics:
 - There are hospitals that have pharmacy protocols that position antibiotics within units to facilitate rapid release

Antibiotic Stewardship vs Infection Control

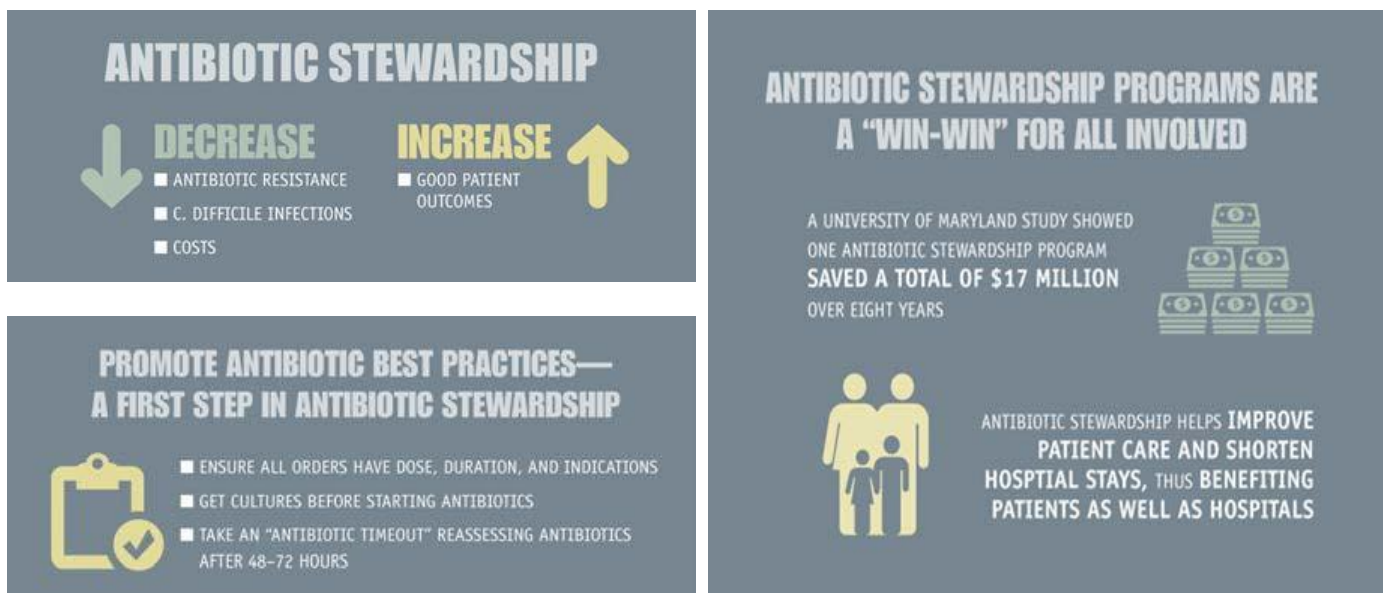
	Infection Control	antibiotic Stewardship Program
Patient safety	Optimize environment and protocols within the hospital to prevent infections	Optimize antibiotic therapy
Treatment?	Not responsible for diagnosis and treatment	Not responsible for diagnosis and treatment

What Antibiotic Stewardship is NOT?

- It is not a mechanism to restrict or prevent antibiotics among patients with infections or suspected infections that need antibiotics
- If there is an issue in any facility where antibiotic stewardship programs are impeding urgent antibiotic release for patients with sepsis or septic shock, this should be assessed and modified

Antibiotic Stewardship Programs and Public Health

- Antibiotic stewardship interventions have been proven to improve individual patient outcomes, reduce the overall burden of antibiotic resistance, save healthcare dollars, and ultimately save lives



The infographic is divided into four main sections on a dark blue background with white and yellow text and icons.

- ANTIBIOTIC STEWARDSHIP**
 - DECREASE** (indicated by a green downward arrow):
 - ANTIBIOTIC RESISTANCE
 - C. DIFFICILE INFECTIONS
 - COSTS
 - INCREASE** (indicated by a yellow upward arrow):
 - GOOD PATIENT OUTCOMES
- PROMOTE ANTIBIOTIC BEST PRACTICES— A FIRST STEP IN ANTIBIOTIC STEWARDSHIP** (indicated by a yellow clipboard icon with a checkmark)
 - ENSURE ALL ORDERS HAVE DOSE, DURATION, AND INDICATIONS
 - GET CULTURES BEFORE STARTING ANTIBIOTICS
 - TAKE AN “ANTIBIOTIC TIMEOUT” REASSESSING ANTIBIOTICS AFTER 48–72 HOURS
- ANTIBIOTIC STEWARDSHIP PROGRAMS ARE A “WIN-WIN” FOR ALL INVOLVED**
 - A UNIVERSITY OF MARYLAND STUDY SHOWED ONE ANTIBIOTIC STEWARDSHIP PROGRAM SAVED A TOTAL OF \$17 MILLION OVER EIGHT YEARS (indicated by a stack of money icons).
 - ANTIBIOTIC STEWARDSHIP HELPS IMPROVE PATIENT CARE AND SHORTEN HOSPITAL STAYS, THUS BENEFITING PATIENTS AS WELL AS HOSPITALS (indicated by a family icon).

Appropriate Antibiotic Use & Challenges in the ED

- ED's role in appropriate antibiotic use
 - Diagnose sepsis and serious bacterial infections
 - Start empiric antibiotic therapy
 - Obtain appropriate cultures prior to treatment (e.g. blood cultures)
 - Prescribe antibiotics for discharged patients
- ED's challenges in stewardship
 - Hard to capture all ED clinicians
 - Need for quick decision making
 - Lack of follow-up
 - Patient satisfaction & demand



Antibiotic Stewardship and Sepsis

- No single template for a program to optimize antibiotic prescribing in hospitals
- Complexity of medical decision making and variability in the type and care among U.S. hospitals require flexibility in implementation
 - Adapting to ED is especially challenging
- Antibiotic stewardship **has been successful** in many different healthcare settings (i.e. long term care facilities, telemedicine)

Antibiotic Stewardship: Hospital Core Elements



- Leadership Commitment
- Accountability
- Drug Expertise
- Action
- Tracking
- Reporting
- Education

Antibiotic Stewardship: Outpatient Core Elements



- Commitment
- Action for policy and practice
- Tracking and reporting
- Education and expertise

<https://www.cdc.gov/getsmart/healthcare/implementation/core-elements.html>

<https://www.cdc.gov/getsmart/community/improving-prescribing/core-elements/core-outpatient-stewardship.html>

ED and Antibiotic Stewardship

- Engaging ED as first stop in inpatient care
 - Have an ED clinician sit on the hospital antibiotic stewardship program
 - Leverage the ED pharmacist (<5% of EDs have a dedicated pharmacist)
 - Guide ED empiric treatment with clinical pathways, clinical decision support, antibiotic order forms
 - Collect cultures prior to starting antibiotics to help the inpatient team optimize therapy
 - Optimize antibiotic dosing

Objectives

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Sepsis: Challenges to Diagnosis and Treatment

- Difficult to diagnose, no specific pathogen or clinical test for sepsis
- Lack of sepsis diagnostic specificity and the importance of initiating early antibiotic therapy likely contributes to inappropriate broad spectrum use of antibiotics
- A pathogen is not identified in most cases of sepsis and septic shock
- Viral infections also contribute to a significant amount to sepsis
- Sepsis can mimic other types of conditions


Sepsis: Challenges to Diagnosis and Treatment

RESEARCH

Open Access

Diagnosing sepsis is subjective and highly variable: a survey of intensivists using case vignettes



Chanu Rhee^{1,2*} , Sameer S. Kadri³, Robert L. Danner³, Anthony F. Suffredini³, Anthony F. Massaro², Barrett T. Kitch⁴, Grace Lee¹ and Michael Klompas^{1,2}

- 5 case vignettes of patients with **suspected or confirmed infection** and **possible organ dysfunction** distributed to 94 academic intensivists
 - Respondents classified cases as SIRS alone, sepsis, severe sepsis, septic shock, or none of the above

Antibiotic Stewardship and Sepsis: ED

- Front line practitioners are important for addressing antibiotic resistance
- Broad spectrum antibiotic use is often the most appropriate initial regimen for life-threatening infections
 - Ensuring the **most appropriate empiric treatment** is a major focus of stewardship
 - Appropriate culture and diagnostics performed in the ED ensures antibiotics are tailored

Sepsis and Septic Shock vs Infections

- Imperative for early antibiotic administration in sepsis and septic shock
 - Antibiotics and source control are the backbone of sepsis treatment
- However, among patients with infections (without signs of sepsis) – further work can be performed prior to initiation of antibiotics
 - Getting a ‘true’ history of allergies from a family member or medical records if possible
 - Making sure appropriate tests are performed to localize the source of infection, including cultures if needed

Sepsis Treatment: Antibiotic Stewardship

- **The initial choice of an antibiotic in the ED is perhaps the most important dose the patient receives**
 - Should be based on suspected infection, host factors and prior antibiotic exposure
- **The antibiotic choice in the ED has significant influence on what therapy is continued in the inpatient setting**
 - Represents an important opportunity for antibiotic stewardship

Sepsis Treatment: Antibiotic Stewardship

- ED plays an important role in obtaining cultures prior to administration of antibiotics that allows for tailoring of antibiotic therapy during hospitalization

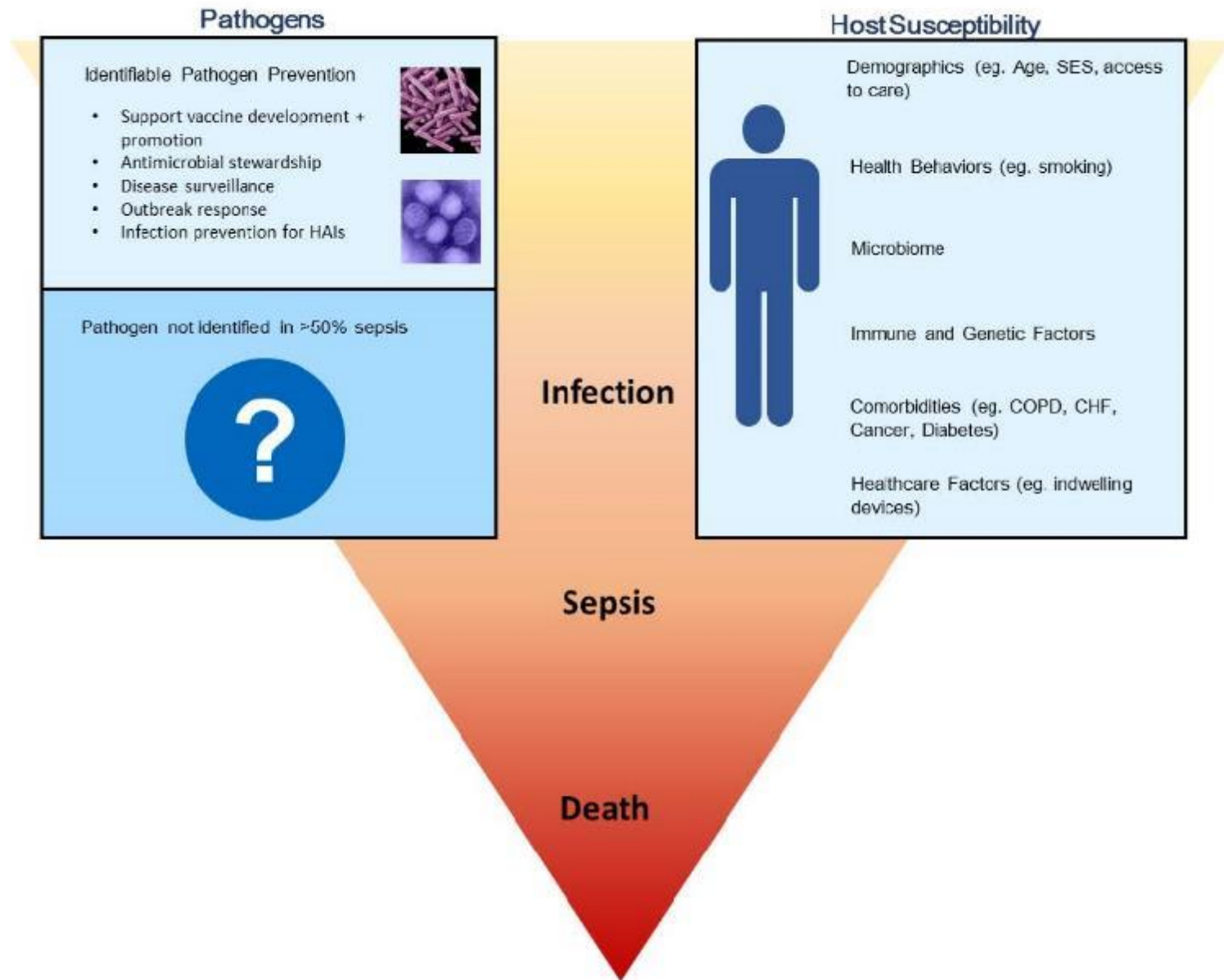
Specimen Collection

- **Swabs are discouraged** since swabs usually have insufficient material for gram stain and culture;
 - if swabs must be used be sure quantity is adequate for both culture and gram stain
- **Do not culture chronic superficial wounds or sinus drainage** since superficial cultures correlate poorly with deep cultures
- **Stool:**
 - Multiple specimens per day are not indicated
 - Formed stools in general should not be submitted

Objectives

- Review the importance of antibiotic stewardship
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Sepsis Prevention Framework



Sepsis Questions: Public Health Perspective

- Who develops sepsis or infections that often lead to sepsis?
- How many persons get sepsis each year in the United States? How many die?
- How can CDC work to improve education for healthcare providers, patients and caregivers about sepsis?
- How can other research – microbiome disruption, patient skin or nasal disinfection, improved management of medical devices, etc. – contribute to sepsis prevention?

Vital Signs: Sepsis (August, 2016)

AUGUST 2016

vital signs

Making Health Care Safer

Think sepsis. Time matters.

Sepsis is a complication caused by the body's overwhelming and life-threatening response to infection. It can lead to tissue damage, organ failure, and death. Sepsis is difficult to diagnose. It happens quickly and can be confused with other conditions early on. Sepsis is a medical emergency. Time matters. When sepsis is quickly recognized and treated, lives are saved. Healthcare providers are the critical link to preventing, recognizing, and treating sepsis.

80%
Sepsis begins inside of the hospital for nearly 80% of patients.

7 in 10
A CDC evaluation found 7 in 10 patients with sepsis had recently used health care services or had chronic diseases requiring frequent medical care.

4
Four types of infections are most often associated with sepsis: lung, urinary tract, skin, and gut.

Healthcare providers can

- Prevent infections.** Follow infection control requirements (e.g., hand hygiene) and ensure patients receive recommended vaccines (e.g., flu and pneumococcal).
- Educate patients and their families.** Stress the need to prevent infections, manage chronic conditions, and seek care if signs of severe infection or sepsis are present.
- Think sepsis.** Know sepsis signs and symptoms to identify and treat patients early.
- Act fast.** If sepsis is suspected, order tests to determine if an infection is present, where it is, and what caused it. Start antibiotics and other medical care immediately. Document antibiotic dose, duration, and purpose.
- Reassess patient management.** Check patient progress frequently. Reassess antibiotic therapy 24-48 hours or sooner to change therapy as needed. Be sure the antibiotic type, dose, and duration are correct.

Want to learn more? www.cdc.gov/vitalsigns/sepsis

Centers for Disease Control and Prevention
National Center for Emerging and Zoonotic Infectious Diseases

Prevent sepsis and improve early recognition.

Improve health conditions.
George is a 72-year-old man with diabetes. During his check-up, George's healthcare provider takes the opportunity to strengthen his chronic disease care (glucose control and skin care), provide recommended vaccines, and share information about symptoms that indicate an infection is worsening or sepsis is developing.

Educate patients and their families.
One week later, George has a cut on his foot that might be infected. He calls his healthcare provider, who tells him how to take care of the cut and signs of infection. Two weeks later, his foot is worse and he becomes short of breath, fevers, chills, and is more tired than usual. His recognition symptoms are worsening and it could be sepsis. He seeks medical attention immediately.

Think sepsis. Act fast.
At the hospital, a healthcare provider recognizes the signs and symptoms of sepsis. She immediately orders tests to determine the source of infection and starts appropriate treatment, including antibiotics. She documents the dose, duration, and purpose of antibiotics.

Reassess patient management.
Healthcare providers closely monitor George's progress and adjust therapy as needed. When George improves, his providers transfer him to a rehabilitation facility to continue his recovery. This hospital care team discharge his treatment plan with the team at the new facility.

Problem:

Sepsis is deadly when it's not quickly recognized and treated.

Certain people with an infection are more likely to get sepsis.

- CDC evaluation found more than 90% of adults and 70% of children who developed sepsis had a health condition that may have put them at risk.
- Sepsis occurs most often in people 65 years or older or younger than 1 year with weakened immune systems, or with chronic medical conditions (e.g., diabetes).
- While less common, even healthy infants, children, and adults can develop sepsis from an infection, especially when not treated properly.

Certain infections and germs lead to sepsis often.

- Four types of infections are often associated with sepsis: lung, urinary tract, skin, and gut.
- Common germs that can cause sepsis are *Staphylococcus aureus*, *Escherichia coli*, and some types of *Streptococcus*.
- *Always get prompt care for the infection with an antibiotic course if infection becomes a life-threatening illness or other serious condition.

Healthcare providers are key to preventing infections and illnesses that can lead to sepsis.

- EDUCATE** patients and their families about the early symptoms of severe infection and sepsis, and when to seek care for an infection, especially those at higher risk.
- REWARD** patients that take control of chronic diseases, take preventive infections.
- ENCOURAGE** infection prevention measures, such as hand hygiene and routine repeat infections.

Common infections can lead to sepsis.

Know the signs and symptoms

Among adults with sepsis:

- 53% had a lung infection (e.g., pneumonia)
- 50% had a urinary tract infection (e.g., urinary infection)
- 50% had a type of gut infection
- 40% had a skin infection

Shivering, fever, or a very cold
Extreme pain or discomfort
Confusion or disorientation
Short of breath

What Can Be Done?

The Federal government is

- Working with partners to promote and align public health efforts, including infection prevention, vaccinations, chronic disease management, appropriate antibiotic use, and sepsis prevention and early recognition.
- Investigating causes of sepsis to identify new prevention strategies and at-risk populations.
- Supporting development of new sepsis tests and treatments.
- Developing more accurate tracking methods to evaluate progress in preventing and treating patients with sepsis.

Healthcare providers can

- Prevent infections.** Follow infection control requirements (e.g., hand hygiene) and ensure patients receive recommended vaccines (e.g., flu and pneumococcal).
- Educate patients and their families.** Stress the need to prevent infections, manage chronic conditions, and seek care if signs of severe infection or sepsis are present.
- Think sepsis.** Know sepsis signs and symptoms to identify and treat patients early.
- Act fast.** If sepsis is suspected, order tests to determine if an infection is present, where it is, and what caused it. Start antibiotics and other medical care immediately. Document antibiotic dose, duration, and purpose.
- Reassess patient management.** Check patient progress frequently. Reassess antibiotic therapy 24-48 hours or sooner to change therapy as needed. Be sure the antibiotic type, dose, and duration are correct.

Health care facility CEOs/administrators can

- Make infection control a priority. Ensure a strong link between infection control and prevention, sepsis early recognition, and appropriate antibiotic use programs.
- Train healthcare providers and front-line staff to quickly recognize and treat sepsis.
- Collaborate with health departments and other health care facilities within your area to improve infection control.

State and local health departments can

- Promote sepsis prevention and early recognition, vaccination, chronic disease management, and infection prevention in health care facilities and community settings.
- Review actions other states and organizations have taken to improve sepsis early recognition and treatment (<http://sepsiscare.org>).

Patients and their families can

- Learn sepsis signs and symptoms. Know if you are at higher risk. If sepsis is suspected, get immediate medical attention. Ask, "Could it be sepsis?"
- Talk to a healthcare provider about managing chronic conditions and getting vaccines.
- Practice good hygiene, such as handwashing.

1-800-CDC-INFO (222-4333)
TTY: 1-800-232-6349
www.cdc.gov

Centers for Disease Control and Prevention
1600 Clifton Road, NE, Atlanta, GA 30333
Publication date: 8/22/16

Thank You!

For more information, contact CDC
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