The Spread of the Superbug

AST STAFF

As technology continues to allow scientists to make medical advances that once were considered difficult, new threats to public health are rising. Superbugs are deadly bacteria that spread easily and can potentially be untreatable. A newer family of superbugs named carbapenem-resistant Enterobacteriaceae, known as CRE, has spread across hospitals throughout the United States in 2013, and again has topped The Center for Disease Control and Prevention's (CDC) top five health concerns for the new year.[1]

HISTORY OF SUPERBUGS

Antimicrobial resistance in bacteria is nothing new. The concern dates back more than 50 years ago as bacterial resistance started to appear in cases of *Staph aureus* infections in the 1950s. Methicillin was introduced in 1960 and just a year later, methicillin-resistance *Staph aureus* or MRSA, was beginning to be seen.[4] Since then, there have been different strains of superbugs.

MRSA, most commonly known and one of the original superbugs, has been followed by a slew of other superbugs that all have one thing in common: resistance to antibiotics. A group of six hospital-borne pathogens, known as ESKAPE (Enterococcus, Staphylococcus, Klebsiella, Acinetobacter, Pseudomonas and Enterobacter) were present in hospitals starting 20 years ago.[6] Because there have been so many antibiotics used to treat these strains, they have been trained to resistant these drugs. This group of bacteria invades through hospital equipment such as surgical implants and central lines making the affected patient susceptible to infection.

LEARNING OBJECTIVES

- Identity how superbug CRE spreads
- Learn about the history of superbugs in American society
- List five of the scariest superbugs in history
- Review AST's standard for hand hygiene
- Summarize the best ways to prevent superbugs from spreading

There are also food-borne bugs that have become drug resistant, partially due to farm animals being fed antibiotics to promote growth.[6] Escherichia Coli and Salmonella are two of these types of strains. Super gonorrhea and chlamydia are also a part of the superbug family as individuals either opt to not seek treatment of these conditions, which leads to a series of problems, or because they have had STD infections treated with antibiotics in the past and now these new strains require more than just a few pills.

Tuberculosis was once curable with antibiotics. Much like the others in the superbug family, it is now resisting antibiotic treatments. This condition is a global threat, killing 1.34 million people each year. Since people can easily travel between countries, TB is being spread faster than ever and is difficult to treat. According to the World Health Organization in 2010, 650,000 out of 12 million TB cases were drug resistant.[6]

CRE is a new family of germs and evades some of the strongest antibiotics, according to the CDC.6 This factor makes these infections almost untreatable. The CDC says in the last year, "one in 25 acute-care facilities reported at least one case of hospital-acquired CRE." (CRE) In a CDC report, 42 states in the US have had at least one report of a particular strain of CRE. These germs tend to be found in the human digestive system and have adapted to resist all forms of antibiotics. This particular strain of CRE has intensified as reports on this strain have increased from 2% to 10% through the past decade in the US.[3]

The superbug tends to affect those who already are ill, have been in the hospital for a while or are elderly. "In 2001, only 1.2% of the common family of bacteria, Enterobacteriaceae, were resistant to carbapenem antibiotics – the strongest class available. By 2011, that figure had jumped to 4.2%."[2] Almost all of CRE infections occur to patients receiving serious medical care and as many as half of the patients who get bloodstream infections from CRE die from the infection.[1]

These deadly antibiotic-resistant superbugs are cause for alarm is if nothing is done to stop their spread. These bacteria have the ability to share its resistance genes with other bacteria making far more common bacteria, such as E coli, possibly untreatable. Since there is a small chance that an effective drug would be developed and produced in the next several years to kill CRE, the issue becomes that of a major public concern.[2]

Antimicrobial resistance in bacteria is nothing new. The concern dates back more than 50 years ago as bacterial resistance started to appear in cases of Staph-aureus infections in the 1950s.

CASE STUDY

According to the CDC, it worked with the state of Florida to stop a year-long CRE outbreak. The outbreak took place in a long-term acute care facility. Improvements were made to a variety of techniques to help control and then reduce the infection. Gown and glove use improved; Staff, equipment and rooms were dedicated to CRE-infected patients; and the staff underwent training in an effort to reduce the spread of the disease. After a year, the percentage of patients who got CRE at the facility decreased from 44% to 0.[1]

PREVENTION

The best way to combat CRE and other superbugs is to get everyone on the same page about taking preventative measures. The CDC has issued a public campaign directed at hospitals, healthcare providers and patients to help curb the spread of this infectious superbug.

Hospitals need to take great care in detecting if any of their patients have CRE and take precautions such as wearing gloves and gowns; dedicating separate rooms, machinery and staff for those who are infected; removing invasive devices, such as catheters, as soon as possible; and making sure that even basics such as hand washing is done properly and followed by everyone.[2]

Doctors should pause before prescribing antibiotics to make sure that the condition(s) a patient has will be appropriately fought by an antibiotic. Patients also need to think twice before asking his or her doctor to prescribe antibiotics as now many common illnesses such as ear infections and sinus infections often go away without them. These two

HOW CRE SPREADS[1]

- Lots of germs abound, a couple of which are CRE
- Antibiotics are used and kill off good germs, leaving the couple of CRE germs behind
- CRE continues to grow, expanding from a couple to many
- CRE germs share their genetic defenses to make other bacteria resistant

HAND HYGIENE

The following is taken from AST's Standard of Practice for Hand Hygiene. For more and other AST Standards of Practice, visit www.ast.org.

Proper care and hygiene of the fingernails, hands and arms by the surgical team members is essential to promoting surgical conscience, providing quality surgical care to the patient, and ensuring a positive outcome for the patient.[7]

STANDARD OF PRACTICE I

The surgical team members should practice on a daily basis effective hand and fingernail hygiene.

1. Effective hand hygiene should be practiced on a daily basis to remove dirt, skin oil, debris and transient microorganisms to prevent transmission to the patient.
   - A. Indications for hand washing include the following:
   - B. Hands are visibly dirty or contaminated, or visibly contaminated with blood or body fluids
   - C. Anytime the possibility existed of contact with blood or body fluids
   - D. When entering the surgical suite at the beginning of a day or shift
   - E. Prior to having direct contact with a patient and between patients
   - F. Immediately after the removal of gloves
   - G. Before and after eating
   - H. Immediately after using the restroom
2. Hand hygiene includes daily skin care by using hand lotions or creams to minimize the occurrence of irritant contact dermatitis, dry and cracked skin associated with repeated handwashing.
   - A. Manufacturers of hand lotions and creams should be consulted regarding any effects their product(s) may have on the persistent effects of antimicrobial soaps being used in the healthcare facility in order to choose the proper lotion or cream.
   - B. Lotions and creams should be selected based on compatibility with gloves.
3. The skin of surgical team members should be healthy and intact. Cuts, abrasions, open sores and hangnails provide a portal of exit and entry of microorganisms, thereby providing risk of exposure to surgical personnel and patients.

STANDARD OF PRACTICE II

Fingernails should be natural and polish-free. Fingernails should be short, debris-free, and not extend past the tips of the fingers.

1. The subungual area of the fingernail harbors high concentrations of bacteria, particularly coagulase-negative *staphylococci*, gram-negative rods, Corynebacteria, and yeasts. The subungual area should be cleansed with particular attention, using a disposable fingernail cleaner and/or fingernail brush under running water.
2. Artificial fingernails should not be worn by surgical team members.
   - A. Artificial fingernails are more likely to harbor greater numbers of microorganisms, as compared to the natural fingernail, even after handwashing. Personnel wearing artificial nails have been epidemiologically connected in outbreaks of infection.
   - B. Fungal growth can occur between the natural fingernail, and the artificial fingernail due to moisture, and products used to apply the artificial fingernail.
3. Studies have established that there is no increase in microbial growth related to wearing freshly applied nail polish. However, it is recommended that fingernail polish should not be worn by surgical personnel.
   - A. Chipped fingernail polish may support microbial growth on the fingernails.
   - B. Data does indicate that chipped nail polish or polish that has been worn for more than four days does harbor greater numbers of bacteria.
4. The relationship between long fingernails and surgical site infections has not been established. However, it is known fingernails that extend beyond the fingertips are more difficult to clean and keep clean, and therefore could contribute to an increase in the potential for harboring greater numbers of microorganisms.
   - A. Fingernails that extend beyond the fingertips add to the potential for scratching patients during patient care, transfer and transport to and from the surgical suite and OR, and while positioning the patient.
   - B. Fingernails that extend beyond the fingertips increase the risk of tearing or puncturing gloves.
   - C. It is recommended that the natural nail tips be kept less than ¼-inch long and not significantly extend past the fingertips.

STANDARD OF PRACTICE III

The reinforcement of hand and fingernail hygiene should be constantly emphasized with surgical technology students and peers.

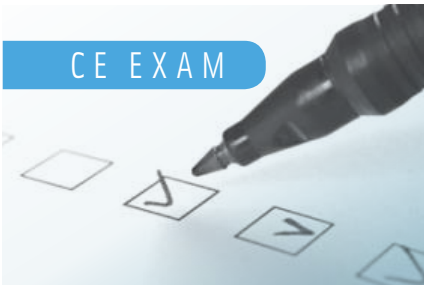
1. Hand and fingernail hygiene begins in the classroom, lab and clinical rotation, and should be constantly emphasized to the student.
2. Education and promotion of hand and fingernail hygiene have been targeted as the primary factors in gaining compliance by healthcare workers.

aspects may help lessen one's resistance to antibiotic drugs.

In 2012, the CDC shared its CRE toolkit as a way to help facilities and individuals partake in measures that can help reduce the chance of CRE appearing. Actions include proper hand hygiene, educational programs and training and CRE screening initiatives.

REFERENCES

1. CDC looks back at 2013 health challenges, ahead to 2014 health worries. December 16, 2013. Accessed January 7, 2014. http://www.cdc.gov/media/releases/2013/p1216-eoy2013.html
2. Eisler, P; Szabo L. CDC sounds alarm on deadly untreatable superbugs. March 6, 2013. Accessed January 7, 2014. http://www.usatoday.com/story/news/nation/2013/03/05/superbugs-infections-hospitals/1965133/
3. Gillen S. Superbug 2013: Deadly Antibiotic-Resistant Superbugs Sweep Across US. March 11, 2013. Accessed January 7, 2014. http://www.policymic.com/articles/29325/superbug-2013-deadly-antibiotic-resistant-superbugs-sweep-across-u-s
4. Mangiadi, J, MD; Marcovici, R. History of Hospital Acquired Infections. 2011. http://www.optimusise.com/history-hospital-infection1.php
5. Moellering, R, MD. NDM-1 – A Cause for Worldwide Concern. *N Engl J Med.* 2010. Accessed January 7, 2014. http://www.nejm.org/doi/full/10.1056/NEJMp1011715
6. Moisse, K. CRE Tops List of Scary Superbugs. March 6, 2013. Accessed January 7, 2014. http://abcnews.go.com/Health/cre-tops-list-scary-superbugs/print?id=18666434
7. 7. Standards of Practice for Hand Hygiene and Fingernails. AST. 2007. Accessed January 7, 2014. http://www.ast.org/pdf/Standards_of_Practice/RSOP_Hand_Hygiene_Fingernails.pdf



Earn CE Credits at Home

You will be awarded continuing education (CE) credits toward your recertification after reading the designated article and completing the test with a score of 70% or better. If you do not pass the test, it will be returned along with your payment.

Send the original answer sheet from the journal and make a copy for your records. If possible use a credit card (debit or credit) for payment. It is a faster option for processing of credits and offers more flexibility for correct payment. When submitting multiple tests, you do not need to submit a separate check for each journal test. You may submit multiple journal tests with one check or money order.

Members this test is also available online at ***www.ast.org.*** No stamps or checks and it posts to your record automatically!

Members: $6 per credit
(per credit not per test)

Nonmembers: $10 per credit
(per credit not per test plus the $400 nonmember fee per submission)

After your credits are processed, AST will send you a letter acknowledging the number of credits that were accepted. Members can also check your CE credit status online with your login information at ***www.ast.org.***

3 WAYS TO SUBMIT YOUR CE CREDITS

Mail to: AST, Member Services, 6 West Dry Creek Circle Ste 200, Littleton, CO 80120-8031

Fax CE credits to: 303-694-9169

E-mail scanned CE credits in PDF format to: ***memserv@ast.org***

For questions please contact Member Services - ***memserv@ast.org*** or 800-637-7433, option 3. Business hours: Mon-Fri, 8:00a.m. - 4:30 p.m., MT

The Spread of the Superbug

362 **FEBRUARY 2014** 1 CE credit - $6

1. **According to the CDC, one in ___ acute-care facilities reported at least one case of hospital-acquired CRE.**
   a. 35
   b. 25
   c. 45
   d. 15

2. **Which group of hospital-borne pathogens is known for invading through hospital equipment such as surgical implants and central lines?**
   a. E Coli
   b. MRSA
   c. ESKAPE
   d. CRE

3. **This particular strain of CRE has increased ____ in the past decade in the US.**
   a. 10%
   b. 2%
   c. 8%
   d. 12%

4. **These superbugs have the ability to share its _____ with other bacteria making far more common bacteria possibly untreatable.**
   a. Resistance genes
   b. Chemistry
   c. DNA
   d. None of the above

5. **In 2012, the CDC shared its CRE toolkit. Actions to reduce spreading superbug infections included:**
   a. Proper hand hygiene
   b. Educational programs
   c. CRE screening initiatives
   d. All of the above

6. **In the state of Florida, CDC worked to help stop a year-long CRE outbreak. After a year, the percentage of patients who got CRE at the facility was ____.**
   a. 44%
   b. 0
   c. 2%
   d. 4%

7. **Tuberculosis was once a curable disease. Now much like the others in the superbug family, it's resisting antibiotic treatments. How many people does TB kill each year?**
   a. 650,000
   b. 12 million
   c. 210,000
   d. 1.34 million

8. **Which of the following is a type of food-borne superbug?**
   a. Chlamydia
   b. CRE
   c. Salmonella
   d. Enterobacter

9. **Reports of antimicrobial resistance started appearing in ____.**
   a. 1961
   b. 1950
   c. 1960
   d. 1951

10. **CDC reports that ___ states in the US have had at least one report of this particular strain of CRE.**
    a. 49
    b. 25
    c. 42
    d. 36

THE SPREAD OF THE SUPERBUG 362 **FEBRUARY 2014** 1 CE credit - $6

NBSTSA Certification No. _____

AST Member No. _____

☐ My address has changed. The address below is the new address.

Name _____

Address _____

City _____ State _____ Zip _____

Telephone _____

☐ Check enclosed ☐ Check Number _____

☐ Visa ☐ MasterCard ☐ American Express

Credit Card Number _____

Expiration Date _____

	a	b	c	d
1	☐	☐	☐	☐
2	☐	☐	☐	☐
3	☐	☐	☐	☐
4	☐	☐	☐	☐
5	☐	☐	☐	☐
6	☐	☐	☐	☐
7	☐	☐	☐	☐
8	☐	☐	☐	☐
9	☐	☐	☐	☐
10	☐	☐	☐	☐

Make It Easy - Take CE Exams Online

You must have a credit card to purchase test online. We accept Visa, MasterCard and American Express. Your credit card will only be charged once you pass the test and then your credits will be automatically recorded to your account.

Log on to your account on the AST homepage to take advantage of this benefit.