

Antibiotic Stewardship Program Protects Patients: Barnes-Jewish Hospital Revamps Program

The development of antibiotics was a breakthrough in patient safety. When antibiotics came on the scene, many thought that patients suffering serious complications, even death, from infections would be a thing of the past. Unfortunately, as the use of antibiotics increased throughout the 20th and 21st centuries, so did the instances of antibiotic-resistant bacteria.

Barnes-Jewish Hospital in St. Louis was one of the first U.S. hospitals to tackle antibiotic resistance. Hospital staff established an Antibiotic Stewardship Program (ASP) in 1984 to improve patient care and decrease the hospital's costs by setting antibiotic-use guidelines. Recently, the organization began an overhaul of the program, bringing its methods into the 21st Century.

Categorizing Antibiotics

Ed Casabar, Pharm.D., B.C.P.S., an infectious diseases clinical pharmacist, is a member of the hospital's Antibiotic Utilization Review Subcommittee. The subcommittee is made up of physicians, nurses, pharmacists, microbiologists, and infection control specialists. Casabar and 17 other members of the subcommittee manage the ASP, in part by reviewing requests for new antibiotics on the hospital's formulary and by classifying formulary antibiotics into one of the three following categories:

1. **Unrestricted antibiotics:**

Physicians do not need prior approval from the Antibiotic Utilization Review Subcommittee to prescribe unrestricted antibiotics.

2. **Controlled antibiotics:**

Although physicians do not need prior approval to prescribe a controlled antibiotic, after 72

hours they must justify its continued use. (Casabar explains that with more information available about the patient's condition after 72 hours, the subcommittee is able to determine whether the patient would be better served with a more specialized antibiotic or no antibiotic at all.)

3. **Restricted antibiotics:** Physicians need the subcommittee's approval before they can prescribe these antibiotics, which tend to be broad-spectrum antibiotics those that are effective against a wide variety of organisms. "They often are new and expensive drugs that we tend to look at under scrutiny," Casabar says.

This restriction process guides physicians in choosing the antibiotic best suited for each patient's condition. "It nudges physicians away from commonly used broad-spectrum antibiotics to less-

expensive, narrower-spectrum ones," Casabar says. Overusing a broad-spectrum antibiotic can eventually lead to a patient becoming resistant to the healing properties of the medication. It can also lead to the development of organisms that are resistant to antibiotics.

Casabar says he has noticed instances of antibiotic resistance increasing during his 22 years at Barnes-Jewish Hospital. However, this problem is not new. The Centers for Disease Control and Prevention (CDC) is addressing this issue through the Get Smart: Know When Antibiotics Work program. "Within about four years after the introduction of penicillin, antibiotic resistance was detected in bacteria," says Lauri Hicks, M.D., the program's medical director. "However, the problem of antibiotic resistance has grown with increasing antibiotic use. Many common infections that were easy to treat now require more intensive treatment and hospitalization."

Case Study at a Glance

Organization: Located in St. Louis, Barnes-Jewish Hospital is a 1,228-bed tertiary care academic medical center affiliated with the Washington University School of Medicine.

Program purpose: To improve patient health and slow the development of antibiotic resistance by guiding antibiotic use.

Lessons learned: Developing and maintaining an Antibiotic Stewardship Program (ASP) required much coordination and communication between hospital departments, along with supportive hospital administration and a key group of dedicated experts to champion the process.

Outcomes: Although measuring outcomes has been challenging, Barnes-Jewish Hospital believes its ASP has improved patient care through the daily educational interactions between antibiotic approval personnel and prescribing physicians. The hospital also has been able to show an impact on costs and some stability in the resistance patterns for certain organisms against certain antibiotics.

Bacteria Fight Back

Appropriate antibiotic use can lead to antibiotic resistance, and inappropriate use compounds the problem, Hicks says. Inappropriate use occurs when people take antibiotics they don't need or fail to follow dosage instructions, or when physicians prescribe the wrong antibiotic.

Hicks explains several ways in which bacteria become resistant to antibiotics:

- Bacteria form families both in and on living bodies. Within each bacteria family there is some diversity, so while most of the bacteria will die when exposed to an antibiotic, some will survive. The surviving bacteria reproduce, and their offspring are antibiotic resistant.
- When an individual doesn't complete the treatment of a prescribed antibiotic, some bacteria may remain in or on his or her body. The remaining bacteria can learn how to evade the antibiotic the next time the individual takes it.
- Antibiotic-resistant bacteria can share information/genetic material with other bacteria, even those outside of their family.
- Individuals who develop or carry antibiotic-resistant bacteria can spread them to others.

Through its Public Health Action Plan to Combat Antimicrobial Resistance, the CDC recommends the following four actions to address the problem¹:

- Surveillance
- Prevention and control
- Research
- Product development

Surveillance of antibiotic resistance provides early warning of emerging problems, allowing health professionals to monitor changing patterns of resistance and put in place preventive

measures. Prevention and control is best addressed by educating patients on the proper use and limitations of antibiotics and ensuring that health care providers have the proper support tools to aid in prescribing antibiotics. Research conducted throughout the years has contributed much to the understanding of the process of antibiotic resistance within organisms and the resulting impact on humans, animals, and the environment. However, product development is not occurring quickly enough to address the problem of increasing antibiotic resistance. Researchers need to make special efforts to translate investigative findings into new antibiotics able to kill resistant organisms as well as diagnostic tests, vaccines, and other tools to prevent the emergence and spread of antibiotic resistance.

Much of the delay in product development is due to reluctance by pharmaceutical companies to invest in the development of new antibiotics that are given for a short time to a small number of patients, Casabar explains. It is more profitable for them to invest in medications to treat chronic conditions, such as arthritis, which are given to a large number of patients, often for the rest of their lives.

Committed to the Future of Antibiotics

Barnes-Jewish Hospital is in line with the CDC's action plan. The hospital has begun surveillance by reviewing the effects of its antibiotic restrictions, says Casabar. "In the past, after we reviewed physician requests to continue a controlled antibiotic, or prescribe a restricted antibiotic we usually didn't look back at the cases," he explains. "By following up, we are able to receive more information on how effective these restrictions have been and tie off any loose ends."


Prevention and control of antibiotic resistance have been the main goals of



Barnes-Jewish Hospital, St. Louis.

the ASP. Barnes-Jewish Hospital is poised to take these goals to the next level, with the recent introduction of its computerized prescriber order entry system. Launched in June, this system is used by pharmacy workers, physicians, and nurses to improve efficiency in drug orders and eliminate transcription errors, incorrect medication abbreviations and requests for medications not on the hospital formulary. Future plans call for the system to give physicians a list of appropriate uses for any drug ordered.

Implementing and updating the ASP has been a labor-intensive project and continues to require great commitment from hospital staff. But the results have been well worth the effort, says Casabar, as staff have noted some stability in antibiotic-resistance patterns.

Another invaluable aspect of the ASP has been the education it provides to new physicians and medical students training at Washington University in St. Louis, which is affiliated with Barnes-Jewish Hospital. "We are proud that the medical students and residents at our hospital are learning how to use antibiotics appropriately through our Antibiotic Stewardship Program," says Casabar. 

Reference

1. Centers for Disease Control and Prevention: *A Public Health Action Plan to Combat Antimicrobial Resistance*. <http://www.cdc.gov/drugresistance/actionplan/html/index.htm> (accessed Oct. 1, 2009).