Wexner Medical Center

Core Metric: Clinical Care Surveillance

Executive Brief

About

Ranked as one of "America's Best Hospitals" for 20 years in U.S. News & World Report, The Ohio State's Wexner Medical Center is central Ohio's only academic medical center. They serve all patients and populations, with the uninsured and Medicaid population comprising approximately 25% of the patient mix. Their expert physicians and researchers are creating the future of medicine through leadership in personalized healthcare, giving people access to unique disease prevention and treatment options based on their own genetic makeup and lifestyle. They have a staff of approximately 16,000, with over 1,500 physicians, 900 fellows/residents and 500 mid-level providers.

Results

- Saved $7.7 mil
- Decreased IV ciprofloxacin use by 50-60%
- Reduced daptomycin use by 50%
- Reduced IV linezolid use by 50%
- Reduced PO linezolid use by 50%
- Reduced ertapenem use by 50%

Overview

In 2008, Ohio State University's Wexner Medical Center (OSUWMC) developed an antimicrobial stewardship program (ASP) to monitor potential overuse, under use and misuse of antimicrobial agents. To gather information, OSUWMC built a data mart in 2013 that extracted data from its electronic medical record system (EMR). The program resulted in clinical initiatives that decreased use of particular antimicrobial agents and drove an estimated $7.7 million in savings.

Situation

OSUWMC implemented a formal ASP in 2008 to minimize unintended consequences of antimicrobial use, including toxicity, the selection of pathogenic organisms with high morbidity and mortality, the emergence of resistant organisms and extended costly hospital stay. Their overarching goal was to optimize clinical outcomes by ensuring the right antimicrobial therapy was given to the right patient at the right time, avoiding the overuse, under use or misuse of antimicrobial agents. They recognized that one critical metric required to successfully evaluate the impact of ASP interventions was antimicrobial use. Knowing the quantity of targeted drugs being used over time was necessary to understand resistance patterns, prescribing patterns and antimicrobial cost burden.

With funding from the Centers for Disease Control and Prevention Epi-Center program, OSUWMC's ASP investigators, with the assistance of the information warehouse staff, developed a preliminary antimicrobial data mart to monitor antimicrobial use in the intensive care units. The preliminary data mart was developed using antimicrobial charges and provided the foundation for OSUWMC's current data mart.

The EMR enabled OSUWMC to upgrade the antimicrobial data mart in 2013 to measure and display the actual drug administered based on electronic medical administration records. They upgraded the data mart using EMR data to allow ASP members to directly access and query data from the EMR database and generate custom reports within OSUWMC's custom enterprise data warehouse. They stratified data by antimicrobial agent, time periods, clinical service and/or unit, and prescribing clinician. The ASP team used the information to monitor antimicrobial use in order to understand resistance patterns, prescribing patterns and antimicrobial cost burden. The data also enabled them to monitor the impact of ASP interventions that affected targeted antimicrobial use.

The data mart itself didn't change physician behavior but reflected the impact of ASP interventions designed to change physician behavior. For example, if an antibiotic became restricted, the prescribing clinician needed to page an ASP team member for approval. If the drug use was approved, the clinician was provided a code to enter into the EMR at the time of ordering. Code entry was required for the pharmacist to process the order. The change in drug volume before and after restriction could be determined from the data mart and be reported back to prescribers.
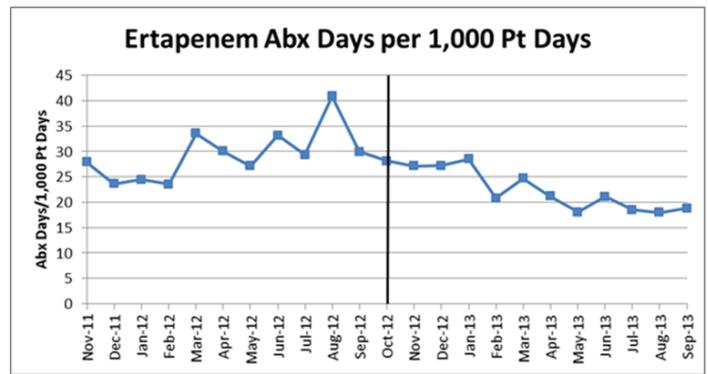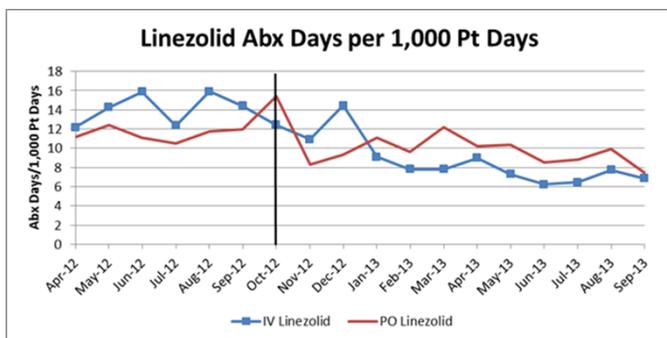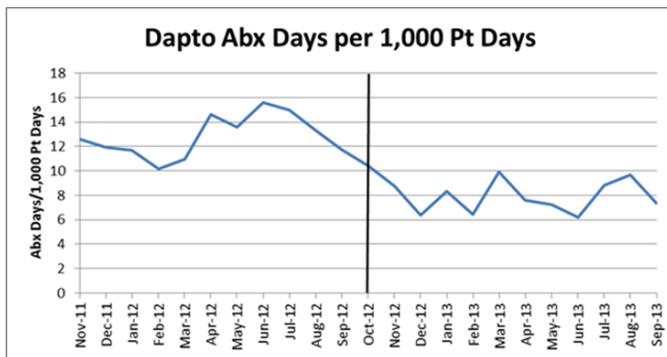
Outcomes

The antimicrobial data mart enabled OSUWMC to assess the impact of ASP interventions and prompt new interventions. Examples included:

- ❖ Decreased IV ciprofloxacin use by 50-60 percent, with a corresponding reduction and leveling of C. difficile infection rates.

Ciprofloxacin Abx days/1,000 Patient Days
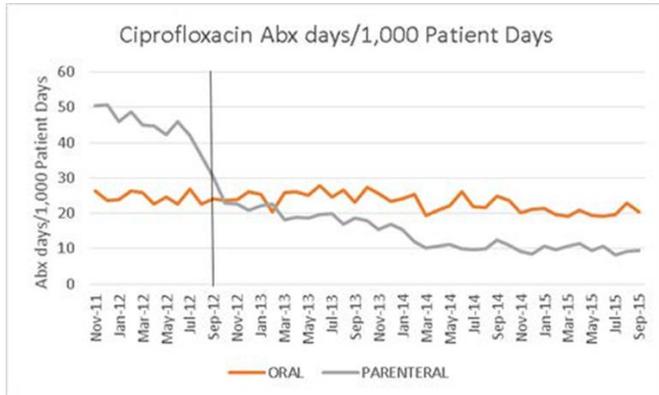
- ❖ Reduced use of daptomycin by 50 percent, from a high of 16 to eight Abx days/1,000 patient days.

- ❖ Reduced use of IV linezolid by 50 percent, from a high of 16 to eight Abx days/1,000 patient days; reduced use of PO linezolid by nearly 50 percent, from a high of 15 to eight Abx days/1,000 patient days.

Dapto Abx Days per 1,000 Pt Days

Linezolid Abx Days per 1,000 Pt Days

Ertapenem Abx Days per 1,000 Pt Days

- ❖ Reduced use of ertapenem by 50 percent, from a high of 40 to 20 Abx days/1,000 patient days.

Financial Considerations

Five information warehouse staff spent 913 hours planning, designing, building and configuring the data mart, with an estimated $57,062.50 total resource cost for the project.

The data mart was instrumental in measuring the impact of pharmacy and ASP interventions on drug use reduction and associated cost savings. The estimated cost savings just from the restriction of linezolid over five months was $315,560 and $7,463,204 from highest to lowest use.

Lessons Learned

OSUWMC shared these insights:

- ❖ A major challenge in implementing the antimicrobial data mart was accounting for the patient's location. Patients move around throughout the day. To create an "anti-microbial day" measure broken down by location, we had to decide which location to use. In the end, we used the patient's location at midnight, allowing us to analyze the "anti-microbial days" in conjunction with the midnight census.

- ❖ Identifying anti-microbial drugs prior to the implementation of RxNorm (National Institutes of Health's medication naming and terminology system) proved difficult due to some drugs having multiple classifications and uses. We manually accounted for all drugs to identify which should be included as anti-microbial drugs. Because of antimicrobial labeling limitations in RxNorm, further analysis of RxNorm in 2015 showed that we will need to continue manual identification of antimicrobial drugs for the foreseeable future.

- ❖ Deep collaboration between IT and the clinical department was valuable. IT engaged the ASP early and often, rather than simply delivering exactly what was requested. IT was able to to design a functional solution that got to the root of their request.