UNIVERSITY of MARYLAND
UPPER CHESAPEAKE HEALTH

Antibiotic Stewardship – A Journey Toward the Triple Aim

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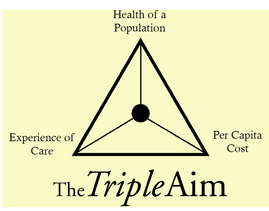
Problem Statement

UM UCH recognized that our institution's nosocomial *C. difficile* rates during the years 2004-2008 were averaging around 1/1000 patient days. Rates of Vancomycin resistance enterococci were over 40% and community acquired MRSA infections were an emerging threat. Anecdotal evidence pointed to occasional inappropriate antibiotic use at our two hospitals.

Looking at national trends, the Centers for Disease Control and Prevention (CDC) estimates that 20-50% of antibiotics are either prescribed inappropriately or unnecessarily. Antibiotic misuse can lead to adverse drug reactions, *C.difficile* infections, and increased antibiotic resistance. Emerging antibiotic resistance is currently a major threat to public health warranting the development of antibiotic stewardship programs.

With this context in mind, UM UCH decided to establish an antibiotic stewardship program (ASP).

Antibiotic Stewardship Program Goals



- Promote appropriate use of antimicrobial therapy.
- Minimize the emergence of antimicrobial-resistant bacteria.
- Preventing hospital acquired *C. difficile* infections.
- Reduce healthcare costs in alignment with the Triple Aim.

Community Hospital Collaboration

Solutions

Solution 1: Antibiotic Restrictions

- Restrict the use of commonly misused and expensive, broad spectrum ABX.
  - Empiric use of Level 1 ABX (piperacillin-tazobactam and vancomycin) is restricted for 72 hours, after which either a positive culture or an ID consult is required
  - Empiric use of Level 2 ABX (carbapenems, echinocandins, tigecycline, daptomycin, linezolid, ganciclovir, voriconazole, lipid amphotericin and non-formulary antibiotics) requires an ID consult within 24 hours.

Solution 2: De-escalation

- Pharmacy reviews a daily Microbiology report and suggests de-escalation of antibiotics based on culture results.

Solution 3: Pharmacokinetic and Renal Dosing

- Pharmacy performs all pharmacokinetic dosing for patients on vancomycin and aminoglycosides and monitors for toxicities.
- Pharmacy is authorized to order drug levels, BUN/creatinine and adjust dosages for these antibiotics. The pharmacy is additionally authorized to adjust dosages for all antibiotics according to renal function per hospital guidelines.
- Implemented extended infusion dosing of piperacillin-tazobactam.

Solution 4: IV to Oral Antibiotic Conversion

- Pharmacy is authorized to automatically switch some ABX from IV to PO when criteria are met per hospital guidelines.

Solution 5: Pharmacy Rounding

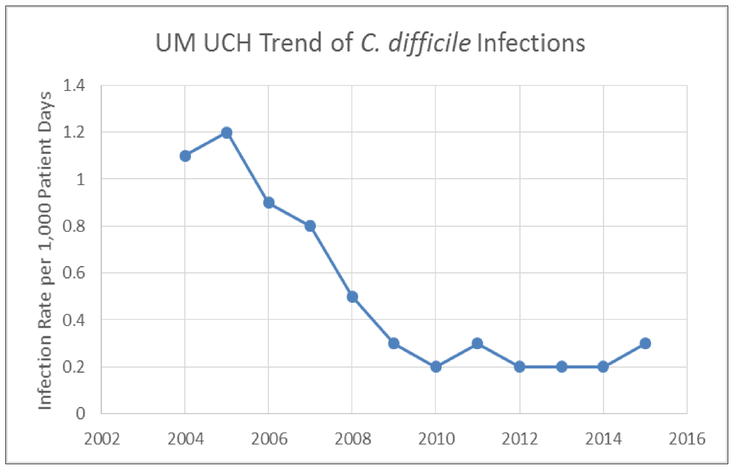
- Clinical pharmacists make rounds in the ICU and some nursing units daily. The rounds provide means to review every single ABX to make sure they are used for the appropriate indications, duration and with the optimal dosing and routes of administration. Pharmacy also enforces the use of all restricted ABX during these clinical rounds.

Solution 6: Order Sets and Clinical Pathways

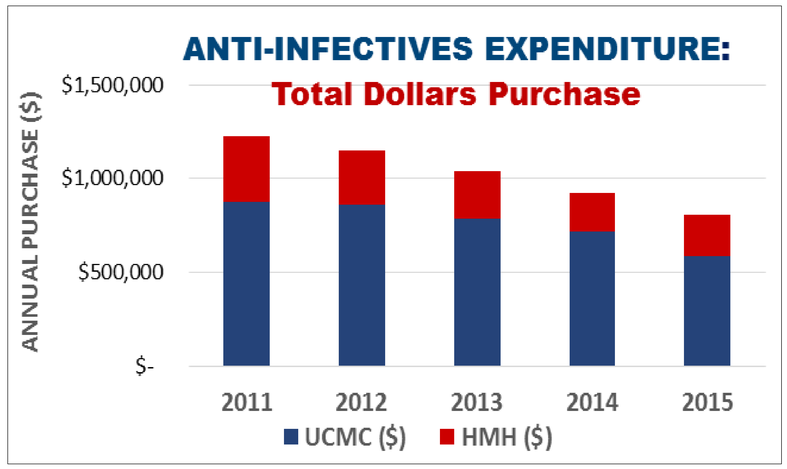
- Order sets and clinical pathways guide providers regarding the choices of ABX based on clinical indications such as sepsis, COPD, cellulitis, meningitis, and pneumonia using evidence-based guidelines and review of our annual antibiograms.

Measurable Outcomes

Outcomes of our Antibiotic Stewardship program address quality and patient safety, as well as health care expenditure. Program results are shared with hospital leadership and key stakeholders via the Medical Executive Committee, Quality of Care Committee, and Board of Directors.



Since establishing of our ASP, our rates of *C. difficile* infections have stayed in the range of 0.2-0.3/1000 patient days. This rate reduction has been sustained over the past five years without any other intervention which could have decreased *C. difficile* rates.



Cumulative savings of ABX purchases of approximately $1,000,000 were calculated over a four year period.