ICAP Journal Club

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Article

Seas C, Legua P, Delfin B, et al. **Implementing an Antimicrobial Stewardship Program in an Oncology Center in Lima, Peru: A Model for Low- and Middle-Income Countries.** *Open Forum Infectious Diseases*. 2024; 4(8): ofae402. https://doi.org/10.1093/ofid/ofae402

Study Summary

This study evaluated the performance of a multifaceted antimicrobial stewardship (AMS) intervention strategy that was designed and implemented to foster acceptance of recommended antimicrobial regimens, optimize antimicrobial consumption, and streamline the use of antimicrobials for surgical prophylaxis.

Study Setting

- The largest private oncology center in Lima, Peru
- The hospital had 77 admission beds, a 24-hour emergency room, a 6-bed intensive care unit and a fully equipped laboratory for microbiological testing

Methods

- Between 2016 and 2023, the AMS program was implemented by a team that included a physician–infectious disease specialist, microbiologist, pharmacist, and two nurses.
- The program followed the recommendations of the World Health Organization (WHO) toolkit for low-income and middle-income countries[i], and included the following interventions:
    - *Multidisciplinary collaboration:* Members of different specialties including oncologists, surgeons, intensive care unit staff, emergency physicians, infectious disease specialists, microbiologists, epidemiologists, nurses, and pharmacists collaborated in designing a collaboration plan.
    - *Documentation of microbiological information:* Data on pathogens isolated in the bloodstream, respiratory tract, and urinary tract were tabulated according to patient location, age, gender, and type of tumor using WHONET software.[ii] The information was reviewed by the AMS team and published every 6 months.
    - *Local Guidelines and Protocols:* Guidelines for treating infections and for surgical prophylaxis according to local microbiological data were developed and shared across all specialties through the center's electronic software.

- *Education and Training:* Educational materials were developed including videos, lectures, and printed materials featuring crucial messages about the importance of proper antimicrobial use and the consequences of misuse. Training sessions were scheduled throughout the year to ensure awareness of policies and adherence to best practices.
- *Audit and Feedback*: Healthcare personnel reviewed prescriptions of antimicrobials with high consumption rates (particularly vancomycin and meropenem, which are often misused, as well as ceftriaxone, ciprofloxacin, and voriconazole). A prospective audit was conducted twice for each patient: within 24 hours of the prescription and 72 hours later. Immediate feedback was provided to prescribers after each audit.
- *Pharmacy Alerts:* The pharmacy issued an alert whenever a restricted antimicrobial was prescribed, as well as when it had been used for seven days, to enable real-time monitoring of antimicrobial prescribing.
- *Continuous Quality Improvement:* The AMS team met regularly to assess quality performance indicators, and to design strategies for enhancing quality indicators.

- To evaluate the program, data on adult patients with cancer were collected prospectively for the following indicators:
    - Percentages of consultations for audits within 24 hours of prescription and 72 hours later
    - Percentage of recommendations accepted
    - Antimicrobial consumption, calculated as the average daily defined dose (DDD) per 100 patient-days (pd).[iii]
    - Prescription and adequacy of antimicrobial prophylaxis for mastectomies and prostatectomies, with a target of 90% for both indicators.

Results

- The median monthly number of first audits was 130 (range 88–188).
- The proportion of antimicrobial prescriptions that were audited once or twice increased from 60% in 2016 to 95% in 2023; the percentage of recommendations in these audits that were accepted increased from 65% to 95%.
- There was a marked reduction in the consumption of vancomycin and meropenem during the 8-year study period.
    - Vancomycin consumption decreased by 95% (from 9.3 to 0.5 DDD per 100 pd), which coincided with the near absence of methicillin-resistant *Staphylococcus aureus* (MRSA).
    - Meropenem consumption decreased by 84% (from 25 to 4 per DDD per 100 pd).
- Since 2019, the overall proportion and adequacy of prescriptions of antimicrobials for prophylaxis in mastectomies and prostatectomies have consistently exceeded 90%.
- Between 2016 and 2023, the mean number of bacterial isolates per year was 900.

- The five most common bacteria in bloodstream infections were: *Escherichia coli* (37%), *Klebsiella pneumoniae* (17%), *S. aureus* (4%), *Pseudomonas aeruginosa* (4%), and *Enterococcus faecalis* (4%). Fifty-two percent of cultured *E. coli* and 60% of cultured *K. pneumoniae* produced extended-spectrum beta-lactamases (ESBLs).
- The rate of in-hospital all-cause mortality remained stable at 3%.

Critical Analysis

This study demonstrated that implementing a multifaceted AMS intervention strategy resulted in notable increases in infectious disease consultations and acceptance of recommendations as well as a reduction in the prescription of critically misused antibiotics. The AMS program also achieved improvements in prescription and adequacy of surgical prophylaxis. The following points should be considered when interpreting the study findings:

- Tests of statistical significance were not performed for the change in antimicrobial consumption and adequacy of surgical prophylaxis.
- While the authors noted that in-hospital all-cause mortality remained stable during the study period, the impact of the interventions on patient outcomes like length of stay and morbidity are unknown.
- While AMS programs typically collaborate closely with infection prevention and control (IPC) programs to tackle antimicrobial resistance, information on IPC activities and data on healthcare-associated infections were not provided.
- The study was conducted in a single private oncology center, and the findings may not be generalizable to health facilities with different contextual characteristics.
- Comprehensive educational measures were implemented for healthcare workers, which are resource-intensive and may not be feasible in resource-limited settings.
- The study evaluated DDD per 100 pd instead of days of therapy. Antimicrobial utilization data presented in DDDs provide a rough estimate of consumption and do not represent actual use. DDDs do, however, allow for comparison across facilities, and are more feasible to measure in resource-constrained healthcare settings.

Implications

This study highlighted the feasibility of implementing a multi-faceted intervention to enhance antimicrobial use within oncology centers in resource-limited settings. Multi-disciplinary teamwork, establishing guidelines for treating common infectious diseases, monitoring antibiotic consumption metrics, educating healthcare professionals about antimicrobial treatment, and sharing of results and periodic feedback across disciplines can reduce antimicrobial consumption and improve the rational use of antimicrobials. A similar intervention strategy can be adopted and implemented in LMICs to curb the misuse of antibiotics in hospital settings.

This article synopsis was written by Dr. Getachew Kassa. Share your thoughts on this article or suggest an article for Journal Club by emailing him at gk2353@cumc.columbia.edu.

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[i] World Health Organization. Defined Daily Dose. Available from: https:// www.who.int/tools/atc-ddd-toolkit/about-ddd

[ii] WHONET. Microbiology laboratory database software. Available from: https://whonet.org/#:~:text=WHONET%20is%20a%20free%20desktop,and%20Women's%20Hospital%20in%20Boston

[iii] World Health Organization. Defined Daily Dose. Available from: https:// www.who.int/tools/atc-ddd-toolkit/about-ddd