Antimicrobial Stewardship Program Implementation in a Medical Intensive Care Unit at a Tertiary Care Hospital in Saudi Arabia

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BACKGROUND

- The inappropriate antimicrobials use, that is currently observed in intensive care units (ICUs) results in increased selection of resistant pathogens, health care cost, as well as significant impact on patients’ mortality [1].
- Published data from Infectious Diseases Society of America (IDSA) and Society for Healthcare Epidemiology of America (SHEA) has shown antimicrobial stewardship program (ASP) implementation to minimize emerging antimicrobial resistance associated with inappropriate antimicrobial use [2-5].
- King Faisal Specialist Hospital & Research Center (KFSHRC), ICU in particular, presents one setting where utilizing such a program is essential to promote antimicrobials standard of practice, and improve patients’ clinical outcomes [1, 5, 7].

OBJECTIVE

Primary Objective: Compare the appropriateness rate of empirical antibiotics therapy (initial and final) before and after implementation of “proactive” antimicrobial stewardship program. Initial appropriateness was defined as the first intervention initiated by physicians while final appropriateness was assessed following ASP team interventions.

Secondary Objectives: The rate of clostridium difficile-associated diarrhea (CDAD), frequency of multi-drug resistant organisms (MDR) including methicillin-resistant staphylococcus aureus (MRSA), extended spectrum beta-lactamasmes producing strains (ESBL), and physicians’ acceptance rate for the ASP recommendations.

METHODS

Study Design: This is a comparative, non-randomized, historical-controlled study. Adult medical ICU patients were enrolled, in a prospective fashion, under active ASP arm and compared with historical patients who were admitted to the same unit before the ASP implementation (Figure 1)

Setting: KFSHRC-Riyadh is an 894-bed multi-facility, multi-entity tertiary care hospital with 20 adult male and female beds at medical intensive care unit (MICU). Adult critically ill patients (> 14 years old) were defined as those requiring mechanical ventilation (invasive or noninvasive), or those with a fraction of inspired oxygen (FiO2) concentration ≥ 0.6; and/or those requiring intravenous infusion of inotropic or vasopressor medications.

Patients’ Selection: “Please refer to figure 2.3 and table 1”

Inclusion criteria:
- Patients on five targeted antibiotics: piperacillin/tazobactam, imipenem/cilastatin, meropenem, vancomycin, tigecycline.
- No Official Infectious disease (ID) service consultation.

Exclusion Criteria:
- Patients were excluded if they didn’t fit the previously mentioned inclusion criteria.

Statistical analysis:
- A sample size of 73 participants (49 in historical control arm and 24 in active ASP arm) based on alpha of 0.05 would yield 90% power to detect a difference of 20% between groups for the primary outcome.
- Descriptive data were analyzed by using chi-square test for categorical data and student t-test for continuous data. The commercial software SPSS system (version 19) was used for statistical analyzes.

RESULTS

- ASP implementation in the MICU at tertiary care hospital resulted in optimal utilization of antibiotics. The significant appropriateness of antibiotics in the active arm is contributed by ASP and the proactive nature of its implementation.
- A positive outcome was noted on emergence of multi-drug resistant organisms (MDR), however, the rate of clostridium difficile-associated diarrhea was comparable between the groups.
- The results of our study are consistent with the Cochrane meta-analysis which showed a positive impact of interventions for optimization of antibiotics use and MDR emergence [8].
- Limitations of our study included lack of randomization, single institution’s population, and difficulty in controlling confounding variables.

CONCLUSION

Antimicrobial stewardship program is important in many healthcare settings; the ICU presents one setting where it is greatly needed. Therefore, utilizing such data can improve clinical outcomes and the cost-effectiveness of antimicrobial therapy by increasing the likelihood that the appropriate antibiotic treatment will be prescribed.

References available upon request