Evaluation of the Impact of Urine Culture and Susceptibility Testing on Optimizing Antibiotic Prescribing: A Retrospective Observational Study

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Abstract

Objective:

This study aimed to evaluate the impact of culture and susceptibility testing in improving antibiotic prescribing retrospectively in Jordan.

Methods: This is a retrospective cross-sectional study that was conducted at Jordan University hospital, all urine cultures requested for adult patients (≥ 18 years) admitted to JUH within the period from January 2019-July 2021were reviewed and only those cultures with positive episodes of infection were considered. The empiric antibiotic prescribed prior to the urine culture data and susceptibility results, as well as the specific antibiotic prescribed after the urine culture data and susceptibility results, were evaluated. The antibiotic appropriate prescription before and after culture results were compared to evaluate the improvement in antibiotic prescription following culture and susceptibility testing.

Results: In this study, 6950 urine culture episodes for 6950 patients were screened, among them, 65.5% (n = 4550) were negative culture episodes and were excluded from the study. The remaining 34.5% (n = 2400) revealed positive results. Among those patients with positive culture episodes, 1600 patients (66.7%) were discharged too early before the availability of culture results and were excluded. Of the remaining 800 patients, 701 patients (87.6%) received empiric treatment. In 26.8% of the cases, the prescribed empiric agents failed to have appropriate coverage of the identified pathogens, and in 14.6% of the cases, the identified microorganisms were reported as resistant to the prescribed empiric agents. Furthermore, only 13.4% of the patients (n = 107) were appropriately treated with empiric antibacterial agents. We were not able to judge the appropriateness of the prescribed empiric antibacterial agents for one-third (32.9%) of the patients because they didn't have susceptibility reports performed. After culture and

susceptibility results were available, antibacterial medications were administered to 92.9% of patients. The most frequently prescribed empiric and specific antibacterial medications were ceftriaxone and imipenem, respectively. Among the 800 patients, only 25.4% of them were appropriately treated with antibacterial medications following culture and susceptibility results, while the remaining 597 (74.6%) had received inappropriately targeted therapy. Only 12.4% of patients were received correct empiric as well as specific antibacterial treatment, whereas one-third of patients (31.9%) still receive incorrect treatment even after culture results are available. Unfortunately, we were not able to judge the appropriateness of 42.5% of the prescribed targeted antibacterial agents because of a lack of susceptibility testing. The overall improvement in antibiotic prescription after culture results was available was 10.5% (n = 84), while 22 (2.8%) patients had a worsening in their treatments.
Conclusion: The proper use of antibacterial agents in hospitalized patients includes the correct selection and duration of empiric antibiotics as well as the targeted agent. Inappropriate prescribing encourages the emergence of bacterial resistance and results in a deterioration in a patient's outcome. This study revealed a high rate of inappropriate prescribing of empiric antibiotics as well as targeted therapy at JUH.

Keywords: Antibiotic resistance, Empiric antibiotic, Specific antibiotic, Urine culture, Susceptibility test, Jordan.