

Review Article

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Role of Microbiology Laboratory in Hospital Antimicrobial Stewardship Program: Bringing Backstage to the Apron?

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ABSTRACT

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Worldwide, all clinicians are daily dealing with infectious diseases in their fields and they rely on microbiology laboratory reports for evidence-based treatment of their patients. Nowadays, antimicrobial stewardship programs (ASPs) are becoming popular in health care systems in order to improve quality of antimicrobial therapy and patient outcome. Active commitment of clinical microbiologists in ASP teams and close collaboration of microbiology laboratory with infectious disease physicians is highly desired.

Introduction

Antimicrobial resistance is related to misuse – often overuse -of antimicrobials for both hospitalized and ambulatory patients. There are reasons for inappropriate antimicrobial prescription including lack of a microbiologically supporting data, laboratory mistakes, sending specimens to the laboratory wrongly and over-emphasize on empirical antimicrobial therapy. Antimicrobial stewardship program (ASP) is an interventional package to encourage the

optimal use of antimicrobials in order to achieving the best clinical outcome, with minimal toxicity and impact on following antimicrobial resistance (1). ASP is the cornerstone of antimicrobial policy improvement both in and outside hospitals. From the microbiological view, ASPs diminish antimicrobial resistance, toxicity and side effects, in addition to decrease the rate of clostridioides difficile infection (2).

Because of wide range of infectious diseases and complications, clinical microbiologist has

todeal with a wide range of clinician. For a successful ASP, Clinical microbiologist and infectious disease physicians should collaborate closely(3,4,5), Although there is wide variation in this cooperation field worldwide (6).

Right diagnosis is basis of effective therapy, including right drug, dose and duration. (7). So, the microbiology laboratory can help clinicians to make an effective therapeutic plan based on right microbiological information. Microbiology laboratory has prominent role in ASP “six D's of antimicrobial stewardship” (Diagnosis, Debridement/drainage, Drug, Dose, Duration, De-escalation) (8).

According to the 2007 IDSA/SHEA guidelines, the membership of clinical microbiologists in ASP team was considered optimal. Their role was described as “the microbiology laboratory plays a critical role in antimicrobial stewardship by providing patient-specific culture and susceptibility data to optimize individual antimicrobial management and by assisting infection control efforts in the surveillance of resistant organisms and in the molecular epidemiologic investigation of outbreaks”. The other important mission of microbiology laboratories in ASP described there was providing a local antibiogram panel in order to facilitate making local antimicrobial therapy guidelines. (9)

In a 2016 guideline update, six “to-do” recommendations were described for microbiology laboratory in ASP team: (10)

“We suggest development of stratified antibiograms over solely relying on non-stratified antibiograms to assist ASPs in developing guidelines for empiric therapy (weak recommendation, low-quality evidence)”.

“We suggest selective and cascade reporting of antibiotics over reporting of all tested antibiotics (weak recommendation, low-quality evidence)”.

“We suggest the use of rapid viral testing for respiratory pathogens to reduce the use of inappropriate antibiotics (weak recommendation, low-quality evidence)”.

“We suggest rapid diagnostic testing in addition to conventional culture and routine reporting on blood specimens if combined with active ASP support and interpretation (weak recommendation, moderate-quality evidence)”.

“In adults in ICUs with suspected infection, we suggest the use of serial PCT measurements as an ASP intervention to decrease antibiotic use (weak recommendation, moderate-quality evidence)”.

“In patients with hematologic malignancy at risk of contracting invasive fungal disease (IFD), we suggest incorporating nonculture-based fungal markers in ASP interventions to optimize antifungal use (weak recommendation, low-quality evidence)”. Microbiology laboratories also should provide protocols to clarify how to choose the appropriate test or culture according to the patient signs and symptoms, how to obtain proper clinical specimens, how to send the microbiology laboratory and finally how to interpret microbiology reports. Clear examples in these fields are problems about of blood cultures contaminants and sending unnecessary urine cultures in asymptomatic patients (11).

The Clinical & Laboratory Standards Institute (CLSI) and European Committee for Antimicrobial Susceptibility Testing (EUCAST) guidelines are updating regularly

and are essential for microbiology laboratories to provide qualified reports, although there are considerable controversies between them to choose the most appropriate cut-off points which could be challenging (12,13). Therefore, close collaboration between ID physicians and clinical microbiologists is necessary for implementing new breakpoint guidelines (14,15).

In conclusion, we believe that clinical microbiologist plays a crucial role in the ASP through provide fast and accurate microbiology result, especially in the inpatients settings in order to accelerate diagnosis and management of infectious diseases and related complications. Also, we recommend to do regular CME activity and educate clinicians about importance of ASP at the hospital.

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