Meta-analyses on the Optimization of the Duration of Antimicrobial Treatment for Various Infections

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KEYWORDS

- Meta-analyses • Duration • Antibiotics • Treatment • Short
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Thirteen relevant meta-analyses (MAs) were identified. A variety of infections were the focus in these MAs: acute bacterial meningitis in one, acute otitis media in one, acute bacterial sinusitis in one, streptococcal tonsillopharyngitis in two, infectious exacerbations of chronic bronchitis in two, community-acquired pneumonia (CAP) in two, acute pyelonephritis in one, acute cystitis in two, and brucellosis in one. The herein reviewed MAs indicate that a short-duration treatment seems to be as effective as a longer course of antibiotic treatment in such infections as acute otitis media, acute bacterial sinusitis, CAP, infectious exacerbations of chronic bronchitis, and acute pyelone-phritis. In the case of acute cystitis, clinical success is not different in the comparators, whereas a better bacteriologic cure rate is evident in the long-duration regimens. In the case of streptococcal tonsillopharyngitis and brucellosis, patients receiving longer courses of antibiotics have better clinical and bacteriologic cure rates. MAs can have a decisive role to estimate the optimal duration of treatment for various infections with far-reaching implications for clinical practice. The duration of antibiotic treatment

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can be shortened in a variety of common bacterial infections without compromising patients' outcomes.

The duration of antibiotic treatment is often a dilemma for physicians as to whether a short or a lengthier regimen is more appropriate. A longer than necessary duration of treatment is unwanted for several reasons. The longer the drug is administered to a patient, the greater the risk for toxicity. Recent data suggest that a significant number of patients taking antibiotics present to the emergency departments of hospitals with a variety of adverse events.[1] Moreover, longer treatment is more expensive to the patient and to the health care system. In addition, resistance of the microorganisms responsible for the infection may be more likely to develop when patients are exposed to longer courses of antibiotics;[2] antimicrobial resistance can increase the days of hospitalization, morbidity, or mortality.[3] Finally, patient compliance is another potential benefit of short-duration antibiotic regimens. It is mandatory to evaluate whether a shorter-duration antibiotic regimen for the treatment of a disease is as effective as a longer one and therefore preferable.

It is not surprising that a significant number of randomized control trials (RCTs) have been conducted to examine the optimal duration of antibiotic treatment for various infections. Conflicting results of these RCTs may only further perpetuate the question regarding the ideal duration of antibiotic treatment. This problem may be solved by the panorama of these studies, with the use of MAs. Specifically, the results of all the RCTs on each specific field can be examined, analyzed, and evaluated by the use of MAs.

LITERATURE REVIEW

In this study the Medline, Scopus, and Cochrane online medical databases were searched for MAs investigating RCTs that examined the duration of treatment for the respected diseases. This study is restricted to humans and articles written in the English language. Only MAs that included a comparison of the same antibiotic in both treatment groups (short-duration arm and long-duration arm), either as the only focus of the MA or at least in a subset analysis, were further reviewed. This approach was used because significant differences in pharmacokinetic properties (ie, half-time) of one antibiotic in comparison with another antibiotic may introduce heterogeneity in the comparison of short- versus long-duration antibiotic regimens. A total of 13 relevant MAs were retrieved: one for acute bacterial meningitis, one for acute otitis media, one for acute bacterial sinusitis, two for streptococcal tonsillopharyngitis, two for infectious exacerbations of chronic bronchitis, two for CAP, one for acute pyelonephritis, two for cystitis in women, and one for brucellosis.

RELEVANT META-ANALYSES
Acute Bacterial Meningitis

Karageorgopoulos and colleagues[4] have performed a MA to study the clinical effectiveness and safety of short duration of antimicrobial treatment versus long duration in acute bacterial meningitis. Five RCTs with an open-label design involving children (age range, 3 weeks–16 years) were included. No difference could be shown in the comparison of short-duration (4–7 days) with long-duration (7–14 days) treatment with intravenous ceftriaxone regarding the clinical outcomes of this MA. Specifically, there was no difference in the end-of-therapy clinical success (five RCTs; 383 patients; fixed effect model [FEM]; odds ratio [OR], 1.24; 95% confidence interval [CI], 0.73–2.11) or in the long-term neurologic complications (five RCTs; 367 patients; FEM; OR, 0.60; 95% CI, 0.29–1.27). In addition, long-term hearing impairment (four RCTs;