the potency of the given drug and provides no information regarding the time-course of antibiotic effect, nor whether the rate of bacterial killing may be altered *in vivo* by inadequate drug exposure (16). Accordingly, the best way to categorize an antibiotic is through the combination of the PK/PD characteristics, as it defines the individualized drug exposure necessary to ensure the optimal drug effectiveness for a given pathogen. In the past, this was considered merely a theoretical concept. Anyway, thanks to the identification of clinically relevant PK/PD targets measurable in hospital laboratories, individualized dosing strategies have been recently proposed [12]. Beta-lactam agents are examples of time dependent antibiotics (T>MIC), where the rate of killing is determined by the length of time necessary to kill, whereas aminoglycosides, daptomycin and fluoroquinolones are concentration-dependent antibiotics (Cmax/MIC), where killing is dependent on increasing concentrations of the drug. Some antimicrobial agents such as azithromycin, clindamycin, vancomycin, oxazolidinones and tetracycline exhibit mixed time-dependent and concentration dependent properties (AUC/MIC).

A growing body of literature has been published in the last 2–3 years showing that licensed standard doses of antibiotics are often insufficient to achieve PK/PD targets in ICU patients. This has been demonstrated for linezolid, meropenem, ceftriaxone, piperacillin-tazobactam, and daptomycin. Patients at risk of not attaining these targets would benefit from drug dose intensification, with significant improvements in the clinical cure rates (12).

Conclusions

The current scenario of persisting poor outcomes for ICU patients with infection, as well as the documented association between suboptimal antimicrobial exposure and treatment failure, calls for an urgent and rapid optimization of drug dosing in this clinical setting. We, therefore, propose fast-track pharmacology as a branch of clinical pharmacology by direct analogy with what has been achieved in microbiology and enabled by improvements in analytical techniques. The concept of fast-track pharmacology facilitates the application of pharmacologic concepts at the bedside with the goal of improving the safety and efficacy of antimicrobial therapy for ICU patients.

A fast pharmacology could help to address this issue by providing TDM results with a short turnaround time and by guiding physicians in the rational adjustment of antibiotic doses by proper identification and weight of the clinical variables eventually affecting drug PK in ICU (17). However, prospective clinical trials are required to determine whether a fast pharmacology-based approach (ideally combined with a fast microbiology to reach PK/PD targets) can significantly improve the treatment of infections in ICU patients.

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