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A review of the factors influencing antimicrobial prescribing

Esther Calbo[a,b,*], Luis Álvarez-Rocha[c], Francisco Gudiol[d] and Juan Pasquau[e]

[a]*Unidad de Enfermedades Infecciosas, Servicio de Medicina Interna, Hospital Universitari Mútua de Terrassa, Terrassa, Barcelona, Spain*
[b]*Departamento de Medicina, Universitat Internacional de Catalunya, Barcelona, Spain*
[c]*Unidad de Cuidados Intensivos, Hospital Universitario de A Coruña, A Coruña, Spain*
[d]*Servicio de Enfermedades Infecciosas, Hospital de Bellvitge, Universitat de Barcelona, Barcelona, Spain*
[e]*Servicio de Enfermedades Infecciosas, Hospital Virgen de las Nieves, Granada, Spain*

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ABSTRACT

There are multiple benefits of appropriate antimicrobial prescribing: it has a direct impact on clinical outcomes, avoids adverse effects, is cost effective and, perhaps most importantly, it helps to prevent the emergence of resistance. However, any physician can prescribe antibiotics, which is not the case with other clinically relevant drugs. There is great variability in the prescribing physician's (PP) training, motivation, workload and setting, including accessibility to infectious diseases consultants and/or diagnostic techniques, and therefore there is a high risk of inappropriate prescription. Many antibiotic prescribing errors occur around the selection and duration of treatment. This includes a low threshold for the indication of antibiotics, delayed initiation of treatment when indicated, limited knowledge of local antimicrobial resistance patterns by the PPs, errors in the final choice of dose, route or drug and a lack of de-escalation. Similarly, the prescription of prophylactic antibiotics to prevent surgical site infections, despite being commonly accepted, is suboptimal. Factors that may explain suboptimal use are related to the absence of well-defined protocols, poor knowledge of prophylactic protocols, miscommunication or disagreement between physicians, logistical problems, and a lack of audits. A proper understanding of the prescribing process can guide interventions to improve the PP's practices. Some of the potential interventions included in a stewardship program are education in antimicrobial prescribing, information on the local resistance patterns and accessibility to a qualified infectious diseases consultant.

Revisión de los factores que influyen en la prescripción de antibióticos

Palabras clave:
Optimización del uso de antibióticos
Proceso de prescripción de antibióticos
Determinantes del uso de antibióticos
Prescripción inadecuada
Resistencia al fármaco

RESUMEN

La prescripción adecuada de antimicrobianos tiene un impacto directo sobre la evolución clínica del paciente, evita posibles efectos adversos, es coste-efectiva y contribuye a evitar la emergencia de resistencias. A diferencia de lo que ocurre con otros fármacos de interés clínico, cualquier médico puede prescribirlos. Esto significa que entre los médicos prescriptores (MP) hay una gran variabilidad en el grado de formación, motivación, carga de trabajo y especialidad, la accesibilidad a los consultores de enfermedades infecciosas y/o a técnicas de diagnóstico, lo que conlleva un alto riesgo de uso inadecuado. Muchos de los errores de la prescripción están relacionados con una mala selección o duración de los tratamientos antibióticos. Eso incluye un bajo umbral para la indicación, un retraso en el inicio, un conocimiento limitado de los patrones locales de resistencia, errores en la elección final de dosis, vía o fármaco y, por último, la falta de simplificación de los tratamientos empíricos. Del mismo modo, el uso de antibióticos profilácticos, a pesar de ser comúnmente aceptado, no es óptimo. Las razones fundamentales que explican esta situación están relacionadas con la ausencia de protocolos bien definidos o la falta de conocimiento de estos, la falta de comunicación entre los médicos y/o la existencia de problemas logísticos. Una comprensión adecuada del proceso de prescripción puede guiar las intervenciones para mejorar los hábitos de los MP. Algunas de las posibles intervenciones podrían ser medidas formativas, la difusión de las resistencias locales y la accesibilidad a un consultor experto.

*Corresponding author.
E-mail: ecalbo@mutuaterrassa.es (E. Calbo).

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Introduction

There are many benefits of appropriate antimicrobial prescribing: it has a direct impact on clinical outcomes, avoids adverse effects, is cost effective and, perhaps most importantly, helps to prevent the emergence of resistance.[1,2] However, antimicrobial prescription is a complex process involving multiple factors. Any physician can prescribe antibiotics, which is not the case with other clinically relevant drugs. There is great variability in the degree of training, motivation, settings, workload of the prescribing physician, accessibility to infectious diseases consultants and/or diagnostic techniques; therefore, there is a high risk of inappropriate use of antimicrobials. The solution to these problems may seem relatively straightforward: simply follow specific guidelines. However, real-life decisions on antimicrobial prescribing are not based on accurate clinical diagnoses, but on the nature and severity of the signs and symptoms. Antimicrobial prescribing is subjected to a certain degree of diagnostic uncertainty and is influenced by many factors related to the physician, the patient and the environment. In order to promote the appropriate use of antimicrobials, it is important to analyze the prescribing process, the prescribing physicians (PP) and other influencing factors. This review reflects on the elements related to the inappropriate prescribing of antibiotics in their empirical, directed or prophylactic use.

Prescribing process

Many studies have used a qualitative approach to investigate aspects that determine the appropriate use of antimicrobials. According to these studies, the primary aspects can be grouped into factors related to the PP, factors related to the patients and factors related to the environment.

Fear of failure is one of the factors related to the PP. Diagnostic uncertainty, prognostic impact, multiple choices, inadequate training and difficulties in the doctor-patient relationship[3] generate tensions and anxieties for the PP. These anxieties tend to be mitigated by mimicry (do what others are doing) or by the consultation of guidelines. An additional problem related to the PP is that antimicrobial prescribing can occur in multiple settings: from areas with a high workload, comprised of patients with acute and potentially serious syndromes and difficult follow-up[4] (e.g., emergency services) to areas with high-risk and/or vulnerable patients, where the temptation is to use the best available strategies and drug options. Also, the lack of time for reflection on their prescription choices and the outcome feedback needed to evaluate these decisions plays a role.[4] Additional factors are economic considerations, particularly in private practice settings, and the lack of awareness of antimicrobial resistance as being a real problem. PPs tend to be more concerned for their individual patient than for the potential risk of bacterial resistance.[5] In fact, prescribing antibiotics unnecessarily is considered less inappropriate and causes less PP concern than the inappropriate prescription of antibiotics.[6] Previous negative experiences in handling infectious diseases with or without the use of antimicrobials and an altruistic attitude toward the patient are other factors that contribute to the misuse of antibiotics.

Environmental factors can also contribute to the misuse of antimicrobials. Numerous factors have been identified in this category, including lax regulations on the prescription and dispensing of antimicrobials; authorization of antimicrobial use for certain population groups with poor education on the impact of antimicrobial resistance; a lack of adequate resources for the etiological diagnosis of major infectious syndromes; institutional saving policies that induce a bias in prescribing criteria based on dubious evidence; and pressure from the pharmaceutical industry that influences the professionals' criteria, with little time for reflection and discussion.[7] The lack of institutional initiatives for improving the use of antimicrobial agents in hospitals, the absence of a competitive environment and the poor compensation obtained from the PP's efforts result in a lack of motivation for additional training and professional improvement. On the other hand, the lack of specific targets adapted for each intervention (which greatly reduces their effectiveness), poor professional networks and the lack of joint committees (including external agents such as universities, scientific advisers, health institutions and private companies), make the development and design of objectives and strategies to establish the use of antimicrobial awareness in hospitals difficult.

Empirical therapy

Empirical treatment requires interventions with a significant prognostic impact based on clinical and microbiological predictions, with complex treatment options. The need for improvement in the prognosis of serious infections has increased the tendency to prescribe broad-spectrum antibiotics following a logical and simplified strategy that prioritizes the clinical benefits over the potential negative consequences. The implementation of programs such as the "Sepsis Survival Campaign" has contributed to the extension of this strategy. The rationale and logic of this strategy hinders the possibilities of change and, until now, it has not been possible to successfully implement antimicrobial stewardship programs in this setting.

Many antibiotic prescribing errors occur around the selection of empirical treatments. This includes a low threshold for the indication of antibiotics (due to problems predicting the bacterial etiology), delayed initiation of treatment when indicated (caused by the difficulty in recognizing the severity of infections), a limited knowledge of local antimicrobial resistance patterns by the PPs and errors in the final choice of dose, route or drug (due to limited specific training in antibiotic use and to low awareness of the clinical guidelines). The potential interventions in empirical settings are difficult. After a long history of accumulated failure, current proposals to minimize exposure to antibiotics are mainly focused on strategies to reduce the duration of directed antimicrobial therapies. Nevertheless, empirical therapy has many opportunities for improvement and should remain a priority issue for the improvement programs. Possible interventions include the following: *a)* facilitating the recognition of serious infections (by means of strategies such as the "Sepsis Survival Campaign"), which would avert the delay of empirical therapy in critically ill patients and would reduce pressure on the use of drugs and intensive strategies in patients who are not severely ill; *b)* facilitating access to evidence-based guidelines incorporating local epidemiology and resistance patterns; *c)* the recommendation and requirement to conduct controlled cultures before starting antibiotic therapy; *d)* the implementation of strategies to promote de-escalation and the reduction of antibiotic therapy duration, as will be discussed below.

Effective antimicrobial stewardship programs can improve the PP's empirical prescribing through adapted protocols, electronic information, smart phone training sessions and prospective audits of antimicrobial use, performed by either infectious diseases physicians or clinical pharmacists with infectious disease training.[8]

Directed therapy

Between the second and third day after starting empirical antibiotic treatment, the PP should always consider whether to make changes to the initial regimen to optimize it if possible.

Optimization pursues the administration of the most selective, effective and safe antibiotics against the infection being treated, at appropriate doses according to pharmacokinetic and pharmacodynamic parameters (PK/PD) and during the shortest possible time, all in accordance with the best available scientific evidence. Any changes