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General review

Medical table: A major tool for antimicrobial stewardship policy

Tableau de bord : un outil majeur du bon usage des antibiotiques

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Abstract

Infectious diseases are unpredictable, with heterogeneous clinical presentations, diverse pathogens, and various susceptibility rates to anti-infective agents. These features lead to a wide variety of clinical practices, which in turn strongly limits their evaluation. We have been using a medical table since 2005 to monitor the medical activity in our department. The observation of heterogeneous therapeutic practices led to drafting up our own antibiotic guidelines and to implementing a continuous evaluation of their observance and impact on morbidity and mortality associated with infectious diseases, including adverse effects of antibiotics, duration of hospital stay, use of intensive care, and deaths. The 10-year analysis of medical practices using the medical table is based on more than 10,000 hospitalizations. It shows simplified antibiotic therapies and a reduction in infection-related morbidity and mortality. The medical table is a major tool for antimicrobial stewardship, leading to constant benefits for patients.

Keywords: Antibiotic therapy; Antimicrobial stewardship; Medical table; Bacterial resistance

Résumé

Les maladies infectieuses sont par nature non programmables et de présentations cliniques hétérogènes, les agents pathogènes en cause étant variables de même que leur sensibilité aux anti-infectieux. Cet état de fait génère une hétérogénéité des pratiques cliniques qui, en retour, limite leur évaluation. Nous avons mis en place depuis 10 ans un tableau de bord enregistrant notre activité d'hospitalisation. Le constat d'hétérogénéité des pratiques thérapeutiques a conduit à l'instauration de la protocolisation antibiotique et à une évaluation continue de leur observance et impact sur la morbi-mortalité : effets secondaires des antibiotiques, durées d'hospitalisation, recours à la réanimation et décès. L'analyse à 10 ans des pratiques avec le tableau de bord médical (TBM), intégrant plus de 10 000 hospitalisations, montre une simplification des modalités d'antibiothérapies combinée à une réduction de la morbi-mortalité associée aux infections. Nos résultats désignent le TBM comme un outil majeur de la mise en œuvre des recommandations de bon usage des antibiotiques et illustrent qu'il est nécessaire et associé à de réels bénéfices pour les patients.

Mots clés : Antibiothérapie ; Bon usage des antibiotiques ; Tableau de bord ; Résistance bactérienne

Great advances have been made in the field of medical sciences over the past 10 years. With regard to infectious diseases, one may mention the therapeutic developments in the human immunodeficiency virus (HIV) or the hepatitis C virus [1,2].

Mixed results have, however, been observed in the field of antibiotic therapy. Few new antibiotics have been developed, and antibiotics keep on being misused; thus, facilitating the spread of multidrug resistant bacteria [3,4]. Measures taken to reduce antibiotic prescriptions in France or abroad are only moderately effective, as antibiotic consumption remains high [5–8]. New measures aim to raise public awareness, to reinforce the initial and continuing training of prescribers on antibiotic therapies, and to use certification criteria for healthcare facilities [9].

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However, raising public awareness on that matter is a real challenge considering the population's behavior related to major public health problems such as pollution, tobacco, or obesity.

The benefits of an initial and continuing training for prescribers must be assessed over their professional lifetime. Finally, the current certification does not take into consideration the difference between the successful implementation of antibiotic stewardship measures and the quality of antibiotic therapies at patient level [10].

The excessive use of antibiotics can mainly be explained by the very characteristics of infections: sudden onset, great variety of clinical and microbiological signs and symptoms, without any specific symptoms. This variety is even more complex when it comes to treatments because of comorbidities that can modify empirical antibiotic therapies. For instance, 17 potential therapeutic options are mentioned in the 2006 French consensus conference (updated in 2010) for lower respiratory tract infections [11]; the 2007 American conference consensus recommended 15 therapeutic options [12].

Patients presenting with community-acquired viral infections and especially with ENT infections are still too frequently prescribed antibiotics despite their absence of benefits [13], and antibiotic therapies prescribed in the intensive care unit (ICU) relies on de-escalation, while ignoring prior escalation [14].

Considering the current organization of care and continuing vocational training, the lack of significant changes in prescription habits comes from the physician's impossibility to get feedback on the prescribed treatment modalities and more specifically on their impact on the morbidity and mortality of infected patients. Getting feedback from audits is probably the best way to acknowledge the variety of practices [15,16]. This feedback includes data related to morbidity and mortality of infected patients and tells us that the effectiveness of various recommended therapeutic options is not equal, and that therapeutic regimens must incorporate the whole treatment strategy, taking into consideration the various technical and medical capacities of healthcare facilities [16–21].

For the past 10 years, we have been using a medical table for the hospitalization ward of our department. Its primary objective was to analyze medical, diagnostic, and therapeutic practices. The first benefits of this tool were described in 2008 [22], and subsequent evaluations led us to progressively change our therapeutic practices [18,23–26]. The present article aimed to show that the medical table can, at the very least, help implement measures to tackle antibiotic misuse. Its use has even been associated with a reduction in the infection-related morbidity and mortality; physicians can more easily understand this objective than the sole reduction in antibiotic therapies.

1. Method

The operating principle of the medical table has already been described [22]. Table 1 summarizes the successive steps of data acquisition and control. The medical table operates as a database, declared to the French Data Protection Authority (French acronym CNIL) (number 1430722). Symptom data collection at hospital admission was standardized in January 2011.

Table 1
Successive steps leading to an accurate database.
Étapes successives amenant à une base de données exploitable.

1. By the end of hospital stay, the patient's detailed report is prepared by the senior physician in charge, targeting all parameters required in our database
2. A secretary and a senior physician work together to update the database
3. Parameters specific to disease-related groups are confirmed by the senior physician
4. The grouping of patients is checked according to similar pathologies by a third person from our staff
5. A comprehensive verification of all data and parameters is performed by the third person to correct for any error
6. A cross check of all data is performed at least 6 times a year
7. The database auditing is performed at least 4 times a year by the combined group of secretaries and senior physicians
8. At the beginning of any study, all specific parameters required are checked by the resident and/or senior physician in charge of the study

This data collection is, however, not systematically indexed to the medical table, but it is a useful complement for clinical evaluation works [27].

We used the following antibiotic stewardship criteria for this work:

- percentage of antibiotic therapies that complied with internal guidelines, defined as the prescription of molecules mentioned in the reference documents available within the hospitalization wards;
- number of antibiotic therapy lines per patient. A single line of treatment indicates an effective antibiotic therapy, whether it be documented or non-documented. Two treatment lines indicate that the empirical treatment was tailored to bacteriological data with the prescription of a second documented treatment. Three treatment lines or more indicate clinical and/or microbiological diagnostic difficulties and/or drug intolerance;
- percentage of adverse effects related to antibiotics.

The impact on morbidity and mortality was assessed using hospital lengths of stays, use of ICU care, and death during hospitalization (either in the infectious disease department or following transfer to another hospital ward during the same hospitalization period). Extracted data used in our analysis runs from July 1, 2005 to June 30, 2015. Final non-infectious diagnoses (for which a non-infectious disorder was officially diagnosed) and diagnostic uncertainties categorized as "other" (influenza-like illnesses or self-limiting fever without any formal diagnostic evidence; Fig. 1) were excluded from the analysis.

We aimed to show the impact of the medical table on antibiotic therapy modalities as the impact analysis indicates which guidelines should be used. This analysis then modifies the morbidity and mortality of infections. These modifications must therefore be comprehended over time, in the short- or medium-term. Data obtained from the medical table over the past 10 years must therefore be analyzed.

Data was registered and analyzed using Statview version 4.5. Various statistical tests were used as needed.

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