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Opinion

Pharmacoeconomic Impact and Analytical Issues of Therapeutic Drug Monitoring

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DESCRIPTION

Over the last three decades, the principles of pharmacoeconomics have been applied in a variety of areas, including TDM, in response to the lessons learned from the use of TDM and the growing interest of physicians and the general public in rising medical costs. As a method of intervention, TDM aims to improve the patient's response to important life-sustaining drugs and reduce side effects. In addition, the resources consumed by the TDM approach are likely to be recovered with positive outcomes such as reduced hospitalization, making TDM a good candidate for assessing economic outcomes. Donabedian's proposal proposes a structure-process-result method for assessing the quality of medical practice. His assessment of structural components in this way includes elements related to the design of medical systems, such as buildings, equipment, staff, and patient composition. Process components include activities related to healthcare services. The Outcomes component examines the effects of health interventions on patient outcomes and the impact of the economic performance of the healthcare system. Extending Donabedian analysis to TDM, structural components include TDM testing equipment and facilities, clinical and laboratory staff qualifications, the presence of TDM services, monitoring and management organizations.

Process components include ensuring appropriate indications for determining serum levels, timing of sample collection, reporting results to physicians, appropriate physician responses to treatment recommendations and monitoring of patient responses to treatment. Finally, the measurement of results used to assess the efficacy of TDM includes assessment of frequency, cure, mortality, and cost reduction of drug-induced adverse events associated with TDM services. A drug-economic analysis of the effects of TDM in adult patients with systemic tonic-clonic epilepsy shows that patients undergoing TDM have far more effective seizure control, less adverse events, better profitability, and lower patient costs shown to experience savings from less hospitalization per seizure. More people had a chance of remission. A meta-analysis of TDM studies has shown that TDM appears to be beneficial to patients taking theophylline or digoxin, despite the use of a limited number of drugs. The same group also concluded that the clinical pharmacokinetic services performed by clinical pharmacists had a significant impact on the proportion of patients with the desired serum drug levels. In addition, this service has reduced the proportion of improperly collected samples. Aminoglycoside TDM is an important approach to reducing the incidence of aminoglycoside toxicity while maximizing efficacy parameters such as: B. Optimize the ratio of peaks to minimum inhibitory concentration. Several patient-oriented studies have reported the cost-effectiveness of dose individualization with TDM. Vancomycin is thought to be less nephrotoxic than aminoglycosides, but there appears to be a link between serum concentration and toxicity and efficacy. All current immunosuppressive agents show significant inter-subject and intra-subject variation in pharmacokinetic factors, and some concentration-controlled studies have shown that blood levels are a better predictor of clinical efficacy than dose. Many consensus documents have been published in the first decade addressing the need and methodology of immunosuppressive drug monitoring, and the latest publications provide important guidelines and recommendations for the administration of cyclosporine, sirolimus, and tacrolimus. However, with the exception of aminoglycosides, there is a lack of well-designed studies investigating the added value and cost-effectiveness of TDM. Despite the lack of formal cost-effectiveness data, TDM is considered the therapeutic standard for treatment with antiepileptic drugs, digoxin, psychiatry, and immunosuppressants.

Analytical issues in therapeutic drug monitoring

As stated previously, the practice of therapeutic drug monitoring requires the orchestration of several disciplines, including pharmacokinetics, pharmacodynamics, and laboratory analysis. The analytical impact on determining pharmacokinetic parameters is not well appreciated. Analytical goals in therapeutic drug monitoring should be established by determining the nature of the problem to be solved, selecting the appropriate matrix and methodology to solve the problem, and developing valid analytical schemes that are performed competently with appropriate quality and interpreted within the framework of the problem.

If plasma concentration measurements are valuable, you need to consider the time of blood draw, blood sample type, measurement technique, and interpretation of the results. First, it is important to take a blood sample and measure the drug concentration at the right time after administration. Sampling timing errors can be the cause of most errors in interpreting the results. For most drugs,

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blood samples can be taken in heparinized tubes or coagulated, with no significant pre-measurement storage restrictions. However, for lithium and aminoglycosides, the blood sample should coagulate and separate within 1 hour. For cyclosporine, it is important to consult your local laboratory for details on proper sampling techniques and post-dose timing. The laboratory should ensure that the assay used is as reliable and specific as possible and that proper quality control is in place. Method validation is becoming an increasingly important aspect. The pharmaceutical industry has endeavored around the world to reconcile the concepts used in validation. It is important to ensure the accuracy and specificity of the assays used in clinical laboratories to measure drug levels in serum. Historically, drug testing laboratories have developed testing procedures using a variety of analytical methods, from radioimmunoassays to high performance liquid chromatography (HPLC) methods. However, most of the drug assays currently performed in clinical practices is variants of commercially available immune binding assays. The most commonly used methods are radioimmunoassay (FPIA), enzyme-linked immunosorbent assay (EMIT), and enzyme-linked immunosorbent assay (ELISA). These assays are specific. However, in some cases, metabolites and other drug-like substances are also recognized by the experimental antibody. Most of these assay interferences are the result of cross-reactivity with drug metabolites, but in some cases, endogenous compounds or drugs with similar structures cross-react and the measured drug concentration readings are it can be increased or decreased by mistake.