Therapeutic Drug Monitoring and Clinical Toxicology: Challenges and Future Directions

Abstract

Therapeutic drug monitoring (TDM) is the clinical practice of measuring levels of drugs in the plasma, serum, or blood at predetermined times or intervals in an effort to maintain blood concentration of a drug within optimum range. Drugs that are usually monitored are those with low therapeutic indices, drugs that have irreversible adverse effects, as well as drugs used in the treatment of diseases whose symptoms are similar to the toxic effects of the drug. TDM is useful in detecting compliance and non-compliance to drug therapy in patients. It also provides a means of detecting treatment failure. Clinical toxicology is the study of the physiological effects of toxic agents, their mechanism of action, and ways of managing these effects. Furthermore, clinical toxicology helps in the identification of chemicals, drugs, or toxins that may affect patients.

Even though TDM and clinical toxicology are useful, they come with some limitations. Some of the assays used in TDM and clinical toxicology lack sensitivity. Taking samples at the right time is another challenge associated with TDM and clinical toxicology. Inaccuracies from sampling site and handling of samples prior to analysis can affect results. Some drugs also have active metabolites that might not be detected by TDM and clinical toxicological assays. Additionally, TDM and clinical toxicology are expensive to undertake. Indeed, the significance of TDM and clinical toxicology in clinical practice cannot be overemphasized. Nonetheless, more research can be done on alternate sampling matrices such as saliva and dried blood spot. These matrices would make TDM and clinical toxicology more convenient and easy to do. There is the need for better interpretation of results obtained from TDM and clinical toxicological assays. Hence, health professionals need to be trained and re-trained on appropriate interpretation of TDM and clinical toxicological results so patients are managed appropriately.