

## Medication-related services in a Mexican pediatric hospital

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The National Institute of Pediatrics is a tertiary care hospital and a major medical center in Mexico City for the care of children. A significant percentage of the patients have chronic and complex diseases, and a small number arrive with recently-acquired ailments. Many patients require multiple treatments, hospitalization, and subsequent follow-up, some of which is long-term. The institute, which has about 8,000 inpatients, conducts approximately 200,000 consultations, more than 6,000 surgical interventions, and 500,000 laboratory tests each year. We describe the services that help ensure the safe and effective use of drugs at this institution.

**Therapeutic drug monitoring service.** Therapeutic drug monitoring (TDM) is one of the main activities of the pharmacology laboratory, which allows physicians to define the optimal treatment based on the selected therapeutic agents. Determining a patient's serum drug concentration allows physicians to use

pharmacokinetic values to individualize drug dosages.

TDM is often requested when the anticipated drug response does not occur despite the use of apparently adequate dosages or when drug toxicity is presumed. The TDM service recommends dosage adjustments on the basis of serum drug concentrations and pharmacokinetic and pharmacodynamic aspects of the drug and may recommend alternative therapy with more effective or less toxic drugs. The service also assists in selecting drug therapies and

advises prescribers when they are unsure how to manage a situation (e.g., lack of pharmacologic response, drug intoxication).

Requests for TDM must first be approved, because the service requires the use of human and technical resources. Information that must be supplied on the required request form includes the name, age, sex, weight, and vital signs of the patient and the name, formulation, and dosage of the drug to be monitored. Further clinical data, such as diagnosis, TDM information, and laboratory test results, are also included. Samples of the appropriate body fluids are collected in accordance with predetermined procedures.

The TDM service interprets the information on the form. Some pharmacokinetic values (e.g., elimination half-life, volume of distribution) may be calculated by the TDM service since these data will help to define dosage adjustments. Finally, the consultation report is completed and accompanied by relevant observations and recommendations.

**Drug information service.** A clinical pharmacologist directs the drug information service, which supplies objective, specific, and current drug

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information and promotes rational drug use. The service may provide information on the treatment of poisonings caused by agents such as drugs, chemical substances, plants, venomous animals, and environmental pollutants. The provided information benefits both the medical staff and patients' relatives, who must ensure that the drugs are given properly and the course of therapy is completed. This can be achieved by direct counseling of relatives after referral by the physician.

The drug information service receives request forms for assistance, searches for the information, and generates a response. After defining exactly what the question is, the next step is to determine who has made the request (e.g., physician, pharmacist, nurse, relative), since the type and depth of the answer will depend on this. Requests may also be made by telephone. When the application refers to a specific patient, data about that patient are obtained before an answer can be given. Drug information is obtained from numerous sources, such as the Iowa Drug Information Service (Ovid Technologies, New York, NY), DrugKnowledge System (Micromedex, Greenwood

Village, CO), *Drug Facts and Comparisons*,<sup>1</sup> *American Medical Association Drug Evaluations*,<sup>2</sup> and *Goodman & Gilman's The Pharmacological Basis of Therapeutics*.<sup>3</sup>

Questions are classified by therapeutic category, as this determines the search strategy and allows the elimination of references that do not add information to the specific case. Questions are answered according to the urgency of the situation. Whenever possible, questions are followed-up, especially those related to acutely ill patients.

**Drug preparation and quality control.** The acquisition of drugs selected is an important responsibility of the hospital pharmacy, which has to decide on the purchase of products of adequate quality and cost; however, the pharmacy also has to decide on the supply of bulk substances necessary to prepare medications that are not commercially available in pediatric formulations. The preparation of dosage forms for internal use is a significant activity of this service, which is always performed using quality-control measures, ensuring product integrity.

The pharmacology laboratory has an aseptic area where trained staff

prepare drugs. Worksheets used for drug preparation include the patient name, requested drug preparation, and significant information regarding the use and storage of the drug. Before physicians request the preparation of a drug, they must determine whether a pediatric formulation is available. If the request is for a drug not previously prepared in the laboratory, the first step is the search for information on stability, purity, appearance, and microbiological control to establish the expiration period of the new drug. Once the drug is prepared, it is remitted to the applicant service and accompanied by usage and storage recommendations. Finally, the preparation and expiration dates are clearly written on the label and forms.

**Conclusion.** A variety of services contribute to the safe and effective use of drugs in a Mexican pediatric hospital.

#### References

1. Drug facts and comparisons 2003. St. Louis, MO: Facts and Comparisons; 2003.
2. AMA drug evaluations. Chicago: American Medical Association; 1986.
3. Hardman JG, Limbird LE, Gilman AG, eds. *Goodman & Gilman's the pharmacological basis of therapeutics*, 9th ed. New York: Pergamon; 1996.