



THE ROLE OF HOSPITAL PHARMACISTS IN CLINICAL TOXICOLOGY IN THE NETHERLANDS

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Among other roles, Dutch hospitals produce drugs on a semi-industrial scale. This justifies a quality control laboratory that analyses both raw materials and products. Having the equipment and the analytical knowledge our pharmacy department's laboratory is well able to perform analysis in other media such as biological fluids. Methods that are used for quality control such as GC, HPLC/Diode Array Detector (HPLC/DAD) and repeated Mass Spectrometry are applied to Therapeutic Drug Monitoring (TDM) and toxicology. In the treatment of a patient with suspected poisoning the hospital pharmacist has a unique task. The hospital pharmacist is not only a consultant on pharmacotherapeutics but he is involved in diagnosis, planning and performing the toxicological laboratory screening, evaluating the results, advising on treatment and endpoint parameters.

The pharmacist uses his expertise in cases of suspected poisoning or overdose of medication. When a patient in a coma is admitted to the emergency room and an external cause is suspected, a number of specialists are involved. In most cases a doctor of internal medicine and a neurologist are consulted. The hospital pharmacist is also consulted about possible toxic agents. To make the diagnosis qualitative and quantitative toxicological analyses are performed. Then a specific combination of analytical methods is applied which covers drugs or other substances that best fit the symptoms. Toxicological screening is tailor made. The extent of the analytical screening depends on the medical history and the clinical symptoms or toxidrome (from "toxic" and "syndrome"). The hospital pharmacist contacts the doctor and adds treatment options to the analytical results. By estimating the kinetics of the probable toxin the hospital pharmacist can indicate the time the intoxication will last,

for how long the treatment should be applied and can give a prognosis on patient outcome.

Toxicokinetic calculations can give valuable information on the efficiency of detox treatment such as dialysis or show the effects of antidotes for instance in chelation therapy in heavy metal poisoning. The hospital pharmacist is also involved in the manufacturing and dispensing of antidotes. Some antidotes are available centrally, in one medical centre in the country. Some institutes perform drug testing for prisons or workplace testing or are involved in forensic toxicology.

The Dutch Association of Hospital Pharmacists (NVZA) has an active working committee on analysis and toxicology. Toxicological testing is done by the Dutch Association for Quality Assessment in TDM and Toxicology (KKGT).

Since 2004, the NVZA, the Dutch Association for Clinical Pharmacology & Biopharmacy (NVKF&B), and the National Poisons Information, Centre (NVIC) have collaborated in the toxicological information site www.toxicologie.org, with practical advice about management of poisoning. On this site, treatment guidelines for clinical practice are presented for the most common types of intoxication. At present, the site has more than 3,000 visitors a month and this number is still increasing.

During the 4-year course in hospital pharmacy, each postgraduate student must do a six-day course in clinical toxicology. This course consists of a theoretical, a practical part and an exam. Participants have to write up several clinical toxicological cases: these must cover taking a medical history to requesting and interpreting analyses and giving advice about treatment, prognosis and other aspects. Some hospital pharmacists hold diplomas in toxicology.

Over the last 10-20 years Dutch hospital pharmacists have developed several toxicological screening methods using HPLC/DAD and an online library. Today more and more LC-MS/MS methods are being used. Hospital pharmacists regularly publish analytical methods, case reports on toxicology as well as evaluations on treatment methods such as haemodialysis.

Hospital pharmacists are collaborating in teaching doctors clinical toxicology. They are implementing and guiding Point of Care drug testing. In addition hospital pharmacists have a role in poisoning prevention, by contributing to the process of making regulations and by providing information and warnings.

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