



## The work of a poison control centre: What does it take?

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**Truven Health Analytics® was acquired by IBM in 2016 to help form a new business, Watson Health™. Watson Health aspires to improve lives and give hope by delivering innovation to address the world's most pressing health challenges through data and cognitive insights.**

Poison control centres (PCCs) have been set up in response to the challenge of decreasing mortality and morbidity from poisoning.

The first PCCs in Europe were officially established in the early 1970s, to respond on an emergency basis to requests, mainly from physicians, for the management of poisoning exposures (with the direct evidence of their traditional work in the decreasing of morbidity and mortality associated with toxic exposures). The ideal now is the prevention of illness or the prevention of exposure to the illness and public education in health-improving strategies.

PCCs worldwide provide specialised services designed to efficiently manage and prevent acute poisoning in the community. PCCs are an important public health resource, providing information about prevention and management of acute poisoning and directing the potentially life-saving care of critically affected patients.

The Poison Information Centre (PIC) in Athens is the only one in Greece. It was established in 1975 in one of the two largest children's hospitals in Greece, because the majority (56 percent) of calls for poisoning involves children under 14 years of age. The number of calls from 1975 (4,000 per year) has risen over the years to about 40,000 per year. In an effort to achieve basic quality standards, the primary roles of the Greek PIC are:

– **Healthcare expenditure reduction**

This means cost-effective, 24-hour operation for the public. Sixty-five to 70 percent of cases are managed by the PIC staff at the patient's home. This service prevents unnecessary phone calls to physicians and visits to emergency departments or primary care offices.

– **Urgent treatment guidelines**

Guidelines have been developed about the real-time treatment of acute poisoning in the form of therapeutic protocols for the management and follow-up of poisoning exposures. Healthcare professionals can now be offered resources for safe patient care.

It is suggested that the Health Ministry should encourage health professionals to declare all cases of intoxication to the PIC and inform them about the outcome of hospitalised patients. This is so that all of the necessary information will be available in order to decide which groups of intoxications will be followed up on every year according to our epidemiologic data, concerning serious toxicity or trends in population poisoning.

– **Limitation of cases that are followed up on**

This is a practice that is applied in the majority of centres for the most serious cases or for target groups (when a perspective protocol has been scheduled). The target groups' follow-up is scheduled to realise the trends in the community or specific target groups, and to organise the public health awareness.

– **Prevention**

This is part of the dynamic process of toxicovigilance, which enables the PIC to evaluate and manage the toxic risk existing in a community. The Greek PIC serves a vital role for the environmental exposure surveillance system, based on our routine work. This implies knowledge about the properties of poisonous substances, the epidemiology of new forms of poisoning and determination of trends in the type of poisoning over time. Prevention activities include:

- **Primary prevention** before the event, by educating the public to have increased awareness and embrace safe attitudes.
- A worldwide harmonization on regulatory and control measures is necessary.
- Registration schemes and licensing of all commercial products can help ensure that the quality and safe marketing are monitored.
- Legislation can be used to ban or restrict the use of chemicals that may be unsafe, and to regulate the purposes and the conditions of use.
- The availability of medicinal products and chemicals can be determined and restricted by legislation.

- Our implementation on prevention activities can save resources because of the reduction in instances of unintentional, intentional and occupational poisoning at home, outdoors and at the workplace. This can be achieved through controlling public access to the products by improving their safety and the environment where they are used (for example, child-resistant packaging of pharmaceuticals or the addition of bittering agents to dangerous liquids) and by educating communities about safety practices.

- **Secondary prevention** through use of appropriate first aid measures in case of toxic exposure, with a consequent reduction in disabilities and costly long-term medical care. This includes the initial steps to minimise the effects of the toxic agent, the diagnosis, decontamination, first aid treatment, specific antidote therapy, and the education of the community and healthcare professionals about how to recognise and manage poisonings.

### Products documentation and classification

PCCs by law must have archives of all marketing products. In recent years, at the PIC in Athens, we have made an effort to obtain all Data Safety Sheets as electronic records. Our archives include information about:

- Drugs from National Organism of Medicines, which provides licenses before drugs are placed on the market.
- Household chemicals, for which we receive composition and concentration ranges by electronic means.
- Dangerous chemicals from the General Chemical State Laboratory of Greece, which gives us electronically the exact composition and concentration of registered dangerous products.
- Cosmetics, for which exists European harmonization, (obligatory by law since January 2012.)
- Agrochemicals from Hellenic Ministry of Rural Development and Food, which provides the license for them. (There is a network safety data bank for pesticides and other agrochemicals, linked with our PIC.)

## Scientific sources

For the diagnosis and treatment of each case, the PIC in Athens uses a computerised database called the Micromedex® POISINDEX® System in daily practice. POISINDEX is a part of the Micromedex® Toxicology Management Solution from Truven Health Analytics®, part of the IBM Watson Health™ business.

There are many benefits to using this system:

- **Continually updated information**, so we feel more informed integrating new data for therapeutic procedures.
- **Wide range of content** including all the possible exposures to chemicals, drugs, illicit drugs, agricultural products, plants, and bites from reptiles, spiders and other insects. Content includes:
  - **Uses** of the substance, synonyms or similar ingredients (in the same category of toxicants).
  - **Range of toxicity** in adults and in pediatric population, as well as case reports concerning intoxication from the product.
  - **Kinetics** of the involved substance, which provide information about the absorption, metabolism, protein binding, volume of distribution, elimination half-life and way of excretion.

All this information gives us a critical tool to manage a potentially severely poisoned patient. Knowing the protein binding and the volume of distribution, we can decide whether the patient needs hemodialysis. We can also know if toxic metabolites will be produced. Depending on the route of excretion, we can decide if we must proceed with forced diuresis (urine excretion) or repeated doses of activated charcoal (if the substance underlies enterohepatic circulation). From the plasma peak levels we know the time in which, if needed, we must perform plasma or urine level measurements. Elimination half-life helps us to estimate the duration of patient observation in the day care unit if the patient has no clinical findings.

Another benefit of POISINDEX is that for many substances there is a guide for patient disposition. This provides quick answers about the appropriate examination and the time needed to perform plasma, serum or urine levels, if indicated. With awareness about the mechanism of action of the substances, we can comprehend the way in which they cause damage in specific tissues and act accordingly.

By nature, the management of toxicological exposures is often anecdotal. For ethical reasons, clinical trials to study the effects of toxic exposures aren't conducted, and data regarding the pharmacokinetic disposition of a substance in the human body can be lacking. Often this is because the substance is not intended for human consumption or exposure, as in the case of agricultural products or poisonous animal bites. Additionally, the manifestations of a toxic exposure are not only dependent on the amount of exposure to a substance but also on the patient's age, genetics, comorbidities and exposure to other toxic agents. This makes treatment of an exposure both unique and challenging for each patient. We have found that the best published evidence available for management of a toxic exposure may be case series or case reports, and supportive care may be the only treatment option.

## Case data documentation

This is an important tool for the identification of existing toxic hazards, to arrange prevention activities or other public health policies such as the restriction of market disposal of hazardous products.

We have computerised data collection for each case and therefore can collect patient-related data, which can be archived and analyzed to detect trends and sentinel events and develop a toxico-surveillance capacity. This case documentation may serve as a basis for epidemiological and toxicological studies.

Toxicovigilance based on our routine work has identified significant problems before they were recognised by public health authorities—for example, massive food poisoning from cultured greens contaminated with datura stramonium. In this incidence, after clinical investigation we defined the toxic substance; directed the confirmation measures; and alerted the hospitals, Food Control Agency and other public health authorities for appropriate response. The result was public awareness and the withdrawal of contaminated greens from the market.

Creation of our own case data files from instructive or unusual cases is of significant value for the development of treatment protocols. As we have already mentioned, our follow-up protocols are restricted to the most serious cases.

## Education for healthcare professionals

### – Student training

Medical and nursing school students should be trained in toxicology and therapeutic management of severe intoxications. Pharmacy school students should be trained in pharmacokinetics, dosing tools and principles of clinical toxicology.

### – Physician training

Practicing physicians need the appropriate knowledge and skills to recognise and treat patients with acute intoxication. In Greece, there is no special training in toxicology as separate expertise at the university level. Therefore, we advise the Ministry of Health to introduce a three-month, in-house training for physicians in our PCC.

### – Nurse training

Nurses need training to help educate communities and help give first aid to a poisoned patient.

## Conclusion

PCCs serve as important leading agencies for the assessment and treatment of poisoning and toxic exposures, as well as for the control and prevention of such events. Their vital role is to illustrate policy, operation and practice.

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Produced in the United States of America  
July 2017

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HPW03070-USEN-01