

A Centralised Drug and Poison Information Centre*

R Ponampalam *FRCS (A&E Edinburgh), FAMS*

Department of Emergency Medicine, SGH

ABSTRACT

In countries such as the United States where Drug and Poison Information Centers (DPICs) provide drug and poison information and advice, the reported numbers of poisonings have been found to be relatively high, exceeding over 2 million exposures in 1997 alone and averaging 8.8 exposures per thousand population. Similarly, high incidences of adverse drug reactions have been reported in recent studies, leading some authors to conclude that adverse drug reactions constitute the fourth leading cause of death in the United States. In a local study that was published, it was found that most physicians, including General Practitioners, were keen on managing poisonings and adverse drug reactions provided they had access to the necessary information resources. The DPIC was created with the intention of filling this gap in knowledge by being a centralised one-stop resource centre for drug and poison information needs literally a phone call away. In this regard, the role of the DPIC is to provide timely and safe information appropriate to the enquirer (medical professional, member of public or industry) on drug-related enquiries, poisonings, suspected poisoning and prevention of poisoning. To provide answers to these questions, the Centre has computerised databases and a compendium of resource materials on the identification of chemicals, and health hazard data including information on the toxicity, signs and symptoms and treatment of poisoning. In addition, the DPIC has specially trained poison information officers, experienced drug information pharmacists and clinical toxicologists to assist in dealing with complex situations.

Keywords: adverse drug reactions, poison prevention, poisoning, toxic exposure

INTRODUCTION

Poisoning is not an uncommon problem encountered in medical practice. The main challenge for the physician is to identify promptly those patients who might either develop serious complications from an overdose or potentially benefit from specific interventions including initial resuscitation and stabilisation, decontamination, enhanced elimination of absorbed toxins, use of antidotes and supportive care. Today, the multitude of pharmaceutical agents and chemicals in our environment makes it difficult for the attending physician to have the appropriate information readily available to manage these cases on his own. Providing these physicians with the necessary information in a timely manner to help them decide on the appropriate management was one important

consideration which led to the conceptualisation and eventual formation of the centralised Drug and Poison Information Centre (DPIC).

In Singapore, deaths from injuries, including poisoning, ranked as the fifth leading cause of death and the leading cause of hospitalisation in 1988.¹ Poisoning averaged 30 to 40 deaths per year, accounting for 3 to 4% of injury deaths and 0.3% of all deaths during the period 1970 to 1989. In 1989, reported admissions for poisoning numbered 3002 or 0.9% of the total admission of 331684 patients with the majority (2867 or 95.5%) being managed in public sector hospitals. This figure did not include other admissions in which poisoning or drugs contributed to the admission. Official statistics of inpatient admissions over the last few years show annual hospital admissions of about 2 500 poisoning cases among all public hospitals.² In addition, approximately 400 to 500 instances of adverse drug reactions are reported yearly.³

* Presented at SGH Hospital-wide Monthly Clinical Meeting on 12 June 2004.

However, a recent study conducted amongst medical practitioners in Singapore in 1998, to which 1071 physicians responded, revealed an annual total workload to be 7872 poisonings, 10591 drug allergies, 23136 adverse drug reactions, 4559 adverse drug interactions, 3540 adverse reactions to traditional medications and 6134 alcohol-related effects.⁴ Hence, the total workload amounted to 55832 toxicology- and adverse drug reaction-related problems among physicians who responded to the study. Though these are much higher than the official statistics, the numbers would be even greater if the results are extrapolated to the nearly 5000 doctors practicing in Singapore.

It is clear that many instances of poisonings are managed locally, with varying consequences in terms of morbidity, and most adverse reactions are not being reported (as is commonly thought to occur in most communities). The reasons may be manifold. The lack of recognition of the occurrence of a toxic or adverse drug event, contributed by the lack of awareness of such problems, may lead to misdiagnosis of such events. In addition, the use of voluntary reporting systems with minimal timely reciprocal benefits to the informant are unattractive and cumbersome, leading to the under-reporting of such events and creating an impression of paucity of such events.

The Drug Information Services (DISs) currently available in the 6 local public hospitals and the Poisons Information Centre (PIC) at the Health Sciences Authority altogether handle only a total of 1,500 enquiries monthly (50 per day). The low utilisation of the current DISs and PIC as an information and advice centre for managing drug- and poison-related events is compounded by several factors. First, these organisations function mainly during office hours and are difficult to access readily after office hours, thus creating an impression of poor accessibility. Second, the access numbers of these facilities are not known to most potential users. Publicity is hardly carried out owing to the inadequate infrastructure and anticipated inability to cope with a high volume of calls and requests for information. Third, most of the current centres utilise off-the-shelf electronic databases which are massive and difficult to easily access for the kind of information often required by callers. Finally, most services are staffed by pharmacists and scientists, with no clinical input from trained clinical toxicologists. Clinical input is especially important in cases of toxic exposure management.

In countries such as the United States where DPICs provide information and advice, the reported numbers of poisonings have been found to be relatively high,

exceeding 2 million exposures in 1997 alone and averaging 8.8 exposures per thousand population.⁵ Similarly, high incidences of adverse drug reaction have been reported in recent studies, leading some authors to conclude that adverse drug reactions constitute the fourth leading cause of death in the United States.⁶⁻⁹

A local study found that most physicians, including general practitioners, were keen on managing poisonings and adverse drug reactions provided they had access to the necessary information resources.¹⁰ In fact, most physicians (93.9%) were keen on having access to a DPIC for advice on such matters. Overall, 78.8% preferred the setting up of a single, 24-hour, well-run and efficient centralised service rather than multiple smaller facilities.

With this in mind, the DPIC was conceptualised and subsequently created with the intention of providing a centralised one-stop resource centre for drug and poison information needs literally a phone call away.

SETTING UP OF A CENTRALISED DPIC

The centralised DPIC is a Ministry of Health, Health Service Development Programme (HSDP) funded project. It was designed to provide information to health professionals (for example, doctors, dentists, pharmacists, nurses), members of the public and industry on the signs and symptoms of poisoning and the preferred or necessary treatment in acute cases. In addition, it would also provide drug information and collate demographics of toxic exposures.

The DPIC answers enquiries from all over the country on, among others, poisonings involving medicines, household commodities, agricultural chemicals, industrial chemicals, cosmetics and poisonous plants. In addition, information on identification of drugs, drug side effects and interactions, intravenous compatibilities, and other drug-related information are also provided as part of its services.

To provide answers to these questions, the Centre has a computerised database which contains information on the identification of chemicals, and health hazard data including information on the toxicity, signs and symptoms and treatment of poisoning. In addition, the availability of experienced drug information pharmacists and clinical toxicologists assists the caller in making clinically sound judgements.

GOALS OF THE DPIC

The mission of the DPIC is to provide readily accessible evidence-based drug and poison emergency

management advice in a timely manner and to serve as the primary resource for poison education, prevention and treatment advisory in Singapore.

The DPIC has set the following goals as part of its initiative to achieve its overall mission:

1. Provision of prompt and accurate poison information to those who access the service.
2. Provision of drug information to facilitate health professionals in better management of their patients.
3. Education of the public in the areas of poison prevention and first aid.
4. Education of health care professionals in the areas of clinical toxicology, poisoning epidemiology, poison prevention, toxicological diagnosis and care.

DPIC SERVICES

Initially, drug and poison information will be provided to members of the medical profession (such as doctors, nurses, pharmacists). This will be gradually expanded to include industries (chemical, pharmaceutical) and subsequently the general public who may call in for information and advice on toxic exposures. Future prospects in provision of such services both regionally and internationally will be explored. This phased build-up in services is expected to facilitate the training of DPIC staff while the workload is gradually built-up over a period of time.

Priority is given to calls from both the general public and health professionals associated with acute human exposures to poisons. One of the objectives of the service is to prevent unnecessary attendances at health care facilities, as well as ensure rapid and optimum treatment for cases of poisoning. No calls are refused, but in some instances callers will be referred to a more appropriate agency or consultant for information. No charge is made for acute information. In order to maintain the standard of information given, regular audits and reviews of calls to the Centre are carried out.

Occupational and environmental toxicology consults as well as chemical risk assessments are some of the areas in which the DPIC will be able to provide assistance. These complex issues sometimes require multidisciplinary input for an accurate assessment to be made. The DPIC expects to be able to coordinate these activities.

The DPIC aims to collect and disseminate relevant statistics on poisoning. These statistics could be used

to identify trends in poisoning and the areas where preventive measures need to be taken, or where additional educational activity is required. This **toxic surveillance** is expected to help by providing local information on the following areas:

1. Adverse effects from newly introduced, experimental or established drugs (adverse drug reaction monitoring programme)
2. Trends in poisoning and drug abuse
3. Toxic clusters or mass poisonings
4. Toxicity and adverse effects to herbal remedies, nutritional supplements, alternative medicines, and so on.

This information can then be fed back to regulatory authorities for necessary action.

Literature reviews and **drug evaluation** to support Pharmacy and Therapeutics Committees of hospitals in Formulary selection as well as drug use evaluation are also carried out by the DPIC.

The DPIC has a role in the prevention of poisoning, primarily through the provision of appropriate information to members of the public via pamphlets; and participation and collaboration with other agencies involved in health promotional activities.

The DPIC also aims to provide relevant education to health professionals, industry and the general public on poisoning by coordinating **training programmes in toxicology** at various levels including undergraduate, postgraduate, interest groups (for example, industrial nurses, industrial safety officers) and public.

The DPIC expects to contribute to **national disaster preparedness** from chemical accidents and chemical terrorism linked events by coordinating hazardous materials training programmes and preparing chemical agent treatment protocols for management of chemical casualties.

TARGET POPULATION OF THE DPIC

The following target populations will be served by the DPIC:

1. Medical Professionals

The medical professionals managing patients who are accidentally or intentionally exposed to toxins or drugs, can obtain the necessary advice and guidance based on latest evidence, resulting in more focused action plans.

2. Pharmaceutical and Chemical Industries

The pharmaceutical and chemical industries will also be able to gain valuable information on toxicity of chemicals utilised in their manufacturing processes and hence adopt appropriate safety precautions or substitute less toxic chemicals. With time, these industries may engage the centre to provide toxicity information on their behalf to the public and regulatory authorities.

In clinical drug trials, the DPIC has the advantage of providing advice via a 24-hour hotline while at the same time capturing and monitoring the safety profile of newly released drugs and chemical products in our community.

3. Members of Public Including Patients

It was noted from our study that there were approximately 55 832 toxicology and adverse drug-related events per year encountered by the 1 071 responding physicians.⁴ If extrapolated to the entire physician population of 5 000, this figure would be close to 250 000 encounters. This may be an underestimation as it is widely known that the extent of problems encountered by physicians is merely the tip of the iceberg, as many members of the public may not seek medical attention for one reason or another.

4. Hospitals

The DPIC will also support Pharmacy and Therapeutics Committees in performing literature reviews and drug evaluation reports.

5. Teaching Programmes in Toxicology

The DPIC will be involved in teaching medical students aspects of toxicology and provide an option for toxicology electives for interested students.

At the postgraduate level, toxicology programmes can be formalised and form part of the curriculum for emergency medicine and internal medicine trainees. The DPIC will coordinate these functions and provide the clinical opportunities for such teaching.

The Centre will also coordinate and host fellowship programmes in toxicology. Currently, toxicologists from Vietnam are rotated through the DPIC on toxicology attachments.

6. Government Ministries, Administrative and Regulatory Bodies (Health and Occupational Safety)

Feedback and advice can be given to appropriate regulatory bodies on chemical threats as the Centre can be expected to be the initial institution to pick up on such sentinel events through calls received.

7. Hazardous Material Incident Medical Response Preparedness

The DPIC will be able to provide necessary instruction and courses to train emergency medical responders and hospital staff in responding to hazardous materials incidents including chemical, biological and radiological agents.

OPERATIONAL ASPECTS OF THE DPIC

A medical director, who will be responsible for administrative and professional aspects of running the DPIC and who will be assisted by a manager. The centre adopts a three-tier approach in its day-to-day operations. The frontline poison information officers who are trained to advise on matters relating to management of poisonings and adverse drug events in a protocol-based approach, take the calls. A specially trained drug and poison information pharmacist, who will directly supervise the poison information officers, provides the second line of service. Finally, a clinical toxicologist or fellow under the toxicologist supervision will be rostered to provide tertiary level support and advice to the poison information officers and pharmacist in difficult situations.

Depending on the complexity of the information required, the estimated turnaround times for complete information are as follows:

1. 80% within 15 minutes
2. 10% within 1 hour
3. 5% within 1 to 24 hours
4. 5% more than 24 hours

Details which could be used to identify a caller, and or details of a call including telephone numbers etc. will be treated as confidential.

BENEFITS OF A DPIC

The benefits of a DPIC are intangible for the most part but studies have shown them to be cost-effective (Annex 1).¹¹⁻¹⁵ These benefits translate to improved

healthcare outcomes in terms of decreased mortality and morbidity from toxic exposures, efficient time management and better use of limited healthcare resources, resulting in reduced cost to the individual and government. Hospitals can expect to have savings from reduced duplication of costs from software licenses, hardware, purchase of reference books and journals, office space rental and other allocated overheads. More effective utilisation of expensive manpower resources can also be made with pooling of resources, such as manpower in the form of drug information pharmacists from the different hospitals. For the primary care physician, he is now empowered to manage his patient with the information resources made available to him through the DPIC without the cost of having to subscribe to expensive databases that may not be often used in his practice.

CONCLUSION

There appears to be a strong demand for drug and poison information to bridge the knowledge gap, where critical information is provided in a timely manner for the physician to carry out the task of managing his patients effectively. It is felt that with better poison information and management guidelines, most patients with toxic exposures can be cost-effectively managed in an ambulatory care setting with review facilities. This will help contain healthcare costs while providing better quality services and better utilisation of limited resources in the specialised field of toxicology. Hence, the formation of a centralised DPIC with pooled resources is expected to not only save cost, but also improve efficiency, effectiveness (including 24-hour coverage) and quality of service.

REFERENCES

1. Emmanuel S. Poisons — the epidemiology. Proceedings of the First Singapore Symposium on Poisoning 1991;15-22.
2. Shum E. Statistics on Poisoning. Correspondence letter from Epidemiology and Disease Control Division, Ministry of Health Singapore, 12/7/2000.
3. Expert Panel on Adverse Drug Reactions and the National Pharmaceutical Administration, Ministry of Health. Analysis of ADR reports for the year 1999. Adverse Drug Reaction News 2000; 2(1):2.
4. Ponampalam R, Anantharaman V. Determining the extent of adverse drug reactions and poisonings encountered by physicians in Singapore. SGH Proceedings 2002; 11(1):17-25.
5. Litovitz TL, Klein-Schwartz W, Dyer KS, Shannon M, Lee S, Powers M. 1997 annual report of the American Association of Poison Control Centers Toxic Exposure Surveillance System. Am J Emerg Med 1998; 16:443-97.
6. Expert Panel on Adverse Drug Reactions and the National Pharmaceutical Administration, Ministry of Health. Analysis of ADR reports for the year 1998. Adverse Drug Reaction News 1999; 1(2):2.
7. Bates DW, Cullen DJ, Laird N, Peterson LA, Small SD, Servi D, et al. Incidence of adverse drug events and potential adverse drug events. Implications for prevention. ADE Prevention Study Group. JAMA 1995; 274:29-34.
8. Lazarou J, Pomeranz BH, Corey PN. Incidence of adverse drug reactions in hospitalized patients: a meta-analysis of prospective studies. JAMA 1998; 279:1200-5.
9. McKenzie MW, Marchall GL, Netzloff ML, Cluff LE. Adverse drug reactions leading to hospitalization in children. J Pediatr 1976; 89:487-90.
10. Ponampalam R, Anantharaman V. The need for drug and poison information – the Singapore physicians' perspective. Singapore Med J 2003, 44:231-42.
11. Harrison DL, Draugalis JR, Slack MK, Langley PC. Cost-effectiveness of regional poison control centers. Arch Intern Med 1996; 156:2601-8.
12. Miller TR, Lestina DC. Costs of poisoning in the United States and savings from poison control centers: a benefit-cost analysis. Ann Em Med 1997; 29:239-41.
13. Williams RM. Are poison control centers cost-effective? Ann Em Med 1997; 29:246-7.
14. Phillips KA, Homan RK, Hiatt PH, Luft HS, Kearney TE, Heard SE, et al. The costs and outcomes of restricting public access to poison control centers. Results from a natural experiment. Med Care 1998; 36:271-80.
15. Mvros R, Dean BS, Krenzelok EP. Poison center funding — who should pay? J Toxicol Clin Toxicol 1994; 32:503-8.

THE DRUG AND POISON INFORMATION CENTRE

Hours of Operation

24 hours a day, everyday of the week

Access to Services

Telephone: 6423 9119, Facsimile: 6324 2991

Email: gaedpic@sgh.com.sg, Website: <http://dpic.sgh.com.sg>

Project Director: Dr R Ponampalam, Consultant, Department of Emergency Medicine, SGH

BENEFITS OF A CENTRALISED DPIC

1. A useful resource for doctors managing a variety of poisoning and adverse drug reactions.
2. Reduction in unnecessary Emergency Department visits and referrals
3. Reduced effects of outdated first aid treatments
4. Better prescribing habits by medical practitioners
5. Reduction in time required for diagnosis and treatment of poisoned patients
6. Improved management of hazardous incidents in industries
7. Better availability of toxicological information to MOH and industry on a day-to-day basis and in management of chemical accidents
8. Reduced exposure to toxins during pregnancy and other periods of life.
9. Improved healthcare by education of health care providers and public
10. Minimized community exposure to toxic materials
11. Better detection and elimination of hazardous commercial products
12. Reduced incidence of unintentional poisonings in the workplace and home

OTHER BENEFITS OF A CENTRALISED DPIC

1. Reduction in duplication of drug information (DI) work that is currently undertaken by all individual DI pharmacist in the public hospitals such as:
 - a. Literature reviews and recommendations for P&T committees
 - b. Drug use evaluation
 - c. Production and publication of DI bulletins

This will reduce the amount of routine workload that these pharmacists currently do and also improve the quality of work by useful collaborations with expert colleagues. In fact, the basic DI work carried out by these pharmacist can be taken over by the poison information officers thus freeing up the DI pharmacist to concentrate on more complex drug information/ interactions issues, research, etc.

2. Provide patient service support in the form of a 24-hour hotline to advice patients who may develop adverse reactions to medications that are prescribed.
3. Enhance hospitals ability to monitor drug safety and adverse reactions profiles.
4. Provide consultation and advice to general practitioners, industry (chemical & pharmaceutical) and public on matters related to drug and poisons information.
5. Provide timely support to clinical drug trials & research in the form of safety advice and monitoring of adverse effects to new medications/chemicals.
6. Provide post marketing surveillance and facilitates drug safety issues on recently released drugs.
7. Additional benefits of a trained toxicologist able to provide specific advice on the management of poisonings on a 24-hour basis.
8. Timely and crucial guidance to hospital physicians in the form of treatment protocols for the management of casualties from a chemical incident or disaster enhancing National Disaster Preparedness.