ORIGINAL ARTICLE

TOXBASE: Poisons information on the internet

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Objectives: To assess the uptake, usage and acceptability of TOXBASE, the National Poisons Information Service internet toxicology information service.

Methods: An observational study of database usage, and a questionnaire of users were undertaken involving users of TOXBASE within the UK between August 1999, when the internet site was launched, and May 2000. The main outcome measures were numbers of registered users, usage patterns on the database, responses to user satisfaction questionnaire.

Results: The number of registered users increased from 567 to 1500. There was a 68% increase in accident and emergency departments registered, a 159% increase in general practitioners, but a 324% increase in other hospital departments. Between January 2000 and the end of May there had been 60 281 accesses to the product database, the most frequent to the paracetamol entry (7291 accesses). Ecstasy was the seventh most frequent entry accessed. Altogether 165 of 330 questionnaires were returned. The majority came from accident and emergency departments, the major users of the system. Users were generally well (>95%) satisfied with ease and speed of access. A number of suggestions for improvements were put forward.

Conclusions: TOXBASE has been extensively accessed since being placed on the internet (<http://www.spib.axl.co.uk>). The pattern of enquiries mirrors clinical presentation with poisoning. The system seems to be easily used. It is a model for future delivery of treatment guidelines at the point of patient care.

Poisons information services have operated in the UK since the 1960s. Information was originally provided by telephone, but with increasing numbers of calls, many about relatively straightforward poisons, a decision was made in Scotland in the early 1980s to use the then new technology of Viewdata to provide a computer information database to health professionals. This service went on line in 1983 and provided first line information about the management of poisoning to registered NHS users.¹ This service, TOXBASE, subsequently became the first line poisons information database of the National Poisons Information Service (NPIS) for the whole of the UK. Since its inception TOXBASE has been available free of charge to registered users within the National Health Service, and by 1999 contained information on approximately 12 000 substances and products. In addition a number of monographs had been written for TOXBASE on specific aspects of poisons management such as paediatric poisoning, slang drug names and poisoning in pregnancy.

At the beginning of 1999 more than 500 users were registered on the system. The software and computers that had run it since its inception were by then obsolete and the decision was made within the National Poisons Information Service to move TOXBASE to a compatible system, to enable internet access (<http://www.spib.axl.co.uk>).² The process of conversion to the new technology was conducted over the spring and summer of 1999 and the internet system went live in August of that year. At that time all current users of the Viewdata system were automatically registered on the new internet version.

Since then publicity aimed at increasing the awareness of health service employees about TOXBASE availability has been carried out in a variety of ways, including letters to the medical directors of all hospitals and to accident and emergency (A&E) departments and minor injuries units. In addition study days have been arranged for individual groups of doctors and nurses. Indirect publicity was obtained from articles in the medical press³ and information on other web sites (<http://www.doh.gov.uk>; <http://www.doctors.net.uk>;

<http://www.show.scot.nhs.uk/spib>). The main user groups are hospital departments, principally A&E departments, GP surgeries and departments of public health. In this article we describe a study to assess the uptake of TOXBASE since the move to the internet, and the acceptability of this system to users in the United Kingdom. It was particularly important for us to ensure users with different web browsers were able to use all aspects of TOXBASE, including search and print commands.

METHODS

We have evaluated the use of the TOXBASE system in two ways. Firstly, by examining usage of the database, and secondly by a questionnaire that was sent to a selection of users of the system.

The host computer system and the TOXBASE web site allow analysis of the source of enquiries, that is the individual user site, and the pages within the database that have been examined by those users. It is therefore possible to investigate the uptake of the system by users, and identify the entries that are interrogated by them. It is thus also possible to monitor use by different types of enquirer, and examine the pattern of inquiries for different types of user.

In February of 2000 questionnaires were sent to a sample of 330 users of the internet version of TOXBASE. The questionnaire was designed primarily for A&E departments to investigate access to TOXBASE; ease of usage of the system; familiarity with the various types of material on TOXBASE; and to obtain any suggestions for improvements to this system.

It was sent to a medical and a nursing contact in all A&E departments (112). In addition all NHS Direct centres (6) and 50% of other, non-Poison Unit, users (25 GPs and 75 others) were surveyed. Those surveyed included 218 individuals who were registered as representatives of a host institution that had used the internet version of TOXBASE between August 1999 and February 2000.

Table 1 Source of TOXBASE users before going on the internet and at the end of May 2000

	1 August 1999	31 May 2000	% Increase
A&E departments	149	251	68%
Other hospital departments	124	526	324%
GPs	207	537	159%
NHS Direct centres	3	11	267%
Other	84	196	133%
Total	567	1521	168%

Table 2 Top substances accessed January–May 2000 and rank position in 1999

Substance	Number of accesses	Rank position in 1999
Paracetamol	7291	1
Codeine/dihydrocodeine	2170	2
Salicylates	2040	3
Ibuprofen	1562	4
Detergents	1418	5
Diazepam	1176	6
Ecstasy	1115	21
Zopiclone	1097	7
Thioridazine	1038	12
Caffeine (from compound analgesics)	1013	9

RESULTS

Uptake and use

At the beginning of August 1999 all 567 existing users were automatically registered on the new internet TOXBASE site. By the end of May 2000 there were more than 1500 registered users (table 1). The largest increase in registrations occurred in the category "other hospital departments", which includes laboratories and intensive care units. There was a 68% increase in the number of registered A&E departments. Altogether 744 of the 954 new registrations came from England, 143 from Scotland, 38 Wales, 22 Northern Ireland and seven from the other registered sources.

As until the end of December 1999 it was possible to access TOXBASE via both Viewdata and the internet we have only analysed product accesses to TOXBASE via the internet for the year 2000 (5 months). The most frequent accesses to TOXBASE are shown in table 2. This table also shows the rank order for these substances for inquiries made during 1999. The most obvious change is the frequency of enquiries regarding ecstasy, which was 21st in the rank order for 1999 but 7th in 2000.

In addition we are able to examine for the first time accesses to information other than the product substance monographs (table 3). The most popular access was to the paediatric poisoning entry and the second most common to the eye decontamination instructions. These were accessed 2314 and 1580 times respectively on the internet site from its inception.

User satisfaction

Altogether 165 (50%) of questionnaires distributed were returned. Some 111 of these came from A&E departments and 18 from other hospital sources. Over 95% of respondents indicated that it was "very easy" or "quite easy" to access TOXBASE and 90% thought speed of access adequate (table 4). TOXBASE uses a Java search applet as a tool to interrogate its database and some hospital systems have security processes that disable this tool. Some 12% of those who had tried had difficulty printing information provided from the

Table 3 Top information pages accessed on the internet

Information	Number of accesses
Paediatric poisoning	2314
Eye decontamination	1580
Reference page (tricyclics)	1441
Activated charcoal	1379
Slang terms for drugs	841
Teratology information	762
Slang terms used by addicts	743
NPIS telephone numbers	573
Plants generally considered to be non-toxic	561
Blood alcohol graph	509

Table 4 Access to TOXBASE

Question	Answers	%
How easy did you find it to get on line to TOXBASE?	Very easy/quite easy	95.9
	Difficult/very difficult	4.8
Which web browser are you using?	Internet explorer	71.5
	Netscape	17.0
	Both	2.4
	Other	1.8
Are you accessing TOXBASE	Via the internet	70.3
	Via NHSnet	26.1
	Both	2.5
Is the speed of access adequate?	Yes	89.7
	No	10.3

system, although the reasons for this are unclear (table 5). The most popular access to information other than product monographs (table 6) was to paediatric poisoning (58% of respondents), followed by the household chemicals entry (57% of respondents).

Many respondents did not suggest improvements, but the more frequent suggestions included the inclusion of pictures of plants and snakes and a tablet identification facility. Some responders wished for more specific information on toxic risk, information on drug interactions and the effects of combinations of drugs taken in overdose. A potentially useful suggestion was the inclusion of patient leaflets, which can be printed from the system to give, for example, to parents.

DISCUSSION

TOXBASE is the first database available on the internet designed to meet the needs of first line management in poisoning. This method of information provision for health care, which has been promoted by the UK Health Departments and the NPIS in the emergency management of poisoning, is unique to the United Kingdom. It is therefore important that its mode of use is evaluated. As the system is used predominantly by A&E departments the questionnaire was targeted specifically at these users. The results of our survey indicate a high level of acceptability of the system. The data we have collected on actual system use are in line with the pattern of presentations of acute poisoning at A&E departments.⁴ An on line service also enables new or urgent information to be made available to all users within 24 hours, an example being the press release about unexplained illness and deaths among heroin injectors, and an alert about contaminated ecstasy tablets. This may partly explain the increase in ecstasy inquiries we noted.

Table 5 Using TOXBASE

Question	Answer	%
How easy is it to find a product?	Very easy/quite easy	94.6
	Difficult	3.6
How easy is it to find your way through an entry?	Very easy/quite easy	97.6
	Difficult	1.2
Are you able to see the Java search applet	Yes	77.6
	No	12.7
How easy is it to print information?	Very easy/quite easy	78.8
	Difficult/very difficult	12.2
	Never tried	6.7
Does the printout contain the information you want?	More than required	10.3
	Less than required	6.1
	Correct amount	65.5
Do you have problems with the appearance of the database? (For example, colours, fonts)	Yes	6.1
	No	91.5
Is it easy to find information other than product monographs? (see table 6)	Very easy/quite easy	80.0
	Difficult/very difficult	3.0
	Never tried	6.7
Is the information in the Help facility sufficient?	Just right	37.6
	Too much	1.8
	Not enough	3.6
	Never used	52.7

Table 6 Information other than poisons monographs

Information	% of respondents who have looked at the information
Paediatric poisoning	58.2
Household chemicals	57.0
Activated charcoal	54.5
Slang terms	46.1
Substances of low toxicity	38.2
Gut decontamination	32.1
Antidotes	30.3
New this month	28.5
Poisoning in pregnancy	24.2
References	22.4
Snakes	21.8
Battery codes	17.0
Hyperbaric facilities	17.0
Laboratory services	9.7

At present some aspects of TOXBASE are not being used as much as we would hope. These include the potential interactive nature of the system, in particular with respect to the acquisition of information on the toxic effects of new drugs. TOXBASE has an e-mail facility, but at present this is used very infrequently. This may be because many hospital units do not have e-mail provision on their computer systems. We anticipate that with the wider involvement of the NHS net within the United Kingdom this particular aspect of the TOXBASE system will become more readily available and hence more frequently used for passing information about poisons management to the NPIS.

There are a number of other possible applications for TOXBASE. These include a potential use for distance learning about poisoning management. A number of professional organisations have placed health care protocols within their own web sites (for example, British Heart Foundation, <http://www.bhf.org.uk> and British Hypertension Society, <http://www.hyp.ac.uk/bhs/index.htm>).

The success of TOXBASE at this early stage of its development as an internet tool should encourage the standardisation of web presentations and ease of access to facilitate the more widespread use of consensus statements to support clinical practice.

TOXBASE was originally written to standardise the information provided to health care professionals about the management of poisoning. At present we have no outcome data to indicate how successful it has been in altering poisons management within the hospital departments in which it is used. In the case of paracetamol poisoning it has been shown that distribution of a wall chart assists in the provision of a higher standard of care.³ We anticipate that TOXBASE will serve the same purpose for a wider range of poisons. Further developments in the method of presentation of the data on the system, particularly with respect to multi-agent ingestion are planned and it is hoped these will also contribute to improving levels of patient care. Clinical studies that provide quantitative information on the effects of drug combinations will be used to support this work.⁶

In conclusion, TOXBASE would seem to have been well received as a useful addition to the management poisoning within the UK health care system. Over the next 12 months it is anticipated that the penetration of users will increase, particularly within England and Wales. With this increased use will come a need to adapt TOXBASE, and to this end a series of focus groups have been held to facilitate the development of the system in future.

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Conflicts of interest: the authors are responsible for managing TOXBASE on behalf of the NPIS. The copyright of TOXBASE is held by the Scottish Executive Health Department.

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REFERENCES

- 1 **Proudfoot AT**, Davidson WSM. A Viewdata system for poisons information. *BMJ* 1983;**286**:1125-7.
- 2 **Good AM**, Bateman DN. TOXBASE on the internet. *J Accid Emerg Med* 1999;**16**:399.
- 3 **Jones AL**, Volans G. Recent advances: Management of self poisoning. *BMJ* 1999;**319**:1414-17.
- 4 **Thomas SHL**, Bevan L, Bhattacharyya S, *et al*. Presentation of poisoned patients to accident and emergency departments in the North of England. *Hum Exp Toxicol* 1996;**15**:466-70.
- 5 **Bialas MC**, Evans RJ, Hutchings AD, *et al*. The impact of nationally distributed guidelines on the management of paracetamol poisoning in accident and emergency departments. *J Accid Emerg Med* 1998;**15**:13-17.
- 6 **Love JN**, Howell JM, Litovitz TL, *et al*. Factors associated with the development of cardiovascular morbidity. *Clin Toxicol* 2000;**38**: 275-81.