NPIS
National Poisons Information Service

Health Protection Agency

National Poisons Information Service

Annual Report 2011/2012

National Poisons Information Service

Commissioned by the Health Protection Agency through its Centre for Radiation, Chemical and Environmental Hazards

The main role of the National Poisons Information Service is to advise NHS healthcare professionals on the diagnosis, treatment and care of cases of poisoning across the UK. Poisoning is an extremely common cause of hospital admissions in the NHS, being numerically similar to admissions for myocardial infarction. In addition, many cases of suspected poisoning are managed out of hospital following advice provided by the NPIS, thus reducing unnecessary use of NHS resources. The major workload falls on hospital emergency departments, but minor injuries units and primary care services also make major contributions – the latter to a large extent involving NHS telephone helplines (NHS Direct, NHS 111 and NHS 24).

NPIS Units at 31 March 2012

NPIS Birmingham Unit
City Hospital, Birmingham

hosted by Sandwell and West Birmingham Hospital NHS Trust

Director: Professor J A Vale MD FRCP FRCPE FRCPG FFOM FAACT FBTS Hon FRCPSG

NPIS Cardiff Unit
Llandough Hospital, Cardiff

hosted by Cardiff and Vale University Health Board

Director: Dr J P Thomson BMedSci MBChB FRCP FBTS

NPIS Edinburgh Unit
Royal Infirmary of Edinburgh

hosted by NHS Lothian – University Hospitals Division

Director: Professor D N Bateman BSc MD FRCP FRCPE FBPharmacolS FBTS FAACT

NPIS Newcastle Unit
Regional Drug and Therapeutics Centre, Newcastle

hosted by Newcastle upon Tyne Hospitals NHS Foundation Trust

Director: Professor S H L Thomas BSc MD FRCP FRCPE

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We are grateful for the support and help of all our NPIS and HPA colleagues in the production of this report.

Front cover image
Mushroom identified from photograph as Bolbitius titubans

September 2012
ISBN 978-0-85951-727-0

Foreword

It is a great pleasure to introduce the National Poisons Information Service (NPIS) Annual Report for 2011/12. This covers the seventh year of the NPIS working as a UK-wide integrated network, which was introduced by the Health Protection Agency (HPA) in 2005.

The report is produced as a statement of activity, accountability and governance for the HPA as commissioning organisation for the service and for the main joint funders, who are the English Department of Health, the Scottish Assembly Government, the Welsh Assembly Government, the Northern Ireland Department of Health and Beaumont Hospital, Dublin, on behalf of the Republic of Ireland Government.

The principal aim of the NPIS is to decrease the health burden associated with poisoning by the provision of consistent, evidence-based advice to NHS healthcare professionals, to allow them to provide optimal clinical management of people with confirmed or suspected poisoning. The UK Teratology Information Service (UKTIS) is part of the NPIS and provides advice on drug and chemical exposures during pregnancy.

Evidence of the value of our services to NHS healthcare professionals includes the growing volume of clinical contacts, especially through NPIS internet resources, and the excellent results of user feedback surveys. Increasing demand for statistical information collected by the NPIS demonstrates the value of this resource for health surveillance purposes.

We are now entering the final year of commissioning by the HPA, before this function is adopted by Public Health England in 2013. The service has developed substantially since the HPA took on commissioning arrangements in 2003 and is now a cost-effective, national, integrated service with seamless working between the various provider units, using improved information technology and data management systems and more robust and flexible telephone systems. We remain confident that the NPIS will continue to provide timely and high quality clinical advice to our many users into the future.

Elaine Lynch-Farmery
Centre for Radiation, Chemical and Environmental Hazards,
Health Protection Agency

Simon Thomas
Chair, NPIS Clinical Standards Group

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Executive Summary

Background

The National Poisons Information Service provides information and advice to support the management of the 140,000 people admitted to hospitals with exposure to suspected poisons each year and the many seen and not admitted, or seeking advice in the community. This information is provided through the poisons information database TOXBASE® * and, if needed, by the NPIS 24-hour telephone service. Support from a consultant clinical toxicologist is available at all times. The NPIS also provides the UK Teratology Information Service (UKTIS), which is the national source of information and advice about exposures to drugs and chemicals during pregnancy.

Activity

NPIS policy has been to encourage use of online information provided on TOXBASE, reserving telephone enquiries for more complex cases where further discussion with a specialist in poisons information or NPIS clinician is needed. During 2011/12 there were over 532,000 TOXBASE user sessions and around 1,513,000 separate product accesses, increases of 4.5% and 6.3%, respectively, on equivalent figures for the previous year. There were, in addition, 46,000 hits to the information held on TOXBASE concerning exposure to drugs and chemicals in pregnancy, an increase of more than 22% on activity for 2010/11. The total number of TOXBASE user sessions was therefore over 578,000. As planned, these increases in access to online information were accompanied by a 5.8% reduction in NPIS telephone enquiries to over 51,000, including enquiries to UKTIS. The complexity of these telephone enquiries is illustrated by the number referred to an NPIS consultant, which was 1,540 during 2011/12, an increase of 1% over the previous year.

It is essential to update the approximately 17,000 product entries on TOXBASE regularly, to maintain their quality and the confidence of NHS staff and to allow telephone call numbers to be maintained at manageable levels. During 2011/12 NPIS staff wrote or revised over 5,600 entries, an increase of 42% over the previous year and around a third of the total number. These figures include 109 pregnancy exposure monographs, an increase of 9% on the number of pregnancy monographs written or revised in 2010/11.

Quality

During 2011/12 quality assurance exercises were conducted by questionnaire to obtain evidence of user satisfaction with our services. Overall satisfaction scores were very high for all three areas studied this year, the TOXBASE website (92.7%), the telephone poisons information service (96.7%) and the UKTIS telephone service (90%).

Surveillance

Data from the NPIS are useful for public health surveillance activities. During the year the NPIS has introduced an urgent alerting system to follow up accesses on TOXBASE for agents of interest. During the year 470 alerts were received through this system, 82 involving patients.

Issues of interest highlighted in this year's report include the following.

Schmallenberg virus (SBV)

SBV is a novel virus identified in Germany in 2011 and identified in some UK farms in early 2012. SBV in pregnant sheep and cattle is linked with congenital malformations in the offspring. Although risks of human infection are low, a UK-wide surveillance programme has been set up, coordinated by UKTIS. This will collect information on congenital malformations reported in humans of the type that have been associated with SBV infection in sheep and cattle. No such reports were received during 2011/12, but the project is continuing and will provide reports on a quarterly basis.

Drugs of abuse

NPIS data are useful for tracking toxicity associated with drugs of abuse. During the year the most frequently implicated drugs were MDMA ('ecstasy'), heroin, cannabis, methadone, mephedrone and ketamine. Other than mephedrone, of the newer recreational drugs, those most frequently involved in telephone enquiries have been 'legal highs' (not otherwise specified), naphyrone, methcathinone, 6-(2-aminopropyl)benzofuran (6-APB), 'Ivory Wave' products (reported to contain desoxypipradrol) and methoxetamine.

* TOXBASE® is a registered trademark of the UK National Poisons Information Service

Reductions in activity following legal control have been maintained for mephedrone, 'Ivory Wave' products and naphyrone.

In 2011/12 the NPIS answered 36 telephone enquiries relating to the ketamine analogue methoxetamine and there were also 507 accesses to the methoxetamine TOXBASE monograph. These NPIS data formed part of the evidence considered by the Advisory Council on Misuse of Drugs (ACMD), which subsequently recommended a Temporary Drug Class Order coming into effect on 5 April 2012. The impact of this on NPIS enquiries relating to methoxetamine will be monitored.

During the year the NPIS has worked closely with the UK Focal Point Early Warning System (EWS) on new psychoactive substances, managed by the Department of Health. Further discussions are planned, with a view to developing a chapter for the exchange of data and information but, in the meantime, the NPIS has been listed by the European Monitoring Centre for Drugs and Drug Addiction as part of the UK early warning system national profile.

Pesticides

The NPIS has collected detailed information on exposure to pesticides since 2004, and is tracking 1,930 pesticide and biocide products as part of a research project funded by the Department for Environment, Food and Rural Affairs. Information has been gathered during the year on 1,171 potential exposures, with the agents most commonly implicated being glyphosate and permethrin. Only a minority of patients were classified as having moderate (6.5%) or severe (0.9%) poisoning.

Carbon monoxide

Despite public awareness campaigns, carbon monoxide poisoning continues to be an important preventable cause of morbidity and mortality. During 2011/12 there were 248 telephone enquiries concerning carbon monoxide, involving at least 315 individuals. As in previous years, most exposures occurred in the home, with central heating boilers the most common source. While most episodes were associated with limited or no clinical effects, 27 people had moderate or severe poisoning, of whom four are known to have died.

Lead

Lead is an important public health issue because of the potential severity of acute poisoning and the substantial adverse health effects of chronic exposure. During 2011/12 there were 140 telephone enquiries to the NPIS involving 130 different individuals potentially exposed to lead. Most were not exposed occupationally, with paint-stripping the most common source. Chelation therapy was recommended or had already been given for 14 of these individuals.

Laboratory assay availability

Adequate laboratory resources are essential to support the management of poisoned patients and it is important that these are used appropriately. To facilitate this, the NPIS and Association for Clinical Biochemistry (ACB) agreed new guidelines for laboratory analyses for poisoned patients in the UK during this year, updating guidelines first produced in 2002.

The NPIS and ACB also conducted a joint survey of over 200 major hospitals to ascertain the current availability of assays within the UK. The results indicated that assays required for appropriate management of common poisonings are widely available. In contrast, however, some specialist assays are much less accessible with delays to the receipt of results often inappropriately long, requiring clinicians to make key clinical decisions without access to appropriate information. This may result in suboptimal clinical management, a prolonged admission to hospital and/or poor use of resources.

The updated NPIS/ACB guidelines should help individual hospitals to review how they provide analytical services to support the management of poisoned patients and encourage a more collaborative, comprehensive and effective approach to the provision of specialist assays in the UK.

Education and research

NPIS staff continue to be active in education and research, with more than 80 contributions to the scientific literature published during 2011/12. A high proportion of these were peer-reviewed scientific papers.

1 Introduction

Information on National Poisons Information Service (NPIS) activity in 2011/12 is given in this report. The report shows how different elements of the service work together and illustrates a few examples of its activity – in particular on novel recreational drugs, therapeutic errors and carbon monoxide poisoning.

The NPIS is a network of dedicated units commissioned by the Health Protection Agency (HPA). All these units are linked to clinical treatment facilities within UK teaching hospitals.

The NPIS has provided information to healthcare workers in the UK by telephone since 1963. The poisons information database, TOXBASE® * (www.TOXBASE.org), was developed in 1982; in 1999, it was transferred to the internet and adopted as the first-line information source for healthcare professionals in the UK. While the structure of the NPIS has changed, its focus has always been to assist colleagues in all parts of the NHS to manage poisoned patients. The information and advice provided by the NPIS is updated regularly and is based on published literature, experience from NPIS telephone enquiry data and direct clinical experience of poisoning managed in NPIS-linked clinical departments.

In 1995 the UK Teratology Information Service (UKTIS) moved to Newcastle to become an integral component of NPIS activities. As shown in this report, the activity of UKTIS is important both in supporting women of child-bearing age and their healthcare providers, but also in collecting new information on potential effects of exposure to drugs and chemicals in pregnancy, including the therapeutic use of medicines.

Poisoning continues to be an important public health issue in the UK. It accounts for over 140,000 NHS hospital admissions in the UK each year (just under 1% of the total number), thus creating a significant workload for health service staff. Hospital emergency departments and minor injuries units in particular are involved. The majority of poisoning in adults is related to self-harm, while unintentional poisoning is common in children. Many thousands of different agents can be involved, making it very difficult for NHS staff to keep up to date on diagnosis and management, especially when new or unfamiliar agents are involved. In addition, around 40% of adults who poison themselves also take alcohol at the same time, making clinical assessment and management more difficult.

During the past decade, there has been a small reduction in the number of patients admitted to hospitals throughout the UK for poisoning. Part of this may be due to national strategies aimed at reducing rates of suicide and self-harm. Other reasons are unclear. At the same time, however, novel trends are emerging and new drugs of abuse present a particular challenge. The pattern of prescription drugs taken in poisoning has also changed in line with new approaches to therapy. For example, newer antidepressants and antipsychotic drugs are increasingly involved, as the older and often more toxic agents are withdrawn.

Hospital admission data, illustrated by NHS finished consultant episodes, do not reflect the very many poisoned patients who present to emergency departments across the UK but are not subsequently admitted. Nor do these data reflect the large number of enquiries about poisoning received by NHS public access help lines, NHS Direct and NHS 111 in England and Wales and NHS 24 in Scotland. The NPIS provides advice to both emergency departments and NHS public access lines to help them decide which patients need admitting to hospital and which patients can be safely managed at home.

The NPIS thus provides information to support and assist appropriate triage, referral, assessment and treatment of patients at all levels of the NHS.

The majority of people dying from poisoning do so before healthcare assistance is summoned. Nevertheless, there are still opportunities to improve care for patients with severe poisoning who do survive to hospital admission, reducing morbidity or mortality. At the same time, NPIS advice reduces the need for unnecessary hospital attendance by those who have been exposed to substances of relatively low toxicity.

A key component of the service is obtaining information from treating clinicians on the effects and ultimate outcomes of cases of severe or unusual poisoning. This assists the service in providing current, accurate advice. A better interaction on this aspect is needed from NPIS users, and the NPIS seeks their future collaboration in improving feedback.

The NPIS is funded primarily through 'Government Grant in Aid' from the UK health departments, but receives some contract income and research income for specific projects, notably projects on the health effects of exposure to pesticides and biocides funded by both the Department for Environment, Food and Rural Affairs and the Health and Safety Executive.

* TOXBASE® is a registered trademark of the UK National Poisons Information Service

2 NPIS Advice Service Structure

The NPIS provides a 24-hour consultant-supported clinical toxicology advice service for the diagnosis and management of poisoned patients, including the clinical effects of exposures arising from chemical incidents.

The four NPIS units are currently based within NHS teaching hospital 'providers' (two in England and one each in Scotland and Wales). The service has 24-hour consultant clinical toxicologist support provided by NHS consultant staff in all four NPIS units and colleagues in two other NHS hospitals (Guy's and St Thomas' NHS Foundation Trust and York Hospitals NHS Foundation Trust). NPIS consultant clinical staff also provide specialist services in clinical toxicology to their local populations.

Over the past several years, there has been an expansion in the number of consultant staff available to assist colleagues in the management of more seriously unwell patients. This expansion has occurred in both the NPIS units and in geographically separate acute hospitals. This expansion in the availability of expertise is important for UK resilience. Since the NPIS also receives many enquiries about children, it has formalised existing support from expert paediatricians, particularly to assist in the review of standard advice for the management of poisoning in children.

The primary source of information provided by the NPIS is its online database, TOXBASE (www.TOXBASE.org), which is available free to all UK healthcare professionals who register for it, including hospital staff, primary care physicians, and NHS Direct and NHS 24 services. The NPIS also provides a 24-hour telephone information service for healthcare professionals using a single national telephone number (0844 892 0111) when further advice or information is needed.

NPIS activity is reflected in TOXBASE sessions, TOXBASE accesses and telephone enquiries. The increasing use now being made of TOXBASE, encouraged by NPIS promotional exercises, allows staff to perform more strategic work for the service, including production of TOXBASE monographs.

When first received (see Figure 2.1), telephone enquiries are managed by specialists in poisons information (SPI) who may have a scientific, nursing or pharmacy background. Complex enquiries are referred on to NPIS consultant staff as necessary on a 24-hours-a-day basis.

All NPIS telephone enquiries are now recorded for governance purposes and data logged within a specially designed national database (UKPID). Data are uploaded on to a central server, allowing patient data to be accessed by other NPIS units that subsequently become involved in the management of that case and the provision of easily accessible national data on the activity of the service and the patterns of enquiries received. The information available can also be used to inform clinical management of subsequent similar cases. Data from UKPID are used to support UK pharmaceutical licensing decisions by the Medicines and Healthcare products Regulatory Agency (MHRA), and for studying the epidemiology of poisoning as reported to the NPIS.

In Northern Ireland, the Regional Medicines and Poison Information Service in Belfast provides a daytime poisons information service. Out-of-hours enquiries from healthcare professionals are referred to the NPIS. The NPIS is also contracted to provide poisons information for users in the Republic of Ireland: TOXBASE is provided to major hospital emergency departments and to the National Poisons Information Centre in Dublin. Out-of-hours telephone support is provided by the NPIS.

Information on the potential toxicity of drugs and chemicals in pregnancy is provided by the UK Teratology Information Service (UKTIS). This was established as part of NPIS Newcastle in 1995. Information on aspects of the toxicity of drugs and chemicals in pregnancy is increasingly being made available on TOXBASE.

In order to maintain a consistent approach, irrespective of the provider unit answering an enquiry, it is essential to have national mechanisms for addressing issues that affect the service. A key development over recent years has been the formalisation of such arrangements within a UK strategic framework.

Commissioning issues are dealt with by the HPA NPIS Commissioning Group, which meets quarterly (or more often if required). Clinical issues, including clinical governance matters, are discussed at the NPIS Clinical Standards Group, which also meets quarterly, usually on the same day as the HPA NPIS commissioning meetings. These meetings are attended by a representative of the commissioner, a senior clinician from each provider unit, and a senior specialist in poisons information. Invitations are also sent to representatives of

the National Poisons Information Centre in Dublin. Operating procedures are updated frequently and made available to NPIS staff via TOXBASE.

To encourage a common and evidence-based approach to the clinical management of poisoning, all NPIS clinical and information staff are invited to attend continuing professional development (CPD) meetings which deal with new data and important clinical issues. These occur three times a year and have now been taking place for six years. Each provider unit hosts the event in turn. An important further opportunity for CPD is the annual congress of the European Association of Poison Centres and Clinical Toxicologists, which is attended by many NPIS staff.

There are also regular meetings and teleconferences of the TOXBASE Editing Group and the UKPID User Group. These groups have representation from each provider unit and discuss issues relating to these IT platforms. The National Poisons Information Centre in Dublin and the Northern Ireland Regional Medicines and Poison Information Service also contribute to TOXBASE development and review.

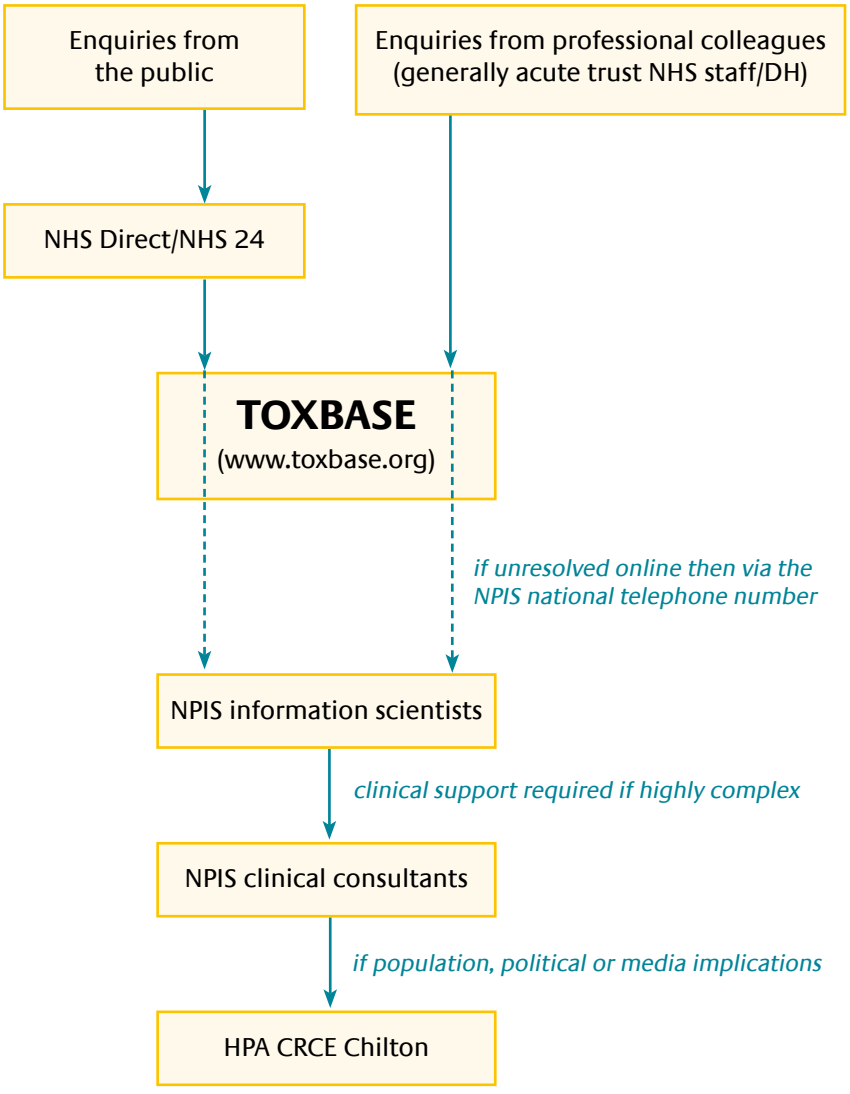


FIGURE 2.1 How poisons enquiries are answered

3 NPIS Activities in 2011/12

3.1 Overall Service Profile

This report concentrates on NPIS activity in 2011/12, as reflected by TOXBASE user sessions, TOXBASE accesses, telephone enquiries and consultant referrals. The increasing use now being made of TOXBASE, encouraged by NPIS promotional exercises, allows staff to perform more strategic work for the service, including production and revision of TOXBASE monographs (Box 3.1, page 11).

The number of TOXBASE user sessions (defined as one logon to the TOXBASE site during which the user may access one or more products several times) was 532,253. This is an increase of 4.5% on the number of sessions in 2010/11. In addition, 46,000 UKTIS monographs were accessed on TOXBASE during 2011/12, a 22.5% increase compared to 2010/11. The total number of TOXBASE user sessions was therefore 578,253, as shown in Figure 3.1.

The number of user sessions includes 6,968 educational sessions, a 54% increase on the 2010/11 figure. Sessions from all the NPIS units and from the Northern Ireland Regional Medicines and Poison Information Service have been excluded from further detailed analyses, as these units may access TOXBASE for training/educational purposes, for operating procedures or for monograph-writing purposes (NPIS units only), as well as for telephone answering.

Therefore a total of 487,215 sessions originating in England, Northern Ireland, Scotland and Wales have been analysed further in this section; UKTIS activities are discussed in Section 3.3. Sessions originating overseas are presented in Box 3.2 (page 13).

There were 1,512,604 individual product accesses in 2011/12, an increase of 6.3% on the number of accesses in 2010/11. Applying the same criteria as for session data, 1,281,708 product accesses have been analysed further, an increase of 14% on the 2010/11 figure.

The total number of telephone enquiries received by the NPIS in 2011/12 was 51,388 (including 3,260 calls made to UKTIS); this is a decrease of 5.8% from 2010/11 (Figure 3.1). The analyses presented in this report include only telephone enquiries to the NPIS that related to patients, of which there were 46,999. These data include the 1,540 telephone enquiries that were referred on for specialist advice from NPIS consultants.

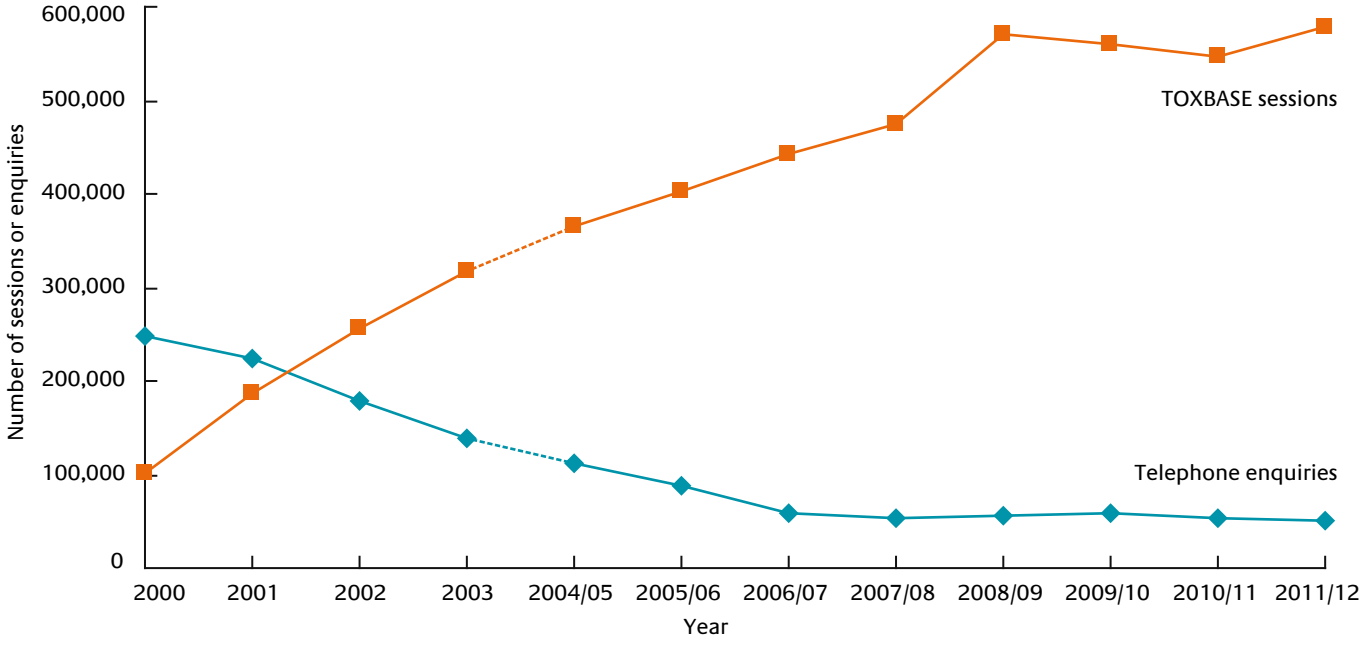


FIGURE 3.1 Telephone enquiries and TOXBASE sessions from 2000 to 2011/12 (data for 2000–2003 by calendar year; subsequent years by financial year) (data from 2009/10 onwards include UKTIS telephone enquiries and pregnancy monograph accesses)

Table 3.1 shows the number of poisons enquiries from UK countries and relates these to population size. Table 3.2 shows the variation in TOXBASE use by strategic health authorities in England compared with use in Northern Ireland, Scotland and Wales. As expected, in 2011/12 the number of telephone enquiries received relative to population size decreased compared to last year's figure. However, the number of TOXBASE sessions relative to population size has increased in each country: up by 4% and 5% in England and Scotland, respectively. This means that, in 2011/12, the overall use of the services provided by the NPIS, relative to population size, has increased by 3% compared with the 2010/11 figure, demonstrating an increased demand for NPIS advice within the UK. Within England, seven out of ten strategic health authorities showed an increased use of TOXBASE in 2011/12 (see Table 3.2); the South East Coast showed an 11% increase compared to 2010/11.

Figure 3.2 shows that, as in previous years, hospital departments and NHS Direct/NHS 24 users are responsible for the majority of TOXBASE sessions: 322,780 (66.2%) and 117,747 (24.6%), respectively. In contrast, telephone enquiries received were distributed more evenly across hospital, primary care and NHS Direct/NHS 24 users: 13,648 (29.4%), 14,837 (31.6%) and 10,527 (22.4%), respectively. This is because, as in previous years, GPs are more likely to call the NPIS than access TOXBASE.

TABLE 3.1 Distribution of poisons enquiries to the NPIS in 2011/12

	Telephone enquiries (involving patients)		TOXBASE sessions		Combined total	
Country	Number	Rate per 100,000 population (mid-2010)*	Number	Rate per 100,000 population (mid-2010)*	Number	Rate per 100,000 population (mid-2010)*
England	38,984	74.6	395,326	756.9	434,310	831.5
Northern Ireland	552	30.7	10,797	600.0	11,349	630.7
Scotland	1,999	38.3	52,358	1,002.6	54,357	1,040.9
Wales	3,166	105.3	28,734	955.8	31,903	1,061.1

* http://www.ons.gov.uk/ons/rel/pop-estimate/population-estimates-for-uk--england-and-wales--scotland-and-northern-ireland/population-estimates-timeseries-1971-to-current-year/index.html (accessed June 2012, England total = 52,233,400)

TABLE 3.2 Regional distribution of TOXBASE sessions in 2011/12

Country	Strategic health authority	Number of TOXBASE sessions	TOXBASE sessions per 100,000 population	Population estimate (mid-2010)*
England	East Midlands	29,707	663.0	4,481,400
	East of England	38,261	656.1	5,831,800
	London†	46,916	599.5	7,825,200
	North East†	27,169	1,042.3	2,606,600
	North West†	65,003	937.2	6,935,700
	South Central	32,313	781.1	4,137,100
	South East Coast†	23,377	533.1	4,385,400
	South West†	41,100	779.3	5,273,700
	West Midlands†	41,730	765.0	5,455,200
	Yorkshire and the Humber†	49,750	938.5	5,301,300
Northern Ireland	–	10,797	600.0	1,799,400
Scotland	–	52,358	1,002.6	5,222,100
Wales	–	28,734	955.8	3,006,400

* http://www.ons.gov.uk/ons/rel/pop-estimate/population-estimates-for-uk--england-and-wales--scotland-and-northern-ireland/population-estimates-timeseries-1971-to-current-year/index.html (accessed June 2012, England total = 52,233,400)

† Strategic health authorities in England that have shown an increased use of TOXBASE in 2011/12

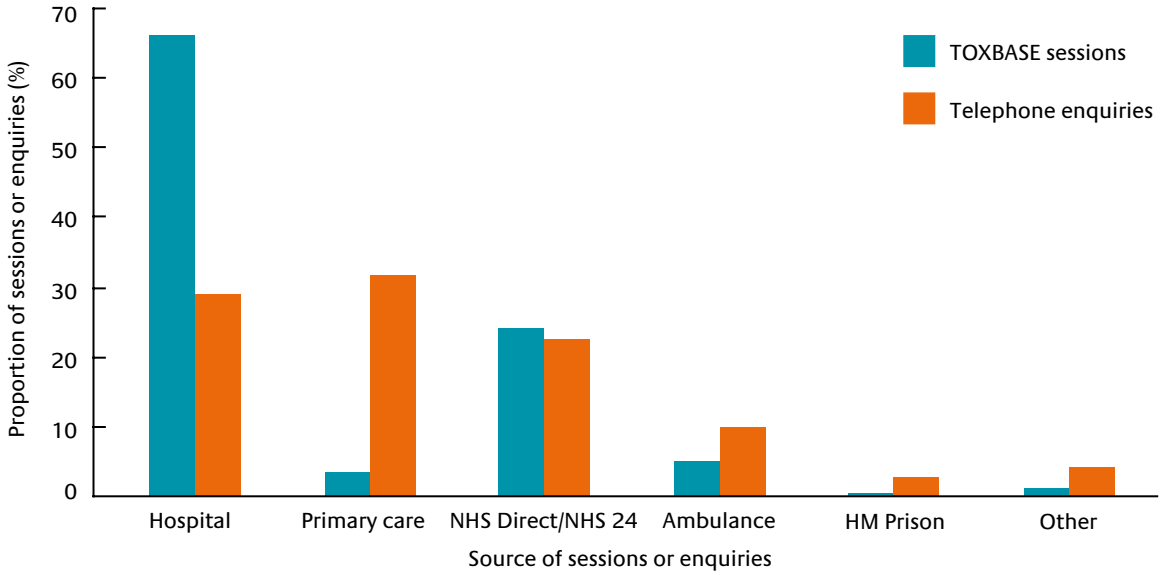


FIGURE 3.2 Telephone enquiries and TOXBASE sessions by user type in 2011/12

As in previous years, the largest number of TOXBASE sessions from hospital users was from hospital emergency departments (277,977 or 86.1%) (Table 3.3). Medicines information departments and pharmacies formed the second largest group of hospital users (31,643 or 9.8%). Of particular note is that the number of sessions originating in intensive care/high dependency units this year has more than doubled compared to the 2010/11 figure, an increase of 142% suggests a greater demand for TOXBASE in these hospital areas. Of the telephone enquiries, 44.3% (20,818) were made by doctors and 41.8% (19,623) by nurses; these proportions are almost identical to those in previous years.

The age ranges of patients who were the subject of telephone enquiries are shown in Figure 3.3; over a quarter (28.2%) involved children under the age of five years. Patients were female in 52.7% of telephone enquiries. These figures for age and sex distribution are similar to those in previous years.

The majority of exposures reported in telephone enquiries were accidental (47%) ingestions that occurred at home (86.6%). Figure 3.4 shows the types of poisonings reported to the NPIS during telephone enquiries in 2011/12; as in previous years, the largest single category was accidental ingestions.

The types of agents that were the subject of TOXBASE sessions and telephone enquiries are shown in Figure 3.5. As in previous years, pharmaceuticals were the most common source of enquiries (70.0% and 64.5%, respectively) for both datasets. The percentages of enquiries versus accesses for each group of agents were similar except for the chemicals group (13.8% vs. 4.61%, respectively) and the animal/plant/fungi group (5.2% vs. 0.01%, respectively). This suggests that users prefer to telephone the NPIS rather than access TOXBASE when the exposure relates to chemicals or an animal, plant or fungus.

TABLE 3.3 Hospital session data by department

Department	Number of sessions
Emergency	277,977
Medicines information and pharmacies	31,643
Admission/assessment	2,345
Intensive care/treatment	1,912
Poisons wards	1,873
Paediatrics	1,657
Psychiatric	1,417
General medicine	752
Clinical biochemistry and other laboratories	623
Public health and Health Protection Agency	537
Other	2,044

Table 3.4 shows the ten pharmaceutical agents that were the most frequent subject of telephone enquiries and TOXBASE accesses. It should be noted that the number of enquiries and accesses listed for paracetamol do not include

BOX 3.1 TOXBASE Editing

With the increased use of TOXBASE by healthcare professionals as the first, and often only, source of advice, it is essential that the information it contains is kept as up to date as possible. Because of the numbers of monographs involved, this is a very substantial workload, which is shared by all the NPIS units. TOXBASE entries that are new to the database and major updates are circulated to all the NPIS units for review before going 'live'. The database is updated on a daily basis.

The HPA NPIS TOXBASE Editing Group includes representatives of clinical and information staff from all the NPIS units, together with representatives from related poisons centres, a public health physician, and a scientist from the HPA Centre for Radiation, Chemical and Environmental Hazards. It meets approximately four times a year (two face-to-face meetings and two web/teleconferences) to agree policy for TOXBASE development, discuss the format of TOXBASE monographs, and agree and prioritise work programmes on the database content.

Areas of clinical controversy or uncertainty are discussed at regular meetings or teleconferences of the TOXBASE Editing Group or by the NPIS Directors at the quarterly NPIS Clinical Standards Group meetings. Monthly literature reviews are circulated as *Current Awareness in Clinical Toxicology* (see Section 3.5), to assist in updating TOXBASE.

The NPIS aims to review each of the approximately 17,000 entries on TOXBASE at least every four years. During 2011/12, 5,624 entries were written or revised.

An important component in the review process is clinical data from users, especially on new products or unusual symptom patterns. We encourage all users to feed back information to the NPIS by the forms on TOXBASE, or by email, letter or telephone. These comments are carefully considered by the service, improvements made to TOXBASE as required, and a response feedback supplied to the user.

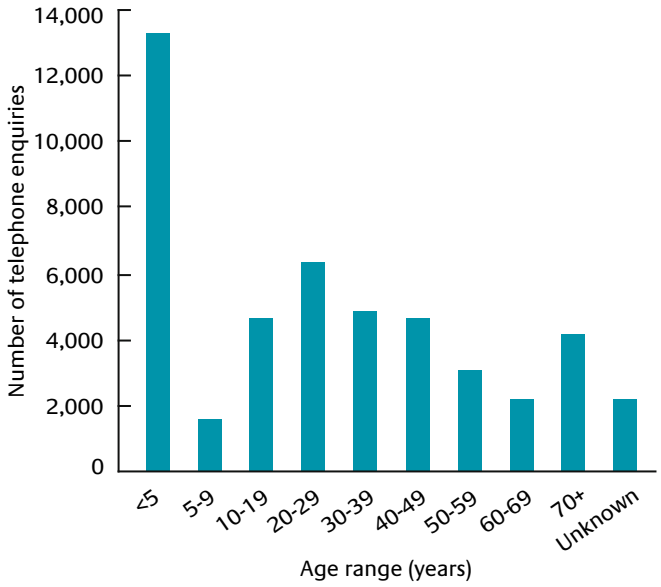


FIGURE 3.3 Age of poisoned patients reported in telephone enquiries to the NPIS in 2011/12

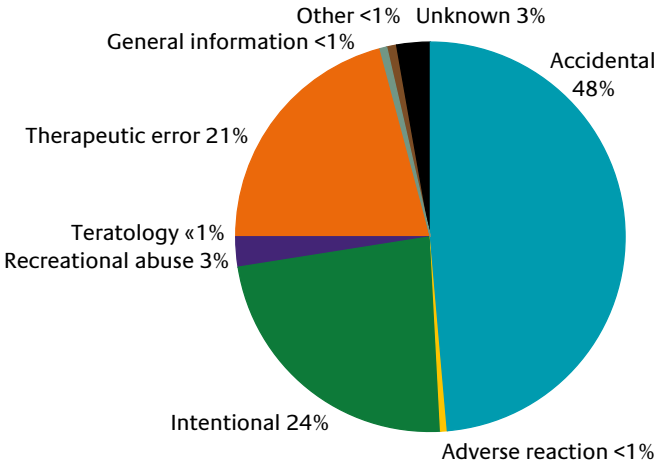


FIGURE 3.4 Types of poisonings as reported in telephone enquiries to the NPIS in 2011/12

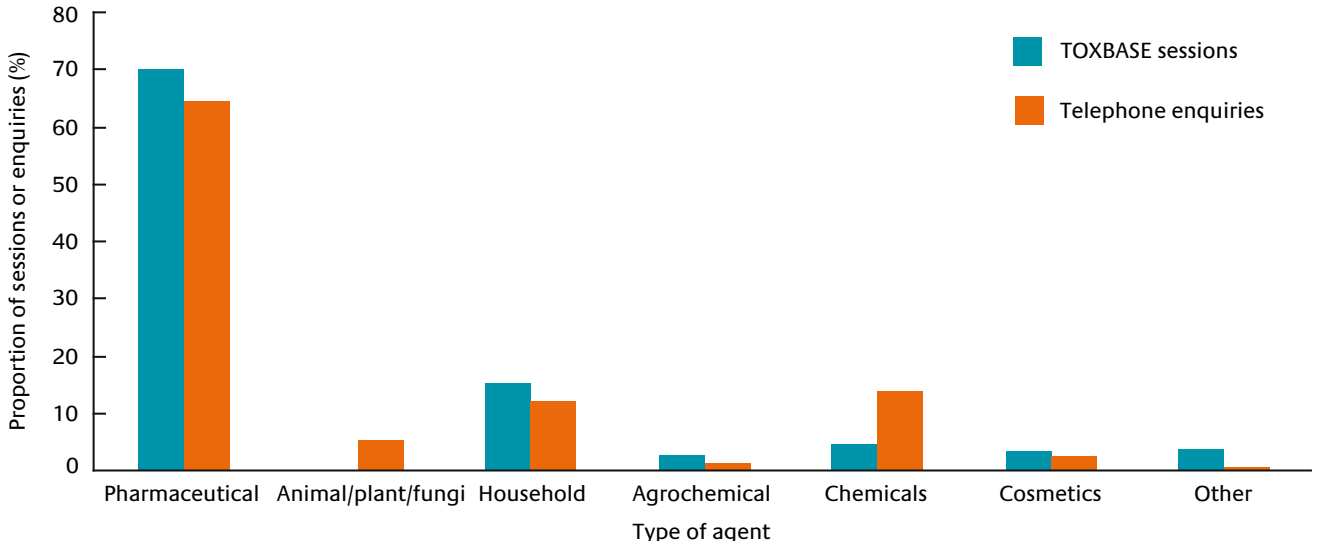


FIGURE 3.5 Types of agents involved in telephone enquiries and accessed by users during TOXBASE sessions in 2011/12

TABLE 3.4 Pharmaceutical agents most commonly involved in telephone enquiries and TOXBASE accesses in 2011/12

Telephone enquiries		TOXBASE accesses	
Agent	**Number of enquiries**	**Agent**	**Number of accesses**
Paracetamol*	5,422	Paracetamol*	88,846
Ibuprofen	2,297	Ibuprofen	44,933
Cocodamol†	1,368	Citalopram	27,091
Citalopram	1,062	Diazepam	24,779
Diazepam	930	Salicylates‡	23,625
Zopiclone	911	Compound analgesics†	21,114
Quetiapine	641	Zopiclone	19,867
Fluoxetine	639	Tramadol	17,396
Tramadol	623	Codeine	16,062
Salicylates‡	591	Fluoxetine	15,935

* Does not include compound analgesics

† Containing paracetamol and codeine only

‡ Includes aspirin

those for compound analgesics (e.g. those containing both paracetamol and codeine), which are counted separately. The number of enquiries and accesses for ethanol are also excluded. The pattern of enquiries and accesses are similar to those of the previous two years, with analgesics and antidepressants predominating. For comparison, the ten pharmaceutical agents that were most frequently accessed on TOXBASE by users in the UK, Republic of Ireland and overseas are given in Table 3.5.

Household products on TOXBASE often contain several ingredients. Table 3.6 shows the ingredients in household products that are most frequently accessed. As in previous years, the most commonly accessed ingredients are surfactants, e.g. those found in washing powders, liquid detergent capsules or dishwasher tablets and bleaches. Of note is that some ingredients, e.g. sodium hydroxide, may also have been accessed directly rather than as an ingredient of a household product; it is not possible to establish from our access data if sodium hydroxide was accessed because it is an ingredient in a household product or because it is an ingredient in another group of products, e.g. industrial cleaners such as Deb Fective, a heavy duty alkaline degreaser liquid for professional use.

TABLE 3.5 Pharmaceutical agents most commonly involved in TOXBASE accesses by UK, Republic of Ireland and overseas users in 2011/12

UK		Republic of Ireland		Overseas	
Agent	Count (% of total)	Agent	Count (% of total)	Agent	Count (% of total)
Paracetamol*	88,846 (6.9%)	Paracetamol*	1,595 (6.2%)	Paracetamol*	3,168 (3.6%)
Ibuprofen	44,933 (3.5%)	Zopiclone	677 (2.6%)	Ibuprofen	1,314 (1.5%)
Citalopram	27,091 (2.1%)	Diazepam	666 (2.5%)	Diazepam	1,057 (1.2%)
Diazepam	24,779 (1.9%)	Ibuprofen	591 (2.3%)	Quetiapine	1,000 (1.1%)
Salicylates‡	23,625 (1.8%)	Escitalopram	474 (1.85)	Salicylates‡	976 (1.1%)
Compound analgesics†	21,114 (1.6%)	Quetiapine	462 (1.8%)	Zopiclone	932 (1.1%)
Zopiclone	19,867 (1.5%)	Venlafaxine	458 (1.8%)	Venlafaxine	829 (0.9%)
Tramadol	17,396 (1.4%)	Salicylates‡	444 (1.7%)	Amitriptyline	794 (0.9%)
Codeine	16,062 (1.3%)	Alprazolam	434 (1.7%)	Escitalopram	764 (0.9%)
Fluoxetine	15,935 (1.3%)	Compound analgesics†	400 (1.5%)	Alprazolam	686 (0.8%)

* Does not include compound analgesics

† Containing paracetamol and codeine only

‡ Includes aspirin

TABLE 3.6 Household agents by ingredients: agents most commonly involved in TOXBASE accesses in 2011/12

Agent	Number of accesses
Surfactants plus detergents [e.g. washing powders/liquids, washing up liquids; Ariel Liquitabs (728) or Fairy Liquitabs (619)]	26,653
Bleaches (chlorine-based)	17,143
Ethylene glycol or methanol (e.g. antifreeze)	9,989
Sodium hydroxide [e.g. oven cleaners; Oven Pride (401)]	7,090
Petroleum distillate [e.g. white spirit (1799) or petrol (1259)]	6,038
Isopropanol (e.g. hand gels and screen washes)	4,616
Hydrogen peroxide (e.g. oxygen-based bleaches)	4,021
Cyanoacrylate (e.g. glues)	2,727
Descalers	1,688
Acetone	1,122

BOX 3.2 Non-UK and Subscription Users of the NPIS

The NPIS provides out-of-hours telephone support under contract to the Republic of Ireland. During 2011/12 there were 1,961 telephone enquiries routed to the NPIS national telephone service from this source. The NPIS units also received 209 telephone enquiries from outside the British Isles.

As well as the out-of-hours contract, the NPIS provides TOXBASE specifically tailored to medical professionals in the Republic of Ireland; in 2011/12 there were 9,195 TOXBASE sessions made by 65 registered Irish users. There were 25,885 individual TOXBASE accesses and the majority of Irish accesses originated in hospital emergency departments.

TOXBASE is provided under special agreements to users in over 40 countries outside the British Isles; 14,655 TOXBASE sessions were made by these users in 2011/12, an increase of 15% on the 2010/11 figure. Brazil uses TOXBASE the most, with 27% of all overseas user sessions originating in Brazil, followed by Belgium (13%), Australia (12.5%) and Austria (6.5%). A total of 87,514 product accesses were made during these sessions.

3.2 Consultant Referrals

Background

Since May 2005, the NPIS has operated a national consultant clinical toxicology on-call rota. Currently 12 consultant clinical toxicologists from the four NPIS units (Birmingham, Cardiff, Edinburgh and Newcastle) participate, as well as three consultants from hospitals in York and London who also contribute to out-of-hours cover (18.00 to 09.00 hours, Monday–Thursday, weekends and public holidays) for the UK and the Republic of Ireland. All staff on the rota are involved in caring for poisoned patients in their own local NHS poisons treatment facilities. A nationally agreed protocol is used to determine when specialists in poisons information should refer enquiries to a consultant. The national rota is managed from NPIS Edinburgh.

For daytime cover, the units continue to make local arrangements and may be supported by consultants, academic clinical staff and specialist registrars (SpRs) who are not on the UK NPIS consultant toxicologist rota, but all enquiries are answered under the supervision of NPIS consultants. NPIS Edinburgh also provides consultant support for Northern Ireland enquiries during the working week. The units provide cross-cover in emergencies and occasionally, in a planned manner, support colleagues in special circumstances during the working week.

For telephone enquiries details of the original call are available on the UKPID central server for audit and checking, and the call reference number is sent to the relevant consultant for audit purposes. In addition, consultants keep contemporaneous local records of advice given, which are passed to the NPIS unit that took the original call for addition to the call record.

For the purposes of collating and auditing consultant referrals, NPIS Cardiff can export data from UKPID for analysis.

Referrals

There were 1,540 referrals made to NPIS consultants (daytime and out-of-hours) in 2011/12, an increase of less than 1% on 2010/11). Figure 3.6 shows the number of referrals by month since April 2007.

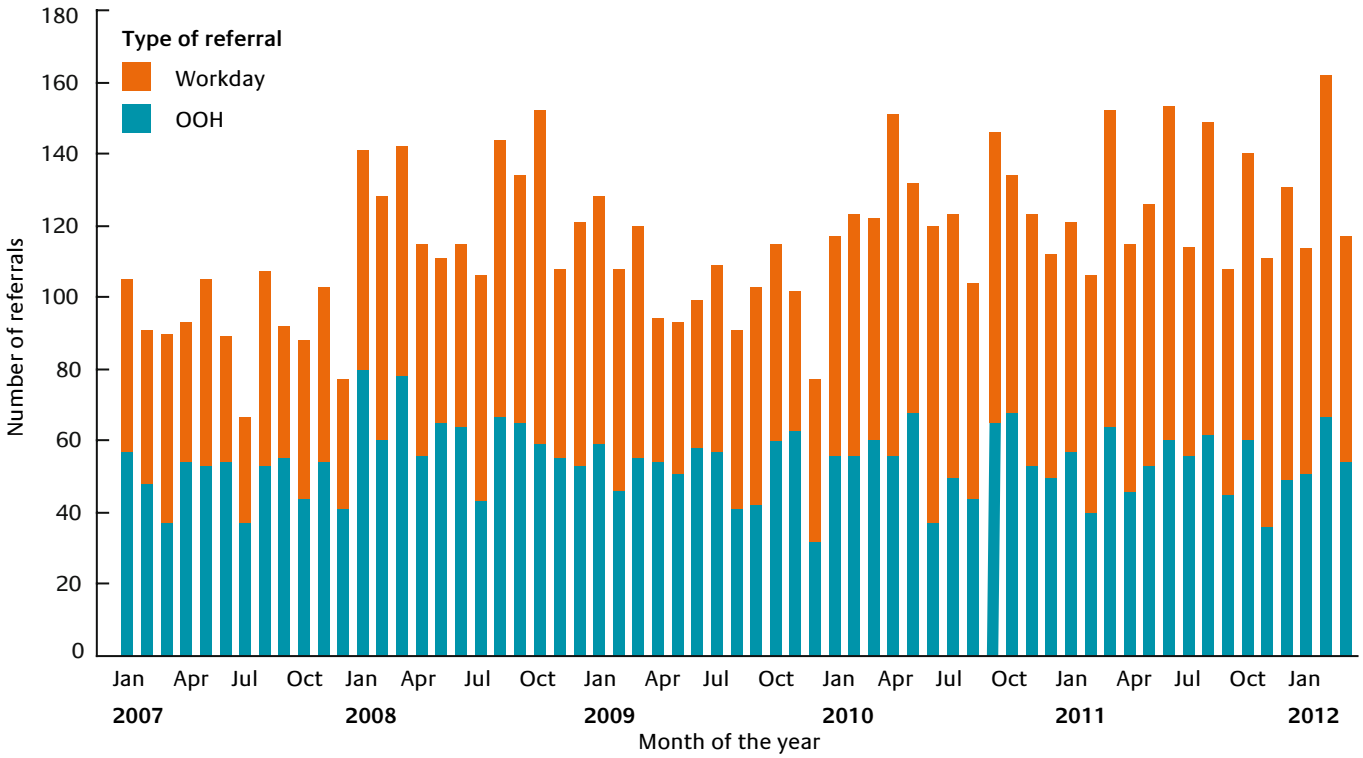


FIGURE 3.6 Monthly NPIS consultant referrals (including out-of-hours and workday referrals) since April 2007

TABLE 3.7 NPIS consultant referrals by country in 2011/12, with 2010/11 values for comparison

Country	Number of referrals	Rate per 100,000 population	Population estimate (mid-2010)*	% in 2011/12	% in 2010/11
England	1,138	2.2	52,233,400	73.9	74.9
Northern Ireland	25	1.4	1,799,400	1.6	1.3
Scotland	277	5.3	5,222,100	18.0	16.1
Wales	67	2.2	3,006,400	4.4	5.1
Republic of Ireland	30	–	–	1.9	2.3
Other	3	–	–	0.2	1.5
Total	**1,540**				

* http://www.ons.gov.uk/ons/rel/pop-estimate/population-estimates-for-uk--england-and-wales--scotland-and-northern-ireland/mid-2010-population-estimates/index.html (accessed May 2012)

Distribution by day of the week is shown in Figure 3.7, with fewer referrals at the weekend. The average number of referrals per day was 4.2 (with a range of 0 to 12 referrals).

Table 3.7 shows consultant referrals by country, with most referrals coming from England.

The majority of consultant referrals came from hospitals (1,344 or 87.3%), with GP/primary care (137 or 8.9%), NHS Direct/NHS 24 (12 or 0.8%) and others (47 or 3.1%) making much smaller contributions. Hospital referrals by department are shown in Table 3.8. There was a slight decrease in the proportion of referrals from units other than emergency departments compared with the previous year. Of note, a large proportion of calls from intensive care and high dependency units are referred on to consultants, indicating the complexity of the clinical situation in these units.

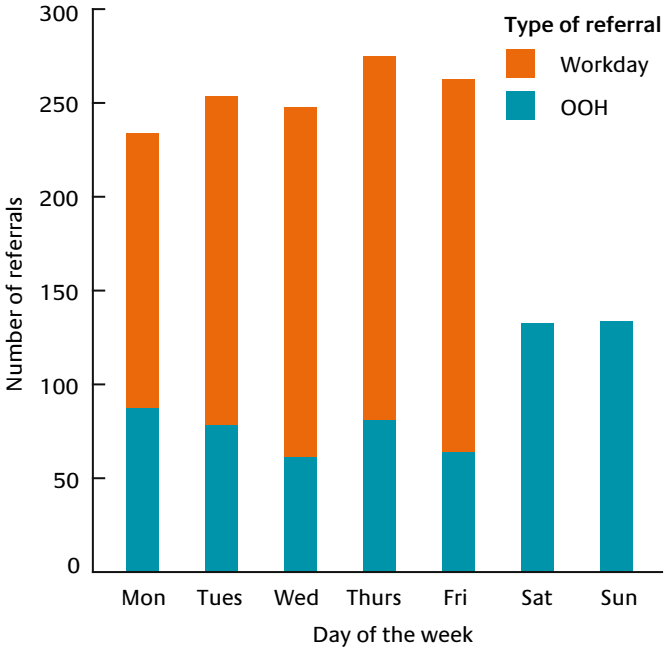


FIGURE 3.7 Number of NPIS consultant referrals (including out-of-hours and workday referrals) in 2011/12 by day of the week

The enquiries

Table 3.9 shows the most common types of products involved in referrals to consultants. These were paracetamol-containing products, cardiac drugs, substances of abuse, benzodiazepines and toxic alcohols or glycols (e.g. ethylene glycol, methanol or

TABLE 3.8 NPIS consultant referrals from hospital by department in 2011/12

Source	Number of referrals	% of total
Emergency departments and minor injuries units	578	43.1
High dependency and intensive care units	301	22.4
Paediatric	104	7.7
Admissions/short stay/assessment	101	7.5
Medical	86	6.4
Medicines information and pharmacies	17	1.3
Psychiatry	11	0.8
Surgery	13	1.0
Other	115	8.6

TABLE 3.9 Agents most commonly involved in NPIS consultant referrals in 2011/12

Agent	Number of referrals
Paracetamol*	322
Drugs of abuse	132
Drug/substance (unknown)	124
Antifreeze/ethylene glycol/methanol	93
Citalopram	58
Diazepam	52
Ibuprofen	50
Aspirin/salicylate	45
Iron	45
Amitriptyline	43
Digoxin	39

* Including 44 cocodamol

antifreeze). In 124 referrals the product taken (if any) was unknown and help with diagnosis was required. Alcohol was involved in 111 consultant referrals.

Feedback into NPIS services

Analysis of the consultant referrals is used to improve the services offered by the NPIS. This includes additions and changes to TOXBASE entries that reflect user needs. Issues highlighted by such calls, especially those that are difficult or complex, are discussed further amongst NPIS staff by email or telephone, and difficult enquiries may be examined in more detail at one of the NPIS CPD meetings. This year CPD topics have included antidotes, recreational drug abuse and occupational exposures.

Conclusions

The NPIS national out-of-hours on-call consultant rota continues to work well. Frequent contact by email and telephone, together with regular educational meetings, helps to ensure consistency of advice. Information gleaned from analysis of the enquiries has assisted in identifying toxicological and methodological problems, improving the clarity of TOXBASE entries and informing the need for research in a number of areas.

3.3 UKTIS

Background

The UK Teratology Information Service (UKTIS), based within NPIS Newcastle, is commissioned to provide advice to healthcare professionals about health aspects of exposure to medicines and chemicals during pregnancy. This is achieved by a telephone information service and by pregnancy monographs on maternal exposures to various drugs and chemicals that are held on TOXBASE. Brief abstracts of this information are now freely accessible on the UKTIS website (UKTIS.org). UKTIS also collects pregnancy outcome data following exposures during pregnancy.

UKTIS works closely with other international teratology organisations to improve data collection and surveillance methodology in the field of reproductive toxicology. These include the European Network of Teratology Information Services (ENTIS), of which UKTIS is a founder member, and the Organisation of Teratology Information Specialists (OTIS), which encompasses teratology services in the USA and Canada.

Overview of 2011/12

Number and source of telephone enquiries to UKTIS

During 2011/12 UKTIS answered 3,260 pregnancy-related telephone enquiries. This is a reduction of 12.5% compared with 2010/11, but this is offset by a planned and substantial increase in access to online information (see below). The geographical distribution of these calls is shown in Table 3.10.

TABLE 3.10 Distribution of teratology enquiries to UKTIS in 2011/12

Country	Number of enquiries	% of enquiries	Enquiries per million population
England	2,848	87.4	45.7
Northern Ireland	36	1.1	20.0
Scotland	142	4.4	27.3
Wales	163	5.0	54.3
Outside the UK and Republic of Ireland	71	2.1	N/A
Total	**3,260**	**100**	–

TABLE 3.11 Regional distribution in England of teratology enquiries to UKTIS in 2011/12

England by region	Number of enquiries	% of enquiries
East Anglia	136	4.8
East Midlands	180	6.3
Greater London	582	20.4
Isle of Man	3	0.1
North East and Yorkshire	526	18.5
North West	389	13.7
South East	522	18.3
South West	214	7.5
West Midlands	294	10.3
Channel Islands	2	0.1
Total	**2,848**	**100**

UKTIS took 71 calls from outside the UK, the majority from the Republic of Ireland. A regional breakdown of calls taken in England is shown in Table 3.11.

Healthcare providers are encouraged to contact UKTIS before their patient conceives or before a drug is prescribed. This is of particular relevance when prescribing to women of child-bearing potential or women with chronic conditions requiring long-term treatment with drugs. UKTIS provides the opportunity to healthcare providers to obtain advice regarding the most or more suitable therapeutic options at this early stage, thereby reducing the potential for adverse fetal outcome. In 2011/12, 10% of risk assessments provided

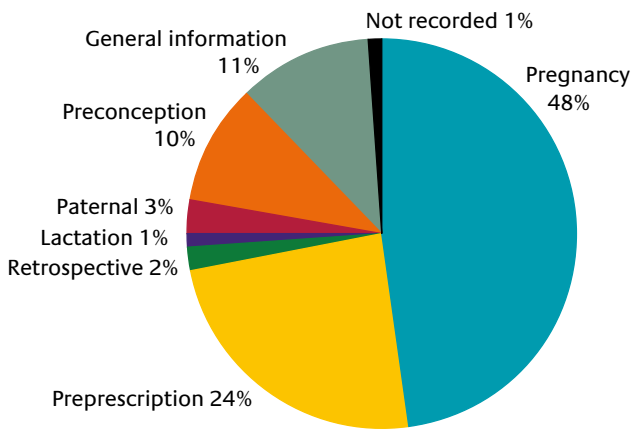


FIGURE 3.8 Enquiries to UKTIS by category of exposure in 2011/12

TABLE 3.12 Telephone enquiries to UKTIS by exposure category in 2011/12

Type of exposure	Number of enquiries	% of enquiries
Therapeutic	2,921	89.6
Drug overdose	92	2.8
Poisoning	99	3.0
Substance abuse	20	0.6
Complementary medicines	9	0.3
Occupational	33	1.0
Environmental	33	1.0
Miscellaneous	53	1.6
Total	**3,260**	**100**

by UKTIS related to women in the preconception period and 24% were provided before a drug was prescribed. These rates are similar to those observed in previous years (Figure 3.8).

The majority of calls (48%) received by UKTIS during 2011/12, however, were regarding pregnant women who had already been exposed to a drug or chemical. In these scenarios UKTIS is able to provide advice about risk to the fetus and, if required, recommendations for prenatal monitoring. As in previous years, therapeutic use of medicines during pregnancy comprised the largest category of enquiries (90%). During 2011/12, UKTIS also advised on the management of 191 cases of poisoning (either deliberate or accidental) during pregnancy and 66 environmental or occupational exposures (Table 3.12).

Hospital pharmacists (31.4%) remain the most frequent type of caller, often having received enquiries themselves from the prescriber. These are followed by GPs (31.3%), hospital doctors (16.4%) and community pharmacists (8.6%) (Figure 3.9).

Substances involved in telephone enquiries

Calls relating to antidepressant medication continue to be the most frequent type of enquiry, making up five of the top ten most frequent enquiries to the service, with selective serotonin receptor inhibitors (SSRIs), especially citalopram and sertraline, most commonly involved (Figure 3.10). Enquiries relating to vitamin D were also in the top 15 this year, reflecting the high level of coverage the topic received in the media.

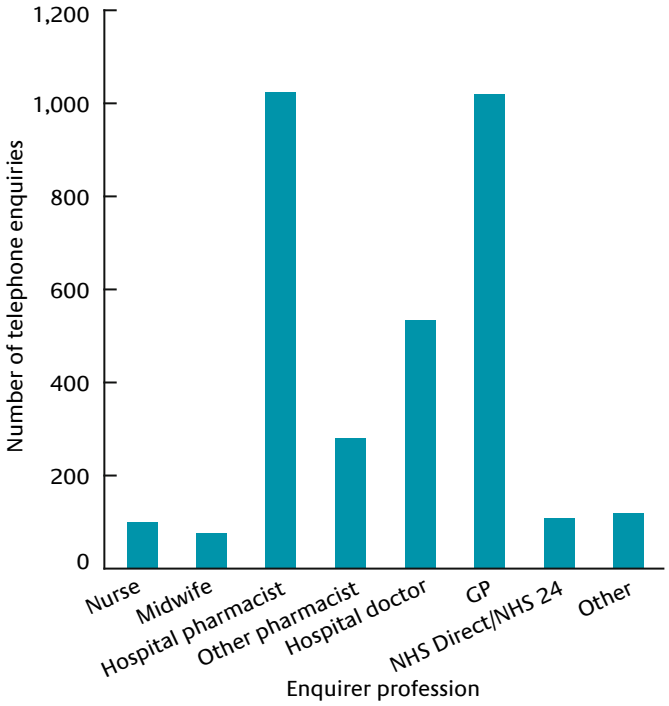


FIGURE 3.9 Telephone enquiries to UKTIS in 2011/12 by profession of enquirer

Use of online information

UKTIS monographs provide a summary of all available information relating to the teratogenicity or reproductive toxicology of a specific exposure in pregnancy.

Full monographs are available, at no charge, to all registered NHS healthcare professionals through TOXBASE. The availability of these monographs, encompassing maternal and paternal exposure, allows immediate access at the time of prescribing or consultation for all registered UK-based NHS healthcare professionals.

As of November 2011, summaries of each monograph have also been made openly available on the UKTIS website (www.uktis.org). This resource has attracted interest worldwide.

There were approximately 46,000 hits to UKTIS monographs on TOXBASE during 2011/12, a 22.5% increase compared to 2010/11, continuing the trend for increasing use of this online information (Figure 3.11) and allowing a managed reduction in telephone enquiry volume.

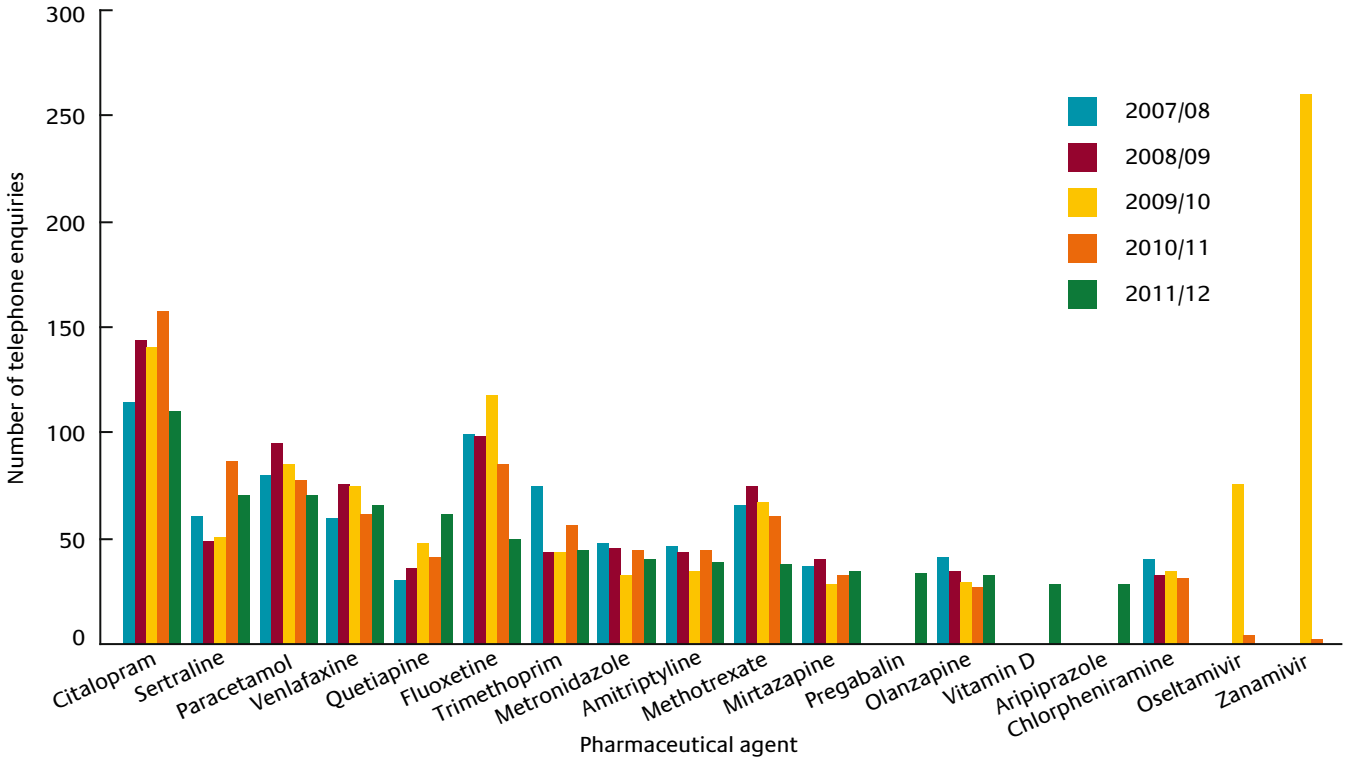


FIGURE 3.10 Agents most commonly involved in enquiries to UKTIS from 2007/08 to 2011/12

" ... more of your excellent monographs on TOXBASE please ... "

Hospital pharmacist

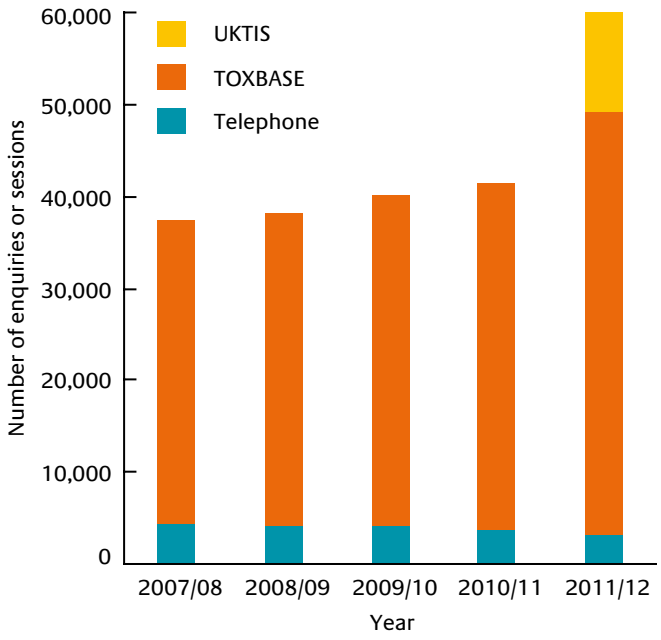


FIGURE 3.11 Telephone enquiries and monograph downloads from TOXBASE from 2007/08 to 2011/12 and from UKTIS.org from October 2011 to April 2012

The top 20 most accessed TOXBASE pregnancy monographs for 2011/12 are listed in Table 3.13. Healthcare professionals most frequently accessed TOXBASE for documents relating to antidepressants, anti-infectives and antihistamines, as well as general documents on nausea and vomiting, migraine, malaria prophylaxis and insect repellents.

UKTIS summary sections of updated or new pregnancy monographs are also hosted by the National Electronic Library for Medicines website (www.nelm.nhs.uk), where they are freely accessible over the internet, with instructions to link to TOXBASE for access to the complete monographs. Email alerts are sent to registered NHS users when any new or updated pregnancy summary is published.

Pregnancy monographs

Published studies on the safety of drug use in pregnancy have continued to increase year on year, resulting in substantial, complex and often conflicting data for commonly prescribed medications. During the year 2011/12 UKTIS has improved

TABLE 3.13 Pregnancy summaries most commonly accessed on TOXBASE.org in 2011/12 and on UKTIS.org from October 2011 to April 2012

TOXBASE.org		UKTIS.org	
Pregnancy monograph	**Number of accesses**	**Pregnancy monograph**	**Number of accesses**
Nausea and vomiting	1,756	Hyoscine	213
SSRIs	1,111	Diclofenac	209
Metronidazole	972	Gentamicin	188
Codeine	946	Propranolol	152
Citalopram	944	Co-amoxiclav	151
Malaria prophylaxis	938	Pregabalin	142
Paracetamol overdose	905	Mefanamic acid	129
Antibiotics	860	Quetiapine	129
Insect repellents	790	NSAIDS	129
Amitriptyline	764	Lithium	121
Fluoxetine	676	Doxycycline	119
Sertraline	626	Codeine	114
Quetiapine	561	Citalopram	110
Chlorphenamine	558	SSRIs	110
Corticosteroids	551	Amitriptyline	109
Trimethoprim	509	Fluoxetine	109
Constipation in pregnancy	494	Warfarin	101
Tramadol	486	Sertraline	100
Paracetamol	485	Clozapine	98
NSAIDS	483	Flucloxacillin	98

the accessibility of this information to healthcare professionals by restructuring monograph design to enable quick and easy access to information. Complex data are now tabulated, and statements summarising reports pertaining to each specific adverse pregnancy outcome have been introduced to provide clinicians with a concise overview of the potential fetal risks associated with a particular exposure in pregnancy (Figure 3.12).

UKTIS monographs are updated on a rolling basis, with priority given to agents commonly involved in telephone enquiries or accessed online, and, where possible, in response to new data becoming available.

UKTIS consistently receives requests for more monographs as a top priority. This is reflected in the trend of service use over the past five years, which shows a decrease in telephone enquiries and increased use of online monographs. Delivering more documents without compromising accuracy has presented a challenge, given the increasing complexity and volume of relevant published data. The appointment during the year of additional scientific staff members has, however, enabled UKTIS to produce 109 new and updated pregnancy monographs in 2011/12 (Table 3.14), a 9% increase on the previous year.

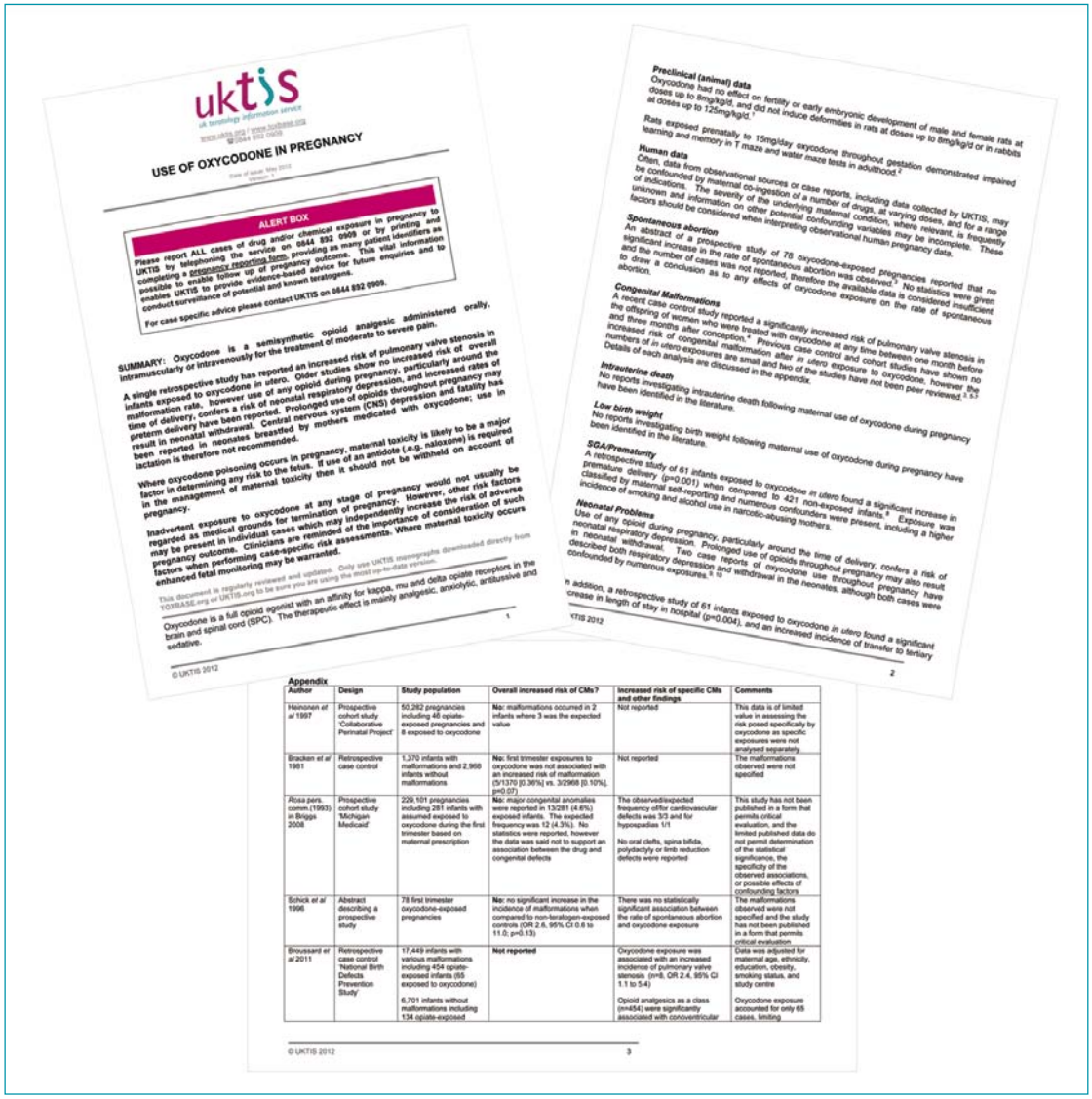


FIGURE 3.12 Example pages showing the new monograph layout, including front page, outcome headings and tabulated data

TABLE 3.14 New and updated pregnancy-related monographs added to TOXBASE in 2011/12			
Acamprosate	Diabetes mellitus	Lewisite	Pyridostigmine
Adalimumab	Diazepam	Malarone	Ricin
Adenosine	Dicobalt edetate	Mebendazole	Rifampicin
Alendronic acid	Dihydrocodeine	Mefepristone	Rituximab
Allergic rhinitis	Disulfiram	Metformin	Sarin
Anthelmintics	Dosulepin	Methyl ethyl ketone	Sertraline
Anthrax	Duloxetine	Methyl Isocyanate	Sodium thiosulphate
Arsenic	Ecstasy	Minocycline	Soman
Arsine	Escitalopram	Misoprostol	SSRIs
Benomyl	Etanercept	Morphine	Strychnine
Beta interferon	Ethylene glycol	Natalizumab	Sulphur mustard
Bisphosphonates	Eyedrops	Obesity	Sulpiride
Butane	Fluoxetine	Occupational cytotoxic medication	Sunbed
BZ (Agent 15)	Gabapentin	Ondansetron	Tabun
C1 esterase inhibitors	Glaucoma	Organophosphate poisoning	Tacrolimus
Carbamates	Glibenclamide	Oxytetracycline	Tetracycline
Carbamazepine	Hydrocarbon solvents	Paint	Tetrodotoxin
Chlorine	Hepatitis B vaccine	Paroxetine	Thallium
Ciprofloxacin	Hepatitis A vaccine	Phosgene	Tobacco
Citalopram	Hot tubs	Phosphine	Topiramate
Cocaine	Hydrogen sulphide	Photographic chemicals	Tranexamic acid
Corticosteroids	Hydroquinone	Pilocarpine	Trichloroacetic acid
CS gas	Hyoscine	Piperazine	Typhoid
Cyanide	Insulin	Pregabalin	Valproate
Cyclosarin	Insulin glargine	Primodos	Venlafaxine
Cyclosporin	Latanoprost	Prussian blue	Xylene

During 2011/12 UKTIS produced new monographs in relation to specific clinical requests from service users and where media attention around a specific health topic was anticipated to increase concern amongst pregnant women – for example, silicone breast implants and vitamin D. Other completed documents included overviews of teratogenic maternal conditions, such as diabetes and obesity, and the medications used in their treatment. Both conditions are major public health issues that are increasing in frequency.

Website development

The launch of the newly redesigned UKTIS website (www.uktis.org) in October 2011 has provided a platform from which to promote, develop and advance the scope of the service (Figure 3.13). This, together with concerted efforts of the team to raise the service profile amongst potential service users, patient support groups and relevant national organisations, has attracted increased national and international recognition of the service. The website was designed in-house to promote the service and raise awareness amongst professionals of the available expertise within UKTIS, and amongst members of the public regarding the specialist advice available to pregnant women on medication and recreational substance use in pregnancy. It holds openly accessible summaries of the 340 detailed pregnancy monographs which are only accessible on TOXBASE to registered NHS healthcare providers. Members of the public requiring specific advice or further information are directed to their healthcare provider who can contact UKTIS on their behalf. The new website will encourage members

" ... increase awareness of this very useful service ... publicise ... advertise more widely "

Hospital pharmacist ... GP ... hospital doctor

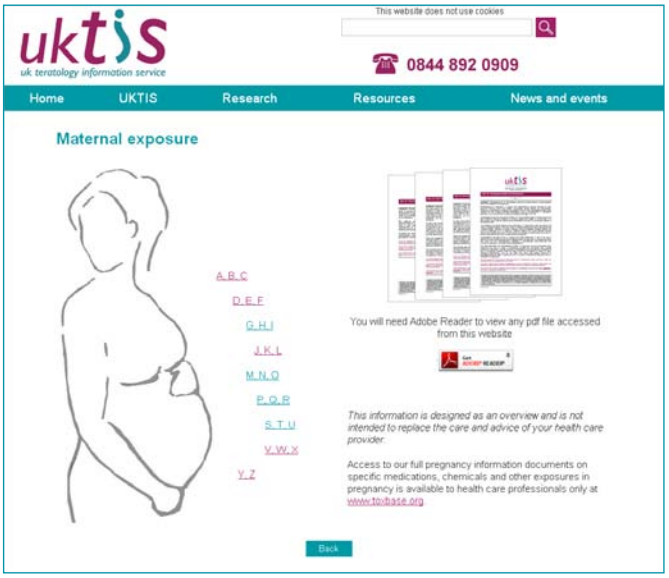


FIGURE 3.13 Maternal exposure index of the summaries page on the newly redesigned UKTIS website

of the public to raise any pregnancy-related exposure issues with their healthcare provider. Future plans include provision, on the website, of information leaflets tailored to patients on medication use in pregnancy.

Since the launch of the redesigned UKTIS website, hits to the site have tripled from a monthly average of 700 hits to 2,100 hits (Figure 3.14). Psychotropic medications featured heavily in the top 20 most accessed summaries on UKTIS, with three of these also featuring in the most frequently accessed monographs on TOXBASE (see Table 3.13). This is in keeping with the recognised trend towards increased numbers of women conceiving whilst on antidepressants. Visitors from within the UK accounted for the majority of hits to the website between April 2011 and its redevelopment in October 2011. Since the launch of the new website, UK visitors have increased by a further 11%, and the number of international visitors by almost three times.

Service profile

New service users and professionals involved in reproductive health have consistently commented on the need to increase awareness of the expertise and resources offered by UKTIS. In response to this feedback, during 2011/12 UKTIS focused on raising its profile amongst potential service users through targeted promotional activities, and amongst scientific and academic groups through the presentation and publication of UKTIS research and surveillance data.

This year, UKTIS staff delivered spoken presentations and workshops at several national conferences and training courses. UKTIS surveillance data have been presented at national and international teratology and poisoning conferences. The 2012 UK/Dutch Clinical Genetics Societies Spring Conference included a dedicated session on teratology, with an introductory presentation highlighting the support available to UK clinicians from UKTIS. In September 2011 UKTIS exhibited information about the service at the UK Medicines

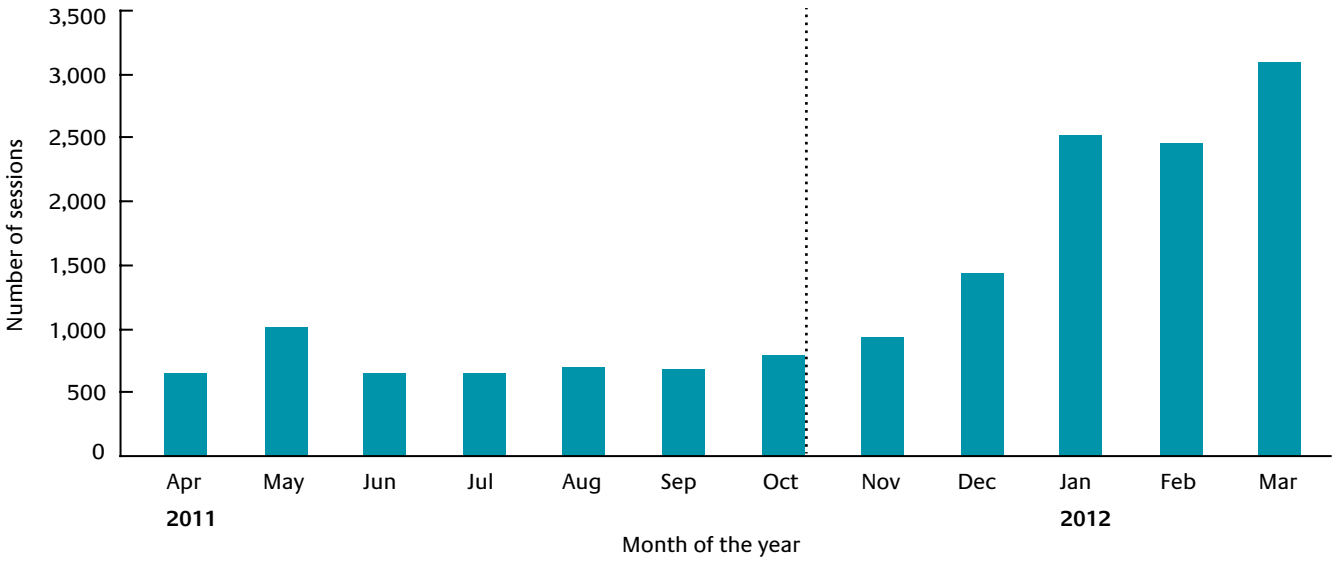


FIGURE 3.14 UKTIS.org website hits before and after the redevelopment of the site in October 2011

Information Practice Development Seminar, in October at the Royal College of General Practitioners Annual Conference, and in March 2012 at the UK/Dutch Clinical Genetics Societies and Cancer Genetics Group Spring Conference.

3.4 Product Data Centre

In order for the NPIS to provide accurate advice on the treatment and management of patients exposed to consumer products, reliable information on the composition of these products is necessary. Manufacturers' product safety datasheets (SDS) also provide information for updating TOXBASE, enabling end-users to obtain specific advice on many common products.

NPIS Birmingham has the responsibility for coordinating the NPIS Product Data Centre and liaising with manufacturers to ensure that the data held are comprehensive and up to date. In 2011/12, 9,913 SDS were added to the NPIS Product Data Centre which now holds 73,169 current SDS. The database is indexed by product name, manufacturer, date of SDS and the accession date for the SDS to the database. Where these fields are insufficient, the database is also fully text searchable, which enables searches to be made on any other criteria, e.g. active ingredients or use.

NPIS Birmingham has also developed a database to support the NPIS Product Data Centre. This second database holds contact details for some 2,400 companies and assists in the tracking of correspondence with companies. It includes data on the current marketing status of products.

3.5 NPIS Literature Database and *Current Awareness in Clinical Toxicology*

To ensure that NPIS staff are equipped to answer enquiries on all aspects of human toxicology and that TOXBASE is kept up to date, access to current scientific literature is essential. With the assistance of the other NPIS units, NPIS Birmingham produces *Current Awareness in Clinical Toxicology* each month. Citations are selected using searches specially developed for the purpose run against Medline, Embase and Science Direct. In addition, the tables of contents of key journals are scanned for suitable papers on publication. Each issue lists some 400 citations, with some 15–20 key papers highlighted because of their importance to the clinical management of poisoning and the updating of TOXBASE. These citations are added to the NPIS Literature Database. In 2011/12, 6,597 references were added to the database, which currently contains 84,342 references. The database is fully searchable using keywords, authors, journals and text words and is available 24-hours-a-day to all NPIS staff.

3.6 NPIS Website

Last October 2011 a new website for the NPIS was launched (www.npis.org). This website is focused primarily on providing information to members of the public. It contains information on the structure and function of the NPIS, details of the range of services provided to healthcare professionals on all aspects of poisoning and links to affiliated organisations and relevant websites. Visitors to the website can also download NPIS publications including its annual reports back to 2004.

The website has been created and is maintained by NPIS Birmingham in collaboration with the other units. The website is updated continuously, particularly with the data in each annual report.

Between October 2011 and March 2012 the site had 20,304 visitors and over 45,000 page views. In addition, 2,127 documents were downloaded from the website. The most popular documents were the low toxicity poster (453 downloads) and the NPIS Annual Report for 2010/11 (426 downloads).

4 Clinical Governance

As a national service delivered by units hosted in four different NHS trusts, it is essential that the NPIS has consistent, robust and comprehensive clinical governance arrangements, ensuring patient safety and driving up quality standards year on year. Some of the key features of the NPIS clinical governance arrangements are listed in Box 4.1.

4.1 Analysis of Critical Events

All NPIS staff are mandated to report critical events or near misses and any complaints or observations on the quality of the service are treated through the same system. Critical events are examined by the Director of the originating unit in the first instance and then reviewed at the NPIS Clinical Standards Group where recommendations on further actions are made. If urgent changes are required, mechanisms are available for rapid discussion amongst the NPIS units and early national implementation of any required changes.

During 2011/12 a total of 15 critical incidents were reported and discussed nationally. These included one critical incident relating to clinical advice provided by an NPIS specialist in poisons information. In this case a patient died from gastrointestinal toxicity several weeks after ingesting an unidentified chemical product from a group not listed on TOXBASE. At the time of the enquiry the patient was reported to be well. Although the specialist in poisons information was reassuring about the prognosis, advice was qualified with the statement that an accurate risk assessment was not possible without more detailed information about the chemical involved. Lessons learned from this incident, especially the provision of advice for unidentified exposures, have been discussed throughout the NPIS.

One report described an enquiry about a child who had swallowed an unidentified mushroom. It was possible to avoid hospital assessment by sending a digital photograph of the species involved to a mycologist known through personal contacts, who identified this as a non-toxic mushroom. Because this was so useful, a formal system for identification and contact of appropriate mycologists for similar enquiries has been put into effect.

Four incidents raised issues with TOXBASE entries and for three of these the TOXBASE entry was modified in the light of the report to improve clarity and reduce the risk of misinterpretation by NHS clinical staff. There were two further reports where the absence of a TOXBASE entry was relevant, including the fatal clinical event described above. In response to each of these, new TOXBASE entries were written.

There were six incidents involving failure of the telephone system due to misrouting or telephone software failures, some due to local issues within NHS hospitals hosting the NPIS units, and some due to national call-routing arrangements. The latter have continued in spite of prolonged discussion with our telephone provider. To provide a long-term solution and to increase flexibility of telephone line provision, the NPIS has commissioned a system which allows telephone enquiry routing to be controlled by NPIS staff, making it possible for staff to log in or out of the system at local level. Not only is this expected to reduce the possibility of routing error, but the system also allows the service to increase the availability of telephone lines in response to a surge in demand.

One further reported incident involved a temporary lack of access to the TOXBASE main site, although the TOXBASE backup site remained operational. There has also been a software issue affecting TOXBASE editing functionality that has been discussed in detail with the TOXBASE software providers.

BOX 4.1 NPIS Clinical Governance: Key Features

Appropriate induction, training and appraisal of staff

Availability of continuous professional development shared nationally where contentious issues can be discussed to ensure consistency of approach

Access to high quality information sources

Early peer review of enquiry answers

Continuous support from senior staff including 24-hour availability of a consultant clinical toxicologist

Reporting and review of critical incidents, complaints and near misses so that lessons can be learned and shared throughout the service

Quality assurance exercises seeking the feedback of users in relation to the use of TOXBASE, the telephone enquiry services for NPIS and UKTIS, and consultant advice

4.2 Quality Assurance Exercises

TOXBASE

Formal quality assurance from TOXBASE users is obtained using an online questionnaire. A selection of users are automatically asked to complete and submit short quality assurance forms during their online session. To achieve a reasonable return rate, invitations are set to be generated between every two and fifteen database logins; this number is varied throughout the year to avoid user fatigue.

A total of 974 returns were received between 1 April 2011 and 31 March 2012. The respondents were nurses (272), junior hospital doctors (220), NHS Direct/NHS 24 staff (152), pharmacists (58), hospital consultants (85) and GPs (71). The remaining 116 indicated another designation – these included middle grade doctors, biomedical scientists and 56 ambulance staff/paramedics.

On type of enquiry, 536 users reported that they primarily used TOXBASE for 'routine enquiries', 293 for a 'triage decision' and 145 for 'complex enquiries'. On frequency of use, 394 reported using TOXBASE weekly, 294 daily and 286 accessed it only occasionally.

Users were asked to grade a series of statements on a scale of 1 to 6 where 1 = disagree completely and 6 = agree completely. Satisfaction scores were high (Table 4.1). When asked to indicate their overall satisfaction with TOXBASE on a scale of 1 to 6, where 1 = poor and 6 = excellent, 903 (92.7%) scored either 5 or 6.

Users were invited to give comments and suggestions in a free text field. Any issues specific to entries are dealt with as they arise, and the remainder are collated for discussion at the TOXBASE Editing Group and NPIS Clinical Standards Group meetings.

In summary, the majority of respondents reported they found use of TOXBASE easy and that the database provided the information they required.

TABLE 4.1 Summary of TOXBASE user satisfaction scores

Question	Satisfaction score (%)*
I had confidence in the information for my query	94.6
The information was sufficient for managing this case	87.6
Logging on to the database was easy	86.9

* Satisfaction score is the proportion of respondents who agree 'completely' or 'a lot'

Telephones

This report provides the results of the 2011/12 (ninth) annual national stakeholder quality assurance questionnaire exercise concerning the NPIS telephone service, conducted in accordance with the national contractual arrangements with the HPA.

User satisfaction data are collected by the NPIS on its telephone service in order to measure how the service meets customer expectations and to monitor user requirements. The report also allows identification of internal clinical governance issues and, to a limited extent, external user problems such as inadequate access to TOXBASE.

A random sample of 2,592 users were posted questionnaires, equating to 5.5% of enquiries. There were 1,110 completed questionnaires returned (42.8%), a response rate typical for surveys of this type.

Prior to telephoning the NPIS, 39.5% of respondents had looked on the TOXBASE website for guidance. This proportion has changed little in recent years (44% in 2010/11 and 37% in 2009/10).

Of those who had consulted TOXBASE prior to contacting the NPIS, the most cited reason for the call was that they required additional information to that on TOXBASE to answer their enquiry (59.2%). This percentage is similar to that in earlier surveys (60% in 2010/11 and 62% in 2009/10). There has been a continued reduction in respondents reporting local protocols requiring them to make telephone enquiries. A similar decline has been observed in respondents reporting that information on TOXBASE conflicted with other information sources.

Of the respondents who did not access TOXBASE first, the numbers giving their reason as not knowing what TOXBASE is has decreased from 36% in 2009/10 and 32% in 2010/11 to

28% in 2011/12. Amongst this group, GPs continue to be the most common designation (56%).

Respondents (38.5%) reported that they were unable to access TOXBASE for the following reasons: TOXBASE was unavailable in their department (19.5%), TOXBASE was in an area of the department to which they had no access (4.5%), or they were unable to log in and/or had connection difficulty (14.5%). These figures have shown little recent change. The number reporting that they have not been trained to use TOXBASE (8.5%) has fallen since 2005/06 when it was 15%.

To assess the quality of the telephone service as perceived by users, respondents were asked to agree or disagree with a series of statements relating to the particular enquiry they made to the NPIS. Respondents showed a high degree of satisfaction in the way they answered the various questions posed in Table 4.2. The politeness of NPIS staff, promptness of enquiry handling, confidence in the reply and both the speed of delivery and amount of information all attained particularly good feedback. The satisfaction score was slightly lower (but still above 90%) for the time taken to answer the telephone. No significant changes have been observed since the 2010/11 exercise.

TABLE 4.2 Summary of telephone enquirer satisfaction scores, with last year's data for comparison

	Satisfaction score (%)*	
Question	**2011/12**	**2010/11**
The person I spoke to was polite and pleasant	97.8	98.3
Once my call was answered by a specialist in poisons information the enquiry was dealt with promptly	96.4	97.4
I had confidence in the reply I was given	96.3	96.3
The information was given to me at an appropriate speed	96.1	96.3
I was given an appropriate amount of information for my needs	96.1	94.7
The reply from the NPIS was relevant and useful	95.5	95.4
My telephone call was answered without delay by a specialist in poisons information	90.1	92.9

* Satisfaction score is the proportion of respondents who agree 'completely' or 'a lot'

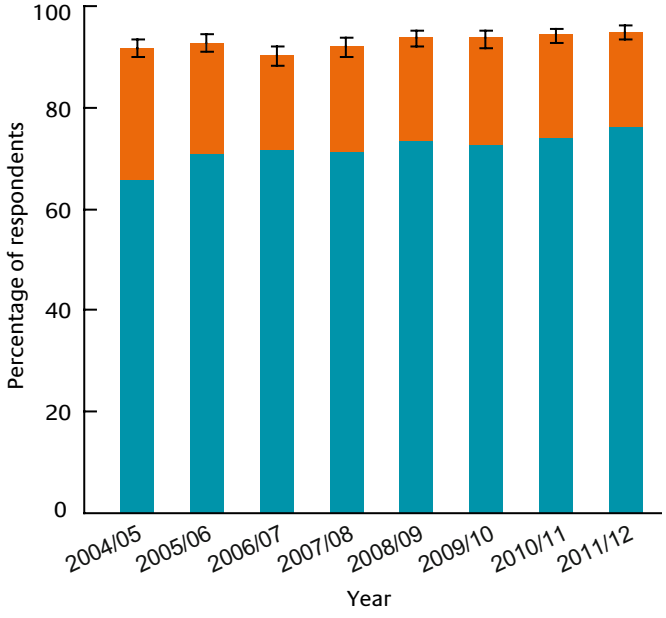


FIGURE 4.1 Overall quality scores (with 95% confidence intervals) for the NPIS expressed as a percentage of respondents scoring 5 ( ) or 6 ( ) out of a possible 6 (non-respondents are excluded from the denominator)

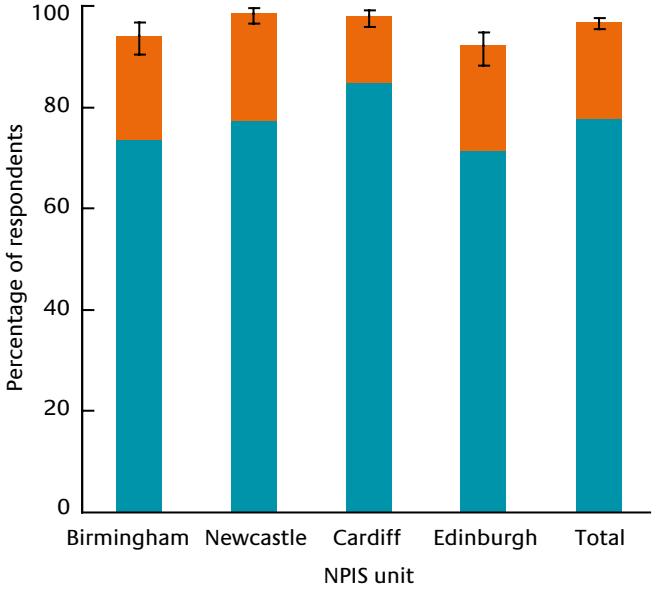


FIGURE 4.2 Overall quality scores (with 95% confidence intervals) for 2011/12 for the NPIS units, expressed as a percentage of respondents scoring 5 ( ) or 6 ( ) out of a possible 6 (non-respondents are excluded from the denominator)

There continues to be a very high rating of overall satisfaction with the service. This is defined as a score of 5 or 6 out of a total of 6, with an overall satisfaction score of 96.7%, if non-respondents are excluded from the denominator (Figure 4.1) or 94.8% if they are included. Overall satisfaction was greater than 90% for enquiries handled by each of the four NPIS units (Figure 4.2).

Summary and conclusions

- As in previous years, the overall response rate is low but typical of surveys of this type. The low response rate may introduce some bias, which could be in either direction.
- Respondents continue to have a high level of satisfaction with the service provided by each NPIS unit, with overall satisfaction at least as good as in earlier years.
- There is evidence of improved awareness of TOXBASE.

UKTIS

During 2011/12 UKTIS has continued to concentrate on improving the quality of both the information provided to service users, mainly through written summaries (monographs) on pregnancy exposures, as well as that of the patient data collected from healthcare professionals by the service. As in previous years, improvements to the service have been informed by both formal and informal feedback from service users.

During 2011/12 a random sample of 350 telephone enquiries (10.7% of the total enquiries), made directly to UKTIS, were selected for quality assurance monitoring over the course of the year. Questionnaires were sent out to enquirers between one and four weeks after the enquiry. As of May 2012, 122 (35%) of these forms had been returned.

The respondents were hospital consultants (15), junior hospital doctors (2), pharmacists (25), community pharmacists (1), GPs (66), nurses (4) and other healthcare professionals (6). The occupation of three respondents was not reported. Of the respondents, 38% had used the service between one and five times previously, with a further 29% being first-time enquirers, reflecting a 6% increase in the latter group compared with 2010/11.

Overall satisfaction scores were high – in particular, 90% of respondents 'agreed' or 'strongly agreed' that they were highly satisfied with the service they received, with 98% agreeing that they found it easy to contact UKTIS. The majority were also happy with the amount of information they received from the service (88%). Of the enquirers, 94% reported that they spoke to someone who was polite and pleasant, and 88% had confidence in the reply that they were given (Table 4.3). Free text comments were also provided and each is considered with a view to planning service improvements.

TABLE 4.3 Summary of UKTIS enquirer satisfaction scores

Question	Satisfaction score (%)*
The person I spoke to was polite and pleasant (agree)	94
I had confidence in the reply I was given (agree)	88
The reply from UKTIS was relevant and useful (agree)	88
The information was sufficient for my needs (agree)	87
Once I got through, the enquiry took a long time to be dealt with (disagree)	79
The information was given to me too quickly (disagree)	73

* Satisfaction score is the proportion of respondents who scored 5 and 6 (in agreement) or 1 and 2 (in disagreement)

4.3 Service Improvements

Unsuccessful user searches – calls and enquiries

As it is inevitable that databases become out of date over time, the NPIS is working on ways to ensure TOXBASE remains as up to date as possible. Importantly, the healthcare professionals who use TOXBASE now guide this process. Information on unsuccessful user searches on TOXBASE, together with information gained from healthcare professionals during telephone enquiries, are now used to guide production of updates to TOXBASE.

The majority of unsuccessful user searches occur because healthcare professionals have mis-spelled an existing TOXBASE

entry. For example, amitriptyline, carbamazepine and quetiapine are all examples of pharmaceuticals with existing TOXBASE entries that are commonly mis-spelled by users.

On average, the NPIS receives around ten telephone enquiries a day because a user has been unable to find what they was looking for on TOXBASE. This is estimated to be approximately 7% of all telephone enquiries received by the NPIS. The majority of these enquiries were generated because a user was unable to locate the entry for a specific branded product on TOXBASE – in particular, products that are available 'over-the-counter' or in supermarkets. As a result of such enquiries, additional case details may be made available to the NPIS that help in writing the entries. For example, in March 2012, there were 219 telephone enquiries that related to products not on TOXBASE. Of these, 77.6% (170) related to exposures that occurred at home and 78.5% were accidental; only 5.9% (13) were intentional and none was classified as severe according to the poisoning severity score*.

Overlap between unsuccessful user searches and enquiries may exist as users are likely to attempt to search TOXBASE for information before telephoning the service. It is also likely that users will have several attempts at spelling the agent they are looking for, each attempt generating an unsuccessful user search log on the reporting system.

The NPIS aims to improve user satisfaction by reducing the number of unsuccessful user searches and enquiries. This can be achieved by adding common mis-spellings of existing TOXBASE entries as a synonym or a 'sound-alike' link to the existing entry, and by creating new TOXBASE entries, e.g. for novel psychoactive substances. Identifying novel psychoactive substances is of particular significance as it will directly help clinicians in hospital emergency departments and inform the UK early warning system for drugs of abuse (see Section 6.1).

TOXBASE – user feedback

An important component in the review process of TOXBASE entries is feedback from users of the database. Feedback may be received from a variety of sources, e.g. the TOXBASE quality assurance forms (see Section 4.2), questionnaires on TOXBASE for new or unusual products, or by email, letter or telephone. Users may also raise queries on existing entries or provide clinical data.

Any issues specific to entries are dealt with as they arise, and the remainder are collated for discussion at the TOXBASE Editing Group and NPIS Clinical Standards Group meetings. In the past year we have received queries regarding antidote supplies – in particular, the supply of dicobalt edetate.

Issues regarding existing NPIS advice which were referred to the Clinical Standards Group meetings included recommended management following tramadol ingestion, staggered ingestions of paracetamol and the use of folinic acid in methotrexate overdose.

As randomised, controlled trial data are not easily obtained on the management of poisoned patients, a body of evidence on individual patients is a particularly valuable source of clinical evidence for the NPIS.

We encourage all users to feed back information to the NPIS by the forms on TOXBASE, or by email, letter or telephone.

4.4 Education and Training

Training and continuing education of clinical and non-clinical staff are vital to ensure that the service is equipped at all times to provide pertinent, informed and evidence-based advice on all aspects of poisoning. Newly recruited scientific staff undergo in-house training before being allowed to answer telephone enquiries. Consistency and quality of training across the units is achieved by adherence to guidelines set out in the nationally agreed operating procedures *Initial Training of Specialists in Poisons Information and Core Competencies for Specialists in Poisons Information*. At the end of the training period, staff undergo a final competency assessment conducted by the Unit's Director or their Deputy and are then presented with an NPIS certificate of competency as a specialist in poisons information.

One NPIS consultant is responsible for the coordination of a rolling programme of continuing professional development

* Persson HE, Sjöberg GK, Haines JA, et al. Poisoning severity score. Grading of acute poisoning. J Toxicol Clin Toxicol 1998; 36: 205–13

meetings for NPIS information and clinical staff. These meetings serve to ensure not only that everyone involved in the front-line delivery of advice is up to date with the latest developments within the specialty, but also that all staff are fully conversant with new or changing responsibilities within the NPIS. They provide an informal forum where colleagues can discuss difficult or controversial clinical issues and where less experienced staff can present interesting enquiries and discuss optimal management in a non-threatening environment. The venue rotates between the four NPIS units and sometimes, as in June 2011, to the NPIC in Dublin.

These discussions also offer an opportunity for face-to-face contact between the information and clinical staff of all the units who frequently discuss enquiries as part of the out-of-hours NPIS rota. There has been a particular emphasis this year on ensuring that all staff are up to date with the toxicity of chemicals that may be released deliberately. Time has been allocated in each CPD meeting to presentations by relevant experts on some of these agents. Topics covered have included organophosphorus insecticides, radiation medicine, cyanide and organomercurials. In addition, NPIS Birmingham hosted CT IV on 14 October 2011, a meeting jointly sponsored with the HPA and dstl Porton Down, where topics reviewed included the latest data on chemical decontamination and antidote delivery systems. A sample CPD programme from the last year is shown in Figure 4.3.

All NPIS staff undergo regular appraisal and career development planning. Staff are encouraged to submit papers to national and international congresses and scientific meetings hosted by toxicological organisations such as the British Toxicology Society and the European Association of Poison Centres and Clinical Toxicologists (EAPCCT). For example, NPIS staff presented some 36 posters or oral presentations at the 31st International Congress of the EAPCCT held in Dubrovnik, Croatia, 24–27 May 2011.

NPIS CPD Meeting

16 FEBRUARY 2012 **POSTGRADUATE CENTRE UNIVERSITY HOSPITAL LLANDOUGH CARDIFF**

09.45	*Coffee*
10.20	Welcome and housekeeping *Gloria Alldridge*
	Hot topics
	Discussion panel: *C Krishna, Edel Duggan, James Coulson and Nick Bateman*
10.30	Does hypothermia alter paracetamol toxicity? *Catherine Crawford and Nick Bateman*
11.00	Amitriptyline overdose: the role of intralipid *Sonia Bradley, C Krishna and Edel Duggan*
11.20	A case of aconitine poisoning following ingestion of dried monkshood *Mark Vaughan and James Coulson*
11.40	When should desferrioxamine be continued beyond 80 mg/kg? *Stefan Courtney and Nick Bateman*
12.00	The use of desferrioxamine in iron poisoning *Nick Bateman*
12.30	*Lunch*
	Hot topics
14.00	Is insulin therapy appropriate for poisoning with all cardiotoxic drugs? *James Dear*
14.30	The pros and cons of hydroxocobalamin for cyanide poisoning in smoke inhalation *Paul Dargan and Bob Jefferson*
	Special chemicals
15.00	Introduction to radiation injury Part 2: clinical effects *John Thompson*
15.30	Why are organomercurials so toxic? *Sally Bradberry*
	CSG digest
15.50	An update on recent decisions and deliberations of the NPIS Clinical Standards Group *Simon Thomas*

FIGURE 4.3 NPIS CPD programme of 16 February 2012

5 Surveillance and Research

5.1 Urgent Alerting System

The NPIS can now immediately follow-up accesses to entries previously identified as being of interest – for example, agents that are particularly hazardous. Within five minutes of a healthcare professional accessing an entry of interest, an email alert is automatically generated detailing the page accessed and location of the person reading the page.

During the testing phase (12/03/2012 to 20/04/2012) an alerting tag was added to 20 agents of interest. This tag was not visible to the user. All automatic email alerts involving patients were identified and followed up by telephone, where a patient was involved and a contact telephone number had been provided.

In total, 470 email alerts were received between 12/03/2012 and 20/04/2012. Of these, 82 involved patients and 23 telephone numbers were provided; it was not possible to follow up four of these alerts, six did not require follow up, e.g. access by overseas users, and 13 accesses were followed up successfully (11 chlorine and two bromine accesses). The related exposures were mainly accidental inhalations, occurring at work or home, and none was classified as severe; two occurred in public areas and one cluster of alerts (defined as five or more alerts to the same agent on the same day) was identified. Improvements to this system are aimed at increasing the number of successful follow ups.

The NPIS can, in virtual real time, collect data on patients presenting with specific poisonings to hospitals across different regions of the UK as a whole, establishing a direct method of communication immediately. The service offers several advantages for such a surveillance role: it offers a 24-hour service, it can act promptly on real time alerts, disseminating the information appropriately and rapidly, and it is very frequently used by and popular with hospital emergency departments across the country as the first port of call for advice on cases where poisoning might be suspected.

5.2 Schmallenberg Virus (SBV)

Surveillance for Evidence of Teratogenicity in Humans

During the summer of 2011 a novel virus, named Schmallenberg virus (SBV) after the German town in which it was first reported, was identified in sheep and cattle in continental Europe. Lambs and calves of animals infected in early pregnancy (the main period of fetal organ formation) were subsequently noted to have specific congenital malformations including arthrogryposis and limb contractures, while later infection was associated with pregnancy loss and neurological abnormalities in exposed offspring.

By January 2012, SBV had been identified in sheep from several UK farms. The virus was thought to have been transmitted to the UK by infected midges that were blown across the English Channel from continental Europe last year. The number of UK farms reporting infected animals has increased steadily from 29 in January 2012 to 271 by June 2012. Affected farms are predominantly clustered around the English Channel and in Southern England.

Experience from similar viruses suggested that the risk of human disease following SBV exposure is low. However, as this is a novel virus, a risk to humans could not be excluded, particularly in the early phases of the outbreak. Screening for the virus in humans was further limited by the lack of a validated serological test, underscoring the need for the rapid

BOX 5.1 Collaborating Partners in Surveillance for Evidence of Human Teratogenicity of Schmallenberg Virus

UK Network of Neuromuscular Paediatricians

UK Network of Paediatric Pathologists

UK/Dutch Clinical Geneticists

The British Isles Network of Congenital Malformation Registers (BINOCAR)

European Network of Teratology Information Services

Organization of Teratology Information Specialists (North and South America, Japan, Canada)

implementation of a UK-wide surveillance programme for signals suggestive of human teratogenicity. UKTIS is currently coordinating this surveillance on behalf of the HPA, involving the partners shown in Box 5.1.

Strategy

A two pronged approach has been implemented, as follows.

1 **Identification of possible cases using the 'astute clinician' model**
Clinicians and allied healthcare professionals who are likely to encounter fetuses or infants with arthrogryposis have been asked to report any perceived increase in the number of cases, clusters, atypical or unexplained arthrogryposis in fetuses or neonates to UKTIS. Full maternal and infant details will be recorded to enable follow up of cases, further investigation of possible routes of exposure and, where appropriate, access to SBV virological testing once a serological test for humans has been validated. In the absence of evidence to suggest otherwise, this approach is based on the assumption that SBV will cause a similar pattern of neuromuscular abnormalities in humans to that observed in sheep and cattle.

2 **Population surveillance for increased rates of arthrogryposis**
Monitoring for increased reporting in humans of the malformations observed following SBV infection in cattle and sheep is being conducted by congenital malformation registries across the UK. Data collected since the establishment of each registry will be analysed and reported to UKTIS to provide annual prevalence rates of arthrogryposis and related malformations up to 2012. It is planned that quarterly reports of reported rates of these malformations over the next five years will then be provided to UKTIS to allow identification of increases in malformation rates.

Current position

No cases of suspected SBV teratogenicity have been reported as of 22 June 2012. Analysis of the congenital anomaly registry data collected by BINOCAR is in progress.

5.3 Pesticides

Currently 1,930 TOXBASE entries for pesticides and biocides are being tracked as part of an ongoing surveillance study funded by the Department for Environment, Food and Rural Affairs that was started in 2003.

Incident information is collected in two different ways:

- TOXBASE enquiries by either online or postal questionnaire,
- Enquiries to the NPIS telephone enquiry service.

During the year, there were 4,134 TOXBASE accesses concerning pesticides of interest. From TOXBASE sessions, 39 electronic questionnaires were completed and 447 questionnaires returned by post or email. Information on 704 potential incidents was available from the NPIS telephone enquiry service.

Cases involving animals or a head lice treatment product, enquiry sessions from locations in the Republic of Ireland, identifiable duplicate sessions involving the same patient, and sessions that were later reported not to have involved a pesticide, were excluded from this analysis.

As a result of the data collection methods outlined above, information was gathered on 1,190 potential incidents involving pesticides during 2011/12. This equates to an overall return rate of 24.6% (486 of 4,134 plus 704). A further 26 patients were involved in multi-patient exposures.

Of the 1,216 potential exposures available for analysis, in 45 cases symptoms were thought on the balance of probabilities by the respondent or by NPIS Edinburgh not to be related to the pesticide exposure because of, for example, a pre-existing illness or reasonable grounds to link symptoms to a concomitant infection.

These cases have been excluded, leaving a total of 1,171 exposures involving patients for further analysis. The results displayed below include both accidental (91.6%) and deliberate self-harm exposures (DSH) (8.4%).

Pregnancy

There were nine enquiries involving pregnant patients reported during 2011/12. Three were precautionary enquiries relating to potential home fumigation. No exposure had yet taken place. Two enquiries related to amateur herbicide exposure in the garden – Ground Clear (flufenacet, glyphosate and metosulam) and Frontsweep (glyphosate). One involved accidental ingestion of bromadiolone. Three involved accidental exposure to insecticides for use in the home – Johnsons 4 Fleas Fogger (s-methoprene and permethrin), Raid Ant and Cockroach Killer Spray (permethrin) and Zero One Fly Spray (phenothrin). Of the six actual exposures, four were graded poisoning severity score (PSS) 0 and two were PSS 1.

Severity of exposure

Most cases were graded by NPIS staff as minor or not at all poisoned (PSS 0, 54.3%, and PSS 1, 35.8%). A small proportion were graded as moderately or severely poisoned (PSS 2, 6.5%, and PSS 3, 0.9%). The poisoning severity score was uncertain in 2.3% of cases. Two cases reported fatal outcomes. One case was deliberate self-harm involving aluminium phosphide. The second was a suspected ingestion of rat poison by a patient with learning difficulties. This patient had prolonged clotting and bleeding requiring vitamin K. This resolved but the patient subsequently died; however, this was probably not a direct result of the poisoning.

The agents of interest that were most commonly reported in suspected cases of exposure are given in Table 5.1. In addition, 126 cases involved unknown rodenticides, 54 cases an unknown herbicide, 44 cases an unknown ant killer, 20 cases an unknown pesticide, and 14 cases an unknown insecticide.

In 2011/12, patients potentially exposed to pesticide products comprised 658 adults (≥13 years) (56.2%) and 492 children (≤12 years) (42.0%), with 21 of unknown age. Among these patients, 56.3% were male and 41.5% were female (2.1% unknown). The types of products are shown in Figure 5.1. It is worth noting that more than one type of product was involved in some incidents.

As to type of exposure, 22.4% of patients were exposed to the pesticide during use and 42.7% were exposed after it was applied, 13.2% were due to unsatisfactory storage and 9.3% were occupational exposures.

TABLE 5.1 Pesticides most commonly reported by respondents in suspected pesticide exposures in 2011/12, with their 2010/11 numbers of reports for comparison

	Number of reports	
Ingredient	**2011/12**	**2010/11**
Glyphosate	113	126
Permethrin	82	100
Metaldehyde	46	99
Bromadiolone	44	55
Tetramethrin	39	35
Difenacoum	36	49
Mecoprop-p/mecoprop	28	19
2,4-D	27	16
Bendiocarb	26	36
Diquat	25	49
Deltamethrin	21	37
Aluminium phosphide	19	15
D-phenothrin	18	15
Cypermethrin	17	32
MCPA	17	12
Imidacloprid	16	30
Triclopyr	15	7
Fipronil	15	22
Phenols/cresols	14	18
Ferrous sulphate	14	12

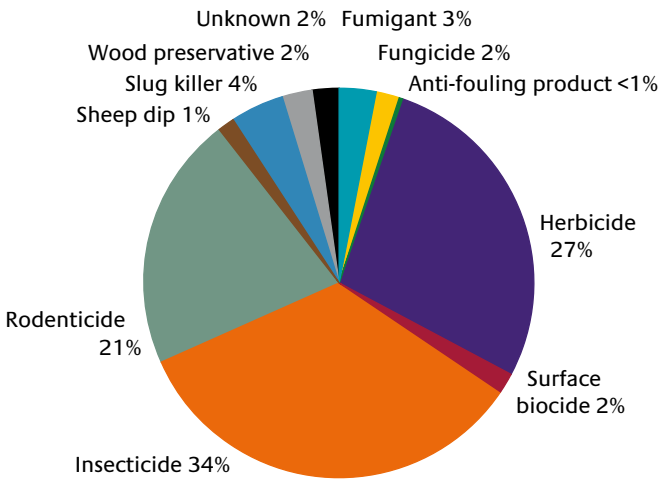


FIGURE 5.1 Pesticide exposures by type of product as reported by respondents, in 2011/12 (1,171 cases)

6 Areas of Interest in 2011/12

6.1 Drugs of Abuse including Newer Stimulants

During the year 2011/12, the NPIS answered 1,217 telephone enquiries relating to drugs of abuse, constituting 2.6% of the overall telephone workload. Over the same period there were 44,767 accesses to drugs of abuse monographs on TOXBASE, representing 4.0% of the total TOXBASE activity (Figure 6.1).

As with all NPIS activity data, these figures are not a direct measure of the frequency of toxicity or hospital admission with drugs of abuse, but give an indirect indication of the substances being encountered by the NHS clinicians using our services. It should be noted that analytical confirmation of exposure is rarely available and the statistics reported here reflect what has been reported as being taken by the recreational drug users involved.

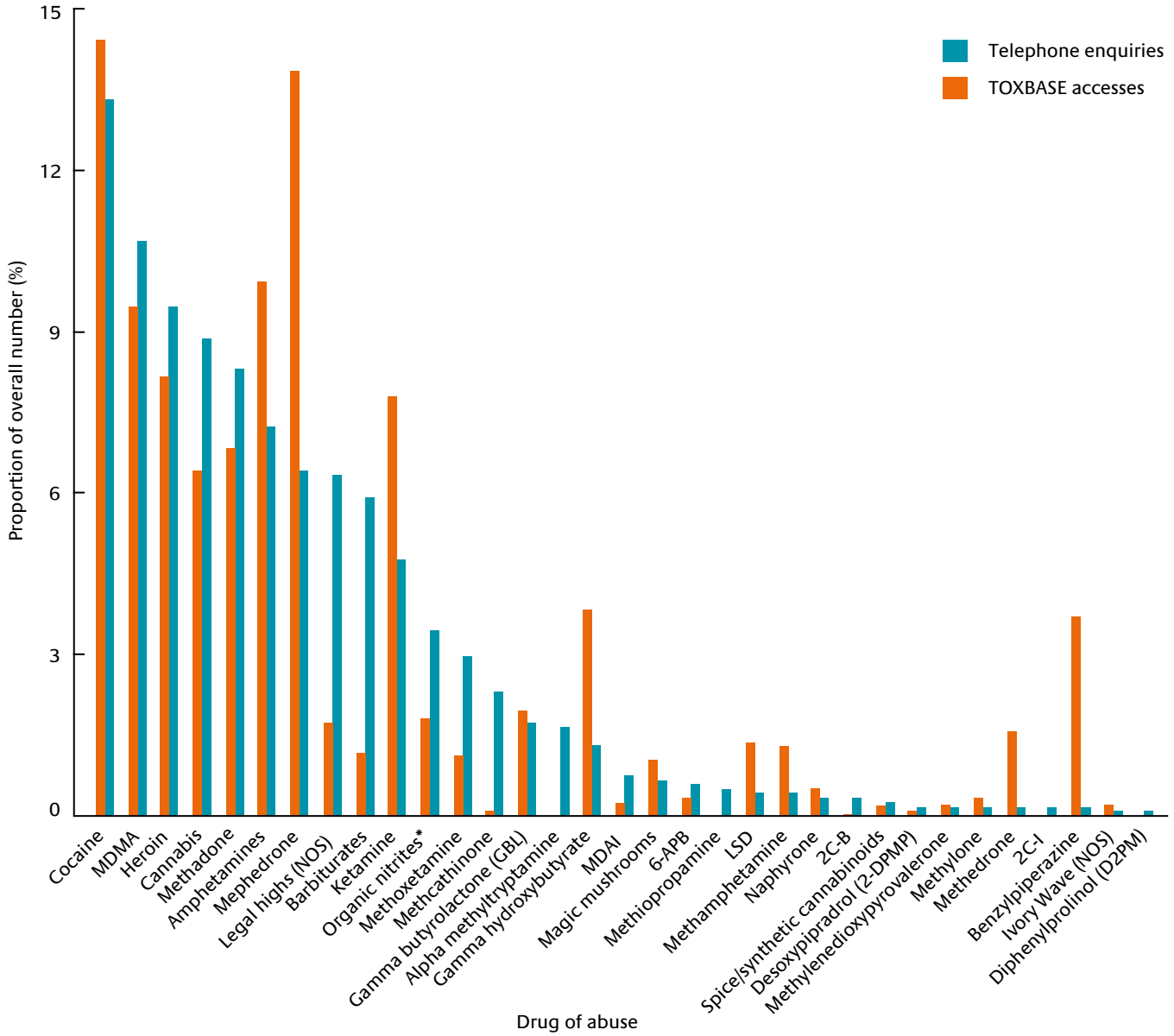


FIGURE 6.1 Drugs of abuse most commonly involved in telephone enquiries and TOXBASE accesses during 2011/12 (data presented as percentage of overall recreational drug telephone or TOXBASE activity)

Abbreviations *MDMA – methylenedioxy-methamphetamine* *6-APB – 6-(2-aminopropyl)benzofuran*
MDAI – 5,6-methylenedioxy-2-aminoindan *LSD – lysergic acid diethylamide*

Cocaine, amphetamines, MDMA ('ecstasy'), heroin, cannabis, methadone, mephedrone and ketamine all feature in the top ten telephone enquiries and TOXBASE accesses for drugs of abuse (Table 6.1). Telephone enquiries and TOXBASE hits have increased over the previous year for MDMA, while those for mephedrone and ketamine were reduced.

For longer term trends it is necessary to present data as proportions of the total numbers of calls received or TOXBASE accesses made each year to take into account the increases in overall TOXBASE accesses and reductions in telephone enquiries that have occurred over the last decade (see Figures 6.2 and 6.3). Reductions in activity relating to MDMA observed between 2004/05 and 2009/10 have not continued in the last two years. Activity relating to cocaine has continued to fall since 2008/09 and recent reductions in activity have also been recorded for gamma hydroxyl butyrate, gamma butyrolactone, benzylpiperazine and volatile nitrites.

The NPIS continues to monitor activity relating to newer recreational drugs. Those most frequently involved in telephone enquiries over the last three years have been mephedrone, 'legal highs' (not otherwise specified), naphyrone, methcathinone, 6-APB, 'Ivory Wave' products (not otherwise specified, but reported to contain desoxypipradrol) and methoxetamine. Monthly enquiry trends for these substances are shown in Figure 6.4. For mephedrone, the previously reported substantial reduction in enquiry numbers following legal control in April 2010 has been maintained for telephone enquiries, although there has been a small increase in TOXBASE hits over the last year. Reductions in activity following legal control have also been maintained for 'Ivory Wave' products and naphyrone.

During 2011/12 the NPIS answered 36 telephone enquiries relating to the ketamine analogue methoxetamine ('mexxy' or 'MXE') and there were 507 accesses to the methoxetamine monograph that was published on TOXBASE in May 2011. On the advice of the Advisory Council on Misuse of Drugs (ACMD), this drug was subject to a Temporary Drug Class Order coming into effect on 5 April 2012. The impact of this on enquiries to the NPIS will continue to be monitored.

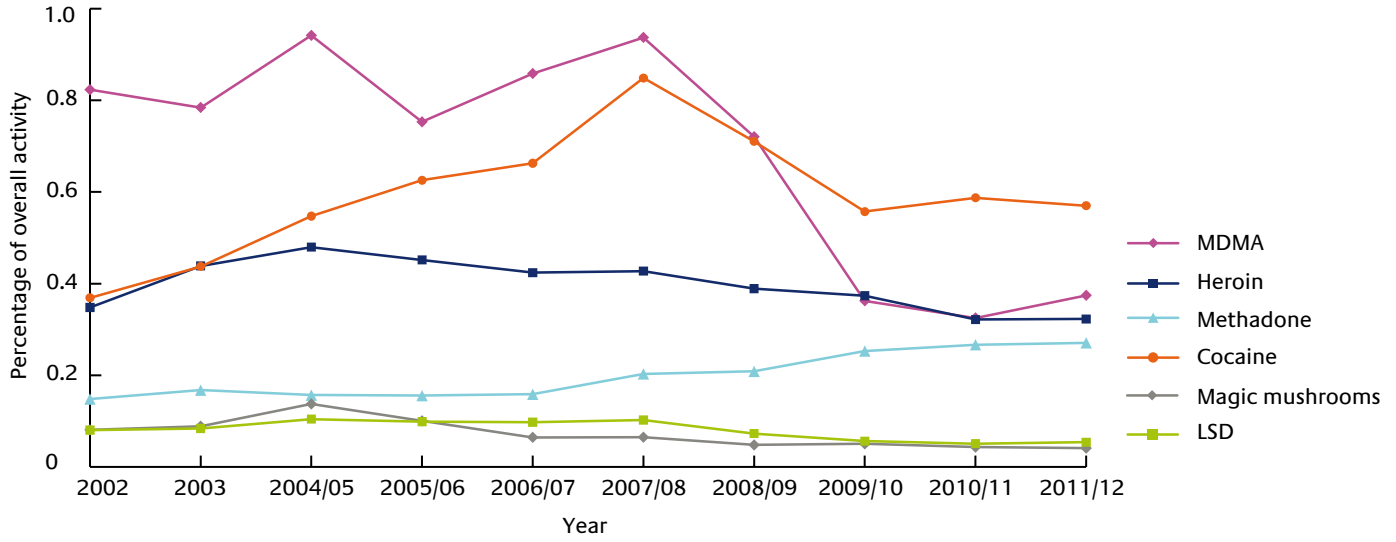
The potential value of NPIS data for surveillance has increasingly been recognised by official government bodies. During the year 2011/12 the NPIS has developed its working relationship with the UK Focal Point Early Warning System (EWS) on new psychoactive substances, which is managed by the Department of Health. Data were provided on NPIS activity relating to methoxetamine and this formed some of the evidence provided to the ACMD and the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA). Further discussions with the UK Focal Point EWS are planned with a view to developing a chapter for the exchange of data and information, but, in the meantime, the NPIS has been listed by the EMCDDA as part of the UK early warning system national profile.

TABLE 6.1 Drugs of abuse most commonly involved in telephone enquiries and TOXBASE accesses in 2011/12

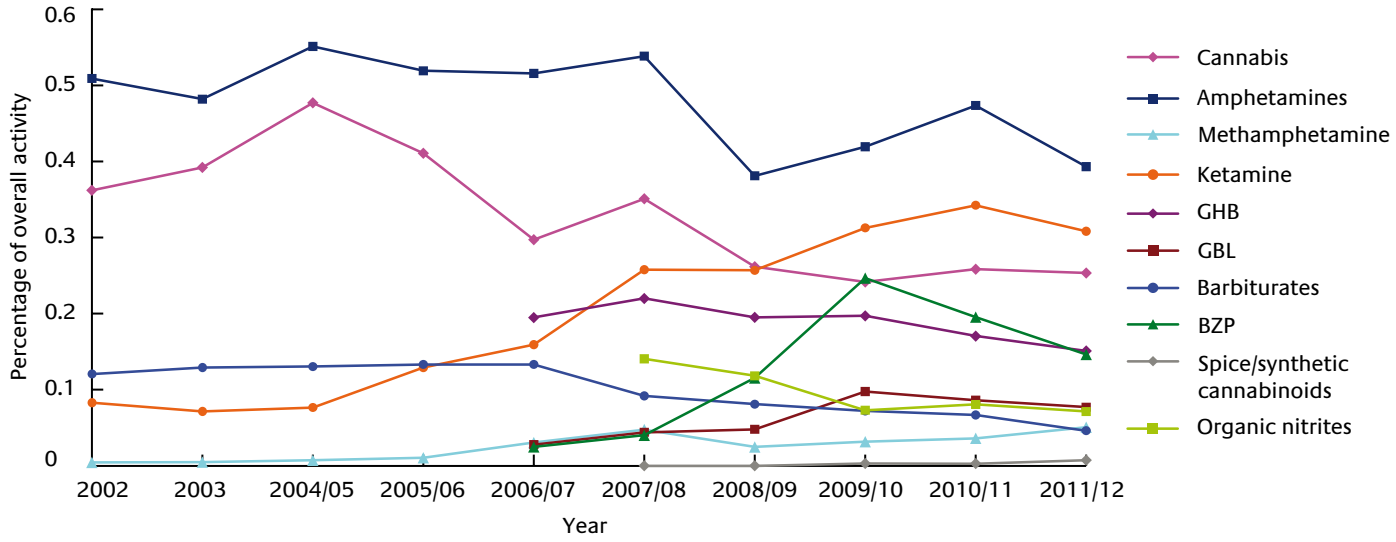
Telephone			TOXBASE		
Drug	Number of enquiries	% change from 2010/11	Drug	Number of accesses	% change from 2010/11
Cocaine	162	−19.4	Cocaine	6,451	+4.5
MDMA	130	+31.3	Mephedrone	6,196	−19.1
Heroin	115	−9.5	Amphetamines	4,448	−10.7
Cannabis	108	+0.9	MDMA	4,235	+23.9
Methadone	101	−12.2	Heroin	3,652	+8.0
Amphetamines*	88	−4.3	Ketamine	3,488	−3.2
Mephedrone	78	−55.7	Methadone	3,063	+9.2
Legal highs (NOS)	77	−2.5	Cannabis	2,868	+5.5
Barbiturates†	72	+7.5	GHB	1,710	−4.7
Ketamine	58	−17.1	Benzylpiperazine	1,656	−19.4

* Excluding dexamphetamine

† May include therapeutic use

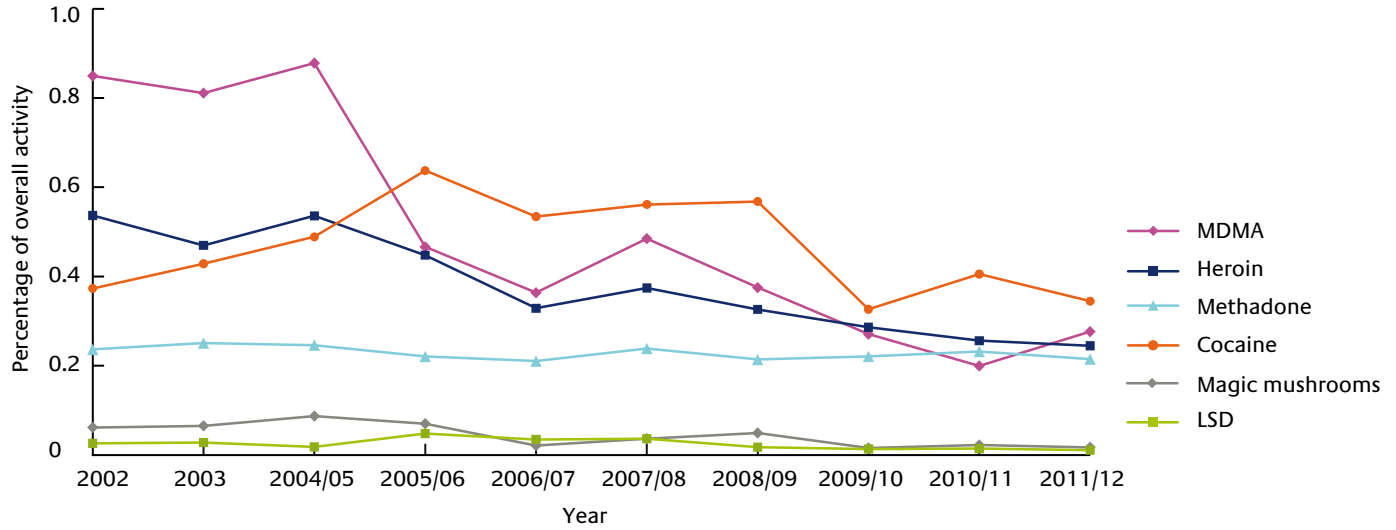


Class A drugs

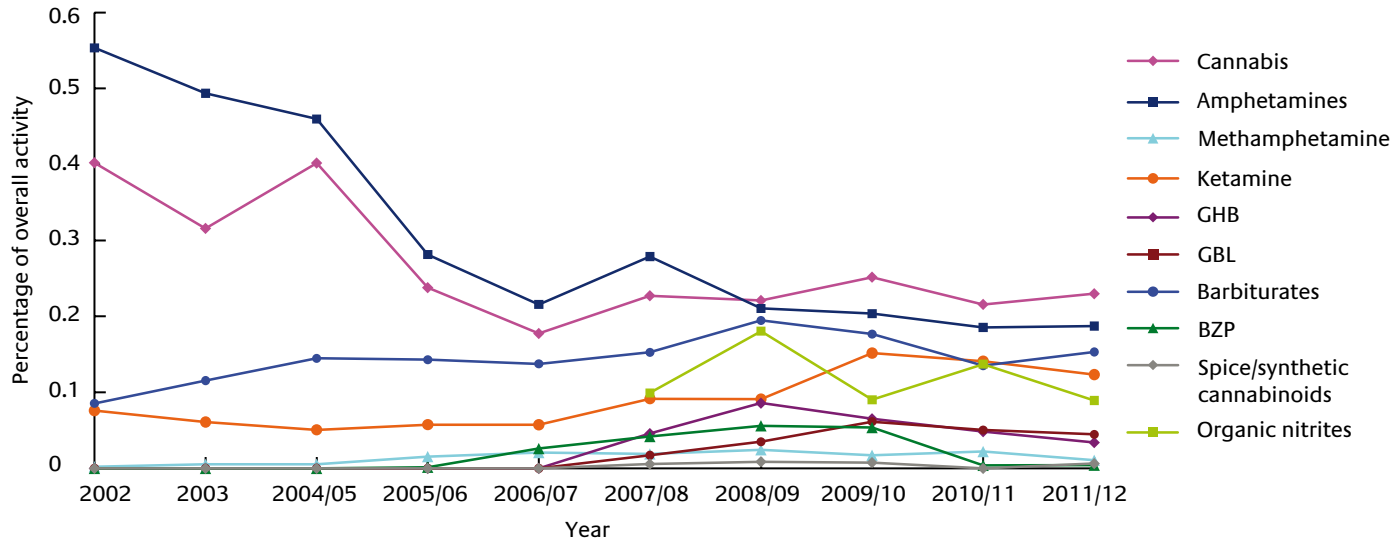


Other drugs

FIGURE 6.2 Proportion of TOXBASE sessions relating to selected drugs of abuse (data for 2002 and 2003 by calendar year; subsequent data by financial years)

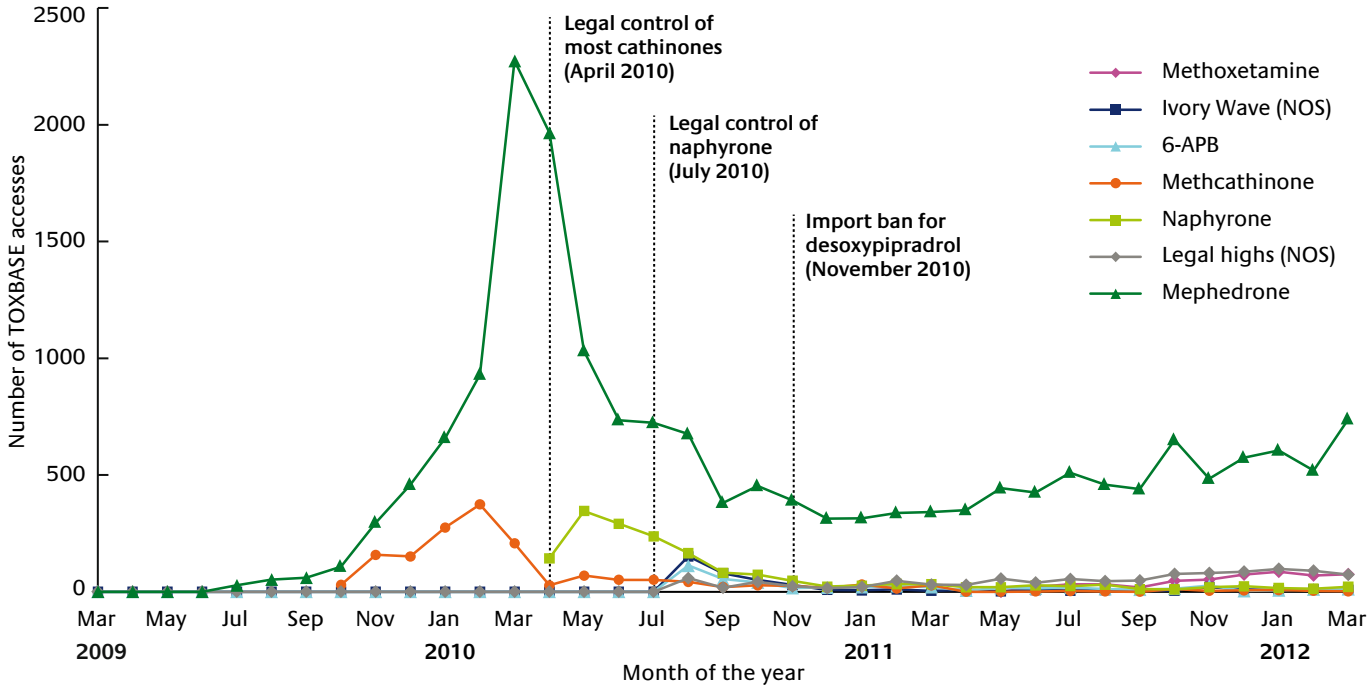


Class A drugs

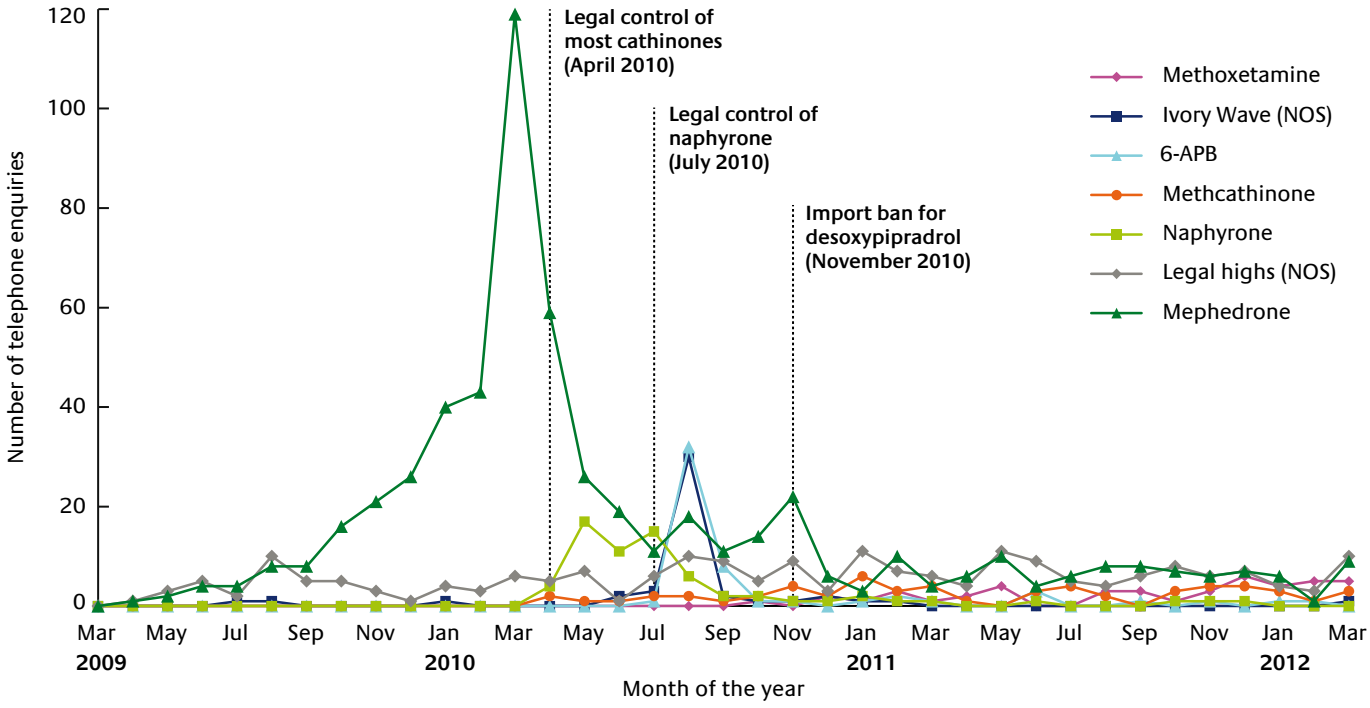


Other drugs

FIGURE 6.3 Proportion of telephone enquiries relating to selected drugs of abuse (data for 2002 and 2003 by calendar year; subsequent data by financial years)



TOXBASE accesses



Telephone enquiries

FIGURE 6.4 Monthly TOXBASE accesses and telephone enquiries relating to selected drugs of abuse, from March 2009 to March 2012

6.2 Quinine Update

Quinine is an antimalarial drug that is commonly prescribed in the UK for treatment of leg cramps, although overall efficacy is modest. In the 2009/10 NPIS annual report we highlighted the serious clinical effects associated with quinine toxicity. These can include cardiac arrhythmias, hearing impairment and visual loss. Acute poisoning can be fatal, while permanent visual impairment may occur in those who survive.

In June 2010, because of limited efficacy and significant toxicity, the Medicines and Healthcare products Regulatory Agency (MHRA) advised that quinine should not be considered a routine treatment for leg cramps, but restricted to those with very painful or frequent episodes associated with regular sleep disturbance, which continue in spite of non-pharmacological interventions such as passive stretching. Prescribing should occur only after careful consideration of risks and benefits*.

Restriction of prescribing of quinine is expected to reduce the availability of the drug in households and, as a consequence, the frequency of accidental or deliberate overdose. We have therefore examined the frequency of reporting to the NPIS of episodes of quinine overdose, comparing data collected in the two reporting years before and the two years after the MHRA guidance was issued.

A reduction of 19.7% has been recorded in telephone enquiries relating to quinine, comparing data for 2010/11 and 2011/12 (227 calls) with those for the two preceding reporting years (283 calls). The numbers of episodes reported as associated with severity described as moderate or severe, however, did not change significantly between these two periods (64 before versus 63 after). Similarly, there have been no significant changes in the proportions of patients reported as having blindness or other visual disturbances, deafness or cardiac disturbances. The frequency of poisoning can also be inferred from the freely-available Hospital Episode Statistics (HES) data†, which provide the numbers of finished consultant episodes (FCEs) for different diagnostic codes. No change in the number of FCEs relating to poisoning with antimalarial drugs, of which quinine is the most common, has been observed, although data are only available up to and including 2010/11.

Over the same two-year periods TOXBASE accesses have increased by 3.2% from 2,154 to 2,223. Annual trends in patient-specific telephone enquiries (available since 2008/09), antimalarial FCEs and TOXBASE accesses are shown in Figure 6.5.

These data indicate that the MHRA guidance has had at best a limited impact on the frequency of quinine poisoning reported to the NPIS and in FCEs relating to poisoning with antimalarial drugs. The NPIS will continue to monitor these data, but, in the meantime, prescribers are reminded of the importance of following the earlier MHRA guidance.

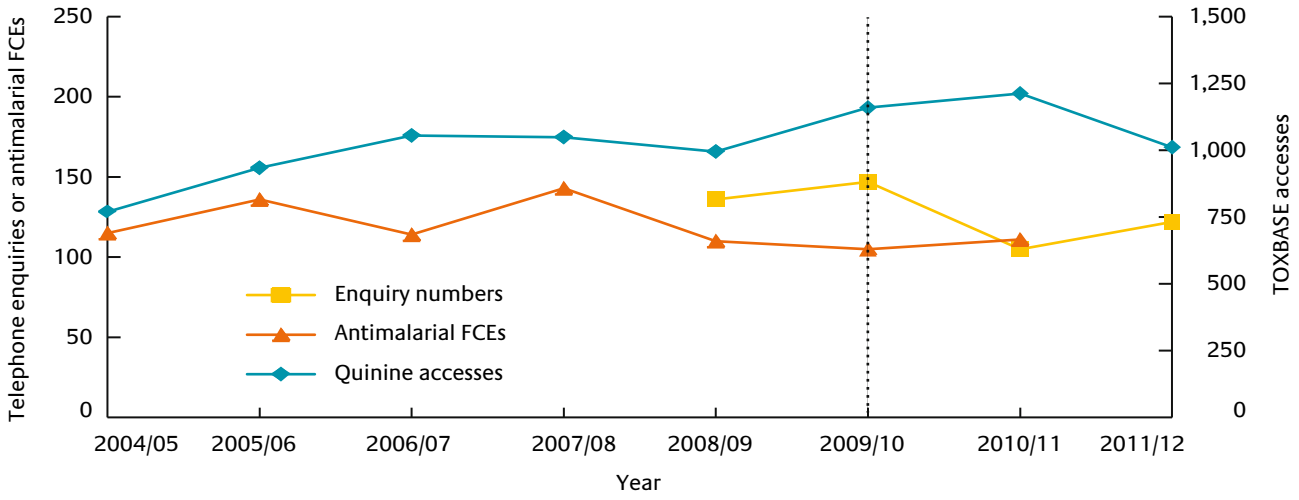


FIGURE 6.5 Annual trends in telephone enquiries and TOXBASE accesses relating to quinine (UK) and in finished consultant episodes (FCEs) relating to poisoning with antimalarial drugs, in England

* http://www.mhra.gov.uk/Safetyinformation/DrugSafetyUpdate/CON085085 (accessed June 2012)

† http://www.hesonline.nhs.uk/ (accessed June 2012)

6.3 Laboratory Support in the Management of Poisoned Patients

Acute poisoning is a common reason for presentation to hospital. The great majority of poisoned patients do not require any specific treatment – for example, with antidotes – and recover completely without serious complications.

It is important that adequate laboratory resources are available to support the management of poisoned patients and that these resources are used in a safe and efficient manner. This year, in order to facilitate this process, the NPIS and the Association for Clinical Biochemistry (ACB) have agreed new guidelines for laboratory analyses for poisoned patients in the UK, updating guidelines first produced in 2002*. Indications for the use of laboratory assays are given in Box 6.1.

BOX 6.1 Indications for Laboratory Assays

To confirm the diagnosis of poisoning when this is in doubt

To influence patient management, e.g. the need for:

- further investigations
- antidotes
  haemodialysis or other extracorporeal methods
- to stop treatment

To plan the re-institution of chronic therapy

In the diagnosis of brain death and in assessing the suitability of potential organ donors

For medico-legal or forensic reasons

Many of the supportive investigations required for the management of poisoned patients will be available in every hospital admitting patients acutely. These include haematological tests and tests of liver and kidney function. However, a number of specialist laboratory investigations should also be available on a 24-hour basis to all hospitals where patients with acute poisoning are admitted.

The new guidelines divide the specialist toxicological assays required into two groups: those that should be readily available in all acute hospitals around the clock (Group 1) and those for which alternative arrangements should apply (Group 2) (see Boxes 6.2 and 6.3). They also include advice on the appropriate availability of other supportive investigations for patients with suspected poisoning, how to take appropriate samples and how to report results clearly. A distinction is made between assays required urgently (Group 1), for which 24-hour availability is necessary, and those that can be performed routinely (Group 2), i.e. during the next normal working day.

BOX 6.2 Group 1 Assays

Assays that should be available on a 24-hour basis in all acute hospitals

Carboxyhaemoglobin	Paracetamol
Digoxin	Paraquat (qualitative urine test)
Ethanol	Salicylate
Iron	Theophylline
Lithium	Valproate
Methaemoglobin	

Results should normally be available within a maximum of 2 hours (or sooner if possible) unless otherwise stated

BOX 6.3 Group 2 Assays

Specialist or infrequent assays

Arsenic	Methanol
Carbamazepine	Methotrexate
Cholinesterase (plasma)	Paraquat (quantitative plasma assay)
Cholinesterase (erythrocyte)	Phenobarbital
Cyanide*	Phenytoin
Ethylene glycol	Thallium
Lead	Thyroxine
Mercury	Toxicology screen†

* May be used for forensic purposes

† Scope may vary according to local needs

* National Poisons Information Service and Association of Clinical Biochemists. Laboratory analyses for poisoned patients: joint position paper. Ann Clin Biochem 2002; 39: 328–39

It is unnecessary for the more specialist (Group 2) assays to be available directly from all acute hospital laboratories. However, arrangements should be in place so that these assays can be accessed urgently when necessary. This may involve an arrangement with a supra-regional specialist toxicology laboratory or a sub-regional centre. It should be the responsibility of each individual hospital to ensure that appropriate arrangements are in place to ensure the provision of these assays, and that staff can follow these arrangements when the need arises, including outside normal working hours.

Having agreed those assays that should be available, the NPIS and ACB then conducted a joint survey of over 200 major hospitals in the UK to ascertain the current availability of assays. Large hospitals were contacted and asked initially to complete an online survey. Subsequently, non-respondents were contacted by the NPIS units and asked to supply data directly. These data included information on which assays the hospitals undertook and how long it would take for the results to become available. Where samples were sent elsewhere, hospitals were asked to state where the samples were sent.

The results of the audit demonstrated that Group 1 assays, those that should be available in all hospitals which admit poisoned patients, are widely available throughout the UK. Furthermore, these assays are generally available at all times with the results being available promptly to treating physicians. However, the results for the Group 2 specialist assays demonstrated a different pattern. Assays for two Group 2 therapeutic drugs, cabamazepine and phenytoin, are widely available at all times and the results often available promptly. However, assays for other Group 2 compounds are much less widely available geographically, with most hospitals sending samples away to be analysed. Their availability and timeliness become particularly restricted outside weekday daytime working hours, with few specialist laboratories offering a comprehensive seven-day and out-of-hours service. Results are often slow to become available. Limited availability and the lack of timely results is particularly true for those assays which are infrequently requested.

The delay to results becoming available is a matter of concern, particularly as antidotes exist for a number of poisons for which Group 2 assays are used. In some cases – for example, ethylene glycol – a decision to use a specific antidote may have to be taken before the assay result becomes available. Similarly, the decision to stop using the antidote may be delayed if analytical results are not available promptly. This may result in suboptimal clinical management, a prolonged admission to hospital and a poor use of resources, both clinical and financial.

Whilst it is sensible to concentrate the availability of Group 2 assays within particular specialist laboratories, there is a need for these assays to be appropriately available throughout the whole country and for the results to be consistently available in a timely fashion. For some assays, particularly out of hours and at weekends, this is not currently the case. It is hoped that the NPIS/ACB guidelines will allow individual hospitals to review how they provide analytical services to support the management of poisoned patients and encourage a more collaborative, comprehensive and effective approach to the provision of specialist assays in the UK.

6.4 Therapeutic Errors including Intravenous Paracetamol

The NPIS receives telephone enquiries relating to suspected medication errors as a cause of potential overdose and details of these are recorded on UKPID.

Medication errors are a cause for concern for those involved and are a potential source of serious harm to the patient. They may occur as a result of a patient being given the wrong dose of the intended medicine, the correct dose of medicine at incorrect intervals or via the wrong route, or the wrong medicine(s) entirely. Errors may occur at any point between deciding to administer a particular dose of medicine, the identification and dispensing of the medication, and its administration to the patient. Reasons for receiving the wrong medicine also include misidentification of the patient – for example, administering another patient's medicine by accident, misidentification of the medicine or dose, and incorrectly written or unclear prescriptions.

Enquiries concerning medication errors were made for 9,674 patients during the year (Figure 6.6). This represents 20.6% of all telephone enquiries made to the NPIS, and is similar to the number of enquiries concerning medication errors last year (9,955 enquiries or 20.1%). Of these, nearly

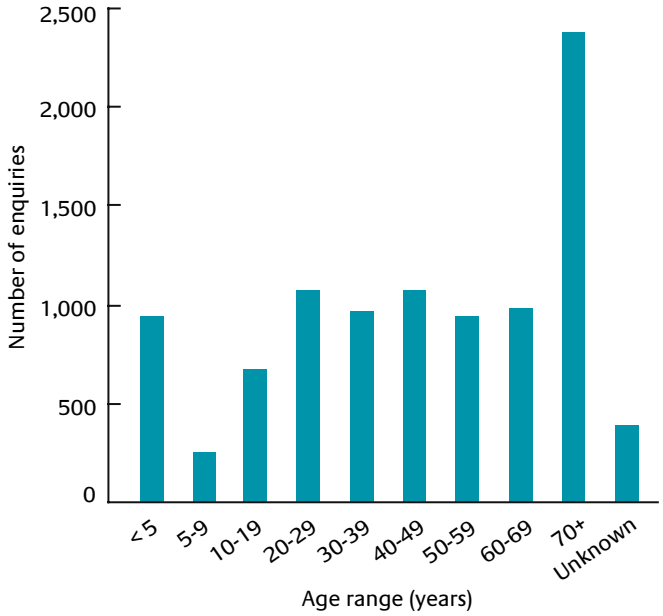


FIGURE 6.6 Number of medication errors resulting in telephone enquiries by age group in 2011/12

one-quarter (2,373) involved patients aged 70 years or more and a further 937 (9.7%) involved children less than five years of age (Figure 6.7).

As patients get older, the proportion of telephone enquiries concerning therapeutic errors also increases. This reflects their increased relative risk of being involved in this type of incident.

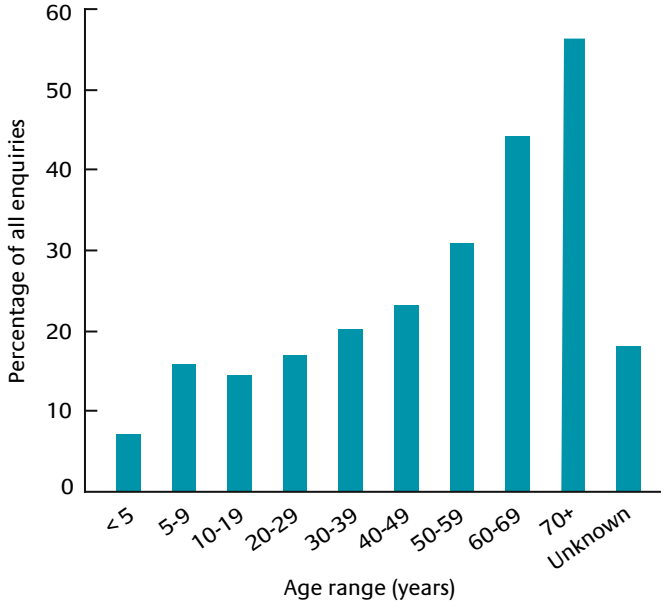


FIGURE 6.7 Medication errors as a percentage of all telephone enquiries for each age group in 2011/12

Of the medication error enquiries, 58% concerned females and 41% males (for 1% the gender was not stated). The vast majority (90%) of medication errors occurred at home. However, 4% occurred in hospitals, 4% in nursing and care homes, 1% in GP surgeries and 1% in prisons.

For patients involved in medication errors, by far the most common route of exposure was ingestion (94%). Injection was the next most common (3%) and eye exposure accounted for a further 1%. Other routes of exposure accounted for less than 1% each.

Drugs used as analgesics or for joint disorders (33%), central nervous system drugs (21%) and cardiovascular drugs (16%) were the most common drug classes implicated (Figure 6.8). The three commonest individual drugs involved were all analgesics and accounted for 22% of the enquiries about therapeutic error: paracetamol (13%), ibuprofen (5%) and cocodamol (3%) (paracetamol and codeine in combination). Medication errors involving intravenous paracetamol administration are discussed in more detail below.

Thirty per cent of medication errors involved acute exposures and 23% concerned several doses within a 24-hour period. A further 33% of medication errors occurred where the substance was already being used.

The severity of exposure may be assessed using the poisoning severity score (PSS). Where the severity score was recorded, most medication errors (81%) resulted in no clinical features, whilst a further 16% caused only minor features. Only 1% were

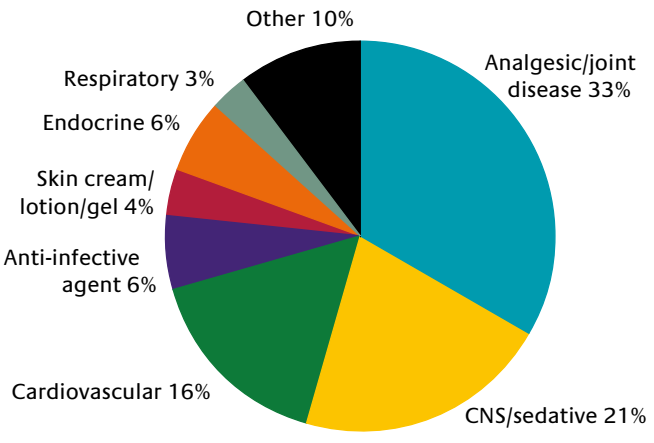


FIGURE 6.8 Pharmaceuticals involved in telephone enquiries about medication errors by drug class in 2011/12

associated with moderate features and 0.2% were assessed as severe. However, despite this overall pattern, three deaths were recorded, reflecting the importance of accurate, appropriate dosing and administration of medicines.

Whilst the majority of medication errors occurred in the home, and most resulted in few adverse features, the potential to cause serious adverse effects must be remembered. All persons who administer medication must remain constantly vigilant to ensure that the correct medicine is given to the correct patient in the correct dose.

Medication errors involving intravenous paracetamol

Intravenous paracetamol preparations have now been available in the UK for several years. Following cases of intravenous overdose reported to the service, the NPIS developed separate treatment guidelines for the management of intravenous paracetamol poisoning in 2010 and brought the potential risks to the attention of prescribers*. Concerns over the risks of therapeutic dosing errors with intravenous paracetamol have now been expressed by both patient safety groups and regulatory authorities.

This year telephone enquiries concerning 34 cases of intravenous paracetamol therapeutic error were made to the NPIS. Of these, 19 enquiries concerned children less than ten years old, ten of whom were aged one year old or less. The acute administration of intravenous paracetamol was involved in 14 cases, and multiple doses of either intravenous paracetamol or combinations of both intravenous and oral paracetamol were involved in 17 cases.

Medication errors with intravenous paracetamol arose for several reasons. In three cases a ten-fold dosing error was made, two of these occurring in children less than one year old. Other cases involved the wrong dose being administered when the patient's weight was considered. In some other cases, intravenous doses were administered in addition to previously administered oral paracetamol. When using intravenous paracetamol it is recommended that the patient's weight and drug history are checked carefully when prescribing is undertaken and that the amount, volume and the timing of recently administered medicines are checked very carefully before administration.

Summary

These data demonstrate the importance of medication errors and their contribution to the workload of the NPIS. This is particularly true for older patients, where medication errors result in greater telephone contact with the service than does intentional self-poisoning. There is a responsibility upon everyone who is involved in prescribing, dispensing, administering and taking medicines to ensure that they are used safely and effectively.

6.5 Carbon Monoxide

Despite continuing public awareness campaigns, carbon monoxide poisoning remains an important preventable cause of morbidity and mortality in the UK. During 2011/12 there were 248 telephone enquiries to the NPIS (286 in 2010/11) regarding confirmed or suspected carbon monoxide exposures which involved one or more individuals. Of these enquiries, 35 involved multiple individuals so that the total number of patients involved was at least 315 (in some cases the number of individuals exposed was not known). The maximum number of individuals exposed in a single incident was nine, and this occurred when several people, including police officers, were investigating a death at a house.

In addition, there were 113 enquiries from the emergency services, health protection staff and the Environment Agency regarding potential carbon monoxide exposure incidents.

The seasonal variation in the number of enquiries is shown in Figure 6.9, which also includes comparable data for 2010/11. This demonstrates, as expected, that enquiries regarding carbon monoxide exposure are generally less frequent in the summer months.

Most enquiries (211 of 248, or 85%) during 2011/12 involved carbon monoxide exposure at home, compared to just 13 (5%) that occurred in the workplace and 11 (4%) reported in a public area. The suspected source of carbon monoxide in the domestic setting is known in 153 out of 211 (73%) cases, as

* Beringer RM, Thompson JP, Parry S, Stoddart PA. Intravenous paracetamol overdose: two case reports and a change to national treatment guidelines. Arch Dis Child 2011; 96(3): 307–8

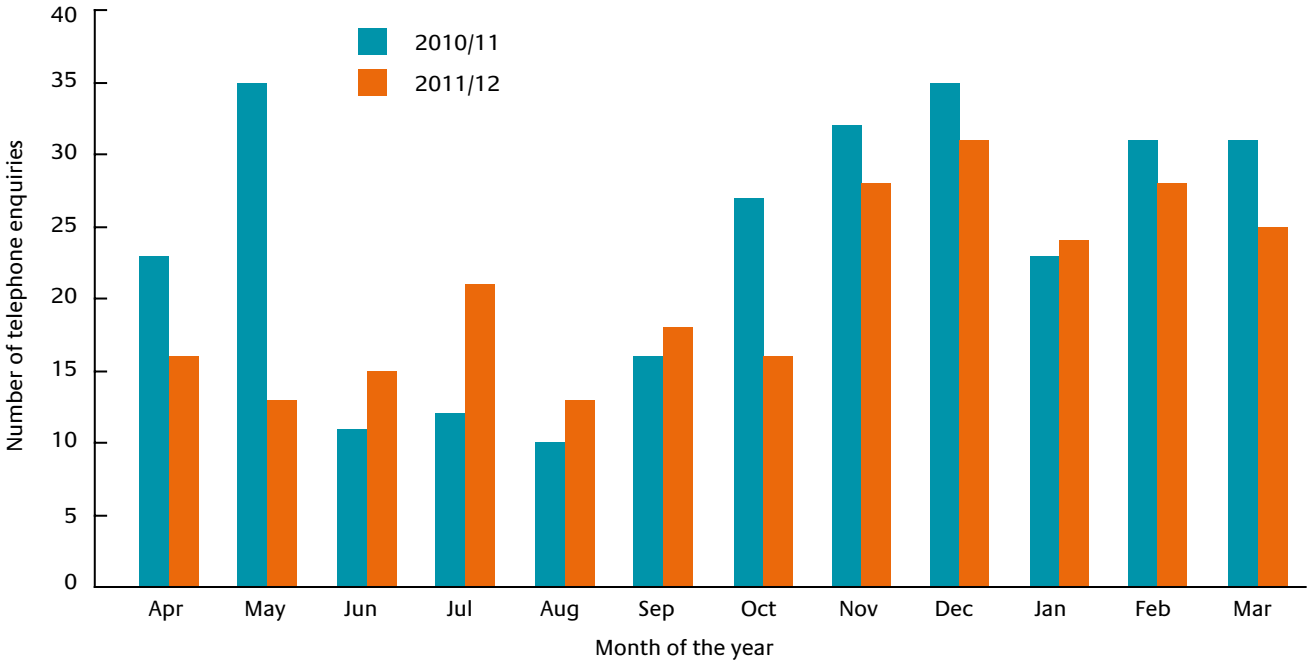


FIGURE 6.9 Number of enquiries regarding carbon monoxide received each month in 2010/11 and 2011/12

shown in Figure 6.10; central heating boilers were implicated most often (accounting for 69 out of 153 enquiries, or 45%).

Exposure was accidental in 298 cases, 16 cases were deemed intentional, and the intent was uncertain in one case. Of the 16 intentional exposures, ten involved vehicle exhaust fumes, two involved the lighting of a barbecue in a confined space, three involved house fires and the source in the remaining exposure remains unknown.

The poisoning severity score (PSS) is known in 296 patients: 266 patients had a PSS of 0 or 1 (minor toxicity), 15 had PSS 2 (moderate toxicity) and 15 were graded PSS 3 (severe toxicity). Twelve of the patients with a PSS 3 had been exposed to carbon monoxide during a domestic fire, so thermal injury may have also contributed to their features; four patients with PSS 3 died. No poisoning severity score was available in the remaining 19 patients.

Carboxyhaemoglobin concentrations are known in 96 of 315 patients; the mean (± SD) carboxyhaemoglobin concentration in these 96 patients was 12.2 (± 14.0)%, in 14 of the 15 patients with PSS 3 was 28.7 (± 17.8)% and in 10 of 16 intentional exposures was 23.1 (± 21.1)%.

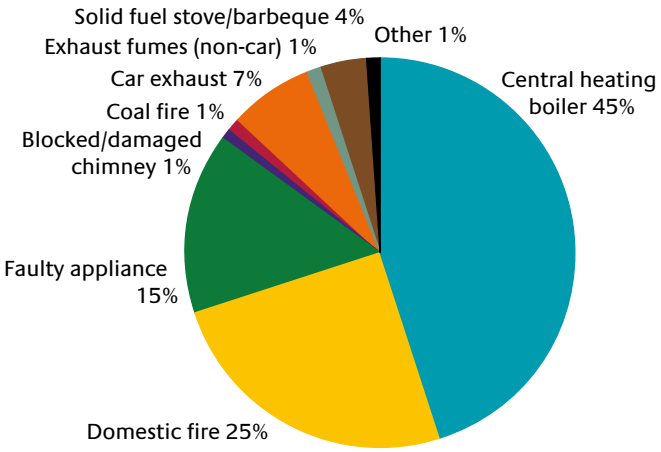


FIGURE 6.10 Source of carbon monoxide exposure in the domestic setting

6.6 Lead

The NPIS has published data recently on lead exposures reported to the service in 2008–2010*. During 2011/12 there were 140 telephone enquiries to the NPIS regarding 130 patients exposed to lead. The maximum number of individuals exposed in a single incident was a family of seven, who had been exposed to lead-containing paint dust during the renovation of their house. The number of occupational and non-occupational exposures grouped by age and gender are shown in Figure 6.11.

A large majority (74%) of the 130 patients were exposed non-occupationally, the most common source being paint-stripping (35 cases). The main routes of exposure were ingestion (45 cases) and inhalation (44 cases); other routes included gunshot wounds (two cases) and dermal contact (one case). In eight patients the route of exposure was not identified.

Twenty-two of those exposed were children under five years of age. A mother took ayurvedic medicines during pregnancy which resulted in a peak blood lead concentration of 53.0 μg/dL. At birth the blood lead concentration in the neonate was 36.2 μg/dL and at one month 39.8 μg/dL.

Only 30 individuals were exposed occupationally, 26 of whom were men. Inhalation was the most common route of exposure (27 cases). In four of 130 patients the circumstances of exposure were unknown.

Blood lead concentrations were available in 45 patients and are shown in Figure 6.12. The mean (± SD) blood lead concentration in the non-occupational group was 63.2 (± 62.9) μg/dL (range 9–308 μg/dL) and the mean (± SD) blood lead concentration in six children under five years of age was 70.9 (± 106.4) μg/dL (range 9–308 μg/dL).

By comparison, the mean (± SD) blood lead concentration in the occupational group was 49.7 (± 28.6) μg/dL (range 22.2–118 μg/dL). Nine patients in the occupational group had a blood lead concentration that exceeded the Health and Safety Executive action level (50 μg/dL).

Chelation therapy was recommended or had been given previously in 14 patients; 11 of these patients were exposed non-occupationally.

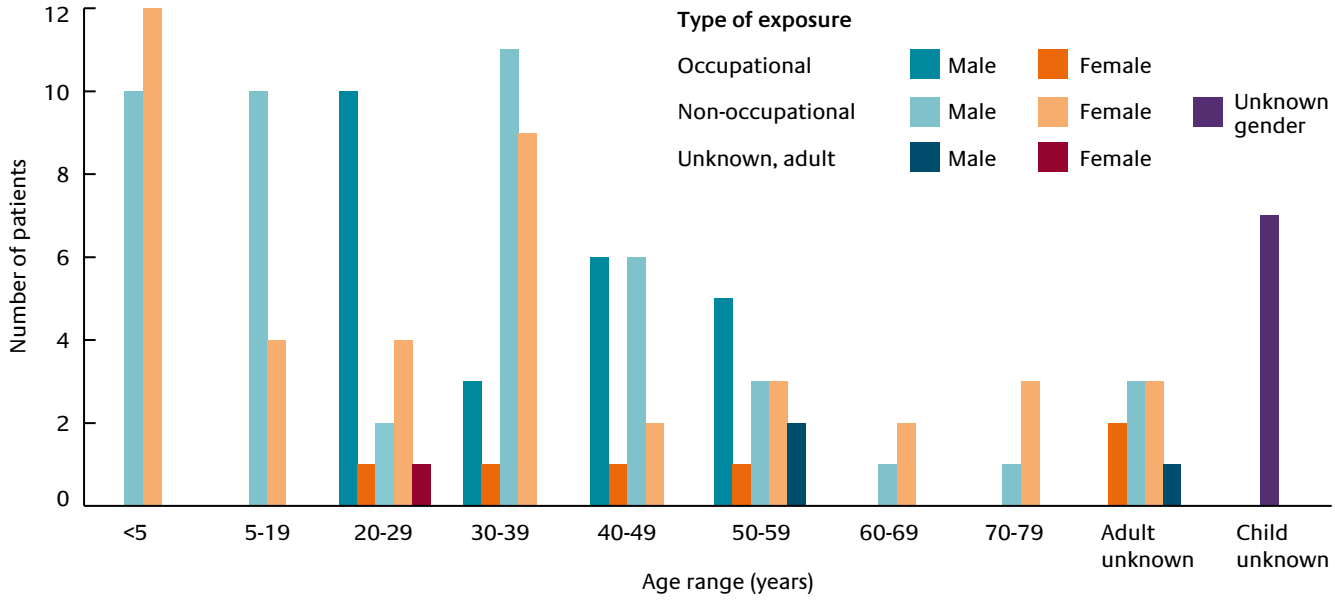


FIGURE 6.11 Age and sex of patients exposed occupationally and non-occupationally to lead

* Brackenridge D, Bradberry SM, Vale JA. Non-occupational and occupational lead exposures reported to the UK National Poisons Information Service 2008–2010. Clin Toxicol 2012; 50: 307

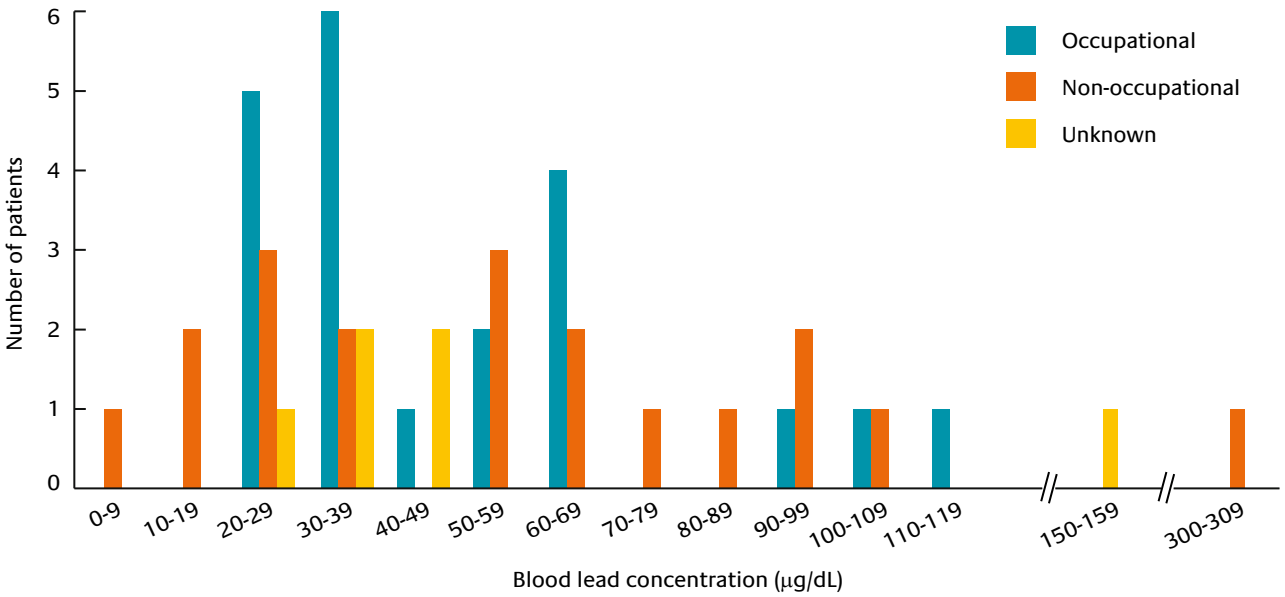


FIGURE 6.12 Blood lead concentrations following occupational and non-occupational exposure

7 Recommendations

Outcome of Recommendations for 2011/12

1 To complete preparations and provide health support for the London 2012 Olympic Games

Outcome Completed. The NPIS and UKTIS have developed and updated relevant information on TOXBASE. Enhanced staff rotas have been organised and a new telephone system has been commissioned to allow a robust and flexible response to sudden changes in service demand into the future.

2 To collaborate with the College of Emergency Medicine to produce and circulate updated guidelines for NHS trusts on recommended holdings of the antidotes required for the treatment of poisoning

Outcome Being progressed, but final version delayed by problems in organising meetings involving all stakeholders and in reaching consensus on some aspects. Completion expected during 2012/13.

3 To collaborate with the Association for Clinical Biochemistry to update recommendations on the use of specialist assays required for the management of poisoning and establish the availability of these assays nationally

Outcome Updated recommendations have been agreed and will be published in 2012/13. Survey of laboratory assay availability completed.

4 To ensure TOXBASE remains a fit-for-purpose, front-line resource for UK healthcare professionals by maintaining the four-yearly review cycle for all entries on the database

Outcome Target achieved, with more than a third of entries reviewed and updated in the year.

Recommendations for 2012/13

1 To provide health support relating to chemical exposure and other forms of poisoning for the London 2012 Olympic and Paralympic Games

2 To develop arrangements for the NPIS to act as the first point of contact for clinical enquiries relating to suspected radiation poisoning

3 To explore arrangements for the exchange of data and information with the UK Focal Point on Drugs Early Warning System

4 To continue to ensure that TOXBASE remains a fit-for-purpose, front-line resource for UK healthcare professionals by maintaining a four-yearly review cycle for all database entries

APPENDIX A

NPIS Staff

NPIS Consultants

NPIS Birmingham

Dr S M Bradberry BSc MD MRCP FAACT
Deputy Director, NPIS Birmingham and West Midlands Poisons Unit, City Hospital

Professor J A Vale MD FRCP FRCPE FRCPG FFOM FAACT FBTS Hon FRCPSG
Director, NPIS Birmingham and West Midlands Poisons Unit, City Hospital, Birmingham; School of Biosciences and College of Medical and Dental Sciences, University of Birmingham

NPIS Cardiff

Dr C V Krishna MD FRCP DipTox DipTher
Deputy Director, NPIS Cardiff, and Consultant Physician, Clinical Pharmacologist, Toxicologist and Honorary Clinical Senior Lecturer, Cardiff and Vale University Health Board and Department of Pharmacology, Therapeutics and Toxicology, Institute of Molecular and Experimental Medicine, School of Medicine, Cardiff University

Professor P A Routledge OBE MD FRCP FRCPE FBPharmacolS FBTS FRCGP
Professor of Clinical Pharmacology and Head of Department of Pharmacology, Therapeutics and Toxicology, Institute of Molecular and Experimental Medicine, School of Medicine, Cardiff University

Dr A Thomas MBChB
Senior Lecturer in Clinical Pharmacology and Honorary Consultant Physician, Department of Pharmacology, Therapeutics and Toxicology, Institute of Molecular and Experimental Medicine, School of Medicine, Cardiff University

Dr J P Thompson BMedSci MBChB FRCP FBTS
Director, NPIS Cardiff, and Senior Lecturer in Clinical Pharmacology, Department of Pharmacology, Therapeutics and Toxicology, Institute of Molecular and Experimental Medicine, School of Medicine, Cardiff University

NPIS Edinburgh

Professor D N Bateman BSc MD FRCP FRCPE FBPharmacolS FBTS FAACT
Director *(until 31 March 2012)*, NPIS Edinburgh, Professor in Clinical Toxicology, University of Edinburgh, and Consultant Physician, Royal Infirmary of Edinburgh

Dr J W Dear PhD FRCPE
NHS Research Scotland Career Research Fellow and Consultant Clinical Toxicologist, Royal Infirmary of Edinburgh

Dr M Eddleston MA PhD FRCPE
Director *(from 1 April 2012)*, NPIS Edinburgh, and Scottish Senior Clinical Research Fellow and Reader, University of Edinburgh, and Consultant Physician, Royal Infirmary of Edinburgh

Dr A Veiraiah MB BS MRCP(UK)
Consultant in Acute Medicine and Toxicology, Royal Infirmary of Edinburgh

NPIS Newcastle (including UKTIS)

Dr S L Hill BSc(Hons) MB BS MRCP (UK)
Consultant Physician and Clinical Toxicologist, Newcastle upon Tyne Hospitals NHS Foundation Trust, and Honorary Senior Clinical Lecturer, Institute of Cellular Medicine, Newcastle University

Dr H K R Thanacoody MD FRCPE
Consultant Physician and Clinical Toxicologist, Newcastle upon Tyne Hospitals NHS Foundation Trust, and Honorary Senior Clinical Lecturer, Institute of Cellular Medicine, Newcastle University

Professor S H L Thomas BSc MD FRCP FRCPE
Director, NPIS Newcastle and UKTIS, Consultant Physician, Newcastle upon Tyne Hospitals NHS Foundation Trust, and Professor of Clinical Pharmacology and Therapeutics, Newcastle University

Dr L Yates MBChB DRCOG MRCPCH PhD
Head of Teratology, UKTIS, Consultant in Clinical Genetics, Institute of Genetic Medicine, Newcastle upon Tyne Hospitals NHS Foundation Trust, and Honorary Senior Clinical Lecturer, Institute of Genetic Medicine, Newcastle University

Consultants providing on-call support for the NPIS

Dr P I Dargan FRCPE FACMT FRCP
Consultant Physician and Clinical Toxicologist, Guy's and St Thomas' NHS Foundation Trust, and King's Health Partners, London, and Reader in Toxicology, King's College London, London

Dr W S Waring BMedSci MB PhD FRCPE
Consultant Physician in Acute Medicine and Clinical Toxicology, York Teaching Hospital Foundation Trust, and Honorary Senior Lecturer in Medicine, Hull York Medical School, York

Dr D M Wood MD FRCP(London) FBPharmacolS
Consultant Physician and Clinical Toxicologist, Guy's and St Thomas' NHS Foundation Trust and King's Health Partners, London, and Honorary Senior Lecturer, King's College London, London

Consultants providing specialist paediatric support for the NPIS

Dr M Anderson BSc BMedSci BM BS MRCPCH
Consultant Paediatrician, Great North Children's Hospital, Newcastle upon Tyne Hospitals NHS Foundation Trust

Dr T Beattie MB MSc FRSCEd(A&E) FCEM FRCPE FFSEM FFSEM(RCPSI) DCH
Consultant in Paediatric Emergency Medicine, Royal Hospital for Sick Children, Edinburgh

National and International Appointments of NPIS Consultants

NPIS staff have a role in supporting many important aspects of toxicology, both nationally and internationally. These include advisory roles to international and national bodies, including government, as well as academic activities. The range of their roles presented below provides a flavour of these activities and indicates the wider 'added value' of the NPIS.

NPIS Birmingham

Dr S M Bradberry

INTERNATIONAL ACTIVITIES

Board Member: European Association of Poison Centres and Clinical Toxicologists

Scientific Committee Member: European Association of Poison Centres and Clinical Toxicologists

INTERNATIONAL SOCIETIES

Fellow: American Academy of Clinical Toxicology

INTERNATIONAL JOURNALS

Senior Editorial Board Member: *Clinical Toxicology*

UK ADVISORY COMMITTEES

Member: Health and Safety Executive Pesticide Incident Appraisal Panel

ACADEMIC ACTIVITIES

Honorary Lecturer: School of Biosciences, University of Birmingham

Joint Course Organiser: MSc (Toxicology), University of Birmingham

Educational Supervisor: Sandwell and West Birmingham Hospitals NHS Trust

Professor J A Vale

INTERNATIONAL ACTIVITIES

Member: Advisory Board Hong Kong Poisons Centre

INTERNATIONAL SOCIETIES

President: Clinical and Translational Specialty Section, Society of Toxicology

INTERNATIONAL JOURNALS

Reviews Editor: *Clinical Toxicology*

Editorial Board Chairman: *Medicine*

Editorial Board Member: *Drugs*

UK ADVISORY COMMITTEES

Chairman: Ministry of Defence Research Ethics Committee

Member: MHRA Clinical Trials Collaboration Group

Consultant: Dstl Porton Down

Member: Expert Advisory Group on Management of Casualties Caused by Chemical Terrorism (Blain II)

ACADEMIC ACTIVITIES

Joint Course Organiser: MSc (Toxicology), University of Birmingham

Examiner: MRCP(UK) Part 2 Clinical Examination (PACES)

Member: SAC in Toxicology, Royal College of Pathologists

Examiner: Faculty of Occupational Medicine

Fellow: American Academy of Clinical Toxicology

Fellow: British Toxicology Society

Fellow: Faculty of Occupational Medicine

NPIS CARDIFF

Dr C V Krishna

NHS NATIONAL AND REGIONAL COMMITTEES

Chairman and Training Programme Director: Clinical Pharmacology Training in Wales

Member: New Medicines Group, All-Wales Medicines Strategy Committee

Member: Joint Specialty Committee, Clinical Pharmacology and Therapeutics

Member: All-Wales Specialist Training Committee in Clinical Pharmacology

ACADEMIC ACTIVITIES

Member: SAC, Clinical Pharmacology and Therapeutics, UK

Member: Prescribing Skills Assessment, Certificate/Diploma/MSc in Medical Toxicology, Cardiff University

Course Organiser: Certificate/Diploma/MSc in Medical Toxicology, Cardiff University

Member: Steering Committee, Diploma in Therapeutics, Cardiff University

PACES Examiner: Royal College of Physicians, UK

Professor P A Routledge

INTERNATIONAL ACTIVITIES

Associate Director: World Health Organization Clearing House for Chemical Incidents, Cardiff, Wales

INTERNATIONAL JOURNALS

Editorial Board Member: *Adverse Reactions and Acute Poisoning Reviews*

Editorial Board Member: *Adverse Drug Reactions Bulletin*

ADVISORY COMMITTEES

Chairman: All-Wales Medicines Strategy Group

Consultant Advisor in Toxicology to the Chief Medical Officer (Wales)

NHS NATIONAL AND REGIONAL COMMITTEES

Chairman: UK Herbal Medicines Advisory Committee

ACADEMIC ACTIVITIES

President: British Pharmacological Society

Course Director: Postgraduate Diploma/MSc Programmes in Medical Toxicology, Therapeutics and Occupational Health, Cardiff University

Faculty Lead: Medicines Management, 1000 Lives Plus Campaign, Wales

Honorary Secretary: Clinical Pharmacology Colloquium

Dr A Thomas

ADVISORY COMMITTEES

Member: New Medicines Group, All-Wales Medicines Strategy Committee

Member: All-Wales Specialist Training Committee in Clinical Pharmacology

NHS NATIONAL AND REGIONAL COMMITTEES

Deputy Director: Yellow Card Centre (Wales)

ACADEMIC ACTIVITIES

Member: Steering Committee, Diploma/MSc in Medical Toxicology, Cardiff University

Member: Steering Committee, Diploma in Therapeutics, Cardiff University

Dr J P Thompson

INTERNATIONAL ACTIVITIES

Member: Advisory Board Hong Kong Poisons Centre

Consultant: WHO Collaborating Centre for Chemical Incidents

INTERNATIONAL SOCIETIES

Chair: Human Toxicology Section British Toxicology Society

Vice President (Clinical): British Pharmacological Society

ADVISORY COMMITTEES

Member: Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment (COT)

Member: Expert Advisory Group on Management of Casualties Caused by Chemical Terrorism (Blain II)

Senior Medical Officer: Yellow Card Centre (Wales)

NHS NATIONAL AND REGIONAL COMMITTEES

Member: New Medicines Group, All-Wales Medicines Strategy Committee

Member: Joint Specialty Committee, Clinical Pharmacology and Therapeutics

Member: All-Wales Specialist Training Committee in Clinical Pharmacology

ACADEMIC ACTIVITIES

Member: Prescribing Skills Assessment and PRESCRIBE Task and Finish Group, British Pharmacological Society

Associate Course Director: Certificate/Diploma/MSc in Medical Toxicology, Therapeutics and Occupational Health, Policy and Practice, Cardiff University

Theme Lead: Prescribing and Therapeutics Education, School of Medicine, Cardiff University

NPIS Edinburgh

Professor D N Bateman

INTERNATIONAL ACTIVITIES

Advisor: World Health Organization/International Programme on Chemical Safety

INTERNATIONAL SOCIETIES

Scientific Committee Member: European Association of Poisons Centres and Clinical Toxicologists

Fellow: American Academy of Clinical Toxicology

INTERNATIONAL JOURNALS

Editor in Chief: *Clinical Toxicology (until December 2011)*

UK ADVISORY COMMITTEES

Member: Pharmacovigilance Expert Advisory Group, MHRA *(until December 2011)*

Member: Expert Advisory Group on Management of Casualties Caused by Chemical Terrorism (Blain II)

Member: Pesticides Adverse Health Effects Surveillance Working Group of the Advisory Committee on Pesticides

NHS NATIONAL AND REGIONAL COMMITTEES

Board Member: Yellow Card Centre (Scotland)

Expert Toxicology Advisor: Scottish Government

ACADEMIC ACTIVITIES

Training Programme Director: Scotland's Clinical Pharmacology and Therapeutics Programme *(until 2011)*

Member: Association of Physicians

Fellow: British Toxicology Society

Fellow: British Pharmacological Society

Dr J Dear

ACADEMIC ACTIVITIES

Tutor: MSc in Translational Medicine, Edinburgh University, PhD Student

External Examiner: MRes in Translational Medicine, Newcastle University

Member: Clinical Pharmacology Specialty Question Group, MRCP(UK)

NHS NATIONAL AND REGIONAL COMMITTEES

Deputy Director: Yellow Card Centre, Scotland

Member: Lothian Formulary Committee

Dr M Eddleston

INTERNATIONAL ACTIVITIES

Advisor: World Health Organization/Department of Mental Health and Evidence and Policy on Environmental Health

INTERNATIONAL SOCIETIES

Board Member: Asia Pacific Association of Medical Toxicology

INTERNATIONAL JOURNALS

Board Member: *Clinical Toxicology*

NPIS Newcastle (including UKTIS)

Dr S Stephens

INTERNATIONAL SOCIETIES

Member: European Network of Teratology information Services

Member: The Teratology Society

Member: Organisation of Teratology Information Specialists

ACADEMIC ACTIVITIES

Honorary Associate Fellow: School of Cellular Medicine, Newcastle University

Dr H K R Thanacoody

UK ADVISORY COMMITTEES

Member: Independent Scientific Advisory Committee, MHRA

Member: Pharmacovigilance Expert Advisory Group, MHRA

ACADEMIC ACTIVITIES

Member: RCPath Toxicology Specialist Advisory Committee

Member: Question Writing Group: Joint Royal Colleges MRCP (Part 1) Examining Board

Module Leader: Certificate/Diploma in Therapeutics, University of Newcastle

Module Leader: Experimental Medicine and Therapeutics, MRes in Translational Medicine, University of Newcastle

External Examiner: Certificate/Diploma/MSc in Medical Toxicology, Cardiff University

Professor S H L Thomas

INTERNATIONAL SOCIETIES

President: European Association of Poisons Centres and Clinical Toxicologists

Expert Panel Member: European Medicines Agency

INTERNATIONAL JOURNALS

Senior Editorial Board Member: *Clinical Toxicology*

International Editorial Board Member: *British Journal of Clinical Pharmacology*

UK ADVISORY COMMITTEES

Member: Commission for Human Medicines

Member: MHRA Paracetamol Ad Hoc Group

Co-opted Member: Technical Committee, Advisory Council on Misuse of Drugs

Member: Expert Advisory Group on Management of Casualties Caused by Chemical Terrorism (Blain II)

Member: Ministry of Defence Advisory Committee on Military Medicine

Member: Ministry of Defence Research Ethics Committee

NHS NATIONAL AND REGIONAL COMMITTEES

Director: Yellow Card Centre (Northern and Yorkshire)

Medical Director: Regional Drug and Therapeutics Centre, Newcastle

Member: North East Treatment Advisory Group

Member: North of Tyne Area Prescribing Committee

Chair: North of Tyne Area Prescribing Committee, Formulary Subcommittee

ACADEMIC ACTIVITIES

Chair: Specialist Training Committee, Clinical Pharmacology and Therapeutics, Northern Deanery

Degree Programme Director: Certificate/Diploma in Therapeutics, Newcastle University

Strand Leader: MRes in Translational Medicine and Therapeutics, Newcastle University

Dr L M Yates

INTERNATIONAL SOCIETIES

Member: European Network of Teratology information Services

Member: The Teratology Society

Member: Organisation of Teratology Information Specialists

Member: British Society of Human Genetics

Member: Clinical Genetics Society

ACADEMIC ACTIVITIES

Member: Organising Committee, British Association for Psychopharmacology (BAP) Guidelines on the Use of Psychotropic Medication Preconception, in Pregnancy and Postpartum

APPENDIX B

Publications in 2011/12

Over 80 contributions to the scientific literature were published in 2011/12 by NPIS staff.

Peer-reviewed Papers

Anderson M*. Clinical risk in paediatrics: Medicines. Clin Risk 2011; 17: 214–16.

Anderson M, Tambe, P, Sammons H, Mulla H, Cole R and Choonara I. Pharmacokinetics of buccal and intranasal lorazepam in healthy adult volunteers. Eur J Clin Pharmacol 2012; 68: 155–9.

Antoine DJ, Jenkins RE, **Dear JW**, Williams DP, McGill MR, Sharpe MR, Simpson KJ, Craig DGN, Jaeschke H, Park K. Molecular forms of HMGB1 and keratin-18 as mechanistic biomarkers for mode of cell death and prognosis during clinical acetaminophen hepatotoxicity. J Hepatol 2012; Epub January 17.

Bateman DN. Antidepressants. Medicine 2012; 40: 100–102.

Bateman DN. Antipsychotic drugs. Medicine 2012; 40: 105–6.

Bateman DN. Benzodiazepines. Medicine 2012; 40: 111.

Bateman DN. Carbon monoxide. Medicine 2012; 40: 115–16.

Bateman DN. Corrosives. Medicine 2012; 40: 118–20.

Bateman DN. Household products. Medicine 2012; 40: 125–6.

Bateman DN. Iron. Medicine 2012; 40: 128–9.

Bateman DN. Non-steroidal anti-inflammatory drugs. Medicine 2012; 40: 140.

Bateman DN. Opioids. Medicine 2012; 40: 141–3.

Bateman DN. The epidemiology of poisoning. Medicine 2012; 40: 42–5.

Bradberry S. Acetone. Medicine 2012; 40: 88.

Bradberry SM. Lead and mercury. Medicine 2012; 40: 133–4.

Bradberry S. Methaemoglobinaemia. Medicine 2012; 40: 59–60.

Bradberry S. Ricin and abrin. Medicine 2012; 40: 80–81.

Bradberry S, Vale A. Management of poisoning: antidotes. Medicine 2012; 40: 69–70.

Bradberry S, Vale A. Plants. Medicine 2012; 40:151–3.

Chang SS, Lu TH, Sterne JAC, **Eddleston M**, Lin JJ, Gunnell D. The impact of pesticide suicide on the geographic distribution of suicide: a spatial analysis in Taiwan. BMC Public Health 2012; 12: 260.

Clutton R, Schoeffmann G, Chesnil M, Gregson R, Reed F, Lawson H, **Eddleston M**. Reducing the oxygen concentration of gases delivered from anaesthetic machines unadapted for medical air. Vet Rec 2011; 169: 440.

Dear JW, Simpson K, Nicolai MPJ, Catterson JH, Street J, Huizinga T, Craig D, Dhaliwal K, Webb S, **Bateman DN**, Webb DJ. Cyclophilin A is a damage associated molecular pattern molecule that mediates acetaminophen-induced liver injury. J Immunol 2011; 187: 3347–52.

Eddleston M, Adhikari S, Egodage S, Ranganath H, Mohamed F, Manuweera G, Azher S, Jayamanne S, Juszczak E, Sheriff R, Dawson AH, Buckley NA. Effects of a provincial ban of two toxic organophosphorus insecticides on pesticide poisoning hospital admissions. Clin Toxicol 2012; 50: 202–9.

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Eddleston M, Street JM, Self I, Thompson A, King T, Williams N, Naredo G, Yu L-M, Dissanayake K, Worek F, John H, Smith S, Thiermann H, Harris JB, Clutton RE. A role for solvents in the toxicity of agricultural organophosphorus pesticides. Toxicology 2012; 294: 94–103.

Ferner RF, **Dear JW, Bateman DN**. Management of paracetamol poisoning. BMJ 2011; 342: d2218.

Gray T, Hoffman RS, **Bateman DN**. Intravenous paracetamol – an international perspective of toxicity. Clin Toxicol 2011; 49: 150–52.

Hill SL, Thomas SHL. Clinical toxicology of newer recreational drugs. Clin Toxicol 2011; 49: 705–19.

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James D, Adams RD, Spears R, Cooper G, Lupton DJ, Thompson JP, Thomas SH, National Poisons Information Service. Clinical characteristics of mephedrone toxicity reported to the UK National Poisons Information Service. Emerg Med J 2011; 28: 686–9.

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Mohamed F, Perera A, Wijayaweera K, Kularatne K, Jayamanne S, **Eddleston M**, Dawson A, Konradsen F, Gunnell DG. The prevalence of previous self-harm amongst self-poisoning patients in Sri Lanka. Social Psychiatr Psychiatric Epidemiol 2011; 46: 517–20.

Morris CM, Ballard CG, Allan L, Rowan E, **Stephens S**, Firbank M, Ford GA, Kenny RA, O'Brien JT, Kalaria RN. NOS3 gene rs1799983 polymorphism and incident dementia in elderly stroke survivors. Neurobiol Aging 2011; 32: 554.e1–6.

Murray DB, **Bateman DN**. Use of intravenous lipids. Not yet in all overdoses with failed resuscitation. BMJ 2011; 342: 840.

* NPIS staff indicated in bold type

Murray DB, Potts S, Haxton C, **Jackson G, Sandilands EA**, Ramsey J, Puchnarewicz M, Holt DW, Johnston A, **Bateman DN, Dear JW**. 'Ivory wave' toxicity in recreational drug users; integration of clinical and poisons information services to manage legal high poisoning. Clin Toxicol 2012; 50: 108–13.

Park BK, Boobis A, Clarke S, Goldring CE, Jones D, Kenna JG, Lambert C, Laverty HG, Naisbitt DJ, Nelson S, Nicoll-Griffith DA, Obach RS, **Routledge P**, Smith DA, Tweedie DJ, Vermeulen N, Williams DP, Wilson ID, Baillie TA. Managing the challenge of chemically reactive metabolites in drug development. Nat Rev Drug Discov 2011; 10: 292–306.

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Plumb J, Craig S, **Eddleston M**, de Beer T. Prolonged refractory hypotension following combined amlodipine and losartan ingestion responsive to metaraminol. Case Rep Med 2011; 283672: Epub May 12.

Routledge PA. An agenda for UK clinical pharmacology; developing and delivering clinical pharmacology in the UK national health service. Br J Clin Pharmacol. 2012 Feb 23. doi: 10.1111/j.1365-2125.2012.04230.x. [Epub ahead of print].

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Sandilands EA, Cameron S, Paterson F, Donaldson S, Briody L, Crowe J, Donnelly J, Thompson A, Johnston NR, Mackenzie I, Uren N, Goddard J, Webb DJ, Megson IL, **Bateman DN, Eddleston M**. Mechanisms for an effect of acetylcysteine on renal function after exposure to radio-graphic contrast material: study protocol. BMC Clin Pharmacol 2012, 12: 3.

Sandilands EA, Reid K, Shaw L, **Bateman DN**, Webb DJ, Shaun N, Kluth DC. Impact of a focussed programme on practical prescribing skills among final year medical students. Br J Clin Pharmacol 2011; 71: 29–33.

Starkey Lewis PJ, **Dear J**, Platt V, Simpson KJ, Craig DGN, Antoine DJ, French NS, Dhaun N, Webb DJ, Costello EM, Neoptolemos JP, Mogg J, Goldring CE, Park K. Circulating microRNAs as potential markers of human drug induced liver injury. Hepatology 2011; 54: 1767–76.

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Thanacoody HKR. Serotonin syndrome. Medicine 2011; 35: 556–7.

Thanacoody HKR. Thioridazine: the good and the bad. Recent Pat Antiinfect Drug Discov 2011; 6: 92–8.

Thomas SHL. Is the cause toxicological? Medicine 2012; 40: 46–7.

Thomas SHL. Low toxicity ingestions. Medicine 2012; 40: 53–4.

Thomas SHL. Antihistamine poisoning. Medicine 2012; 40: 109–10.

Vale A. Alcohols and glycols. Medicine 2012; 40: 89–93.

Vale A. Anticonvulsants. Medicine 2012; 40: 96–7.

Vale A. β-blockers. Medicine 2012; 40: 107.

Vale A. β_2 agonists. Medicine 2012; 40: 108.

Vale A. Cyanide. Medicine 2012; 40: 121.

Vale A. Drugs of abuse (amfetamines, BZP, cannabis, cocaine, GHB, LSD). Medicine 2012; 40: 84–7.

Vale A. Hydrogen sulphide. Medicine 2012; 40: 127.

Vale A. Isopropanol. Medicine 2012; 40: 130.

Vale A. Paracetamol (acetaminophen). Medicine 2012; 40: 144–6.

Vale A. Reducing absorption and increasing elimination. Medicine 2012; 40: 67–8.

Vale A. Rhabdomyolysis. Medicine 2012; 40: 61–2.

Vale A. Salicylates. Medicine 2012; 40: 156–7.

Vale A. Substance abuse: routes, hazards and body packing. Medicine 2012; 40: 74–6.

Vale A. Sulphur dioxide. Medicine 2012; 40: 158.

Vale A, Bateman DN. Poisoning: introduction. Medicine 2012; 40: 41.

Vale A, Bradberry S. Assessment and diagnosis of the poisoned patient. Medicine 2012; 40: 48–52.

Vale A, Bradberry S. Management of poisoning: initial management and need for admission. Medicine 2012; 40: 65–6.

Vale A, Bradberry S. Warfarin and anticoagulant rodenticides. Medicine 2012; 40: 164.

Vale A, Marrs TC, Rice P. Chemical terrorism and nerve agents. Medicine 2012; 40: 77–9.

Veiraiah A, Dyas J, Cooper G, Routledge PA, Thompson JP. Flumazenil use in benzodiazepine overdose in the UK: a retrospective survey of NPIS data. Emerg Med J 2011; Epub ahead of print July 23.

Book Chapters

Mason E, **Routledge PA**. Nausea and vomiting. In: Clinical Pharmacy and Therapeutics (Walker R and Whittlesea C, eds), 5th edition. Churchill Livingstone, 2011: 535–44.

Routledge PA, Shetty HGM. Thrombosis. In: Clinical Pharmacy and Therapeutics (Walker R and Whittlesea C, eds), 5th edition. Churchill Livingstone, 2011: 376–88.

Thanacoody HKR. Drug Interactions. In: Clinical Pharmacy and Therapeutics (Walker R and Whittlesea C, eds), 5th edition. Churchill Livingstone, 2011: 50–61.

Vale A, Bradberry S. Poisoning. In: Kumar and Clark's Medical Management and Therapeutics (Kumar P and Clark M, eds). Edinburgh: Saunders Ltd, 2011: 661–96.

Vale A, Bradberry S, Proudfoot A. Clinical toxicology of insecticides. In: Mammalian Toxicology of Insecticides (Marrs TC, ed). Cambridge: RSC Publishing, 2012: 312–47.

Published Congress Abstracts

Dear JW, Lewis PS, Platt V, Simpson KJ, Craig DG, Laverty H, Moggs J, Goldring C, Park K. Circulating microRNA as a new marker of acetaminophen poisoning in humans. Clin Toxicol 2011; 49: 517.

Fathalla SM, Gray J, **Thomas SH**. Comparative clinical toxicity of individual antipsychotic drugs after overdose. Clin Toxicol 2011; 49: 565.

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Stephens S, Adams S, **Richardson JL, Yates L, Thomas SHL**. Outcome of pregnancy after first trimester exposure to venlafaxine. Birth Defect Res Part A: Clin Mol Teratol 2011; 91: 414.

Thomas E, Dyas J, Krishna CV, Thompson JP. Weever fish envenomation – analysis of enquiries to the UK national poisons information service (NPIS) from 2004–2011. Clin Toxicol 2011; 49: 575.

Other

Routledge PA. Murder, mystery, medicine and their practitioners. Pharmacol Matters 2011; 4: 22–4.

Thanacoody HKR. Opiate overdose. Monograph for BMJ Best Evidence/Point of Care (October 2011).

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September 2012
ISBN 978-0-85951-727-0