Public Health England

NPIS
National Poisons Information Service

National Poisons Information Service
Report 2016/17

The National Poisons Information Service is commissioned by Public Health England on behalf of the UK health departments

National Poisons Information Service

The main role of the National Poisons Information Service (NPIS) is to advise NHS healthcare professionals on the diagnosis, treatment and care of poisoned patients across the UK. Poisoning is an extremely common cause of hospital admissions in the NHS, being similar in number to admissions for myocardial infarction. NPIS advice ensures that healthcare staff have access to up to date information about treating poisoned patients and that patients without significant poisoning are not treated in hospital, thus reducing unnecessary use of NHS resources. The major workload of the NPIS is to advise hospital emergency departments, but minor injuries units and primary care services are also significant users of the service – the latter to a large extent involving NHS advice services (NHS 111, NHS 24 and NHS Direct).

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Foreword

The National Poisons Information Service (NPIS) is commissioned by Public Health England (PHE) on behalf of the English Department of Health, the Scottish Assembly Government, the Welsh Assembly Government and the Northern Ireland Department of Health. NPIS also provides services to the Republic of Ireland and these are commissioned by Beaumont Hospital, Dublin, on behalf of the Irish Government. The services are provided by four NHS hospitals located in Edinburgh, Birmingham, Cardiff and Newcastle that work together to deliver a fully-integrated service. This annual report is written as a statement of our activity, accountability and governance over the last year.

Every day hundreds of people present to NHS services following exposure to a drug or chemical. Circumstances include accidental exposures, drug dosing errors, drug misuse, drug overdose or environmental or occupational exposures. Due to the very large numbers of substances that may be involved, it is essential that healthcare professionals have access to accurate and evidence-based information enabling them to assess and manage each case appropriately. To meet this need, the NPIS provides information and management advice on a 24-hour basis. This is available from our internet database TOXBASE, which provides evidence-based information on thousands of drugs and chemicals, and if further advice is needed, this can be obtained by telephone 24-hours per day from a trained specialist in poisons information or, when necessary, a consultant clinical toxicologist.

PHE also commission the UK Teratology Information Service (UKTIS) who provide specialist advice to healthcare professionals on the effects of exposure to drugs and chemicals during pregnancy. This information is delivered via TOXBASE and the UKTIS specialist telephone advice service. Summary advice and patient information is also freely available via www.UKTIS.org and www.medicinesinpregnancy.org (commonly known as ***bumps*** - best use of medicine in pregnancy).

The NPIS strives to ensure that information on TOXBASE is accurate, up to date and evidence-based. We aim to improve the quality of care for patients admitted to hospital. For many others, the NPIS is able to provide reassurance that the exposure is unlikely to cause adverse health effects, avoiding the need for hospital referral or admission for tens of thousands of patients every year and reducing the workloads of general practitioners and emergency departments in particular. A study performed recently, described in this year's annual report, has demonstrated that the cost savings from preventing unnecessary emergency department referrals alone are greater than the overall costs of commissioning NPIS.

The NPIS continues to receive outstanding responses to user satisfaction surveys, an achievement that all our staff can be proud of. The challenge will be to maintain the quality of our services in the face of the constrained resources we can anticipate in the future.

Simon Thomas
Chair, NPIS Clinical Standards Group

Raquel Duarte-Davidson
Centre for Radiation, Chemical and Environmental Hazards, Public Health England

Executive summary

Background

The National Poisons Information Service (NPIS) is commissioned to provide information and advice to NHS healthcare professionals from across the UK to support the management of patients with suspected poisoning. This is a common presentation, with over 160,000 people attending hospitals in the UK each year. Many more are managed in primary care, which includes NHS advice services such as NHS 111, NHS 24 and NHS Direct.

The NPIS provides this information via TOXBASE, an online database, which is also available as an app for iOS and Android mobile devices, and its 24-hour telephone advice service, staffed by information scientists and supported by a rota of consultant clinical toxicologists. The availability of this expertise avoids unnecessary hospital referrals and admissions for patients at low risk of harm, while improving the quality of treatment and shortening hospital stay for those with clinical toxicity.

The NPIS is affliated with the UK Teratology Information Service (UKTIS), the national source of information and advice about exposures to drugs and chemicals during pregnancy.

Activity

In the UK, there were 602,012 TOXBASE user sessions and 1.69 million page loads of TOXBASE entries during 2016/17. The most frequent users were hospital departments (59%) and NHS 111, NHS 24 and NHS Direct staff (17%).

The TOXBASE app was relaunched in September 2015 offering free access to NHS users and direct access to information on antidotes. Since then registrations have significantly increased with a rise from 23,217 accesses in 2015/16 to 80,929 in 2016/17.

While use of TOXBASE online and the TOXBASE app has increased, demand on the national telephone enquiry line has fallen, with 43,611 telephone enquiries received during 2016/17. The most frequent users of this service are NHS telephone advice services and primary care professionals. Approximately 5% of telephone enquiries were referred to an NPIS consultant, an increase of 1.8% on the previous year.

During 2016/17 the UK Teratology Information Service (UKTIS) recorded a 40% increase in accesses to summary leaflets on its open access website (300,412 page

accesses) compared to 2015/16. In addition, patient information pages on the new UKTIS public-facing website ***bumps*** were accessed by the public on over 1,445,045 occasions in its third year of operation (a 20% increase on 2015/16). These increases were accompanied by a 10% reduction in telephone enquires (1,876 calls) to the UKTIS national enquiry line, while accesses to detailed pregnancy information on TOXBASE also decreased by 5% to 43,584 page loads.

The NPIS follows strict clinical governance processes and, as part of this, it is essential that TOXBASE entries are continually reviewed and edited and where appropriate, new TOXBASE entries are generated. A robust editing process ensures that the advice on TOXBASE remains evidenced-based and reflects current best practice. During 2016/17 4,599 TOXBASE entries were created or updated.

As part of this process, it is essential that the NPIS have access to information about the content and toxicity of consumer products, especially in view of impending EU chemicals legislation; this is provided by the NPIS Product Data Centre. In 2016/17, some 28,000 Safety Datasheets (SDS) were added to the NPIS Product Data Centre which now holds more than 200,000 of these.

Quality

Quality assurance exercises, conducted by questionnaire, continue to demonstrate very high user satisfaction with the services provided by the NPIS. The proportion of respondents scoring services as five or six out of six (very good or excellent) was 93% for TOXBASE online, 97% for the telephone poisons information service and 97% for the UKTIS telephone service.

Surveillance

The development of a fully integrated service, with clinical information collected by the four NPIS units held on a common database, allows the NPIS to provide UK-wide information on referrals to the service. This information is of great value for public health surveillance of poisoning. Examples of work carried out during 2016/17 are summarised within this report. This year topics selected for review include drugs of misuse, carbon monoxide, iron, pesticides and various household products. Further details about these can be found in section six of this report.

1. Introduction

The National Poisons Information Service (NPIS) is a network of dedicated units linked to clinical treatment facilities within UK teaching hospitals that is commissioned by Public Health England (PHE) on behalf of the UK health departments. The NPIS has provided information to healthcare professionals in the UK by telephone since 1963. The poisons information database TOXBASE® * (www.toxbase.org) was developed in 1982 and in 1999 it was transferred online and adopted as the first-line information source for healthcare professionals in the UK. While the structure of the NPIS has changed over the years, its focus has always been to assist colleagues throughout the NHS to manage poisoned patients. The information and advice on TOXBASE is updated regularly and based on published literature, experience from NPIS telephone enquiry data, and direct clinical experience of treating poisoned patients in NPIS-linked clinical departments.

In 1995, the UK Teratology Information Service (UKTIS), formerly termed the National Teratology Information Service (NTIS), moved to Newcastle to become affliated with the NPIS. This report demonstrates the importance of UKTIS both for supporting women of child-bearing age and their healthcare providers by provision of information and advice, and also for collecting new information on the potential effects of exposure to drugs and chemicals during pregnancy, including the therapeutic use of medicines.

Poisoning is an important public health issue in the UK, accounting for around 160,000 NHS emergency department (ED) presentations each year. This is a considerable workload for health service staff. The majority of poisoning in adults is related to self-harm, while unintentional poisoning is common in children.

Many thousands of different agents may 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 self-poison concurrently ingest alcohol which not only complicates identification of the specific poisons involved but also makes clinical assessment and management more challenging.

The vast majority of hospitals in the UK do not have specialist clinical toxicology services, therefore access to high-quality information and clinical advice about poisoning is essential 24-hours a day for the safe and effective management of these patients.

The NPIS supports the appropriate triage, referral, assessment and treatment of poisoned patients across the NHS. Hospital ED data, illustrated by NHS hospital episode statistics, may not provide an accurate reflection due to challenges around

accurate hospital coding. Furthermore, these data do not reflect the significant number of enquiries regarding poisoning received by primary care and NHS telephone advice services (NHS 111 in England, NHS 24 in Scotland and NHS Direct in Wales). The NPIS provides advice to EDs, GPs and NHS public access helplines to aid the decision making process as to whether patients require hospital admission, or whether they can be safely managed at home, avoiding an unnecessary admission.

A key component of the services provided by the NPIS is obtaining information from treating clinicians on the effects and outcomes of cases of severe or unusual poisoning. This information assists in providing current and accurate advice and is continually used to refresh and update the information on TOXBASE.

The NPIS is funded primarily through ‘government grant in aid’ from the UK health departments but receives some contract income for providing services in other territories and research income for specific projects. Overall funding for the service has reduced in real terms in recent years. As a consequence, there has been a reduction in the number of staff employed for NPIS work by the four contributing NHS organisations.

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

2. Structure of the NPIS

The NPIS provides a 24-hour, 365 days a year, consultant-supported clinical toxicology advice service to assist healthcare workers in their diagnosis and management of poisoned patients, including those exposed in chemical incidents.

The four NPIS units are currently based within NHS teaching hospitals (two in England and one each in Scotland and Wales). Three of the units (Birmingham, Cardiff and Newcastle) respond to telephone enquiries 24-hours a day based upon a national rota; the Edinburgh unit takes telephone enquiries during the working day while focusing on editing and production of the TOXBASE database.

The four units also take telephone calls about chemical incidents and forward this information to the Centre for Radiation, Chemical and Environmental Hazards (CRCE) of Public Health England (PHE).

Reductions in funding in real terms have resulted in fewer information scientists being employed for NPIS work. This is creating pressure on rotas and reducing the capacity of the service for other work, including the maintenance of the TOXBASE database.

The service has 24-hour consultant clinical toxicologist support available to advise on the management of more seriously unwell patients. This is provided by NHS consultant staff in all four NPIS units and in addition colleagues from two other NHS Trusts (Guy's and St Thomas' NHS Foundation Trust and York Hospitals NHS Foundation Trust). These NPIS consultant clinical staff also provide specialist services in clinical toxicology in their own hospitals. The availability of this expertise is important for UK resilience. Because the NPIS receives many enquiries about children and from emergency departments, PHE has commissioned support from consultants in paediatrics and emergency medicine.

The primary source of information provided by the NPIS is through its online database, TOXBASE (www.toxbase.org), which is available without charge to all UK NHS healthcare units who register for it, including hospital departments, primary care practices and NHS advice services – NHS 111, NHS 24 and NHS Direct. Ensuring that the information and management advice provided by TOXBASE is evidence-based and up to date is of paramount importance for patient safety and for maintaining the confidence of healthcare professionals in the resource.

It is essential that the great majority of enquiries are made via TOXBASE as the NPIS does not have the capacity to absorb the substantial increase in telephone enquiries that would result from TOXBASE information becoming unavailable or outdated.

The TOXBASE app for iOS and Android mobile devices is also available without charge to UK NHS healthcare professionals. It provides the same information as TOXBASE but has the advantages of being available on personal mobile devices and being available offline.

TOXBASE is written to provide the majority of information required for the safe management of poisoned patients. However, it cannot provide all the answers for individual patients or complex cases and healthcare workers are encouraged to discuss more complex cases with the NPIS.

To this end, the NPIS provides a 24-hour telephone information service for healthcare professionals using a single national telephone number (0344 892 0111) for when such further advice or information is needed (see Box 2.1). NPIS activity is reflected in TOXBASE user sessions, TOXBASE page loads, TOXBASE app accesses and telephone enquiries.

When first received (Figure 2.1), telephone enquiries are managed by specialists in poisons information (SPIs). SPIs may have a scientific, nursing or pharmacy background, are qualified to at least degree level and usually also hold postgraduate qualifications in toxicology. In deciding the severity of each case, the SPIs use the WHO/IPCS/EC/EAPCCT poisoning severity score (PSS)[11] to determine the severity of each case, with a PSS score of one being minor, two moderate, and three severe. Enquiries about complex or severe cases are referred on to NPIS consultant staff on a 24-hour basis.

Audio recordings of all NPIS telephone enquiries are retained for governance purposes and clinical data are logged within a specially designed national database, the UK Poisons Information Database (UKPID). Data are uploaded to a central server, allowing access by other NPIS units that may be involved in managing a particular patient. This also allows easy collation of activity data and surveillance of the patterns of enquiries received.

This clinical information can help the treatment of subsequent similar cases. Data from UKPID can be used for studying the epidemiology of poisoning as reported to the NPIS and its value is currently being assessed by the Medicines and Healthcare Products to establish its value for monitoring the safety in overdose of licensed pharmaceuticals.

In Northern Ireland, the Regional Medicines and Poison Information Service in Belfast provides a poisons information service during working hours, but out-of-hours enquiries from healthcare professionals are referred to the NPIS. The NPIS is also contracted to

[1] Persson HE, Sjöberg GK, Haines JA, Pronczuk de Garbino J. Poisoning severity score. Grading of acute poisoning. Clin Toxicol 1998; 36: 205-13.

provide poisons information for users in the Republic of Ireland through the provision of TOXBASE to major hospital emergency departments and to the National Poisons Information Centre in Dublin. NPIS also provides direct out-of-hours telephone support.

Box 2.1 BT Cloud telephone system

Since June 2012, enquiries to the NPIS have been delivered by the BT Cloud telephone system, ensuring that enquiries are routed to appropriately skilled NPIS staff members who are logged into the system, irrespective of location.

The BT Cloud system has been designed to accommodate all services provided by the NPIS (i.e. poisons, teratology and chemical) and has improved functionality with increased resilience and more efficient cooperative working between the UK NPIS units. Enquiries can be transferred, conference calls established and real-time reporting facilities made available. NPIS specialists in poisons information and consultants can also log in remotely, allowing rapid upscaling of telephone staffing if this is needed.

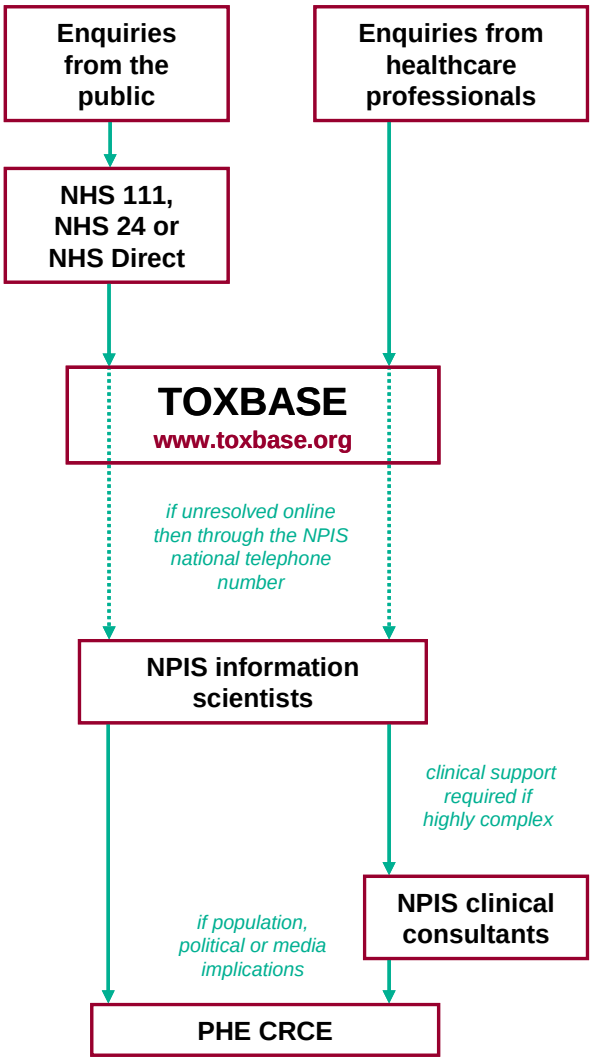

Figure 2.1 How poisons enquiries are answered

Box 2.2 TOXBASE editing

TOXBASE is produced and maintained by the NPIS within an audit framework of user feedback and clinical governance. TOXBASE has seen continued growth in usage since its internet launch in 1999 and deals with over 90% of all enquiries to the NPIS from the UK (the total for 2016/17 being in excess of 600,000). Since 1999, UK health policy has been that TOXBASE should be the first (and often only) point of information for poisons enquiries.

It is therefore essential that the information it contains is kept as up to date and as relevant as possible. This creates a very substantial ongoing workload that is shared by all the NPIS units and lead by Edinburgh. Revising TOXBASE entries is a complex process involving a comprehensive literature search together with information from case-based experience to develop clinical advice through a robust, defendable editing process, which has explicit clinical governance processes.

All TOXBASE entries are peer reviewed before publication and key updates, e.g. for highly toxic agents, standardised recommendations or commonly accessed agents, are agreed at a national level before being published. The NPIS TOXBASE Editing Group includes representatives of clinical and information staff from all four NPIS units, representatives from related poisons centres and a public health physician or scientist from the PHE Centre for Radiation, Chemical and Environmental Hazards. It meets four times a year by web/teleconference to agree policy for TOXBASE development, discuss the format of TOXBASE monographs and agree and prioritise work programmes.

Areas of clinical controversy or uncertainty are discussed at the TOXBASE Editing Group and/or by the NPIS Directors at the quarterly NPIS Clinical Standards Group meetings, as appropriate.

The NPIS aims to review each of the approximately 17,000 entries on TOXBASE at least every four years, requiring the review of over 4,000 entries in a typical year. During 2016/17, 4,599 entries were added or edited.

An important component in the review process of TOXBASE entries is user feedback from TOXBASE quality assurance forms (see Section 5.2), questionnaires on TOXBASE for new and unusual products, responses to follow up on cases of interest, or informal feedback by email, letter or telephone. Users may also raise queries on existing entries or provide additional clinical data. Any issues specific to entries are dealt with as they arise or discussed at the TOXBASE Editing Group and/or NPIS Clinical Standards Group meetings.

Information on the potential toxicity of drugs and chemicals in pregnancy is provided by UKTIS. Information is provided for healthcare professionals by telephone, TOXBASE and the UKTIS website (www.UKTIS.org), while public advice leaflets are held on the ***bumps*** website (www.medicinesinpregnancy.org).

The NPIS maintains a consistent approach, irrespective of the NPIS unit answering an enquiry, through a formal UK-wide strategic framework for training and governance, agreeing clinical advice and supporting the management of the service. Operating procedures are updated regularly and made available to NPIS staff on TOXBASE.

Commissioning issues are dealt with by the PHE NPIS Commissioning Group, which meets quarterly. Clinical issues, including clinical governance, are discussed by the NPIS Clinical Standards Group, which also meets quarterly. These meetings are attended by a representative of the commissioner, a senior clinician from each of the four units and senior specialists in poisons information from the service. Invitations are also sent to representatives of the National Poisons Information Centre in Dublin. Other senior NPIS staff are invited to attend as observers on a rotational basis.

To ensure 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. These educational meetings provide an opportunity for clinicians and scientists to present updates on current topics, research and audit projects, and to discuss complex clinical cases and governance issues. These two-day events occur twice a year and are hosted by all the NPIS units in turn.

There are regular teleconferences of the TOXBASE Editing Group to ensure consistent and nationally agreed database content (see Box 2.2). The National Poisons Information Centre in Dublin and the Northern Ireland Regional Medicines and Poison Information Service also contribute to TOXBASE development and review. The UKPID User Group meets regularly to discuss issues relating to this IT platform.

Cost benefit of NPIS

Commissioning the NPIS uses significant resource and so it is important to assess whether these costs can be justified through benefits provided by the service, such as avoidance of unnecessary hospital referrals and admissions, reduced lengths of stay, and improvements in the quality of treatment for those patients admitted.

During 2016/17, a service evaluation was performed to establish the numbers of enquiries from primary care where admission had been avoided through contact with the NPIS. The aim of this study was to evaluate the financial savings associated with avoided unnecessary hospital referrals.

Two surveys were performed to collect information from healthcare professionals using the NPIS by contacting the national telephone enquiry line or by accessing TOXBASE. For each platform, enquirers were asked to record their preferred referral pathway (emergency department, GP, pharmacy or home care) before accessing NPIS information and again after this information was provided. Results of this evaluation have recently been published in abstract form.[2]

Provision of telephone advice for more than 2,000 referrals from primary care resulted in an 18% reduction in referrals to emergency departments. There were also significant reductions in referrals to GPs (-15%) and pharmacies (-3%). Extrapolating across a full year, this equated to almost 6,000 avoided ED visits and a financial saving of approximately £1 million on the basis of minimum NHS reference costs alone. For the TOXBASE survey, data collected from 851 respondents suggested that accessing this information source reduced emergency department referrals by 8%, although reductions in GP and pharmacy referrals were not statistically significant. Extrapolated across a whole year, these data suggest that by primary care users accessing TOXBASE, approximately 25,000 emergency department referrals can be avoided annually, with a saving in terms of basic NHS reference costs of approximately £3.9 million.

These results demonstrate impressive cost savings from our work with primary care users, but they need to be interpreted with caution. Not all enquirers completed the survey and the response rate for the TOXBASE survey in particular, although typical for internet surveys of this type, was low (2.7%) and this could introduce some bias. Nevertheless, these results demonstrate the value of NPIS services in reducing the burden on hard pressed emergency departments, GPs and pharmacies by avoiding unnecessary referrals. The overall financial savings accruing from these primary care enquiries alone exceed the overall NPIS budget and do not take into account other cost savings from avoided transport and ambulance costs, better outcomes from improvements in quality of care, shorter hospital inpatient stays, avoidance of referral to other health services and avoidance of productivity loss related to unnecessary health care for patients and carers.

[2] Elamin MEMO, James DA, Holmes P, Jackson G, Thompson JP, Sandilands EA, et al. Reductions in emergency department referrals from primary care after use of the UK National Poisons Information Service. Clin Toxicol 2017; 55: 481-2.

3. NPIS activities in 2016/17

3.1 Overall service profile

The total 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) increased in 2016/17 to 662,105 (compared to 660,940 in 2015/16), see Figure 3.1.1. There was also a significant rise in the use of the TOXBASE app, from 23,217 to 80,929 accesses in 2016/17 (see section 3.2 for further detail).

As provision of TOXBASE advice has increased online and via the app, demand on the national telephone enquiry line has declined. The NPIS received 43,611 patient-related telephone enquiries via the national helpline number (0344 892 0111) in 2016/17, of which 1,964 (4.5%) were referred to a consultant toxicologist. As anticipated, a proportion of enquiries will always require telephone access to the service as not all enquiries can be answered via TOXBASE.

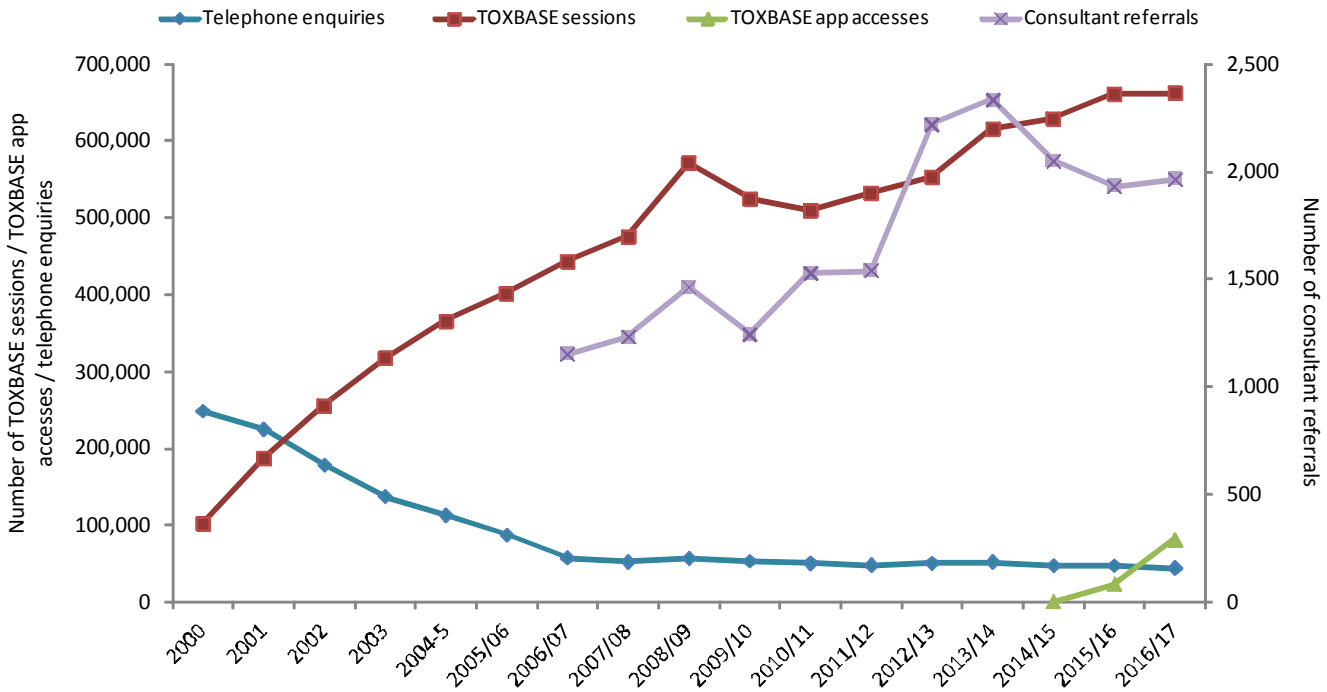

Figure 3.1.1 Annual number of TOXBASE user sessions, App accesses, telephone enquiries and consultant referrals from 2000 to 2016/17

TOXBASE is not only used to guide clinical care but is also used as an educational tool, both within the UK and internationally. For the purposes of further detailed analysis in this report, educational and international users have been excluded. User sessions from all NPIS units, the Northern Ireland Regional Medicines and Poison Information Service, and the National Poison Information Centre, Dublin, have also been excluded as poison

centres access TOXBASE to answer telephone enquiries, for training/educational purposes, and to access operating procedures or for monograph-writing purposes (NPIS units only). Therefore a total of 602,012 user sessions originating in England, Northern Ireland, Scotland and Wales have been analysed further in this report.

TOXBASE user sessions per head of population have increased by 22.8% over the last 6 years, with the largest increases in England and Northern Ireland (Table 3.1.1).

Table 3.1.1 Country of origin of TOXBASE user sessions together with rate of enquiry per 100,000 population in 2010/11 and 2016/17

	2010/11		2016/17	
Country	**Number**	**Rate per 100,000 population***	**Number**	**Rate per 100,000 population****
England	376,657	721.1	503,966	911.9
Northern Ireland	10,620	590.2	13,468	723.3
Scotland	49,807	953.8	53,661	992.9
Wales	28,027	932.2	30,917	917.0
UK	**465,111**	**747.0**	**602,012**	**917.0**

* Based on mid 2010 population estimates viewed June 2011 (UK total = 62,261,300) www.statistics.gov.uk/statbase/Product.asp?vlnk=15106

** Based on mid 2016 population estimates viewed June 2017 (UK total = 65,648,100) https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/bulletins/annualmidyearpopulationestimates/mid2016

User groups for NPIS are shown in Figure 3.1.2, with hospitals, telephone triage services such as NHS 111, paramedics other primary care services being prominent. As in previous years, hospital departments were responsible for the majority (58.9%) of TOXBASE sessions in 2016/17, with most of these originating from emergency departments (354,678; 54.8%). Telephone triage services, hospitals and primary care users were most common users of the telephone advice service.

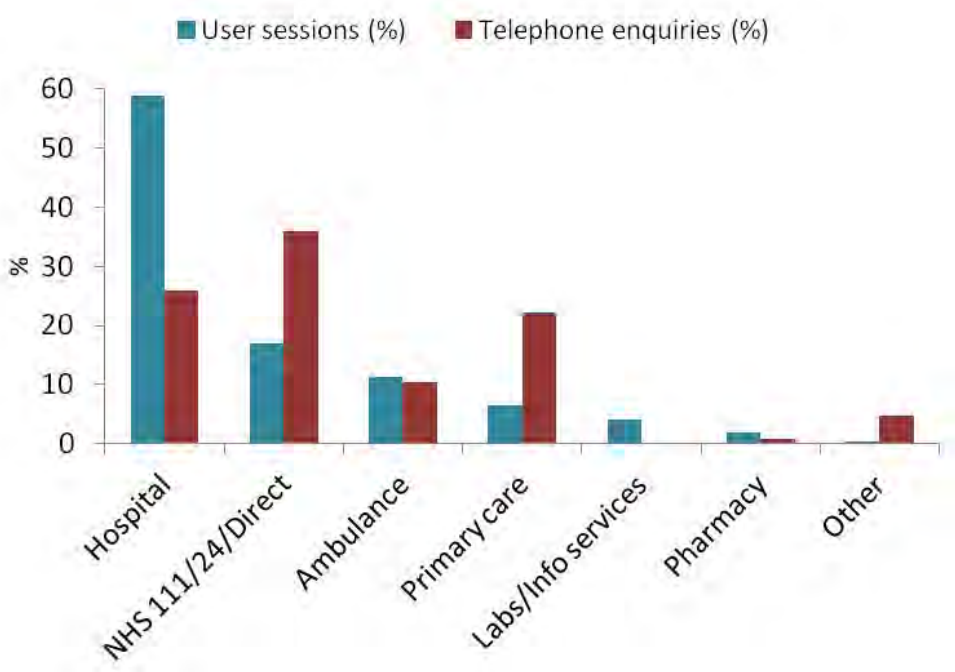

Figure 3.1.2 TOXBASE user sessions and telephone enquiries received in 2016/17 (as % of total number of user sessions and telephone enquiries respectively)

As in previous years the majority of telephone enquiries received in 2016/17 related to accidental (53.5%) ingestions (86.7%), most often involving pharmaceuticals (62.0%), with the location of poisoning being at home (86.5%). Intentional overdose (9,009; 21%) and therapeutic errors (8224; 19%) were also common. The age group most commonly involved in telephone enquiries was children aged four years or under (30%; 12,963).

Applying the same criteria as for TOXBASE session data, there were 1,651,369 individual page loads in 2016/17, which is a 2.1% reduction from 1,686,409 in 2015/16. Of note is that the top 10 page loads for hospital and ambulance users are all pharmaceuticals and paracetamol remains the most accessed TOXBASE entry across all user categories (Table 3.1.2). As would be expected, the top 10 enquiries from telephone triage services and primary care accesses included agents found in household products.

Table 3.1.2 TOXBASE page accesses by ingredients and by category of user in 2016/17

	Hospital		Ambulance	
Rank	Agent	No.	Agent	No.
1	Paracetamol	99,584	Paracetamol	19,239
2	Ibuprofen	27,675	Ibuprofen	7,704
3	Sertraline	25,524	Codeine phosphate	6,069
4	Diazepam	23,913	Sertraline	2,748
5	Codeine phosphate	23,322	Sodium hypochlorite	2,449
6	Quetiapine	18,841	Diazepam	2,035
7	Mirtazapine	18,600	Tramadol hydrochloride	1,987
8	Citalopram hydrobromide	17,561	Aspirin (acetylsalicylic acid)	1,849
9	Zopiclone	16,079	Citalopram hydrobromide	1,837
10	Amitriptyline	15,324	Mirtazapine	1,698

	NHS 111/24/Direct		Primary care	
Rank	Agent	No.	Agent	No.
1	Paracetamol	28,415	Paracetamol	6,844
2	Ibuprofen	14,228	Ibuprofen	2,824
3	Codeine phosphate	7,735	Codeine phosphate	1,782
4	Sodium hypochlorite	4,028	Sodium hypochlorite	867
5	Nonionic surfactants	3,462	Nonionic surfactants	706
6	Anionic surfactants	3,110	Sertraline	637
7	Aspirin (acetylsalicylic acid)	2,711	Anionic surfactants	624
8	Unknown substance	2,279	Aspirin (acetylsalicylic acid)	586
9	Sertraline	2,141	Caffeine	515
10	Caffeine	2,116	Citalopram hydrobromide	496

3.2 TOXBASE app for iOS and Android mobile devices

The NPIS identified a need to deliver information directly to individual healthcare professionals and the TOXBASE app was developed in response to advancing technology and user feedback. It offers convenient mobile access for users at the point of care. The app is synchronised with online TOXBASE content and for the first time provides offline access when no internet connection is available, making it an invaluable resource for emergency responders.

The app was first made available in October 2012 for iPhone and iPad and for Android devices in May 2013. In late 2015 a new version of the app was launched, providing NHS and PHE users with full and free access when they validate their accounts using their NHS/PHE email addresses. For non-NHS subscribers, a ‘paid’ version of the app is available which contains key TOXBASE entries considered by the NPIS to be most useful to those seeking poisons information from around the world. Funds from the small fee charged contribute towards development and hosting costs.

The number of subscribers changes on a daily basis as accounts are created, lapse and are renewed, but on 31 March 2017 there were 7,487 current subscribers (7,262 NHS/PHE [97%] and 225 non-NHS/PHE) (Figure 3.2.1). Included within this total are the NPIS physicians and specialists in poisons information who have access to support their NPIS duties and to increase service resilience in case of local or national failures of internet access. Only 4% of subscribers were located outside the UK. The top workplace and user types are shown in Table 3.2.1; ambulance personnel were the most common.

Between 1 April 2016 and 31 March 2017, subscribers (excluding NPIS users) accessed 80,929 pages including 66,902 product pages, 11,904 information pages and 2,123 antidote pages. Table 3.2.2 shows the top product pages being accessed on the app. Examples of screenshots from the app are shown in Figure 3.2.2. Examples of feedback from TOXBASE app subscribers are provided in Box 3.2.1.

Table 3.2.1 Top workplace and user type of current TOXBASE app subscribers at 31 March 2017

Workplace type	NHS/PHE	Non-NHS	All
Ambulance	3,658 (50%)	56 (25%)	3,714 (50%)
Emergency department	1,092 (15%)	82 (36%)	1,174 (16%)
General practice	498 (7%)	8 (4%)	506 (7%)
Admissions/assessment	488 (7%)	7 (3%)	495 (7%)
ITU/HDU	348 (5%)	6 (3%)	354 (5%)
Pharmacy	299 (4%)	16 (7%)	315 (4%)
Psychiatry	200 (3%)	4 (2%)	204 (3%)
User type	**NHS/PHE**	**Non-NHS**	**All**
Doctor	2,298 (32%)	115 (51%)	2,413 (32%)
Ambulance*	2,228 (31%)	30 (13%)	2,258 (30%)
Allied health professional*	666 (9%)	16 (7%)	682 (9%)
Nurse	524 (7%)	9 (4%)	533 (1%)
Pharmacist	322 (4%)	17 (8%)	339 (5%)

* many of those working within ambulance services select ‘allied health professional’ when registering

Table 3.2.2 Top product pages accessed on the TOXBASE app April 2016 to March 2017

	Product pages	No. accesses		Product pages	No. accesses
1	Paracetamol	5,530	6	Citalopram	987
2	Amitriptyline	1,663	7	Quetiapine	906
3	Sertraline	1,189	8	Mirtazapine	902
4	Ibuprofen	1,166	9	Tramadol	870
5	Diazepam	1,054	10	Zopiclone	863

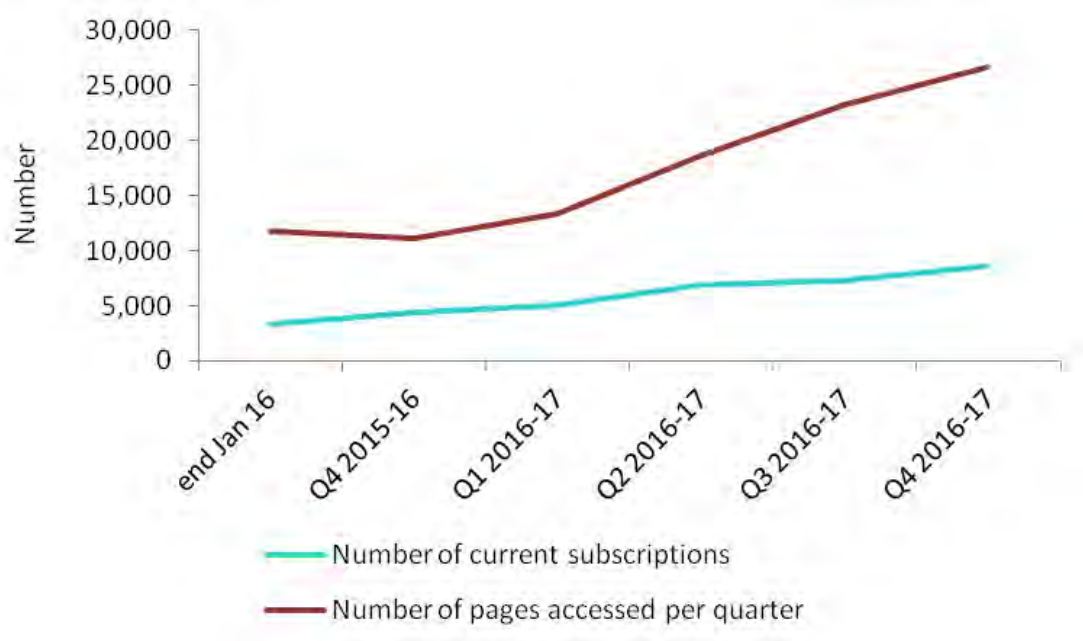

Figure 3.2.1 TOXBASE app subscriptions and pages accessed per quarter January 2016 to March 2017

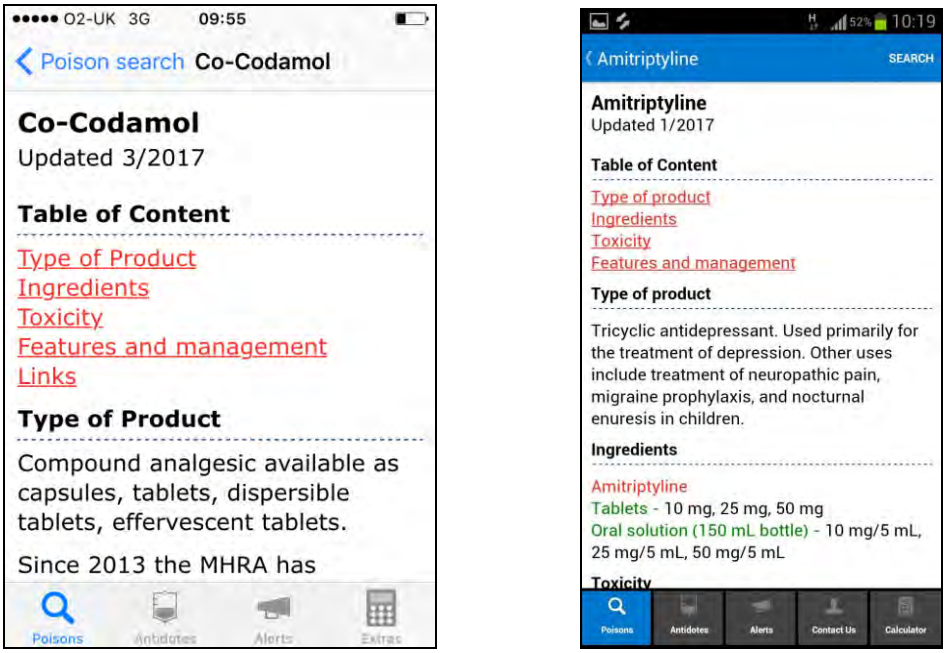

Figure 3.2.2 TOXBASE app screenshots

BOX 3.2.1 Feedback from TOXBASE app subscribers

“This is a phenomenal resource for toxicologists, acute and emergency care physicians or anyone with an interest in toxicology and poisoning.”
TOXBASE app user, UK

“Working in the pre-hospital environment I find this application invaluable.”
TOXBASE online user, UK

“Excellent resource for us paras!”
Paramedic, UK

“It's hard to imagine our everyday work without your database“
Poisons Information Centre Lead, Poland

3.3 Consultant referrals

Background

The NPIS has operated a national consultant clinical toxicology on-call rota for the UK and the Republic of Ireland (out-of-hours) since May 2005. Thirteen consultant clinical toxicologists from the four NPIS units and three consultants from hospitals in York and London contribute to out-of-hours cover (weekdays 18:00-09:00 hours, weekends and public holidays).

All staff on the rota are involved in the care of poisoned patients in their own local NHS hospitals. A nationally agreed protocol is used to determine when specialists in poisons information should refer enquiries to a consultant. The national consultant rota is managed from NPIS Edinburgh.

For daytime cover, units make local arrangements and may be supported by consultants, academic clinical staff and specialist registrars 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 enquiries from Northern Ireland during the working week. Units provide cross-cover in emergencies and occasionally support colleagues in other units during the working week. Details of all telephone calls to the NPIS are stored on the UKPID central server and sent to the relevant consultant for local or national audit and checking. In addition, consultants keep contemporaneous local records of advice given which are added to the records by the NPIS unit that took the original call.

Consultant referrals

There were 1,964 referrals made to NPIS consultants (daytime and out-of-hours) in 2016/17, an increase of 1.8% on 2015/16. Figure 3.3.1 shows the number of referrals by month over the past four years and their distribution by day of the week is shown in Figure 3.3.2. The median number of referrals per day was five (interquartile range, IQR, 3-7), with fewer referrals at the weekend. Referrals by country are shown in Table 3.3.1. The great majority of consultant referrals came from calls originating in hospitals (1,774 or 90.3%: Table 3.3.2), with calls from GPs/primary care being the next most common source (124 or 6.3%). The proportion of consultant referrals following calls from NHS 111, NHS 24 and NHS Direct remained low at 1.2% of referrals.

The enquiries

Table 3.3.3 shows the most common types of agents involved in referrals to consultants. Heading the list are products containing paracetamol, drugs of misuse, digoxin and toxic alcohols or glycols (e.g. ethylene glycol, methanol and antifreeze). For 149 referrals, the product taken (if any) was unknown and help with diagnosis was required.

Feedback into NPIS services

Analysis of consultant referrals is used to improve the services offered by the NPIS. Outcomes include additions and changes to TOXBASE entries that reflect user needs. Issues highlighted by difficult or complex calls are discussed further among NPIS staff by email or telephone at regular TOXBASE Editing Group meetings or at the NPIS CPD meetings.

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 and patient care. 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.

Figure 3.3.1 Monthly consultant referrals (given as out-of-hours and workday referrals) from April 2013 to March 2017

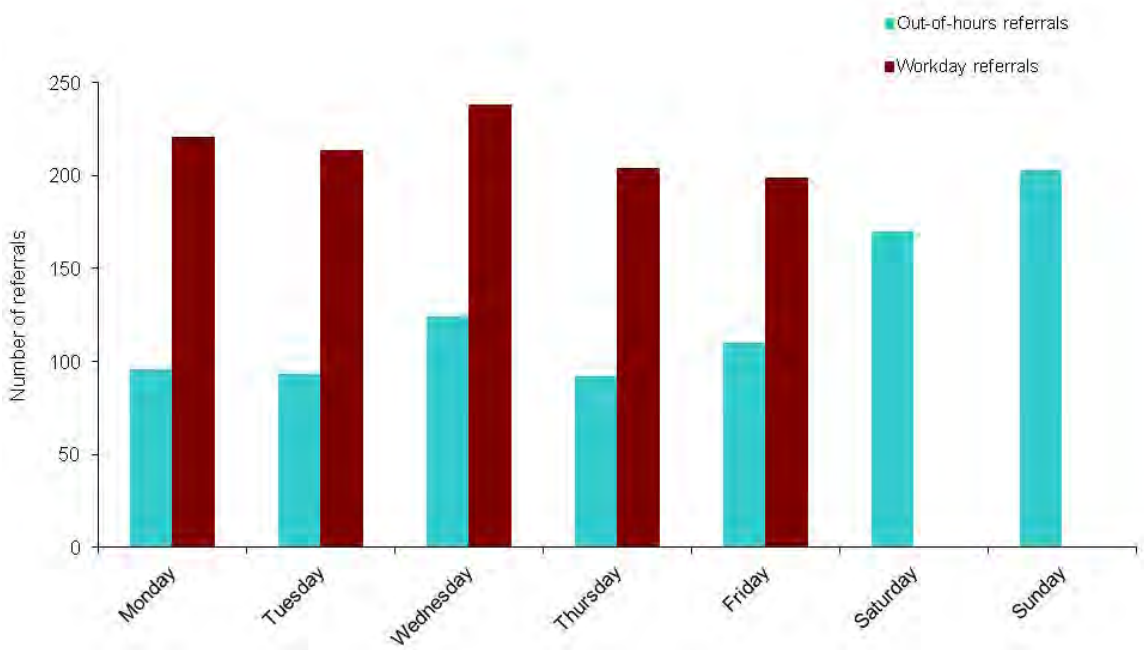

Figure 3.3.2 NPIS consultant referrals by day of the week (given as out-of-hours and workday referrals) in 2016/17

Table 3.3.1 NPIS consultant referrals by country in 2016/17, with 2015/16 percentage values for comparison

	2016/17			
Country	**Number of referrals**	**Rates per 100,000 population***	**% in 2016/17**	**% in 2015/16**
England	1,510	2.7	76.9	78.2
Northern Ireland**	15	0.8	0.8	1.4
Scotland	296	5.5	15.1	11.6
Wales	108	3.5	5.5	7.2
Republic of Ireland**	27	-	1.4	1.4
Other & unknown	8	-	0.4	0.3
Total	**1,964**			

* Based on mid 2016 population estimates viewed June 2017 (UK total = 65,648,100) https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/bulletins/annualmidyearpopulationestimates/mid2016

** overnight cover only

Table 3.3.2 NPIS consultant referrals from hospital by department in 2016/17

Source	**Number of referrals**	**% of total (1,964)**
Emergency departments	777	39.6
Intensive care units	407	20.7
Other hospital units	135	6.9
Paediatrics	176	9.0
General medicine	94	4.8
Unspecified hospital units	76	3.9
Admission/assessment units	62	3.2
Medicines information & pharmacy	16	0.8
Psychiatric units	14	0.7
Surgical	8	0.4
Minor injuries units	9	0.5
Total	**1,774**	

Table 3.3.3 Agents commonly involved in NPIS consultant referrals in 2016/17

Rank	Agent	Number of referrals
1	Paracetamol (including 73 co-codamol)	402
2	Drugs of misuse	223
3	Drug/substance unknown	149
4	Digoxin	81
5	Bites and stings	80
6	Diazepam	78
7	Ethylene glycol, methanol and antifreeze	77
8	Iron compounds	70
9	Ibuprofen	59
10	Plants / mushrooms	55

3.4 NPIS 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. All NPIS staff have 24-hour access to the NPIS Product Data Centre.

NPIS Birmingham has responsibility for the NPIS Product Data Centre and for liaising with manufacturers to ensure that the data held are comprehensive and up to date. In 2016/17, some 28,000 SDS were added to the NPIS Product Data Centre which now holds more than 200,000 SDS. The database is indexed by product name, manufacturer, date of SDS, and the accession date for the SDS to the database. If 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.

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. All NPIS staff have 24-hour access to the NPIS Literature Database, which was created and is maintained by NPIS Birmingham. The database currently contains 122,000 citations on all aspects of clinical, occupational and environmental toxicology. In 2016/17, some 7,000 references were added to the database, which is fully searchable using keywords, authors, journals and text words. Citations are selected using searches specially developed for the purpose and run against Medline, Embase and Science Direct. In addition, the tables of contents of key journals are scanned for suitable papers on publication.

With the assistance of the other NPIS units, NPIS Birmingham also produces Current Awareness in Clinical Toxicology each month. Each issue lists more than 500 citations, with some 15-20 key papers highlighted because of their importance to the clinical management of poisoning and the updating of TOXBASE. Current Awareness is distributed by the international clinical toxicological societies to all poisons units worldwide.

The underlying database, including monthly updates, is provided to all NPIS staff for inclusion in their personal citations manager (Reference Manager™ or End Note™).

3.6 NPIS website

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 health professionals on all aspects of poisoning and links to affiliated organizations and relevant websites. Visitors to the website can also download NPIS publications including annual reports back to 2004.

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

Between April 2016 and March 2017 the site had 40,500 visitors, there were 83,000 page views and 1,700 documents were viewed, the most popular were the NPIS annual reports. Visitors came predominantly from the UK, United States, Australia, Ireland, India and Germany.

4. UKTIS activities in 2016/17

4.1 Overall service profile

UKTIS is the sole dedicated UK provider of evidence-based information on fetal risk following pharmacological and other potentially toxic pregnancy exposures. Established in London in 1983 and subsequently transferred to be part of the NPIS Newcastle unit in 1995, UKTIS aims to support the appropriate use of medicines in pregnancy and to advise on management after in-utero exposure to potentially harmful substances. UKTIS also contributes to teratogen surveillance by undertaking systematic follow up of pregnancies reported to the service so that fetal outcomes can be recorded.

In recent years UKTIS has undergone a number of changes to improve the quality, breadth and accessibility of information produced in the face of increasing funding pressures. Efficiency savings have been achieved through increased use of the internet, streamlined protocols and redistribution of tasks within the service to optimise use of staff strengths and skillsets. As provision of online scientific reviews has increased, pressure on the national telephone enquiry line for healthcare professionals has reduced, thereby enabling staff expertise within UKTIS to be directed to complex enquiry answering, and importantly to the writing and updating of UKTIS scientific reviews and accompanying patient information leaflets. Together these changes have achieved much wider awareness of the services offered by UKTIS, with access figures suggesting a more than 40-fold increase in information delivery since April 2010.

4.2 Information provision

Delivery of the national UKTIS advisory telephone line during weekday core hours was maintained during 2016/17. Call numbers continued to decrease, although to a lesser degree than in previous years, suggesting that initiatives to direct service users to online information in the first instance have been effective and have freed up the phone advisory line for more complex cases. There has also been a reduction in online accesses to the detailed, fully referenced, clinically focused scientific UKTIS monographs available to registered healthcare professionals via TOXBASE, although access numbers remain higher than in 2010/11. In contrast, accesses to review summaries through the open-access UKTIS website (www.uktis.org) have increased year on year since 2012, with a dramatic increase observed in 2016/17. This trend suggests increasing use and awareness of information provided by UKTIS, but a possible reluctance by users to have to register or log-in to access detailed information where a quick overview of risk is all that is required. It is also likely that healthcare professionals such as general practitioners only need information sporadically and are

therefore a fluid user group, and that information is sought in the context of a time pressured consultation (Table 4.2.1).

Taking telephone enquiries and online accesses together, UKTIS information was accessed almost 1.8 million times during 2016/17. Trends in enquiry numbers by year are shown in Table 4.2.1, demonstrating the movement of information provision from telephone enquiries to online information sources.

Table 4.2.1 Telephone enquiries, full monograph (toxbase.org), monograph summary (uktis.org) and *bumps* leaflets page loads (medicinesinpregnancy.org) showing the evolution of UKTIS information provision and user access over the past 7 years as absolute figures and as the percentage of enquiries for each year

	Telephone enquiries		TOXBASE (registered user access)		UKTIS (open access, launched 2012)		*bumps* (open access, launched 2014)		
Year	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**Total**
2010/11	3,722	9.0	37,591	91.0					41,313
2011/12	3,260	5.4	46,061	76.7	10,697	17.8			60,018
2012/13	2,888	2.0	58,067	40.6	81,952	57.4			142,907
2013/14	2,866	1.5	64,876	34.2	121,780	64.3			189,522
2014/15	2,529	0.6	56,799	13.0	160,351	36.4	221,053	50.2	440,732
2015/16	2,098	0.15	45,635	3.2	173,851	12.3	1,193,811	84.4	1,415,395
2016/17	1,876	0.10	43,584	2.4	300,412	16.8	1,445,045	80.7	1,790,917

The introduction of scientifically credible and openly accessible patient-focussed information has proven extremely popular and an expanding library is held on our public facing website, ***bumps*** – best use of medicines in pregnancy (www.medicinesinpregnancy.org), which was launched in April 2014. During 2016/17 one or more patient information pages was added or updated every week and the 136 information pages on ***bumps*** attracted almost 1.5 million page views. ***bumps*** website daily views and information page accesses have risen steadily since launch, increasing from 4,040 in March 2016 to 5,245 in March 2017. Spontaneous feedback suggests that users of the ***bumps*** website include both pregnant women and healthcare professionals, with both groups valuing the unrestricted access to this information.

Several key national organisations and guidelines now preferentially refer readers to UKTIS for advice on medicines use in pregnancy or included links to UKTIS.org and/or ***bumps*** (medicinesinpregnancy.org) as a recommended source of information (Box 4.2.1).

Figure 4.2.1 Organisations and guidelines which refer to UKTIS and *bumps*
Cochrane Reviews
NHS choices
NICE Clinical Knowledge Summaries
NICE Guidelines
Royal College of General Practitioners
Royal College of Obstetrics and Gynaecology

4.3 Surveillance and research

The analysis and publication of surveillance data collected by UKTIS remains an essential function of the service. In the past five years UKTIS staff have co-authored eight collaborative international teratology service studies that included prospective pregnancy outcome data collected by UKTIS.[3,4,5,6,7,8,9,10] Of these, two were completed during 2016/17 with one study, led by UKTIS, finding no increased risk of fetal malformation amongst offspring exposed to the smoking cessation medication varenicline early in the first trimester.[10] The second study identified a signal for pregabalin as a possible teratogen.[7]

Other collaborations involving UKTIS data and/or staff, included an NIHR HTA funded systematic review of treatments for hyperemesis gravidarum[11,12] and an Epilepsy Research UK funded analysis assessing use of the UK Clinical Practice Research

[3] Hoeltzenbein M, Elefant E, Vial T, Finkel-Pekarsky V, Stephens S, Clementi M, et al. Teratogenicity of mycophenolate confirmed in a prospective study of the European Network of Teratology Information Services. Am J Med Genet A 2012;158A: 588-96.
[4] Einarson A, Smart K, Vial T, Diav-Citrin O, Yates L, Stephens S, et al. Rates of major malformations in infants following exposure to duloxetine during pregnancy: a preliminary report. J Clin Psychiatr 2012; 73: 1471.
[5] Winterfeld U, Allignol A, Panchaud A, Rothuizen LE, Merlob P, Cuppers-Maarschalkerweerd B, et al. Pregnancy outcome following maternal exposure to statins: a multicentre prospective study. BJOG 2013; 120: 463-71.
[6] Winterfeld U, Klinger G, Panchaud A, Stephens S, Arnon J, Malm H, et al. Pregnancy outcome following maternal exposure to mirtazapine: a multicenter, prospective study. J Clin Psychopharmacol 2015; 35: 250-9.
[7] Winterfeld U, Merlob P, Baud D, Rousson V, Panchaud A, Rothuizen LE, et al. Pregnancy outcome following maternal exposure to pregabalin may call for concern. Neurology 2016; 86: 2251-7.
[8] Weber-Schoendorfer C, Oppermann M, Wacker E, Bernard N, network of French pharmacovigilance centres, Beghin D, et al. Pregnancy outcome after TNF-alpha inhibitor therapy during the first trimester: a prospective multicentre cohort study. Br J Clin Pharm 2015; 80: 727-39.
[9] Fujii H, Goel A, Bernard N, Pistelli A, Yates LM, Stephens S, et al. Pregnancy outcomes following gabapentin use: results of a prospective comparative cohort study. Neurology 2013; 80: 1565-70.
[10] Richardson JL, Stephens S, Yates LM, Diav-Citrin O, Arnon J, Beghin D, et al. Pregnancy outcomes after maternal varenicline use; analysis of surveillance data collected by the European Network of Teratology Information Services. Reprod Toxicol 2017; 67: 26-34.
[11] McParlin C, O'Donnell A, Robson SC, Beyer F, Moloney E, Bryant A, et al. Treatments for hyperemesis gravidarum and nausea and vomiting in pregnancy: a systematic review. JAMA 2016; 316: 1392-401.
[12] O'Donnell A, McParlin C, Robson SC, Beyer F, Moloney E, Bryant A, et al. Treatments for hyperemesis gravidarum and nausea and vomiting in pregnancy: a systematic review and economic assessment. Health Technol Assess 2016; 20: 1-268.

Datalink to study neurodevelopmental outcome following in-utero exposure to anticonvulsant medications.[13]

In early 2017, a UKTIS senior information scientist completed and submitted their PhD thesis which analysed teratology information service and patient self-reporting methods of teratogen surveillance. This work helped establish valuable research collaborations and has significantly strengthened in-house expertise in advanced statistical techniques specific to the analysis of pregnancy exposure data for the purpose of teratogen signal detection. Importantly, this work involved a critical review of teratogen surveillance systems. It is clear that prospective cohort studies based on data collected by teratology information services around the world make an important contribution to teratogen surveillance but that there is scope for modernisation of the data collection methodologies employed and an urgent need to extend existing infrastructures to capture longer term outcomes of prenatal exposures, in particular offspring neurodevelopment.

[13] Charlton RA, McGrogan A, Snowball J, Yates LM, Wood A, Clayton-Smith J, et al. Sensitivity of the UK Clinical Practice Research Datalink to detect neurodevelopmental effects of medicine exposure in utero: comparative analysis of an antiepileptic drug-exposed cohort. Drug Saf 2017; 40: 387-97.

5. Clinical governance

The NPIS places the strongest emphasis on the quality of the clinical services it provides and has established rigorous clinical governance mechanisms to ensure that these are maintained. Key factors include the appropriate training and continuous professional development of staff, access to appropriate information sources, detailed and regularly reviewed operational procedures and the continuous availability of consultant clinical toxicologists for provision of advice when needed. (Box 5.1).

In spite of these precautions, things can go wrong, especially for a service that handles so many clinical enquiries. Therefore the NPIS encourages the reporting of critical events, complaints, adverse comments or near misses by all staff members. These can then be investigated and lessons learned across the whole service; when necessary, changes to policies, procedures and clinical advice can be made. Reported incidents are reviewed first by the Director of the originating unit and those with exclusively local implications are handled using the clinical governance arrangements of the provider NHS Trust. Those with possible relevance to other NPIS units are referred to the NPIS Clinical Standards Group, where details are considered and recommendations for further actions are made. If an urgent issue arises, this can be discussed rapidly between meetings so that urgent actions can be taken when necessary.

BOX 5.1 Key features of NPIS clinical governance

- Appropriate induction, training and appraisal of all staff
- Nationally organised continuous professional development with discussion of contentious issues, ensuring consistency of approach
- Access to high quality information sources
- Early peer review of enquiry answers and a programme of enquiry audit
- Continuous support from senior staff including 24-hour availability of a consultant clinical toxicologist
- Detailed and regularly updated national operational policies
- Reporting and review of critical incidents, complaints and near misses so that lessons can be learned and shared throughout the service
- Regular quality assurance exercises encompassing all aspects of NPIS work

5.1 Analysis of critical events

During the 2016/17 reporting year there were 13 critical events reported and discussed nationally. Four of these related to clinical advice provided via TOXBASE; in three of these, no changes to the TOXBASE entry were considered necessary, but one report prompted clarification about appropriate observation period following recreational use of fentanyl patches. There were four episodes where clinical advice provided by NPIS staff

via telephone had been questioned. Investigations indicated that the advice provided was suboptimal in two of these cases; one had resulted in the unnecessary referral of a patient to hospital and in the other unnecessary ECG monitoring had been recommended. In each case, feedback was provided to the staff member involved. Other incidents reported included the use of TOXBASE by an NHS staff member planning a suicide attempt, delay in the delivery of antivenom for exotic snakebite by an external contractor and the issuing of clinical advice by an external agency which implied support from NPIS when this had not been discussed.

The remaining two critical incidents were important because they reflect increasing pressures on NPIS staffing resource. In one case telephone advice about a critically ill patient could not be obtained by an emergency department because both out-of-hours telephone lines were being used for other enquiries. In the other, an NPIS unit was only able to cover one rather than the usual two telephone lines during a weekend shift due to short term staff sickness. Problems of this type, although rare, are likely to occur with increasing frequency in view of gradual resource-related reductions in NPIS staff numbers. To mitigate the problem, a mechanism by which volunteer staff from other NPIS units can be asked to provide additional cover at short notice has been organised.

5.2 Quality assurance exercises

Telephone enquiry service

NPIS units have collected information on user satisfaction with their telephone enquiry service since 2002. The aim is to establish service performance, user requirements and expectations and identify areas for improvement. This report provides the results of the stakeholder quality assurance questionnaire exercise for 2016/17, in line with PHE contractual arrangements.

Survey results

During the 2016/17 reporting year, 43,610 patient specific enquiries were answered, slightly lower than the previous year (46,885). There were 2,811 questionnaires sent out and 682 responses received, giving a response rate of 24.3%, similar to the response rate for 2015/16 (23.5%). The designation of responders reflected the profile of service users, with the most common responder groups being General Practitioners (33.2%) and NHS 111 nurses (16.2%).

A slight improvement was noted in the proportion of respondents checking TOXBASE before ringing the service, which increased to 52.6% compared to 50.1% the previous year. Of those who had checked TOXBASE prior to telephoning the service, 55.3% cited the reason for phoning to be insufficient information on TOXBASE to answer their

enquiry. Other reasons were: special circumstances or other reasons (31.6% vs 36.2% in 2015/16), inability to interpret the information on TOXBASE (9.8% vs 6.6% in 2015/16), a local protocol to call NPIS (2.8% vs 2.2% in 2015/16) and the perception that information on TOXBASE contradicted other information they had (0.5% vs 2.2% in 2015/16). The reasons reported for not accessing TOXBASE before telephoning the NPIS are presented in Table 5.2.1.

To evaluate user satisfaction respondents were asked to what extent they agreed or disagreed with a series of statements relating to the particular enquiry they made to the NPIS. The responses received demonstrate excellent satisfaction with the way the enquiry was dealt with, with all parameters assessed resulting in satisfaction scores exceeding the results of 2015/16.

Overall user satisfaction with the service was graded using a scale of one to six, with one indicating a very poor service and six an excellent service. The overall satisfaction rating of users grading the service a five or a six (excluding non-respondents) was 98.9%, compared to 98.4% last year (Table 5.2.2). Figure 5.2.1 below represents the overall quality scores for the individual units.

Table 5.2.1 Reasons why telephone enquirers did not consult TOXBASE first

Reason	% of respondents	
	2015/16	2016/17
“I don’t know what TOXBASE is”	17.9	17.4
“We don’t have it in our department”	23.9	26.2
“It was in a part of the department that we didn’t have access to”	3.1	4.1
“We couldn’t get logged on/the connection wasn’t working”	16.2	17.7
“We’ve not been trained to use it yet”	12.2	12.0
Other	26.7	22.7

Summary

As in previous years, the response rate, although typical of surveys of this type, was low and this may introduce bias, which could be in either direction. Respondents continue to have a very high level of satisfaction with the service, both overall and for each of the specific issues enquired about. User satisfaction was high for calls dealt with by all the NPIS units.

Table 5.2.2 Satisfaction scores 2015/16 vs 2016/17

Question	Satisfaction score %*	
	2015/16	2016/17
"The person I spoke to was polite and pleasant"	98.1	98.6
"Once my call was answered by a specialist in poisons information the enquiry was dealt with promptly"	97.4	98.2
"The information was given to me at an appropriate speed"	97.5	98.0
"I had confidence in the reply I was given"	97.1	97.9
"The reply from NPIS was relevant and useful"	96.2	96.6
"I was given an appropriate amount of information for my needs"	95.8	96.8
"My telephone call was answered without delay by a specialist in poisons information"	92.2	94.7

* satisfaction score is the proportion of respondents who agree 'completely' (6) or 'a lot' (5) [excluding non-respondents]

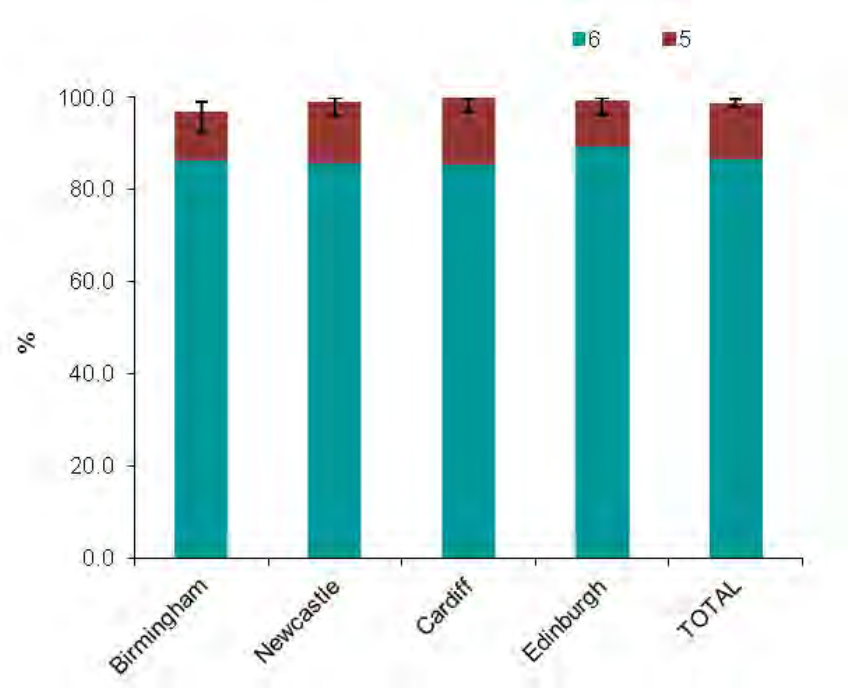

Figure 5.2.1 Overall quality scores for 2016/17 for the four NPIS units expressed as a proportion of respondents scoring 5 of 6 (non-respondents excluded from the denominator)

TOXBASE

Formal quality assurance is obtained from TOXBASE users using an online questionnaire. A selection of users are automatically asked to complete and submit one of a series of short quality assurance forms during their online session. To combat user

fatigue, differing forms are presented throughout the year. Invitations are generated every five to 15 database logins; this number is varied throughout the year. A total of 881 returns were received during the 2016/17 reporting year. On type of enquiry (147 responses), 56.5% users reported that they primarily used TOXBASE for 'routine enquiries', 28.6% for a 'triage decision' and 15.0% for 'complex enquiries'. On frequency of use (147 responses), 40.8% reported using TOXBASE weekly, 36.1% occasionally, and 23.1% daily.

Users were asked to grade a series of statements on a scale of one to six where one = disagree completely, and six = agree completely. Satisfaction scores were high (Table 5.2.3). Of those asked to indicate their overall satisfaction with TOXBASE on a scale of one to six (590 responses), 547 (92.7%) scored either five (good) or six (excellent).

TOXBASE user feedback and service improvements

An important component in the review process of TOXBASE entries is user feedback. Feedback may be received from a variety of sources including TOXBASE quality assurance forms, questionnaires linked to products of interest, responses to follow up on cases of interest, or by email, letter or telephone. Users may raise queries or provide clinical data. Issues specific to entries are dealt with as they arise or may be collated for discussion at the TOXBASE Editing Group or Clinical Standards Group meetings.

TOXBASE quality assurance forms: free text comments

Of the 881 returns, 182 (20.7%) included free text comments which can be grouped as shown in Table 5.2.4. The few negative comments centred on the appearance of the website, navigation around the database, and identifying the salient information; improvements to update the 'usability' and look of TOXBASE are due to be implemented over the coming year. Box 5.2.1 gives examples of comments about TOXBASE from returned forms.

Table 5.2.3 Summary of user satisfaction scores

Rank	No. of responses	Question	Satisfaction score (%)*
1	250	"I had confidence in the information for my query"	95.6
2	212	"Finding the information I required was easy"	92.9
3	250	"Logging on to the database was easy"	89.2
4	272	"The information was sufficient for managing this case"	85.7

* satisfaction score is the proportion of respondents who agree 'completely' (6) or 'a lot' (5)

Table 5.2.4 Summary of free text comments on TOXBASE from quality assurance returns

Type of comment	Number (% value) *
Positive comments and thanks	120 (65.5%)
Suggestions	45 (24.7%)
Negative comments	14 (7.7%)
Comment related to other NPIS services	11 (6.0%)
Information technology	10 (5.5%)
Specific issues	5 (7.7%)

* users often offered multiple comment types within one response

Box 5.2.1 Examples of comments about TOXBASE from quality assurance returns

"TOXBASE is, in my experience, one of the best web-based decision support tools available."

"Bloody love TOXBASE. Service is fantastic"

"This is a compact and yet quite comprehensive software package on toxicology that is invaluable to us at the Poison Control Centre"

"Very informative and in depth guidance though layout requires one to concentrate - could be made a bit more user friendly - I'm not complaining though"

"Good reference source I can trust"

"Excellent resource in Emergency Medicine. Thank you"

"Great help for us telephone triage nurses. Thank you for the service"

"This is a chuffing excellent facility!!!!"

"Website appearance and navigation is dated in appearance, however very functional"

"Always reliable, user friendly and clinically relevant – many thanks!"

"As a 111 clinician I could not perform my role without this wonderful service"

"Today I found all the information that I needed really quickly but sometimes it is difficult to navigate around the system"

"TOXBASE is so helpful for ED docs, we could not do our job with you!"

"Extremely useful service making a very valuable contribution to patient care. Working in Emergency Medicine would be much harder without TOXBASE."

UKTIS quality assurance

Telephone enquiry service

Formal feedback on the UK Teratology Information Service is sought continuously from a random sample of telephone enquirers, with questionnaires sent out between one and four weeks after the enquiry. During 2016/17, 400 enquiries (21% of the total enquiries) were selected for quality assurance monitoring in this way. As of April 2017, 62 (16%) feedback forms had been returned including from GPs (33), pharmacists (13), hospital consultants (7), junior hospital doctors (1), nurses (5) and midwifes (4).

Of the 62 responders, 8% had used the service more than five times, 31% had used the service between one and five times previously and 33% were first-time enquirers. Enquirer satisfaction scores demonstrated a 97% overall degree of satisfaction with the service (Table 5.2.5).

Table 5.2.5 Summary of UKTIS telephone enquirer experience

Question	% answering yes
“The reply from UKTIS was relevant and useful”	100
“Once I got through, the enquiry was answered within an acceptable timeframe”	98
“The information was given to me at an appropriate pace”	98
“The person I spoke to was polite and pleasant”	98
“I had confidence in the reply I was given”	98
“Will you use the service again”	98
“Overall satisfaction with the service”	97

bumps leaflets and website

UKTIS telephone enquirer feedback forms have included additional questions relating to the new ***bumps*** website since 2015. Thirty four (55%) of the 62 healthcare professionals who provided feedback having contacted UKTIS via the national telephone line were not aware of the new ***bumps*** website. Of the 27 responders who had visited ***bumps***, 79% found the website ‘very easy’ or ‘easy’ to use. Eleven responders reported that a ***bumps*** leaflet was available for the exposure they were interested in; eleven reported that no leaflet was available at that point, with the remaining five responders regarding the question as ‘not applicable’. Fourteen respondents rated the information on ***bumps*** as being ‘about right’, with two assessing it as too detailed and one as not detailed enough.

Spontaneous feedback was also received from 43 visitors to the ***bumps*** website via the e-feedback form, 72% of whom resided in the UK. Sixty percent of visitors providing feedback were not healthcare professionals, but of the remainder who were, several were pregnant themselves. Of the 42 responding to this question, 36 (86%) regarded ***bumps*** as 'easy' or 'very easy' to use.

Box 5.2.2 UKTIS and *bumps* end-user feedback

- Love the ***bumps*** website! I always feel supported when I call UKTIS and great to have advice from teratology specialists (healthcare professional via UKTIS questionnaire)
- I have used UKTIS on a number of occasions and always found this service to be incredibly helpful. An invaluable service, thank you (healthcare professional via UKTIS questionnaire)
- Love the website, very very useful. I use it all the time (spontaneous via ***bumps*** website)
- Thanks for such an excellent website (spontaneous via ***bumps*** website)

Feedback continues to be very positive (Box 5.2.2) and suggests that developments in recent years have further improved the provision of information for patients and healthcare professionals. As in previous years, the need to increase awareness of the service and the appetite of patients and healthcare professionals for further information and pregnancy focused treatment guidelines were apparent.

5.3 Education and training for NPIS users

Emergency medicine training

As in previous years, the NPIS and the Royal College of Emergency Medicine (RCEM) organised joint CPD days which were held in London in June and Newcastle in November 2016. These covered important topics in clinical toxicology using case-based presentations and gave delegates the opportunity to discuss specific issues with experts from the NPIS. The CPD days were well attended by consultants and trainees in Emergency Medicine from across the UK who provided excellent formal feedback about the teaching provided.

TOXlearning – a clinical toxicology e-learning resource

A clinical toxicology e-learning resource was first developed by NPIS Edinburgh in 2005. It has been available to NHS healthcare professionals across the UK in its current form (Figure 5.3.1) since December 2013 at www.toxlearning.co.uk.

The resource was initially created to train new NHS 24 centre staff in Scotland, but has been developed over time to deliver a series of modules designed to improve

knowledge of the clinical management of poisoned patients for doctors, nurses and pharmacists in hospitals and general practice, ambulance personnel, staff of NHS 111, NHS 24 and NHS Direct and other healthcare professionals. The NPIS recommends that TOXBASE users of all types and grades complete the 'Using TOXBASE' module (see Box 5.3.1).

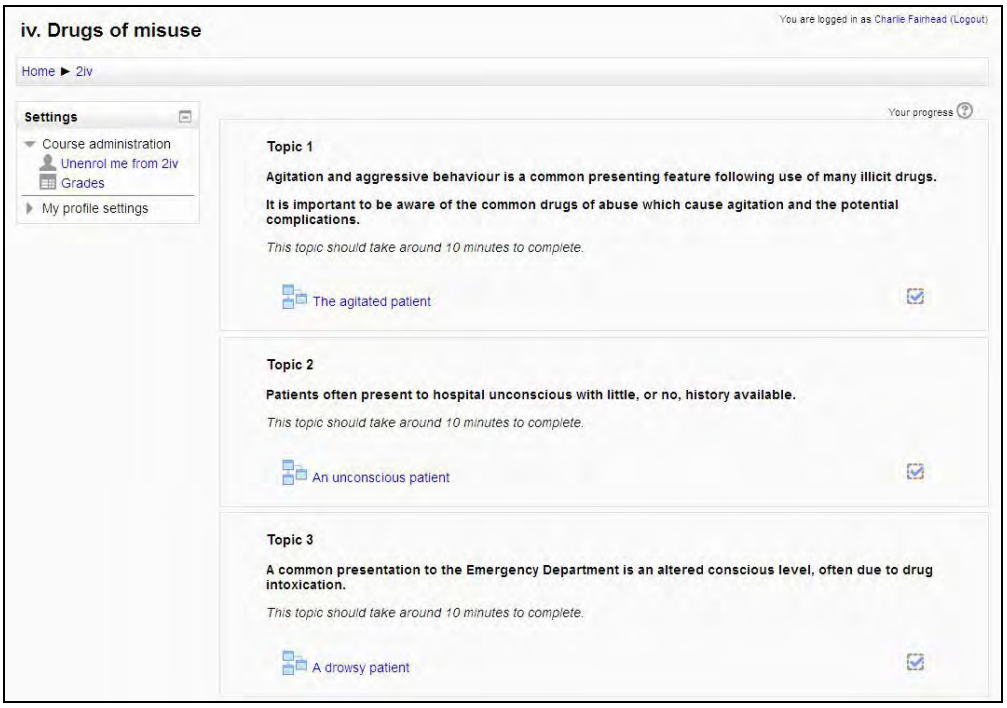

Figure 5.3.1 Screenshot from www.toxlearning.co.uk

Box 5.3.1 TOXlearning module details

Module 1 – Using TOXBASE

This module, which represents 75 minutes of learning, is designed to assist new and existing TOXBASE users to use the database more effectively

Module 2 – Clinical management of the poisoned patient

This module, which represents 180 minutes of learning, includes units on:

- general aspects of poisoning
- problematic poisons
- common poisons
- drugs of misuse

Module 3 – Management of patients involved in chemical incidents

This module, which represents 210 minutes of learning, includes units on:

- decontamination and incident management
- factory and motor vehicle accidents
- leaks and contamination
- riots and potential deliberate release

The number of registered users increased from 2,878 on 31 March 2016 to 4,083 on 31 March 2017, an increase of 42%, with 92% of current users coming from the UK. The top user groups were nurses (30%), ambulance/paramedical staff (27%), doctors (17%) and medical/nursing students (10%).The most common workplaces were NHS 111, NHS 24 and NHS Direct (27%), ambulance services (19%), and hospital emergency departments (11%).

The resource is used by an average of 77 users per month (range 50-100 unique logins). Registration and access are free; users can work through courses at their own pace, save their work, obtain their scores and print off their results for continuing professional development files.

5.4 Training and continuing professional development

Continuing professional development (CPD) for NPIS staff is an essential component of the clinical governance structure of the service. A national CPD programme equips both clinicians and scientific staff with the necessary knowledge and expertise to provide up to date, accurate, evidence-based and consistent advice on all aspects of poisoning.

Training for scientific staff

Each NPIS unit provides structured in-house training and assessment in both clinical and non-clinical (e.g. communication) skills to prepare scientific staff for dealing with healthcare professionals who contact our service for advice. Training is structured towards learning objectives covering all aspects of clinical toxicology, from the mechanisms of toxicity to the management of poisoned patients. These are clearly set out in a national training curriculum. Additionally, scientific staff may wish to undertake a postgraduate qualification in toxicology to further enhance their knowledge and expertise.

Continuing professional development

Within the last year the NPIS annual CPD programme has undergone significant re-structuring. Having previously consisted of four meetings hosted in turn by each of the NPIS units, it now consists of two-day meetings held twice each year, with all NPIS units hosting in turn. This new format has allowed staff greater opportunity for CPD along with the benefit of networking during an evening social event. It is the responsibility of the CPD lead, an NPIS consultant appointed by the directors every three years, to organise the rolling programme of meetings (see Box 5.4.1). An NPIS scientist is also appointed every two years to ensure the needs of the scientific staff are well represented within the educational programme.

Box 5.4.1 NPIS CPD meeting, NPIS Cardiff

Venue: Postgraduate Centre, Llandough Hospital, Cardiff

Day 1: Thursday 23 March 2017

10.30 – 11.30	Massive paracetamol overdoses Does one size fit all? *Dr Daniel Marks, London* How to manage them? *Dr James Dear, NPIS Edinburgh*
11.30 – 12.00	Paracetamol toxicity in neonates *Dr Krishna, NPIS Cardiff*
12.00 – 12.30	Cardiovascular toxicity *Dr Ashraf Kamour, NPIS Cardiff*
13.30 – 14.00	The public health management of chemical incidents *Prof David Russell, CRCE Wales*
14.00 – 14.30	Development of an environmental public health surveillance system: lead poisoning surveillance *Dr David Roberts, FETP Fellow*
14.30 – 14.50	Project 54: Capacity building for medical preparedness and response to CBRN incidents *Dr Eirian Thomas, PHE*
14.50 – 15.10	Additional risk management measures for hazardous mixtures marketed in soluble packaging: an industry perspective *Dr Ehi Idahosa Taylor, PHE*
15.30 – 16.00	Handling of poisoning in pregnancy enquiries *Dacia Jones, NPIS Newcastle*
16.00 – 16.40	Preliminary findings of our clinical audit of NPIS follow up *Dr Sally Bradberry, Emma Moyns & Hayley Williams, NPIS Birmingham*

Day 2: Friday 24 March 2017

09.15 – 09.55	Management of anticoagulant associated bleeding *Prof Phil Routledge, NPIS Cardiff*
09.55 – 10.25	A trip down the garden path *Dr Mark Anderson, Consultant Paediatrician, Newcastle*
10.25 – 10.45	Chewing the fat *Steve Jones, NPIS Cardiff*
10.45 – 10.55	Exposure to fabric protector sprays *Mike Crockett, NPIS Cardiff*
11.20 – 11.45	A complicating factor in a septic patient *Talan Parnell, NPIS Cardiff*
11.45 – 12.45	Diagnosis of death using neurological criteria – toxicological dilemmas *Dr Dale Gardiner, Intensive Care Consultant, Deputy National Lead for Organ Donation*
13.45 – 14.15	An NPIS study of carbon monoxide exposures *Richard Adams, NPIS Edinburgh*
14.15 – 14.45	Petrolleum distillate survey and discussion *Nicola Wheatley, NPIS Cardiff*
14.45 – 15.00	@NPIS? *Dr Euan Sandilands, NPIS Edinburgh*

The primary role of the CPD meetings is to ensure that clinicians and scientists remain up to date with the latest developments within clinical and academic toxicology. This includes education on new poisons, antidotes and other emerging treatment modalities. Additionally, the meetings provide an ideal forum to educate staff about strategic developments within the service, discuss challenging clinical cases and debate new research proposals. The meetings also offer the chance for face-to-face contact and social networking between clinical and scientific staff who may previously have only had contact via the phone.

All NPIS staff unit are encouraged to participate in research and submit papers to peer-reviewed journals and national and international meetings such as the British Toxicology Society and the European Association of Poisons Centres and Clinical Toxicologists.

6 Areas of interest in 2016/17

6.1 Drugs of misuse

Introduction

NPIS activity, although not an exact surrogate for clinical harm, is useful as an indirect marker of health professional activity in managing toxicity associated with drug misuse. Because of this, the service continues to provide information on request to official organisations detailing activity relating to specific substances (Box 6.1.1), including the Advisory Council on the Misuse of Drugs (ACMD), the UK Focal Point (UK FP) and the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA).

Box 6.1.1 Reporting of NPIS data on drug misuse 2016/17

Report on enquiries relating to MDMB-CHMICA
3 June 2016. EMCDDA via UK Focal Point

Report on enquiries relating to methiopropamine - update to May 2016
6 June 2016. ACMD Secretariat, Home Office

Report on enquiries from UK healthcare professionals relating to etizolam and U-47700
19 July 2016. Drugs Policy Unit, Edinburgh, Scotland

Report on enquiries relating to the misuse of loperamide
16 September 2016. EMCDDA via UK Focal Point

Report on enquiries relating acryloylfentanyl
24 November 2016. EMCDDA via UK Focal Point

Report on enquiries relating to furanylfentanyl
24 November 2016. EMCDDA via UK Focal Point

Overall activity

In 2016/17 there were 1,210 NPIS telephone enquiries related to 280 different substances or products, accounting for 2.7% of all NPIS telephone enquiries. This is a 25% reduction on the 1,613 enquiries relating to 385 substances or products received during 2015/16 (3.4% of activity). There was also a 5% reduction in TOXBASE accesses relating to drugs of misuse comparing 2016/17 (64,015, 3.9% of overall activity) with the previous year (67,228, 4.0% of overall activity). Note that these TOXBASE data are likely to under-represent the total contribution made by drug misuse as they exclude licensed pharmaceutical substances (including benzodiazepines, drugs used in ADHD and opioids) that may be taken for abuse purposes rather than toxicity due to medication error or self-harm. The top ten substances involved in telephone enquiries and TOXBASE accesses are shown in Table 6.1.1.

Table 6.1.1 Top 10 telephone enquiries and TOXBASE accesses relating to drugs of misuse

	Telephone enquiries	n (2016/17)	% change (from 2015/16)	TOXBASE accesses	n (2016/17)	% change (from 2015/16)
1	Cocaine (including crack)	163	-5.2%	Cocaine (including crack)	11,499	21.1%
2	MDMA (including ecstasy)	140	6.9%	MDMA including ecstasy)	10,281	1.5%
3	Cannabis	116	6.4%	Heroin	5,201	-7.6%
4	Drug of misuse (not known)	100	-37.1%	Amfetamine	3,980	-32.0%
5	Diazepam	76	-1.3%	Methylphenidate hydrochloride	3,904	3.9%
6	Branded products[1]	74	-73.2%	Cannabis	3,887	-9.5%
7	Heroin	68	-45.2%	Synthetic Cannabinoid Receptor Agonists (including spice)	3,166	-33.5%
8	Methadone	67	4.7%	GHB and sodium oxybate	2,593	-0.5%
9	Amfetamine	54	-11.5%	Ketamine	2,148	21.6%
10	Synthetic Cannabinoid Receptor Agonists (including spice)	51	-52.8%	Branded products	2,062	-63.8%

[1] These are sold in packages with distinctive branding. Examples (sometimes previously termed ‘legal highs’) include ‘Black Mamba’, ‘Vertex’ and‘Sweet Leaf’. The constitents of these products are often unknown and may be inconsistent. Although many contain SCRAs, they are listed separately because some may contain other drug types.

Impact of the Psychoactive Substances Act

The Psychoactive Substances Act (PSA) came into law in the UK on 26 May 2016, describing various offences relating to psychoactive substances including production, supply, offer to supply, possession with intent to supply, possession on custodial premises and importing or exporting. Prior to the PSA, while many drugs of misuse

were controlled by earlier drugs of misuse legislation, some newer substances (new psychoactive substances or NPS) were not controlled. The NPIS is currently examining the impact of the PSA on activity relating to substances that were commonly legal prior to the PSA, especially branded products (sometimes previously termed 'legal highs') and newer synthetic cannabinoid receptor agonists (SCRA). Early analysis shows that for both these groups there has been a reduction in NPIS activity comparing 2016/17 with previous years (Table 6.1.2). However, more detailed statistical analysis is needed to establish the extent to which these reductions are linked with the introduction of the PSA.

A potential concern is that older, previously controlled 'classical' drugs of misuse might occupy the share of the drug misuse market vacated by hitherto legal substances. This could result in increasing episodes of toxicity relating to substances such as heroin, cocaine and MDMA. So far, however, NPIS activity data do not show substantial consistent effects for cocaine (increasing TOXBASE activity but little change in telephone enquiry numbers) or MDMA (small increases in telephone enquiries and TOXBASE accesses) and activity relating to heroin has fallen (Table 6.1.2). Note that data collected prior to the 2014/15 reporting period are not included in these tables; these are not directly comparable because until that year NPIS did not report activity related to all drugs of misuse but limited monitoring to 61 specific substances.

Table 6.1.2 Telephone enquiries and TOXBASE accesses for selected substances over the last three reporting years

	Telephone			TOXBASE		
	2014/15	2015/16	2016/17	2014/15	2015/16	2016/17
Total drug of misuse	1,722	1,613	1,210	69,537	67,228	64,015
Cocaine	164	172	163	8,564	9,492	11,499
Heroin	118	124	68	5,221	5,626	5,201
MDMA	122	131	140	9,972	10,128	10,281
Mephedrone	85	55	14	6,622	4,385	1,454
SCRA	74	108	51	2,544	4,770	3,343
Branded products	391	276	74	3,699	5,703	2,062

Novel synthetic opioids

Concerns have been raised globally regarding the potential harms associated with the emerging misuse of novel synthetic opioids, especially fentanyl derivatives. These are often of higher potency than heroin and have caused severe toxicity including fatalities

internationally. NPIS received two telephone enquiries relating to these substances during the year, involving butrylfentanyl and furanylfentanyl with associated cardiac or respiratory arrest or both. Note, however, that NPIS data are likely to underestimate the true impact of these compounds as their presence may not be recognised by clinicians seeking advice from the service. This is because analytical confirmation of the responsible substance is rarely performed in patients with non-fatal opioid toxicity.

Longer-term trends

Ten year NPIS activity data for various drugs of misuse are shown in Figures 6.1.1 and 6.1.2 for Class A drugs and Figures 6.1.3 and 6.1.4 for other substances of misuse. TOXBASE information for the class A substances cocaine and MDMA has been accessed increasingly frequently over the last 7 years (Figure 6.1.2), but without corresponding increases in telephone enquiry numbers (Figure 6.1.1). The recent decline in telephone enquiries and TOXBASE accesses relating to mephedrone has continued, with further substantial reductions in 2016/17. There have also been recent reductions in telephone enquiries and TOXBASE accesses relating to SCRAs (Figures 6.1.3 and 6.1.4, Table 6.1.2).

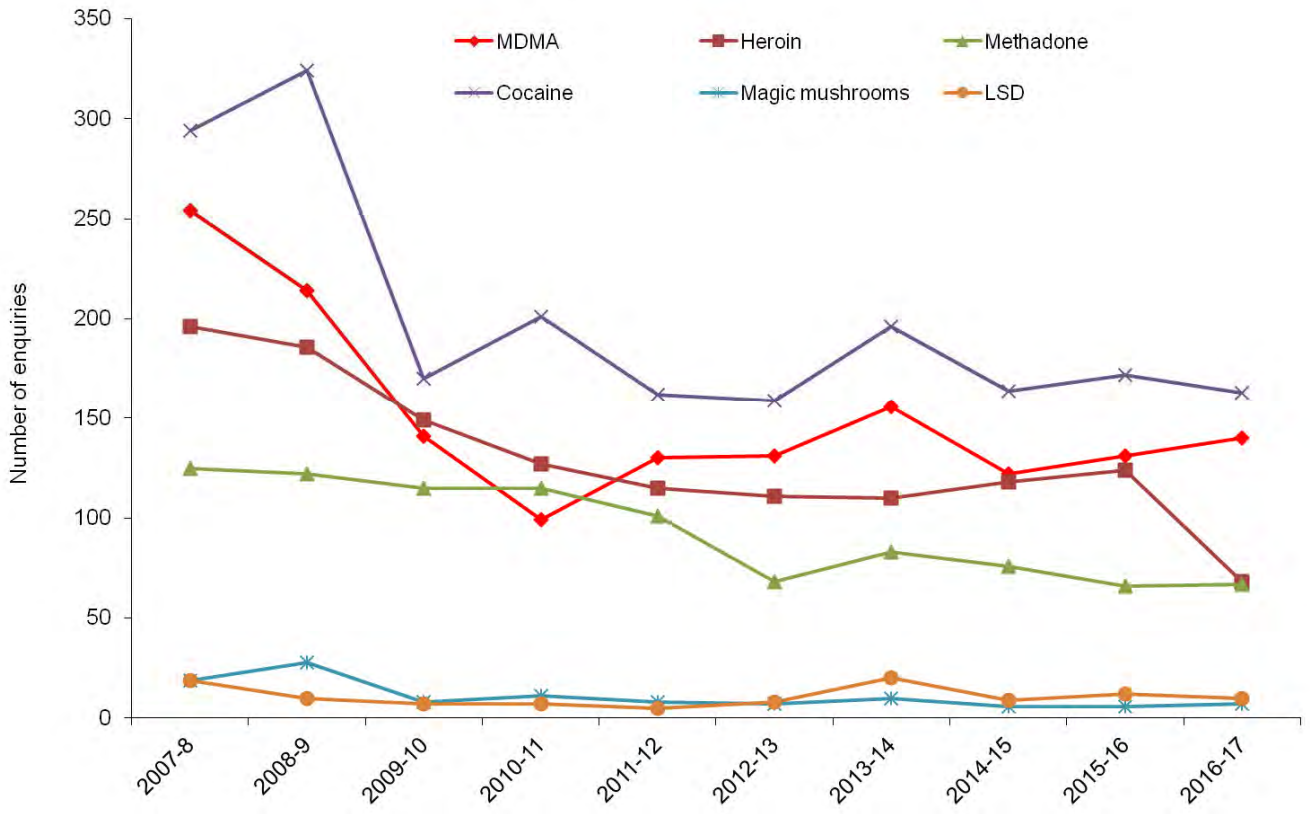

Figure 6.1.1 Annual telephone enquiries regarding selected Class A drugs of misuse, 2007/8 – 2016/17

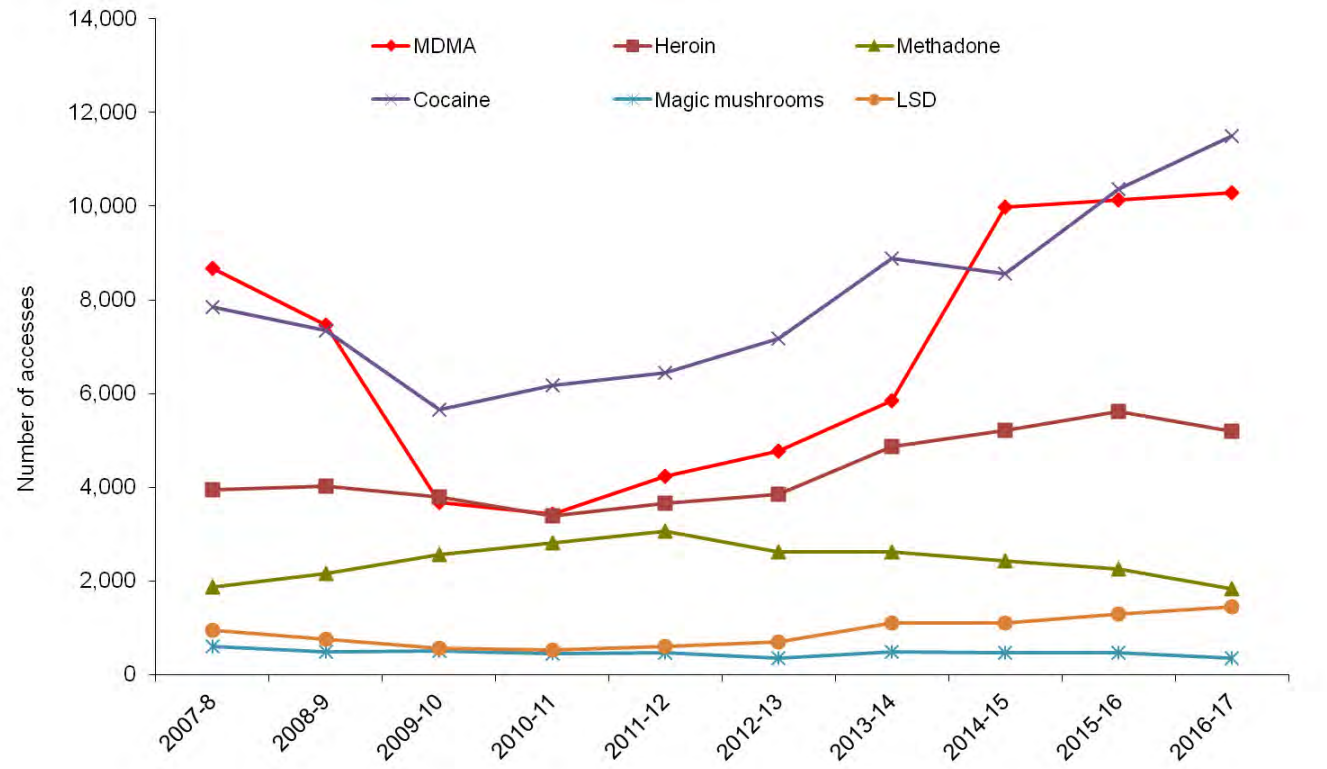

Figure 6.1.2 Annual TOXBASE accesses regarding selected Class A drugs of misuse, 2007/8 – 2016/17

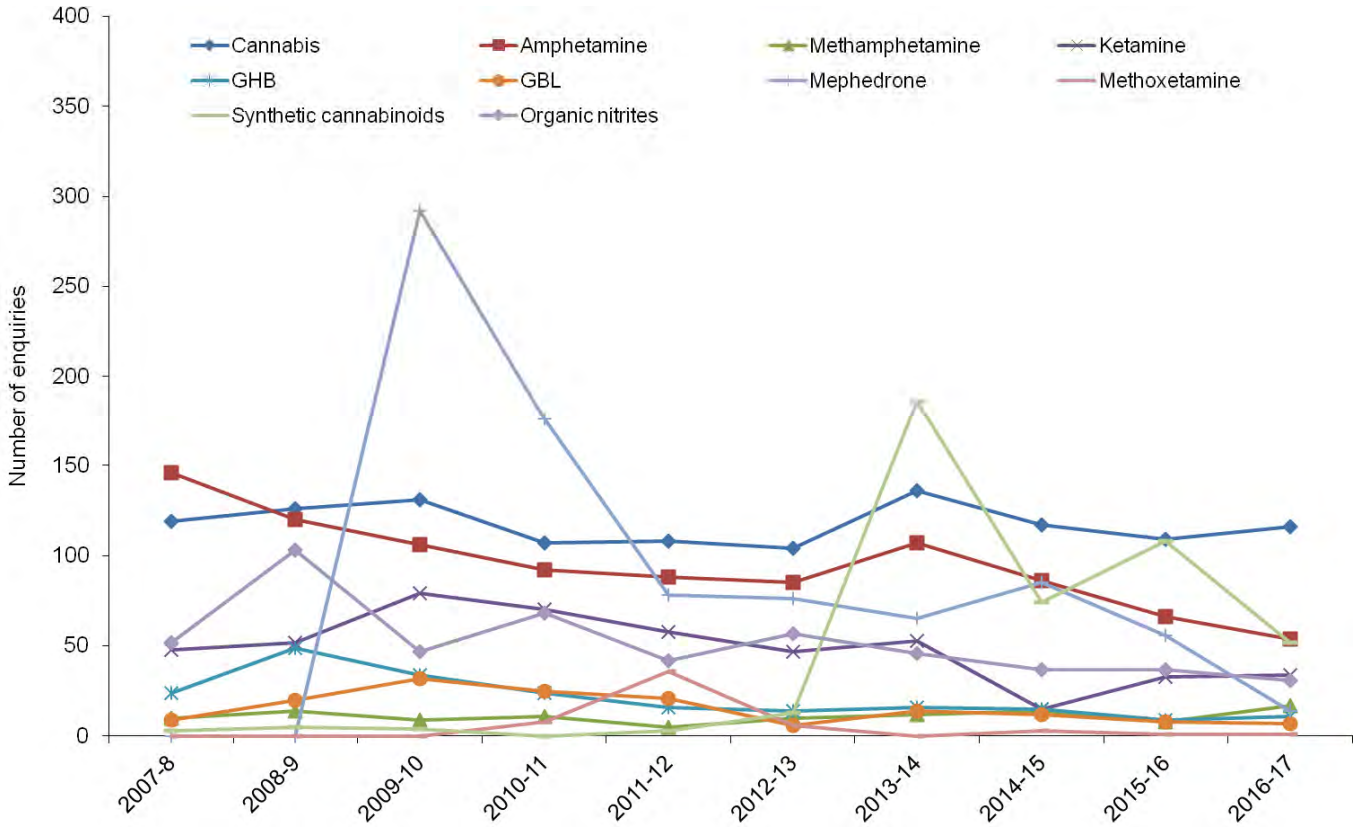

Figure 6.1.3 Annual telephone enquiries regarding other selected drugs of misuse, 2007/8 – 2016/17

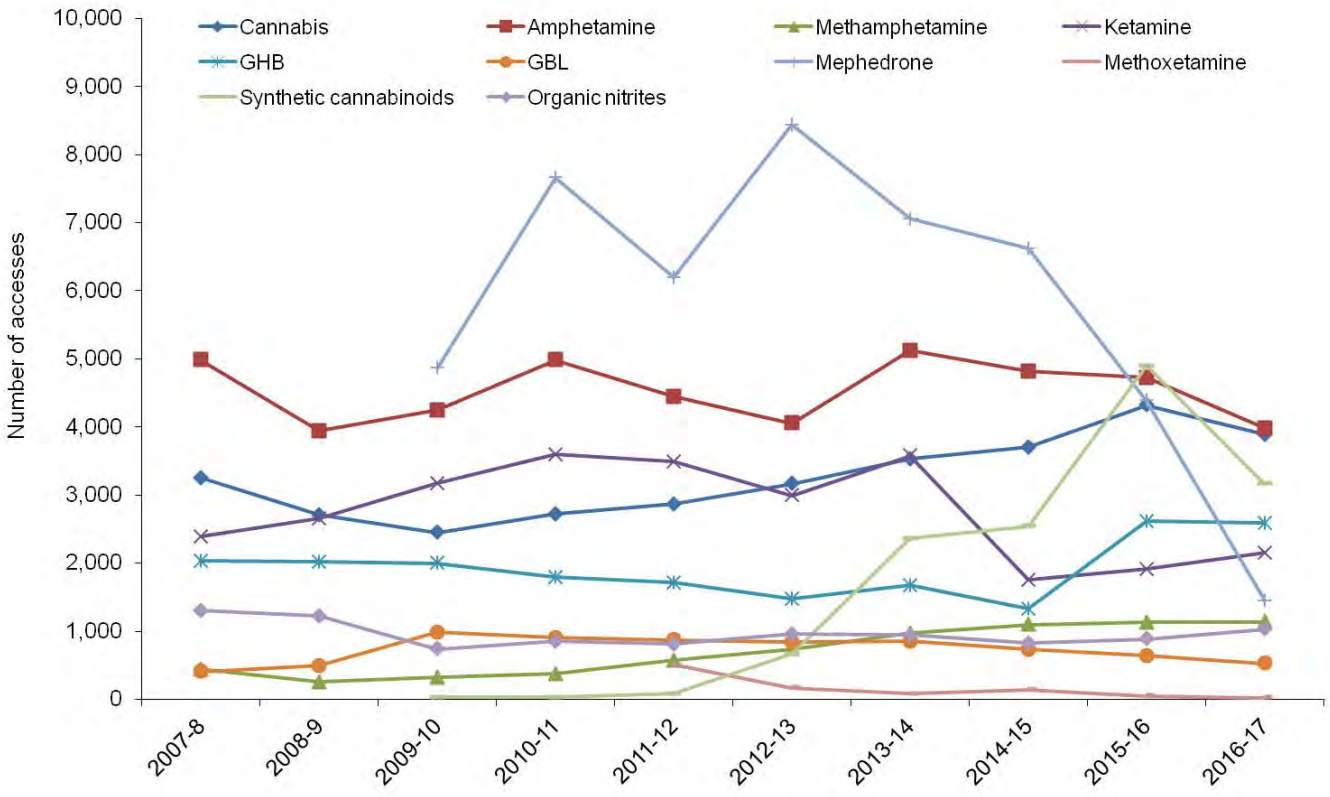

Figure 6.1.4 Annual TOXBASE accesses regarding other selected drugs of misuse, 2007/8 – 2016/17

6.2 Iron poisoning

Iron poisoning is potentially serious but there are limited data available on the most appropriate dose and duration of treatment with the antidote desferrioxamine (DFO). To address this, the NPIS set up a prospective study in 2014 collecting data on iron poisoning cases presenting to hospital. For an initial period (1 February 2014 - 17 January 2016), inclusion criteria included ingestion of a potentially toxic dose of iron (≥20 mg/kg), presence of symptoms, raised serum iron concentration (greater than or ≥55 micromoles/L), or treatment with DFO. Inclusion criteria were adjusted for the period 18 January 2016 to 17 January 2017; during this period only patients receiving DFO were followed up actively.

Over the study period (18 January 2016 - 17 January 2017), the NPIS received 694 calls relating to iron exposures, the majority from hospitals (54.9%). Following exclusions (skin/eye contact; exposure to rust, fertiliser, moss killer, weed killer or slug bait) 310 individual patient enquiries from hospitals were analysed. Monthly call numbers remained consistent with the previous study period (1 February 2014 - 17

January 2016). There were 95 patients aged 15 or younger and 36 patients under five years of age.

At the time of the enquiry, most patients were asymptomatic (47%) or had minor features (43%), with moderate (7.4%) or severe (1.9%) features less common. Severity was not known for 0.6% of cases.

The maximum poisoning severity score (PSS, see Section 2) for each patient was recorded as follows: asymptomatic 32.9%; minor features 53.5%; moderate features 10.6% and severe features 1.6%. The maximum PSS was not known in 1.3% of cases. At follow up, no deaths were recorded (in contrast to the previous period: 1 February 2014 - 17 January 2016) where four deaths were recorded; however, on review none of these were considered likely to be caused by the iron content of the overdose; three were mixed overdoses which included cardiovascular agents in unknown amounts, and the fourth was an elderly patient with pre-existing chronic heart failure.

Twenty patients received DFO following iron overdose (6.4% of all cases). In ten of these cases (50%), iron was ingested alone; three were asymptomatic, six had minor features and one moderate features at the time of presentation. The total dose/kg of DFO administered was known for six (30.0%) of these patients (53 mg/kg; 57 mg/kg; 73 mg/kg; 79 mg/kg; 80 mg/kg and 80 mg/kg; IQR 18.75 mg/kg). Two patients were known to have received doses of 4 g and 6 g, however, as a body weight was not recorded it was not possible to determine dose/kg. In the remaining twelve patients the total dose of DFO administered could not be determined on follow up.

Enquiries about iron poisoning are an important part of the NPIS's workload but few cases are severe and relatively few patients in the study period were treated with the antidote DFO (compared for example with the 40% to 50% of paracetamol poisoned patients who receive the antidote acetylcysteine) Through a detailed analysis of this data, we hope to further clarification and education about the appropriate investigation and management of patients with iron poisoning.

6.3 Pesticides

The NPIS pesticide surveillance system was established in 2004 with the approval of the Pesticides Safety Directorate and funded by the UK Department for Environment, Food and Rural Affairs. The work was implemented to better describe the incidence and characteristics of pesticide exposures in the UK that result in contact with health professionals (thereby selecting for more serious exposures). Surveillance data is collated, and both quarterly and annual reports are submitted to the government's Advisory Committee on Pesticides (ACP) via the Health and Safety Executive's Chemicals Regulation Directorate (CRD).

Currently 1,706 TOXBASE entries for pesticides and biocides are being tracked, a decrease from the 1,897 tracked during 2015/16. Incident information is obtained in two ways, from follow up of TOXBASE enquiries by an online or postal questionnaire or from data collected during NPIS telephone enquiries.

During the year, there were 3,999 accesses to TOXBASE about pesticides of interest and information on 663 potential exposures was available from the NPIS telephone enquiry service. From TOXBASE sessions, 345 follow up post or email questionnaires were returned. Cases involving animals or head lice treatment products, 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 the analysis. Of note, an unknown number of the TOXBASE accesses were for educational purposes rather than care of patients, reducing the response rate denominator.

Overall, information was gathered on 1,011 potential exposures involving pesticides during 2016/17, an overall return rate of 25.3%. No exposures involved multiple patients. This number is similar to the number of cases identified in 2015/16 (1,138).

Of the 1,011 potential exposures available for analysis, there were 11 cases where symptoms were not thought on the balance of probabilities to be related to the pesticide exposure, either by the respondent or by NPIS Edinburgh, because of, for example, there was a pre-existing illness or reasonable grounds to link symptoms to a concomitant infection. These cases were excluded, leaving 1,000 exposures for further analysis. The results presented below include both unintentional acute (845 cases; 84.5%) or chronic (40; 4.0%) exposures and self-harm exposures (SH) (79; 7.9%). The circumstances of exposure in 36 (3.6%) cases were unknown. Most exposures were graded as poisoning severity scrore (PSS, see Section 2) 0 (564 cases; 56.4%) or PSS 1 (369; 36.9%) by the NPIS. Smaller proportions were graded as moderate (PSS 2; 24; 2.4%), severe (PSS 3; 4; 0.4%) or of uncertain severity (39; 3.9%).[1] No fatalities were reported (compared with one in 2015/16).

Agents of interest

The agents most commonly involved in exposures are shown in Table 6.3.1. In addition, there were 125 cases involving unknown rodenticides, 39 cases of unknown herbicides, 27 of unknown insecticides, 22 of unknown pesticides, 15 of unknown ant killers, and three of unknown wood preservatives.

In 2016/17, the patients potentially exposed to pesticide products comprised 550 adults (13 years or older – 55.0%) and 423 children (12 years or younger – 42.3%), with 27 of unknown age (2.7%). There were 545 (54.5%) male patients and 444 (44.4%) female patients and 11 cases (1.1%) where sex was not specified.

The classes of product most commonly involved in exposures are shown in Figure 6.3.1. Multiple/combination products were involved in some incidents.

There were ten enquiries involving pregnant patients reported in 2016/17 (8 in 2014/15). All ten exposures were unintentional and acute. None were severe.

Table 6.3.1 Pesticides most frequently reported by respondents in suspected pesticide exposures during 2016/17 compared with 2015/16, ordered by rank in 2016/17

Ingredient	2015/16	2016/17
	Frequency ≥15	
Glyphosate	123	101
Permethrin	100	97
Metaldehyde	56	69
Bromadiolone	45	59
Difenacoum	48	50
Cypermethrin	34	33
Phenols/cresols	36	32
Imidacloprid	32	31
Fipronil	20	24
Tetramethrin	16	23
Moxidectin	21	23
Diquat	23	22
MCPA	17	20
Bendiocarb	28	18
Piperonyl butoxide	8	18

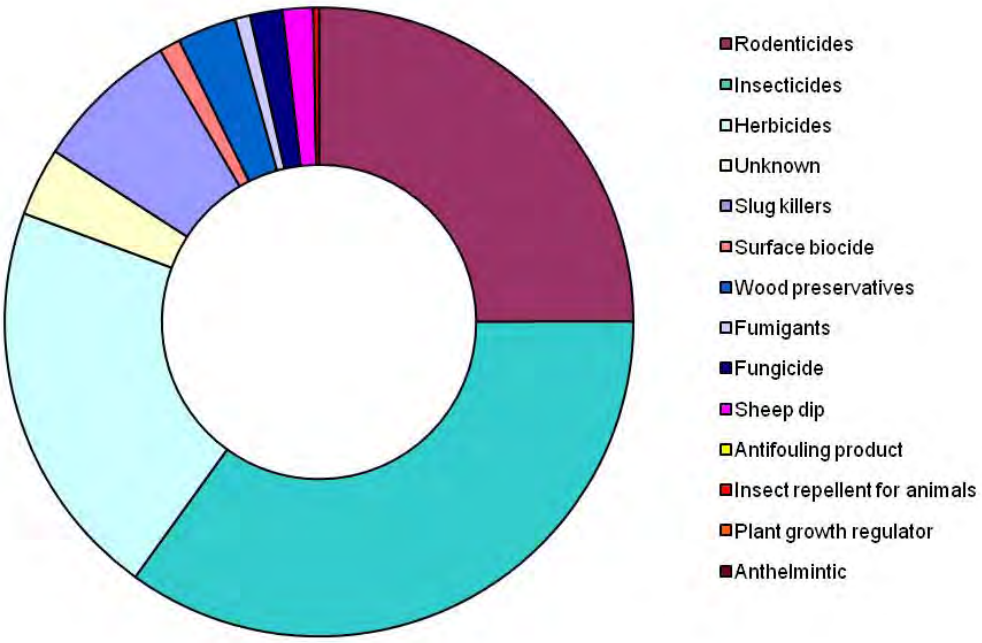

Figure 6.3.1 Pesticide exposures by class of product (as reported by respondent) in 2016/17 (1,021 agents)

6.4 Carbon monoxide (CO)

Carbon monoxide (CO) exposure is a common form of poisoning in the UK. However, relatively little is known about its epidemiology. Since July 2015 NPIS has undertaken a project funded by the Gas Safety Trust to obtain more information, in particular confirmation of exposure, from healthcare professionals contacting the NPIS.

Data were collated from telephone enquiry data via the UK Poison Information Database and follow up questionnaires posted directly to all enquirers. For healthcare professionals accessing TOXBASE, a questionnaire was either emailed or posted directly to the user or their head of department if contact details were not submitted at the time of viewing TOXBASE.

During the first 18 months of the project there were 4,851 alerts submitted from TOXBASE and 419 calls to the NPIS telephone line regarding carbon monoxide. From these enquiries data were available for 1,227 patients.The majority of exposures (96.4%) were unintentional with only 44 patients exposed due to self-harm. Thirty-four exposures involved pregnant women (2.8%).

With respect to gender, 354 (28.9%) patients were male, 472 (38.5%) were female and gender was not specified in 401 (32.7%). Exposures comprised 859 adults (≥13 yrs)

(70.0%) and 222 children (≤12 yrs) (18.1%). Age was undetermined in 146 exposures (11.9%).

The majority of unintentional exposures were associated with boiler failure (280; 24.7%) or an unspecified CO leak (144; 12.7%). In 192 (17.0%) cases of unintentional exposure, activation of a CO alarm prompted the patient to seek medical attention.

Carboxyhaemoglobin concentrations were available for 476 (38.8%) patients. This was measured from a blood test in 374 patients, from a breath test in 36 and pulse oximeter in 20, with the test type not reported for 46 patients. Overall, a positive correlation was reported between poisoning severity score (PSS, see Section 2) and carboxyhaemoglobin concentration (Figure 6.4.1).

Carbon monoxide exposures associated with moderate, severe, or fatal outcomes were most commonly as a result of house fires, where other factors would likely have contributed to the severity of the observed clinical features. Excluding CO exposures secondary to house fires, unintentional CO exposures were most commonly of low severity (717 [58%] cases associated with no symptoms or mild symptoms only), with moderate severity recorded in 57 (5%) cases, severe symptoms in 18 (1.6%) cases and death in three (0.3%) cases.

Symptoms affecting the central nervous system were most common, with 492 (41.9%) patients reporting at least one of these. Gastrointestinal (15.7%) and cardiovascular (6.0%) symptoms were also commonly reported.

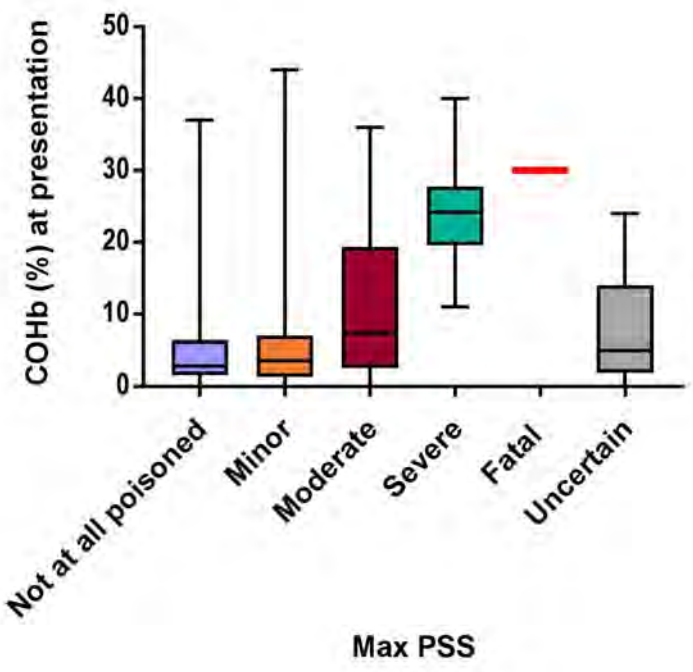

Figure 6.4.1 Relationship of carboxyhaemoglobin (%) at presentation to poisoning severity score (PSS) (excluding house fires) (n=325)

The data presented here demonstrate the ability of the NPIS to collect valuable data on all aspects of CO poisoning from across the UK. With ongoing funding, the NPIS will continue to collect data to improve our understanding of the incidence and characteristics of CO poisoning in the UK.

6.5 Household products

The NPIS continues to study exposures to household products and is at the forefront of global efforts to understand the potential adverse effects, particularly amongst children, of these commonly and widely used chemical products. The NPIS has published data recently on automatic dishwashing products, liquid laundry detergent capsules, automotive screenwashes, oven cleaners and tile and stone floor sealants.

Automatic dishwashing tablets

The traditional tablets for automatic dishwashing machines, which are still used widely, are contained within an external wrapper that requires removal prior to loading the enclosed tablet into the machine. Soluble film automatic dishwashing tablets, unlike their traditional counterparts, require no removal from an outer protective wrapper prior to use. Soluble films used in this way have two main advantages. Firstly, the exact amount of chemicals required for the purpose is delivered once the film dissolves completely in water. Secondly, as there is avoidance of direct contact with the chemicals, the introduction of soluble film products has the potential to improve safety. That being said, the integrity of the soluble film can be compromised and the contents of the tablet can be released prematurely when in contact with moist hands or saliva.

Both traditional and soluble film tablets commonly contain a source of hydrogen peroxide (often as sodium percarbonate) and non-ionic surfactants. Other constituents in some formulations include sodium carbonate, sodium tripolyphosphate and sodium silicate, which reduce water hardness. The pH once dissolved in water is alkaline.

Soluble film automatic dishwashing tablets

The NPIS has recently published the first study to investigate the toxicity of soluble film automatic dishwashing tablets.[14] Telephone enquiries to the NPIS regarding these products were analysed retrospectively for the period January 2008 to December 2015.

[14] Day R, Eddleston M, Thomas SHL, Thompson JP, Vale JA. Toxicity of soluble film automatic dishwashing products as reported to the United Kingdom National Poisons Information Service 2008-2015. Clin Toxicol 2016; 54: 862-6.

There were 498 enquiries relating to 488 patients. Almost all exposures occurred in the home (98.4%) and involved children aged five years or younger (92.8%). Exposure occurred mainly as a result of ingestion alone (n=470, 96.3%) or eye contact alone (n=9, 1.8%); exposures involving multiple routes (ingestion with skin or eye contact; n=9, 1.8%) made up the remaining cases.

The majority of patients were asymptomatic following exposure (n=325, 67.4%). The most common feature following ingestion was vomiting which occurred in 121 of 474 cases (25.5%) where clinical data were available. Nausea (n=8, 1.7%) and coughing (n=6, 1.3%) were also reported; three patients developed stomatitis and another five developed a rash where ingestion alone was considered to be the sole route of exposure. Ocular exposure to the tablet contents resulted in blurred vision, eye pain or conjunctivitis in seven of 10 patients.

In conclusion, ingestion of a soluble film automatic dishwashing tablet rarely resulted in clinically significant symptoms, which is surprising given the potential hazard of the ingredients. Hence, it seems probable that the amount of material actually ingested was very small or that most was spat out.

Traditional automatic dishwashing tablets

During 2016/17 the NPIS published the first study in recent decades to investigate the toxicity of traditional automatic dishwashing tablets, and compared them to the soluble film product type.[15]

There were 503 enquiries relating to 492 patients who had been exposed to a traditional tablet. Most involved children aged five years or less (87.4%). The majority (78.6%) of patients did not develop symptoms after exposure; 21.1% developed minor (poisoning severity score [PSS, see Section 2]) symptoms while one patient developed moderate features. Exposure occurred predominantly as a result of ingestion (n=476, 96.7%); the most common feature in symptomatic patients (n=99, 20.8%) was vomiting (70 [14.7%] cases). Significantly ($p<0.0001$) more adults (44.9% of 49 adults; 95% CI = 31.9-58.7) were reported with features than children (18.2% of 434; 95% CI = 14.9-22.1). There were five cases of eye contact which resulted in eye pain in two patients and eye irritation in another. Only one of 11 patients exposed dermally developed features (a rash around the mouth).

[15] Day R, Eddleston M, Thomas SHL, Thompson JP, Vale JA. Exposures to traditional automatic dishwashing tablets and a comparison with exposures to soluble film tablets reported to the United Kingdom National Poisons Information Service 2008–2015. Clin Toxicol 2017; 55: 206-12.

Comparison between traditional and soluble film exposures

Although exposure to both traditional and soluble film automatic dishwashing tablets rarely produced clinically significant symptoms (PSS ≥ 2), the proportion of patients that became symptomatic following ingestion of a soluble film dishwashing tablet (31.7% of 473 patients; 95% CI=27.7-36.0) was significantly greater ($p<0.0001$) than that for a traditional tablet (20.9% of 483 patients; 95% CI=17.5-24.8). Vomiting was the most commonly reported feature and occurred significantly ($p<0.0001$) more frequently amongst patients who had ingested a soluble film tablet (25.5%; 95% CI =21.8-29.6) than a traditional tablet (14.7%; 95% CI =11.8-18.1).

The reasons for the difference in frequency of symptoms after ingestion of soluble film tablets and traditional tablets are not known with certainty, but may relate to the relative hardness of traditional tablets, which children may find difficult to bite. In addition, soluble film tablets containing a liquid may result in greater ingestion of material.

Liquid laundry detergent capsules

The NPIS has published previously detailed data on 2,133 exposures to liquid laundry detergent capsules.[16,17,18] Although the majority of patients remain asymptomatic or suffer only minor features (PSS 1), a small proportion develop more severe features such as CNS depression, stridor, pulmonary aspiration and/or airway burns following ingestion, and conjunctivitis leading to corneal ulceration from eye exposure.[16,17,18]

As a consequence, the International Association for Soaps, Detergents and Maintenance Products (AISE) established a Product Stewardship Programme in Europe, requiring that safety measures be implemented to reduce the visibility of, and restrict access to, these detergent capsules by small children. Implementation occurred in the UK over several months during the first half of 2013 and the NPIS has reported on the impact of the Product Stewardship Programme on the number of exposures and their severity reported to the service.

While there was a significant difference ($p=0.0002$) between the mean number of annual exposures (469.4) reported between 2008-2012 and the mean number reported between 2014-2015 (403.5), the number of exposures was decreasing steadily prior to

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[16] Williams H, Bateman DN, Thomas SHL, Thompson JP, Scott RAH, Vale JA. Exposure to liquid detergent capsules: a study undertaken by the UK National Poisons Information Service. Clin Toxicol 2012; 50: 776-80.
[17] Williams H, Jones S, Wood K, Scott RAH, Eddleston M, Thomas SH, et al. Reported toxicity in 1486 liquid detergent capsule exposures to the UK National Poisons Information Service 2009–2012, including their ophthalmic and CNS effects. Clin Toxicol 2014; 52: 136-40.
[18] Day R, Eddleston M, Thomas SHL, Thompson JP, Vale JA. The impact of an international initiative on exposures to liquid laundry detergent capsules reported to the United Kingdom National Poisons Information Service between 2008 and 2015. Clin Toxicol 2017; 55: 213-6.

implementation of the Programme in 2013, which did not impact this fall from 2013 onwards. In addition, the number of exposures per million units sold was not impacted by the Programme. There was no significant difference (p=0.68) between the mean number of exposures with PSS ≥ 2 reported between 2008-2012 (11.8) and the mean number reported between 2014-2015 (13.0). Although there was a 28.7% decrease between 2010-2012 and 2014-2015 in the number of exposures with PSS ≥ 2 per million units sold, this decrease was not statistically significant (p=0.18).

Thus, there is no evidence that the Product Stewardship Programme has had a beneficial impact on the number of exposures reported to the NPIS or their severity.

Automotive screenwashes

These products may contain ethylene glycol and/or methanol and/or isopropanol, or ethanol alone or in combination with the other ingredients. The concentrations and combinations of each constituent can vary considerably between products. Some products are sold 'ready-to-use' off the shelf while others require dilution in water at various ratios dependent on season. The NPIS has recently published the first study to investigate the toxicity of screenwashes.[19]

There were 295 enquiries involving 255 individual exposures. The majority (n=241, 94.5%) of exposures involved ingestion and 14 of these also involved other routes. Six cases were due to skin contact alone, three to inhalation alone, three to eye contact alone, one to ear exposure alone and another occurred from inhalation and skin contact. Children below five years of age accounted for 26% of all ingestions.

The identity (and therefore composition) of the screenwash was known with certainty in 124 of 241 ingestions and is shown in Table 6.5.1. Products included methanol in 106 formulations, isopropanol in 72, ethylene glycol in 38, and ethanol in 104.

The PSS was known in 235 of 241 cases of ingestion: most patients were asymptomatic (n=169, 71.9%), but 59 (25.1%) developed minor (PSS 1), 6 (2.6%) moderate (PSS 2), and 1 patient severe (PSS 3) features; this patient later died. Nausea (n=10), vomiting (n=11), abdominal pain (n=10), metabolic acidosis (n=8) and raised anion gap (n=8) were the clinical features reported most commonly after ingestion.

In conclusion, most patients (71.9%) ingesting automotive screenwash did not develop features. The implication is that the amount of screenwash ingested was very small.

[19] Day R, Eddleston M, Thomas SHL, Thompson JP, Bradberry SM, Vale JA. Toxicity from automotive screenwashes reported to the United Kingdom National Poisons Information Service (NPIS) from 2012 to 2015. Clin Toxicol 2017; 55: 221-6.

The concentrations of ethanol in most screenwashes did not appear to impact potential toxicity. Skin and eye exposure produced either no features or only minor toxicity.

Table 6.5.1 Composition of screenwash products ingested

Product composition (n=124)	n=
Methanol (19 also contained ethanol)	23
Methanol and ethylene glycol (12 also contained ethanol)	14
Methanol and isopropanol (45 also contained ethanol)	55
Methanol, ethylene glycol and isopropanol (13 also contained ethanol)	14
Ethylene glycol (eight also contained ethanol)	10
Isopropanol (three also contained ethanol)	3
Ethanol alone	4
Citric acid and boric acid	1

Oven cleaners

Oven cleaning products contain corrosive substances, typically sodium or potassium hydroxide.[20] The NPIS has published a study to investigate the toxicity of oven cleaners.

Telephone enquiries regarding oven cleaning products were analysed retrospectively for the period January 2009 to December 2015 and 796 enquiries relating to 780 patients were identified. Ninety-six percent of the products involved in the reported exposures contained sodium hydroxide and/or potassium hydroxide. Ingestion alone (n=285) or skin contact alone (n=208) accounted for the majority of cases; inhalation alone (n=101), eye contact alone (n=97), and multiple routes of exposure (n=89) accounted for the remainder. Ninety-five percent of patients exposed by inhalation, 94% exposed dermally and 85% reporting eye exposure, developed features of toxicity. Patients exposed by multiple routes developed symptoms in 70% of cases.

Only 103 of the 285 patients ingested oven cleaner directly, whereas 182 patients ingested food they considered to have been contaminated with oven cleaner. In 100 of the 103 direct ingestions where the features and PSS were known, 56 reported symptoms which were minor in 51 cases. The most common features following ingestion were vomiting (n=26), abdominal pain (n=22) or pharyngitis (n=15). Skin burns

[20] Day RC, Bradberry SM, Sandilands EA, Thomas SHL, Thompson JP, Vale JA. Toxicity resulting from exposure to oven cleaners as reported to the UK National Poisons Information Service (NPIS) from 2009 to 2015. Clin Toxicol 2017. Published online 26/4/17.

(n=91), predominantly involving the hands or arms, occurred in 44% of dermal exposures. Following inhalation, patients frequently developed respiratory features (n=52) including coughing and chest pain/tightness. Eye pain (n=43) and conjunctivitis (n=33) commonly occurred following ocular exposure.

In conclusion, most (71%) patients exposed to an oven cleaner irrespective of the route of exposure developed features of toxicity, though in most cases only minor features developed; moderate or severe features ensued in 4%. Those patients exposed dermally, ophthalmically or by inhalation developed features more frequently (>85%) than those who had ingested a product directly (56%).

Grout, tile and floor stone sealants

These products contain a solvent, a water-repelling agent and, in the case of aerosols, a propellant. The water-repelling agent used is typically a fluoropolymer resin, a silicon based resin, or a combination of both.[21]

A retrospective analysis was performed of 101 telephone enquiries received between 2009 and 2015 involving 96 exposures. The majority of the exposures (n=88) occurred when the sealant was delivered from an aerosol. Twelve patients were exposed occupationally and the remainder were exposed while using the product at home. Eighty-nine exposures were as a result of inhalation alone, two followed ingestion, three skin contact and one eye contact; another involved inhalation and eye contact.

All 90 patients exposed by inhalation developed clinical features: 31 had a PSS of 1 (minor toxicity), 51 patients had features of moderate toxicity (PSS 2) and 8 were graded as having severe toxicity (PSS 3).The most common features were dyspnoea (n=52; 57.8%; 95% CI=47.0–68.5), chest pain/tightness (n=34; 37.8%; 95% CI=27.2–48.4), coughing (n=27; 30.0%; 95% CI=20.0–40.0) and sinus tachycardia (n=11; 12.2%; 95% CI=4.1–18.2); hypoxaemia was present in 20 (22.2%; 95% CI=13.1–31.4). At the time of the enquiry a chest X-ray had been performed on 15 patients: in eight patients (all of whom were PSS 3) the X-ray was reported as being abnormal and showed bilateral shadowing.

In conclusion, if fluoropolymer-containing sealants are inhaled then clinical features may occur and in a small proportion of cases (9%) these features may be severe.

[21] Henke D, Campbell A, Bradberry SM, Sandilands EA, Thomas SHL, Thompson JP, et al. Toxicity from fluoropolymer-containing grout, tile and stone floor sealants reported to the UK National Poisons Information Service 2009–2015. Clin Toxicol 2017; 55: 585-8.

6.6 Dinitrophenol (DNP)

Dinitrophenol is an industrial chemical sometimes purchased from dealers or via the internet and taken for weight reduction and 'body sculpting'. While DNP can reduce body fat, the chemical is highly toxic and not safe for human consumption. DNP has been associated with a number of severe episodes of toxicity in the UK in recent years, including several deaths. For this reason, NPIS has been monitoring enquiries relating to DNP, publishing data in our annual reports and providing more frequent updates to Public Health England and the Food Standards Agency.

During 2016/17, the reductions in telephone enquiries and TOXBASE accesses relating to DNP observed in the previous year have been maintained. Compared to 2015/16, the numbers of separate patients involved in telephone enquiries about systemic DNP exposure fell from 35 to 14, while accesses to the TOXBASE entry on DNP fell from 356 to 120.

While these reductions are encouraging, there continue to be occasional episodes of severe toxicity and NPIS is aware of two patients referred to the service during 2016/17 with DNP poisoning who subsequently died, increasing the total number of DNP-related deaths reported to the service to 13 since 2008 (Figure 6.6.1).

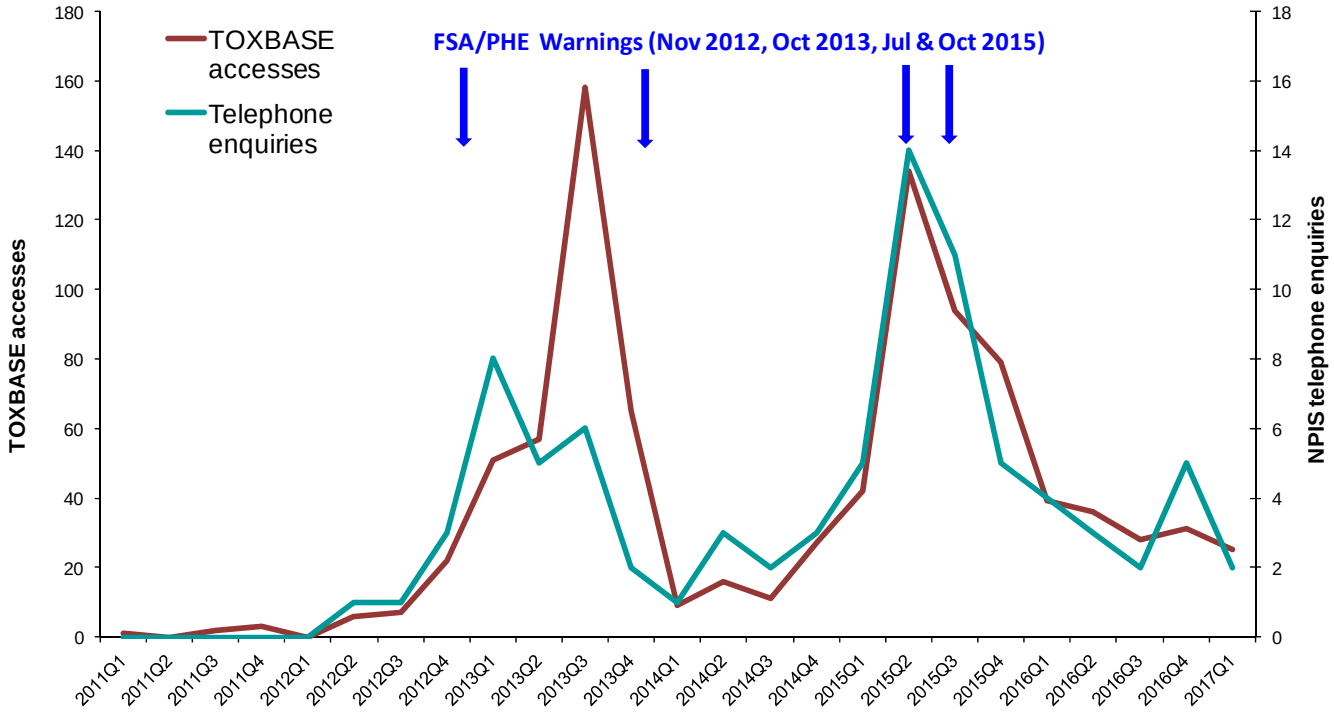

Figure 6.6.1 Telephone enquiries and TOXBASE accesses relating to DNP 2008-2017

6.7 Snake bite

During 2016/17 the NPIS received 113 telephone enquiries concerning snake bites. This represents 0.26% of all enquiries to the service, and is similar to the number of enquiries about snake bites in previous years.

The snake was identified as *Vipera berus* (European adder) in 51% of enquiries, 38% of enquiries regarded an exotic (non-indigenous) species, while the species was unknown in 11%. All exotic species were reported as being privately owned. The most frequently encountered were hognose snakes (40%), pythons (12%), corn snakes (9%), puff adders (9%), rattlesnakes (9%) and boas (7%). Enquiries related to venomous snakes included puff adders (4), rattlesnakes (3), spitting cobras (2) and mangrove swamp snakes (1).

Seasonal trends showed 86% of enquiries were received between the months April and September with a peak in July (26% of cases) and for *Vipera berus* reflects times of activity during the warmer months (Figure 6.7.1).

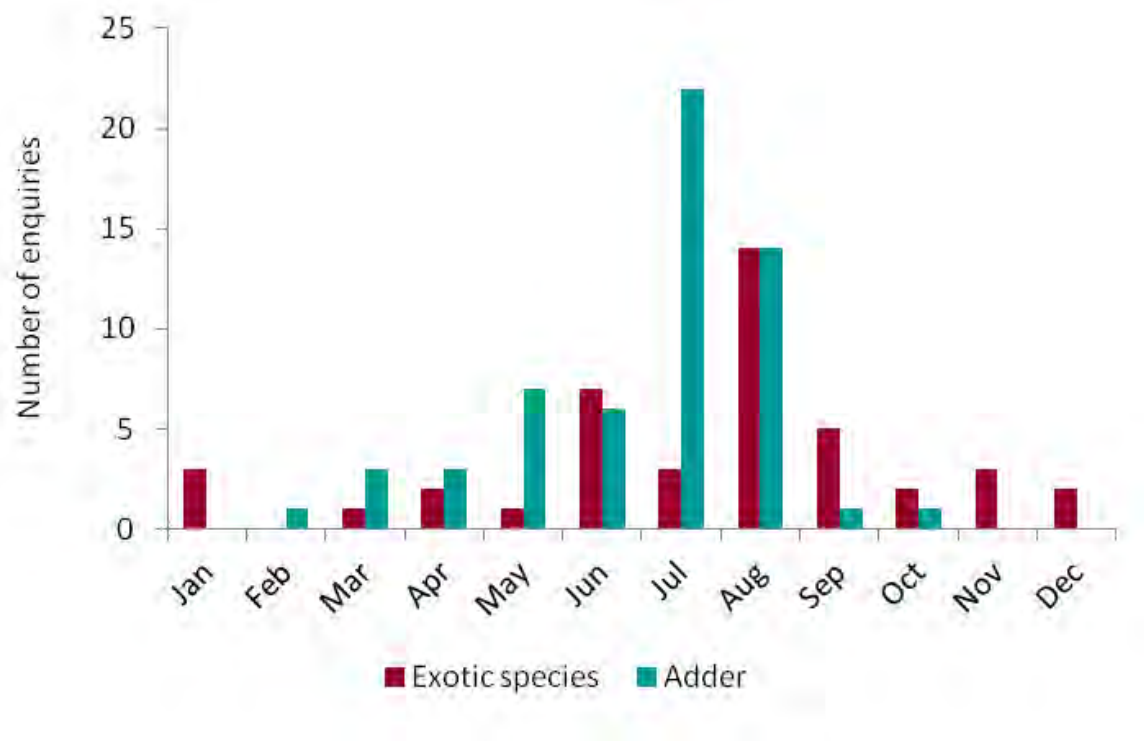

Figure 6.7.1 Number of snake bite cases reported to NPIS in 2016/17, by month

The injury site was identified as the upper limb (hand or arm) in 53%, the lower limb (foot, ankle, shin, calf or thigh) in 31% and the head, chest or buttock in 2%. Eye contact with venom from a spitting cobra rather than from a bite was responsible in 2% of cases, while in 11% the site of injury was not recorded.

Eighty-five percent of cases reported features of envenoming including oedema (75%), cardiovascular effects [8% tachycardia; 7% hypotension; 1% hypotension and tachycardia] (16%), gastrointestinal effects (vomiting & diarrhoea) (11%) and anaphylaxis (defined as hypotension with one or more features of orofacial oedema, rash or bronchospasm) (2%).

Twenty-eight cases were assessed by clinicians in consultation with the NPIS as requiring antivenom, and two cases had received antivenom treatment prior to contacting the NPIS. The NPIS has access to National Antivenom Experts / Consultant Toxinologists for the more complex, serious or unusual cases of exposure to exotic animals and seven cases were discussed via this route.

The majority of bites were from *Vipera berus* but people who keep exotic snakes as pets should be aware of risk of being bitten, and of the need to know the exact species of snake they are keeping so that appropriate treatment may be given in the event of envenomation.

6.8 Button batteries

Button batteries are circular power supply units, typically 10 to 30 mm in diameter, found in portable items such as watches and hearing aids. They often contain inorganic lithium compounds which can be strongly alkaline liquids. Features following ingestion are primarily due to local effects around the battery manifested as irritating and potentially corrosive and electrolytic effects on the gastrointestinal mucosa. Oesophageal obstruction or erosion is known to be a particular hazard due to the locally corrosive properties combining with pressure effects.

This year the NPIS received 54 telephone enquiries concerning button batteries. Exposures often involved children aged less than five years (20 cases), and those aged over 70 years (18 cases). Only 12 enquiries concerned patients outside these age ranges, while in four cases the age was unknown. Of the 54 people exposed, 43 had no symptoms at the time of the enquiry, 10 had minor and one patient had moderate features. Typical features included abdominal pain, melaena (bleeding from the bowel), vomiting, diarrhoea and oesophagitis.

The pattern of poisoning seen this year is similar to that in recent years. Over the last five years the NPIS has received 273 telephone enquiries concerning button batteries with annual totals ranging from 48 to 66 calls. The majority of enquiries were received from healthcare professionals working in hospitals (53%) with 88% of all enquiries recorded as accidental ingestions.

Given the potentially serious consequences of exposure, button batteries should be stored securely and kept away from young children.

6.9 Non-steroidal anti-inflammatory drugs (NSAIDs)

Non-steroidal anti-inflammatory drugs, of which there are many examples, are widely used to treat pain and inflammatory conditions. Because of their widespread availability, they are often involved in episodes of drug overdose. One example, ibuprofen, is the second most common substance (after paracetamol) involved in telephone and TOXBASE enquiries to the NPIS.

There is accumulating evidence that the severity of toxicity after NSAID overdose depends on the specific drug involved. Case reports and small case series have suggested that the risk of central nervous system (CNS) effects and especially seizures appears particularly high following overdose with the NSAID mefenamic acid. This is important not only because of the physical risks and social consequences of having a seizure, but also because mefenamic acid has for many years been used to treat women with painful or heavy periods. The NPIS continues to receive enquiries about management of overdose with mefenamic acid, although prescribing of this medicine has been declining over several years.

A study was therefore performed using routinely collected anonymised data collected by NPIS during telephone enquiries to compare the frequency of central nervous system features, including seizures, after overdose with mefenamic acid in comparison with three other commonly used NSAIDs, ibuprofen, diclofenac and naproxen.

A full report of the study, which involved assessment of almost 23,000 NPIS telephone enquiry records, has recently been published.[22] In brief, the research demonstrated that CNS complications after overdose were substantially and significantly more common with mefenamic acid than with the other NSAIDs studied (adjusted odds ratio 7.77, 95% confidence interval 5.68, 10.62). The difference was especially great for the risk of seizure, which was more than 80 times greater following overdose with mefenamic acid than with the other NSAIDs (adjusted odds ratio 81.5, 95% confidence interval 27.8, 238.8).

There is no convincing evidence that mefenamic acid offers clinical benefits that cannot be obtained with other less toxic NSAIDs. Therefore, because of the very high risk of seizure after overdose, the use of mefenamic acid should be avoided where possible. It

[22] Kamour A, Crichton S, Cooper G, Lupton DJ, Eddleston M, Vale JA, et al. Central nervous system toxicity of mefenamic acid overdose compared with other NSAIDs: an analysis of cases reported to the United Kingdom National Poisons Information Service. Br J Clin Pharmacol 2017; 83: 855-62.

is for regulatory authorities to reassess the balance of benefits and risks and consider whether further steps should be taken to mitigate the risks of mefenamic acid toxicity.

6.10 Cyanide

Patients may become exposed to cyanide-containing compounds from a variety of sources either by ingestion, through the skin or by inhalation. Ingestion of cyanide salts, either deliberately or accidentally, can have potentially serious or fatal effects and cyanide may also be found as a product of combustion (together with other toxins), for example from house fires or cigarettes. Some foods contain cyanogens, and eating these in excess can result in raised concentrations of cyanide in the body.

During 2015/16, 95 telephone enquiries were made to the NPIS where the caller was concerned about exposure to cyanide, a cyanogen, or where the presence of cyanide was recorded. Of these, 38 involved a cyanogen-containing plant, 26 a call where cyanide was discussed as a possible toxin from products of combustion, 19 where hydrogen cyanide or a cyanide salt was the cause of concern and three following exposure to acrylonitrile. The source was unknown in nine cases.

Where the gender was known, females were involved more commonly following plant exposures (22F v 13M), while men were much more commonly exposed to cyanide and its salts (3F v 16M); putative cyanide exposure to products of combustion occurred almost equally between genders (11F v 12M).

Of the 95 exposures, 75 occurred in a domestic situation and 10 at work. The majority of putative domestic exposures were due to plants (38) and products of combustion (24) with eight involving cyanide or a cyanide salt. Of the 10 workplace exposures, none involved either plants or products of combustion: seven were due to cyanide and its salts, two to acrylonitrile and one to an unknown compound.

The severity of features present at the time of the enquiry is recorded using a poisons severity score. Of the 38 enquiries involving plants, 25 were asymptomatic, 12 had minor features and one had moderate features. No patient had severe effects. In contrast, of the 26 cyanide enquiries concerning products of combustion, three were asymptomatic, nine had minor features, four moderate and nine severe features. In enquiries concerning cyanide salts, six were asymptomatic, seven had minor features, five moderate effects and one had severe effects. Of the three acrylonitrile enquires, one was asymptomatic and two had minor features only. The severity was not recorded in nine cases.

In the absence of a clear history of cyanide poisoning, diagnosis may be difficult as it is not possible to obtain analytical conformation rapidly enough to influence initial

management. Whilst it is important to consider the possibility of cyanide exposure from products of combustion, it is fortunate that cyanide concentrations fall as soon as the patient is removed from the source of exposure.

6.11 Oral anticoagulants

Patients who have had a venous thrombosis or embolism or a cardiac arrhythmia (especially atrial fibrillation) may require treatment with an anticoagulant and for some people treatment is lifelong.

Historically anticoagulation has been achieved using medicines which antagonise vitamin K-dependent clotting factors (e.g. warfarin). Their use is complicated by a narrow therapeutic range, extensive drug interactions and a requirement for routine monitoring with blood tests. In overdose, an antidote, vitamin K, is available to reverse their effects. More recently, directly-acting anticoagulants (DOAC's) have been introduced (e.g. apixaban, dabigatran, edoxaban and rivaroxaban) which do not require routine therapeutic monitoring. Not all DOACs had antidotes available, however, and concerns have been raised about consequences of overdosage.

The pattern of anticoagulant prescribing in the UK is changing, with the use of directly acting agents becoming more common. This has resulted in increases in the numbers of NPIS telephone enquiries received about these agents (Figure 6.11.1). This year the NPIS received more telephone enquires (410) than in recent years concerning oral anticoagulants. An increase in enquiries about DOAC's has been accompanied by a smaller fall in the number of enquiries about warfarin (Figure 6.11.2). Enquiries concerning DOACs are now more than twice as common (286) than those involving warfarin (124). Most enquiries concerned patients who were asymptomatic, but the NPIS will continue to monitor the pattern of enquiries concerning oral anticoagulants.

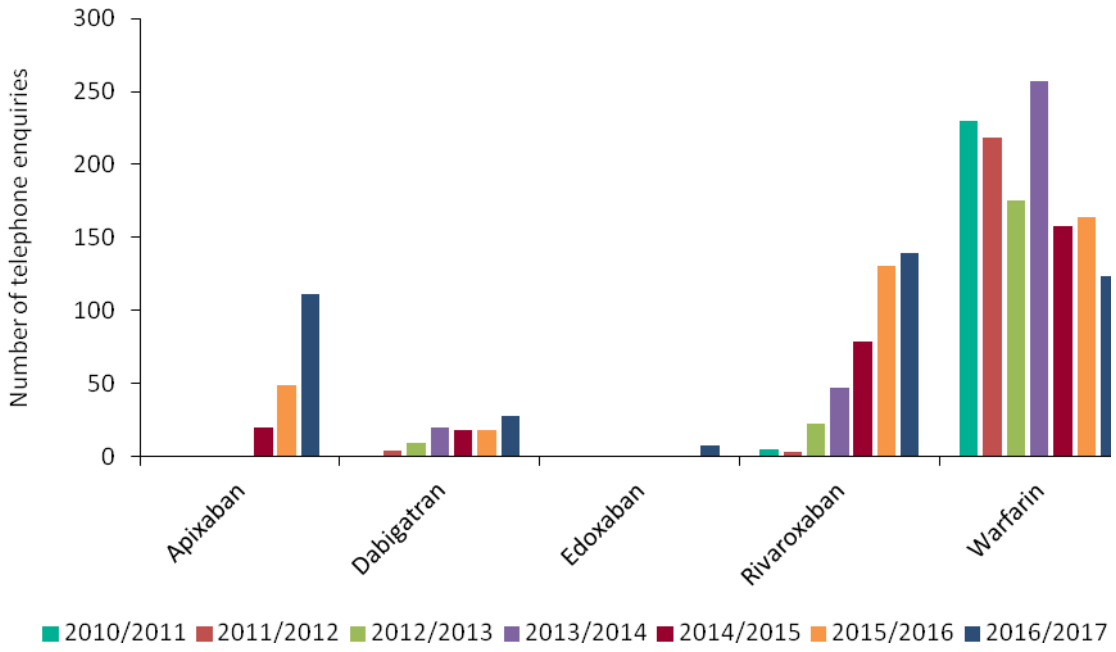

Figure 6.11.1 Telephone enquiries concerning individual direct oral anticoagulants

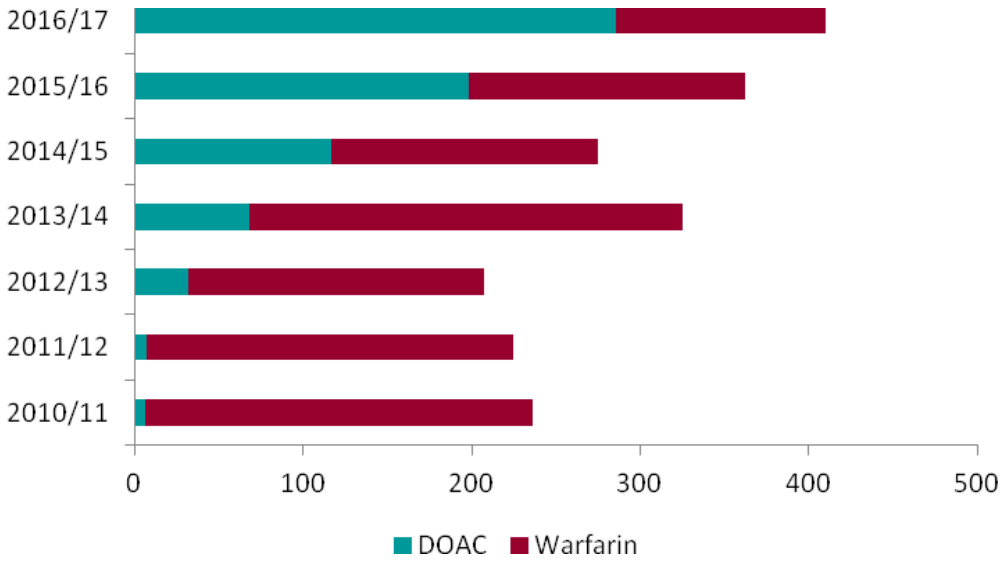

Figure 6.11.2 Telephone enquiries concerning warfarin and direct oral anticoagulants

7. Conclusions

This annual report has demonstrated the quality and value of the services that have been provided by NPIS and UKTIS over the year and our staff can be proud of what has been achieved.

Advice from NPIS continues to be in high demand from front-line NHS healthcare professionals, especially our online information sources, as evidenced by increases in TOXBASE accesses and user sessions and increases in use of the TOXBASE app. These changes have been accompanied by further reductions in telephone enquiry numbers, which may reflect increasing familiarity and satisfaction with our online information. It is possible, however, that increasing difficulty in obtaining telephone advice as a result of reduced staffing of the NPIS equiry line may also have contributed to this reduction. At present the evidence that this is a major factor is not strong; our user satisfaction surveys have not detected a recent change and only one critical event has been reported where advice could not be obtained sufficiently quickly in a critically ill patient. It is important, however, that we continue to monitor this. While telephone enquiries have declined overall, the numbers of complex enquiries and enquiries referred to a consultant have increased.

Similar patterns have been seen for the advice provided by UKTIS on drug and chemical exposures during pregnancy. Telephone enquiry numbers have fallen and there has also been a reduction in accesses to the detailed information available for registered users on TOXBASE. In contrast, however, there has been an increase in accesses to the abstracts openly available to healthcare professionals and members of the public alike on the UKTIS website and there has been a very substantial growth in the use of the patient-focussed information that is now openly available on the ***bumps*** website.

The increasing reliance of NHS staff on our online information sources and the current volume of use emphasises the critical importance of maintaining the thousands of entries involved as accurate, evidence-based and up to date; this is a skilled and labour-intensive task. We have achieved this during 2016/17, with contributions from all NPIS units, but this will continue to be a pressure point, especially as numbers of staff decline.

The NPIS and UKTIS continue to perform surveillance work which is useful for public health purposes; those projects that are externally funded make an important contribution to NPIS income and the number of academic publications achieved continues to be impressive.

Maintaining our services at their current high standard in the context of ongoing reductions in real-term funding will continue to be challenging. We already provide highly productive and cost effective services, but we will need to change our working arrangements further to maximise the support we can provide to NHS healthcare professionals within the resources we can expect to receive.

8. Recommendations

Outcome of Recommendations for NPIS in 2016/17

Re-evaluate best use of staff for maintaining key NPIS functions including the 24-hour telephone rota and the TOXBASE database in the light of reducing funding and staff numbers

Outcome: Essential services have been maintained in spite of reductions in funding and staff numbers

Deliver current surveillance projects that are externally funded and continue to seek further external income to support the integrity of the current service

Outcome: Surveillance projects have continued as specified in the agreements with funding organisations

Evaluate the impact of the Psychoactive Substances Act 2016 on NPIS activity relating to drugs of misuse

Outcome: Data has been collected and presented in this annual report. More detailed analysis of data collected over one year after introduction of the act will be analysed and published during 2017-18

Continue to monitor NPIS data related to poisons of current importance including dinitrophenol, carbon monoxide and pesticides and to report data to appropriate government agencies as appropriate

Outcome: This monitoring has been continued, with data provided to responsible agencies and also published in this annual report

Recommendations for NPIS in 2017/18

Continue to re-evaluate the best use of resources to allow us to maintain key NPIS functions including the 24-hour telephone rota and the TOXBASE database, in the light of reducing funding and staff numbers

Explore and establish staff rotas that allow increased integration of out-of-hours working between units

Develop improved opportunities for continuous professional development of staff through the two-day CPD format and by enhanced distance learning opportunities

Maintain data collection for current externally-funded surveillance projects and continue to seek further external income to support the integrity of the current service

Publish data on the impact of the Psychoactive Substances Act 2016 on NPIS activity relating to drugs of misuse

APPENDIX A Senior NPIS staff

NPIS Consultants and Senior Staff

NPIS Birmingham

Dr S M Bradberry BSc MD FRCP FAACT FEAPCCT
Director, NPIS Birmingham and West Midlands Poisons Unit, City Hospital, Birmingham and Alcohol Lead, Sandwell and West Birmingham NHS Trust, Birmingham

Mr A Campbell BSc MSc DipMedTox FEAPCCT FAACT
Manager, NPIS Birmingham

Professor J A Vale MD FRCP FRCPE FRCPG FFOM FAACT FBTS FBPhS FEAPCCT Hon FRCPSG
Consultant Clinical Pharmacologist and Toxicologist, NPIS Birmingham, City Hospital, Birmingham; Honorary Professor, University of Birmingham

NPIS Cardiff

Mrs G L Alldridge MBE
Senior Information Services Manager, NPIS Cardiff

Dr J Coulson BSc MBBCh LLM MD MRCP DipMedTox DipTher GCGI FRCPE ERT
Senior Lecturer in Clinical Pharmacology, Centre for Medical Education, Cardiff University and Honorary Consultant, Cardiff and Vale University Health Board

Dr C V Krishna MD FRCP DipMedTox DipTher
Deputy Director, NPIS Cardiff; Consultant Physician, Clinical Pharmacologist, Toxicologist Cardiff and Vale University Health Board and Honorary Senior Clinical Lecturer, Cardiff University

Dr A Thomas MBChB MRCP
Senior Lecturer in Clinical Pharmacology, Centre for Medical Education, Cardiff University and Honorary Consultant, Cardiff and Vale University Health Board

Dr J P Thompson BMedSci MBChB FRCP FBTS FEAPCCT FBPhS
Director, NPIS Cardiff; Senior Lecturer in Clinical Pharmacology, Centre for Medical Education, Cardiff University and Honorary Consultant, Cardiff and Vale University Health Board

NPIS Edinburgh

Dr J W Dear PhD FRCPE
Reader in Clinical Pharmacology and Honorary Consultant Clinical Toxicologist, University of Edinburgh and NHS Lothian

Professor M Eddleston ScD FRCPE FEAPCCT
Professor of Clinical Toxicology, University of Edinburgh; Consultant Clinical Toxicologist, NPIS Edinburgh and Royal Infirmary of Edinburgh

Dr G Jackson BSc DipMedTox PhD
Information Services Manager, NPIS Edinburgh

Dr E A Sandilands BSc MD FRCP Edin
Director, NPIS Edinburgh; Consultant Physician and Clinical Toxicologist, Royal Infirmary of Edinburgh; Honorary Senior Clinical Lecturer, University of Edinburgh

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

NPIS Newcastle (including UKTIS)

Mrs S Bradley BSc MSc
Information Services Manager, NPIS Newcastle

Dr S L Hill BSc MBBS MRCP
Consultant Physician and Clinical Toxicologist, Newcastle upon Tyne Hospitals NHS Foundation Trust; Honorary Clinical Senior Lecturer, Institute of Cellular Medicine, Newcastle University

Dr S Stephens BSc PhD
Assistant Head of Teratology, UK Teratology Information Service, Newcastle upon Tyne Hospitals NHS Foundation Trust; Honorary Associate Fellow, Institute of Cellular Medicine, Newcastle University

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

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

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

Consultants providing on-call support for the NPIS

Professor P I Dargan FRCPE FACMT FRCP FAACT FEAPCCT FBPhS
Consultant Physician and Clinical Toxicologist, Clinical Director, Guy's and St Thomas' NHS Foundation Trust, and King's Health Partners, London; Professor of Clinical Toxicology, King's College London, London

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

Dr D M Wood MD FRCP FEAPCCT FACMT FBPhS
Consultant Physician and Clinical Toxicologist and Service (clinical) Lead for Medicine, Guy's and St Thomas' NHS Foundation Trust and King's Health Partners, London; Honorary Senior Lecturer, King's College London, London

Consultants providing specialist support for the NPIS

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

Dr J M Wraight MBChB MSc FCEM Dip Med Tox
Consultant Emergency Physician with Toxicology, St John's Hospital, Livingston and the Royal Infirmary of Edinburgh

National and international appointments of NPIS senior staff

NPIS staff have roles 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

ACADEMIC ACTIVITIES

Honorary Senior Lecturer: School of Biosciences, University of Birmingham
Joint Course Organiser: MSc (Toxicology), University of Birmingham
Educational and Clinical Supervisor: Sandwell and West Birmingham Hospitals NHS Trust

Mr A Campbell

INTERNATIONAL ACTIVITIES

Past-President: European Association of Poisons Centres and Clinical Toxicologists (EAPCCT)
Member: Scientific and Meetings Committee (EAPCCT)

Member: Finance Committee (EAPCCT)
Member: Communications Committee (EAPCCT)
Chair: Nomination Committee (EAPCCT)
Chair: Education Committee (EAPCCT)
Member: Contracts Working Group (EAPCCT)
UK ADVISORY COMMITTEES
Member: British Small Animal Veterinary Association (BSAVA) Petsavers Grants Award Committee

Professor J A Vale
INTERNATIONAL ACTIVITIES
Member: Advisory Board Hong Kong Poisons Centre
INTERNATIONAL JOURNALS
Reviews Editor: Clinical Toxicology
ACADEMIC ACTIVITIES
Joint Course Organiser: MSc (Toxicology), University of Birmingham
Examiner: MRCP(UK) Part 2 Clinical Examination (PACES)

NPIS Cardiff

Dr J Coulson
UK ADVISORY COMMITTEES
Member: Committee on Toxicity
Co-opted member: Tramadol subcommittee to the Advisory Panel on Substance Misuse
NHS NATIONAL AND REGIONAL COMMITTEES
Member: All Wales Medicines Strategy Group
ACADEMIC ACTIVITIES
Clinical Senior Lecturer: Cardiff University
Visiting Lecturer: Birmingham University

Dr C V Krishna
UK ADVISORY COMMITTEES
Member: Specialist Advisory Committee, Clinical Pharmacology and Therapeutics
Workforce Lead: Clinical Pharmacology in the UK
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: All-Wales Specialist Training Committee in Clinical Pharmacology
ACADEMIC ACTIVITIES
Course Director: Medical Toxicology Courses, Cardiff University
Member: SAC, Clinical Pharmacology and Therapeutics, UK
Member: Programme Management Committee, Diploma in Therapeutics, Cardiff University
PACES Examiner: Royal College of Physicians, UK

Dr A Thomas

NHS NATIONAL AND REGIONAL COMMITTEES

Medical Director: Yellow Card Centre Wales
Member: New Medicines Group, All-Wales Medicines Strategy Committee
Member: All-Wales Specialist Training Committee in Clinical Pharmacology

ACADEMIC ACTIVITIES

Theme Lead: BDS Human Disease Course, Cardiff University
Member: Steering Committee, Diploma/MSc in Medical Toxicology, Cardiff University
Member: Steering Committee, Diploma in Therapeutics, Cardiff University
Member: Final Year Exam Executive, Cardiff University

Dr J P Thompson

INTERNATIONAL ACTIVITIES

Member: Advisory Board Hong Kong Poisons Centre
Consultant: WHO Collaborating Centre for Chemical Incidents
Member: TAIEX Panel of Experts for European Commission

INTERNATIONAL SOCIETIES

Chair: EAPCCT Working Group on International Poisons Centre Activities and Regulatory Affairs
Member: EAPCCT Board

UK ADVISORY COMMITTEES

Member: Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment (COT)
Senior Medical Officer: Yellow Card Centre (Wales)

NHS NATIONAL AND REGIONAL COMMITTEES

Chair: Human Toxicology Section, British Toxicology Society
Honorary Secretary: Joint Specialty Committee, Clinical Pharmacology and Therapeutics
Member: New Medicines Group, All-Wales Medicines Strategy Committee
Member: All-Wales Specialist Training Committee in Clinical Pharmacology
Member: New Medicines Group for All Wales Medicines Strategy Group

ACADEMIC ACTIVITIES

Member: Programme Management Committee 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

Dr J Dear

INTERNATIONAL ACTIVITIES

Member: EMA Scientific Advisory Group on Paracetamol

NHS NATIONAL AND REGIONAL COMMITTEES

Deputy Director: Yellow Card Centre, Scotland

Member: Lothian Formulary Committee

ACADEMIC ACTIVITIES

External Examiner: BSc Clinical Pharmacology, Kings College, London
External Examiner: MSc/Diploma in Medical Toxicology, Cardiff University
Member: British Pharmacological Society Clinical Section Committee
Chair: Toxicology Affinity Group for British Pharmacological Society

Professor M Eddleston

INTERNATIONAL ACTIVITIES

Member: WHO Expert Advisory Group for the FAO and WHO Joint Meeting on Pesticide Management
Advisor: World Health Organization/Department of Evidence and Policy on Environmental Health

INTERNATIONAL SOCIETIES

Scientific Committee Member: EAPCCT

INTERNATIONAL JOURNALS

Editorial Board Member: Clinical Toxicology

UK ADVISORY COMMITTEES

Member: UK Department of Health Committee on Antivenoms

Dr E A Sandilands

UK ADVISORY COMMITTEES

Advisor: Consortium of Local Education Authorities for the Provision of Science in Schools (CLEAPSS)
Advisor: Scottish Schools Education and Research Centre (SSERC)

NHS NATIONAL AND REGIONAL COMMITTEES

Member: Lothian Drug and Therapeutics Committee

ACADEMIC ACTIVITIES

MBChB Year 6 Medicine Module Organiser: University of Edinburgh

Dr A Veiraiah

NHS NATIONAL AND REGIONAL COMMITTEES

Medical Lead: SPSP Medicines

ACADEMIC ACTIVITIES

Lothian QI Academy Coach

NPIS Newcastle (including UKTIS)

Dr S Hill

NHS NATIONAL AND REGIONAL COMMITTEES

Member: UK Focal Point Early Warning System on New Psychoactive Substances
Member and Curriculum Lead: Specialist Advisory Committee, Clinical Pharmacology and Therapeutics, Northern Deanery Representative

Member: MRCP Part 1 and 2 Specialty Question Writing Group

ACADEMIC ACTIVITIES

Strand Lead: Masters in Clinical and Health Sciences with Therapeutics, Newcastle University
Module Lead: Masters in Clinical and Health Sciences with Therapeutics – Drug Discovery and Pre-clinical Development, Newcastle University
Module Lead: Drug Discovery and Development, Masters by Research in Translational Medicine, Newcastle University
Training Programme Director and SAC Representative: Clinical Pharmacology and Therapeutics, HEE North East
Member: Clinical Pharmacology and Therapeutics STC (HEE North East)
Member: Acute Medicine STC/DWDN Lead (HEE North East)
Educational Supervisor: PHE Funded Advanced Fellowship in Clinical Toxicology
Site Lead: Foundations of Clinical Practice, MBBS stage 3, Royal Victoria Infirmary, Tyne base unit, Newcastle University

Dr H K R Thanacoody

UK ADVISORY COMMITTEES

Member: Pharmacovigilance Expert Advisory Group, Medicines and Healthcare Products Regulatory Agency

ACADEMIC ACTIVITIES

Member: Joint Royal Colleges MRCP (Part 1) Examining Board
Module Leader: Experimental Medicine and Therapeutics, MRes in Translational Medicine, Newcastle University
Module Leader: Drug Development from First-in-Man to Bedside, Masters in Clinical and Health Sciences, Newcastle University

Professor S H L Thomas

INTERNATIONAL ACTIVITIES

Expert Panel Member: European Medicines Agency

INTERNATIONAL JOURNALS

Deputy Editor: Clinical Toxicology

UK ADVISORY COMMITTEES

Co-opted Member: Technical Committee, Advisory Council on Misuse of Drugs
Member: Advisory Council on Misuse of Drugs Novel Psychoactive Substances working group.
Member: Ministry of Defence Advisory Group on Military and Emergency Response Medicine

NHS NATIONAL AND REGIONAL COMMITTEES

Director: Yellow Card Centre (Northern and Yorkshire)
Medical Director: Regional Drug and Therapeutics Centre, Newcastle
Member: Northern Treatment Advisory Group
Member: Northern Regional Medicines Optimisation Committee
Member: North of Tyne Area Prescribing Committee
Chair: North of Tyne Area Prescribing Committee, Formulary Subcommittee

ACADEMIC ACTIVITIES
Strand Leader: MRes in Translational Medicine and Therapeutics, Newcastle University
Regional Speciality Advisor (North East), Clinical Pharmacology and Therapeutics

Dr L Yates
INTERNATIONAL ACTIVITIES
Chair: Working Group 2: Independence and Transparency, European Medicines Agency (EMA) – European Network of Centres for Pharmacoepidemiology and Pharmacovigilance (ENCePP)
Board Member: European Network of Teratology Information Services (ENTIS)
Chair: Pregnancy Special Interest Group, (EMA-ENCePP)
Organising Committee and Faculty member: Building Teratovigilance in Africa Conference, Oct 2017
INTERNATIONAL SOCIETIES
Board Member: European Network of Teratology Information Services (ENTIS)
UK ADVISORY COMMITTEES
Member: Expert Advisory Committee, Medicines and Healthcare Products Regulatory Agency (MHRA)
Member: Valproate Stakeholders Network (MHRA)
ACADEMIC ACTIVITIES
Steering Committee Member: Neurodevelopment of Babies born to Mother's with Epilepsy (NaME) Study, Hyperemesis Gravidarum Interventions Evidence Synthesis Study

Consultants providing on-call support for the NPIS

Professor P I Dargan
INTERNATIONAL ACTIVITIES
Member: European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) Scientific Committee
Board Member: European Association of Poison Centres and Clinical Toxicologists
Vice Chair: European Association of Poison Centres and Clinical Toxicologists Scientific Committee
Board Member: Asia Pacific Association of Medical Toxicology
Scientific Committee Member: Asia Pacific Association of Medical Toxicology
Member: American College of Medical Toxicology International Committee
Abstract Reviewer: American Academy of Clinical Toxicology
Expert Adviser: World Health Organization
Member: WHO/UN Global Alliance to Eliminate Lead from Paint
Member: WHO Global Burden of Disease Expert Panel
INTERNATIONAL JOURNALS
Editorial Board Member: Clinical Toxicology
Editorial Board Member: Case Reports in Medicine
Editorial Board Member: Toxicologie Analytique et Clinique
Editorial Board Member: Journal of Addiction

UK ADVISORY COMMITTEES
Member: Advisory Council on Misuse of Drugs
Member: Technical Committee, Advisory Council on Misuse of Drugs
Co-chair: College of Emergency Medicine Antidote Guideline Group
Member: London Drug and Alcohol Policy Forum
Steering Group Member: National Programme on Substance Abuse Deaths
Invited Expert: Commission on Human Medicines Expert Working Group (Paracetamol 2016)
ACADEMIC ACTIVITIES
Member: King's College London Phase 5 Examination Board Member
Member: Faculty of Translational Medicine, Biomedical Research Centre (BRC) at Guy's and St Thomas' NHS Foundation Trust and King's College London
Member: London Ambulance Service Clinical Audit and Research Steering Group
Examiner: MRCP (UK) Part 2 Clinical Examination (PACES)
External Examiner: University College London PhD, University of Sydney PhD
Member: WHO Global Burden of Disease Expert Panel

Dr W S Waring
INTERNATIONAL JOURNALS
Associate Editor: Therapeutic Advances in Drug Safety
Editorial Board Member: European Journal of Clinical Pharmacology
Editorial Board Member: Expert Review of Clinical Pharmacology
Editorial Board Member: Recent Patents on Cardiovascular Drug Discovery
UK ADVISORY COMMITTEES
Member: Independent Review Panel for Borderline Products, Medicines and Healthcare Products Regulatory Agency
NHS NATIONAL AND REGIONAL COMMITTEES
Regional Specialty Advisor: Clinical Pharmacology and Therapeutics
Member: Regional RCP Advisory Appointments Committee
CPT Representative: RCP Revalidation Specialty Advisory Group
Clinical Examiner: PACES, Royal College of Physicians of Edinburgh
Member: Regional Training Committee for Acute Medicine
ACADEMIC ACTIVITIES
Honorary Senior Lecturer: Hull York Medical School

Dr D M Wood
INTERNATIONAL ACTIVITIES
Expert Advisor: European Monitoring Centre for Drugs and Drug Addiction (EMCDDA)
Member: American Academy of Clinical Toxicology Scientific Review Committee
INTERNATIONAL JOURNALS
Editorial Board Member: Journal of Medical Toxicology
International Scientific Committee Member: Toxicologie Analytique et Clinique
UK ADVISORY COMMITTEES
Co-opted Member: UK Advisory Council on the Misuse of Drugs (ACMD) Technical and Novel

Psychoactive Working Groups
Member: Scientific advisory group on the Health Foundation Funded ‘Project Neptune’
Member: Advisory Board of the Angelus Foundation, now part of Mentor UK

NHS NATIONAL AND REGIONAL COMMITTEES

Member: Department of Health Early Warning System
Member: Public Health England National Drugs Intelligence Network

ACADEMIC ACTIVITIES

Joint Project Co-ordinator: European Drug Emergencies Network (Euro-DEN) Plus project
Lecturer: NPIS/RCEM Clinical Toxicology Training Days
Lecturer: NPIS Cardiff Update in Medical Toxicology course
Royal College of Physicians (RCP) representative: Royal College of Pathology (RCPath) Specialty Advisory Committee on Toxicology

APPENDIX B NPIS publications in 2016/17

92 contributions to the scientific literature were published in 2015/16 by NPIS staff*

* NPIS staff are given in **bold** type
# early online publication details for this paper were previously listed in the 2015/16 NPIS report

Peer-reviewed papers

Acheampong P, **Thomas SHL**. Determinants of hepatotoxicity after repeated supratherapeutic paracetamol ingestion; systematic review of reported cases. Br J Clin Pharmacol 2016; 82: 923-31.

Aldeyab MA, Noble SC, Cuthbert M, Maxwell S, **Dear J**, Boyter A. Assessment of the impact of the Scottish public health campaign on patient reporting of adverse drug reactions. Drug Ther Perspect 2016; 32: 209-18.

Anderson M, **Hawkins L**, **Eddleston M**, **Thompson JP**, **Vale JA**, **Thomas SH**. Severe and fatal pharmaceutical poisoning in young children in the UK. Arch Dis Child 2016; 101: 653-6.

Antoine DJ, **Dear JW**. How to treat paracetamol overdose and when to do it. Expert Rev Clin Pharmacol 2016; 9: 633-5.#

Antoine DJ, **Dear JW**. Transformative biomarkers for drug-induced liver injury: are we there yet? Biomark Med 2017. Published online 18/1/17.

Bailey GP, Najafi J, **Elamin ME**, Waring WS, **Thomas SH**, Archer JR, Wood DM, Dargan PI. Delays during the administration of acetylcysteine for the treatment of paracetamol overdose. Br J Clin Pharmacol 2016; 82: 1358-63.

Balmforth C, van Bragt JJMH, Ruijs T, Cameron J, Kimmitt RA, Moorhouse R, Czopek A, Hu MK, Gallacher PJ, **Dear JW**, Borooah S, MacIntyre IM, Pearson TMC, Willox L, Talwar D, Tafflet M, Roubeix C, Sennlaub F, Chandran S, Dhillon B, Webb DJ, Dhaun N. Chorioretinal thinning in chronic kidney disease links to inflammation and endothelial dysfunction. JCI Insight 2016. Published online 8/12/16.

Bateman DN, **Dear JW**. Should we treat very large paracetamol overdose differently? Br J Clin Pharmacol 2017. Published online 2/3/17.

Cairney DG, Beckwith HKS, Al-Hourani K, Eddleston M, Bateman DN, **Dear J**. Plasma paracetamol concentration at hospital presentation has a dose-dependent relationship with liver injury despite prompt treatment with intravenous acetylcysteine. Clin Toxicol 2016; 54: 405-10.

Charlton RA, McGrogan A, Snowball J, **Yates L**, Wood A, Clayton-Smith J, Smithson WH, Richardson J, McHugh N, **Thomas SHL**, Baker GA, Bromley R. Sensitivity of the UK Clinical Practice Research Datalink to detect neurodevelopmental effects of medicine exposure in utero: a comparative analysis of an antiepileptic drug exposed cohort. Drug Safety. Published online 10/2/17.

Clarke JI, **Dear JW**, Antoine DJ. Recent advances in biomarkers and therapeutic interventions for hepatic drug safety - false dawn or new horizon? Expert Opin Drug Saf 2016; 15: 625-34.#

Coulson JM, Caparrotta TM, **Thompson JP**. The management of ventricular dysrhythmia in aconite poisoning. Clin Toxicol 2017. Published online 20/2/17.

Crawford C, Anderson M, Cooper G, **Jackson G**, **Thompson J**, **Vale A**, **Thomas S**, **Eddleston M**, Bateman DN. Overdose in young children treated with anti-reflux medications: Poisons enquiry evidence of excess 10-fold dosing errors with ranitidine. Hum Exp Toxicol 2017. Published online 1/1/17.

Day R, **Eddleston M**, **Thomas SH**, **Thompson JP**, **Bradberry SM**, **Vale JA**. Toxicity from automotive screenwashes reported to the United Kingdom National Poisons Information Service (NPIS) from 2012 to 2015. Clin Toxicol 2017; 55: 221-6.

Day R, **Eddleston M**, **Thomas SH**, **Thompson JP**, **Vale JA**. Exposures to traditional automatic dishwashing tablets and a comparison with exposures to soluble film tablets reported to the United Kingdom National Poisons Information Service 2008-2015. Clin Toxicol 2017; 55: 206-12.

Day R, **Eddleston M**, **Thomas SH**, **Thompson JP**, **Vale JA**. The impact of an international initiative on exposures to liquid laundry detergent capsules reported to the United Kingdom National Poisons Information Service between 2008 and 2015. Clin Toxicol 2017; 55: 213-6.

Day R, **Eddleston M**, **Thomas SH**, **Thompson JP**, **Vale JA**. Toxicity of soluble film automatic dishwashing products as reported to the United Kingdom National Poisons Information Service 2008-2015. Clin Toxicol 2016; 54: 862-6.

Gosselin S, Hoegberg LC, Hoffman RS, Graudins A, Stork CM, **Thomas SH**, Stellpflug SJ, Hayes BD, Levine M, Morris M, Nesbitt-Miller A, Turgeon AF, Bailey B, Calello DP,

Chuang R, Bania TC, Mégarbane B, Bhalla A, Lavergne V. Evidence-based recommendations on the use of intravenous lipid emulsion therapy in poisoning. Clin Toxicol 2016; 54: 899-923.

Hazell L, Raschi E, De Ponti F, **Thomas SHL**, Salvo F, Helgee AH, Boyer S, Miriam Sturkenboom M, Shakir S. Evidence for the hERG liability of antihistamines, antipsychotics and anti-infective agents: a systematic literature review from the ARITMO project. J Clin Pharmacol 2016. Published online 26/12/16.

Henke D, **Campbell A**, **Bradberry SM**, **Sandilands EA**, **Thomas SHL**, **Thompson JP**, **Vale JA**. Toxicity from fluoropolymer-containing grout, tile and stone floor sealants reported to the UK National Poisons Information Service 2009–2015. Clin Toxicol 2017. Published online 28/3/17.

Hill SL, Najafi J, Dunn M, Acheampong P, Kamour A, Grundlingh J, Blain PG, **Thomas SHL**. Clinical toxicity following analytically confirmed use of the synthetic cannabinoid receptor agonist MDMB-CHMICA. A report from the Identification of Novel Psychoactive Substances (IONA) study. Clin Toxicol 2016; 54: 638-43.

Ivy J, Oosthuyzen W, Peltz TS, Howarth AR, Hunter RW, Dhaun N, Al-Dujaili EA, Webb DJ, **Dear JW**, Flatman PW, Bailey MA. Glucocorticoids induce nondipping blood pressure by activating the thiazide-sensitive cotransporter. Hypertension 2016; 67: 1039-37.[#]

Kamour A, Crichton S, **Cooper G**, **Lupton DJ**, **Eddleston M**, **Vale JA**, **Thompson JP**, **Thomas SH**. Central nervous system toxicity of mefenamic acid overdose compared with other NSAIDs: an analysis of cases reported to the United Kingdom National Poisons Information Service. Br J Clin Pharmacol 2016; 83: 855-62.

Marrs TC, **Thompson JP**. The efficacy and adverse effects of dicobalt edetate in cyanide poisoning. Clin Toxicol 2016; 54: 609-14.

McCloskey S, **Yates LM**, Sayer JA. The importance of taking a family history in the nephrology clinic. Br J Renal Med 2016; 21; 38-41.

Morrison EE, Bailey MA, **Dear JW**. Renal extracellular vesicles: from physiology to clinical application. J Physiol 2016; 594: 5735-48.

O'Donnell A, McParlin C, Robson S, Beyer F, Moloney E, Bryant A, Bradley J, Muirhead C, Nelson-Piercy C, Newbury-Birch D, Norman J, Simpson E, Swallow B, **Yates L**, Vale L. Treatments for hyperemesis gravidarum and nausea and vomiting in pregnancy: a systematic review. JAMA 2016; 316: 1392-1401.

O'Donnell A, McParlin C, Robson S, Beyer F, Moloney E, Bryant A, Bradley J, Muirhead C, Nelson-Piercy C, Newbury-Birch D, Norman J, Simpson E, Swallow B, **Yates L**, Vale L. Treatments for hyperemesis gravidarum and nausea and vomiting in pregnancy: a systematic review and economic assessment. Health Tech Assess 2016; 20: 1-268.

Oosthuyzen W, Scullion KM, Ivy J, Morrison E, Hunter RW, Starkey Lewis PJ, O'Duibhir E, Street JM, Caporali A, Gregory CD, Forbes SJ, Webb DJ, Bailey MA, **Dear JW**. Vasopressin regulates extracellular vesicle uptake by kidney collecting duct cells. J Am Soc Nephrol 2016; 27: 3345-55.#

Panchal B, **Eddleston M**, **Thomas SH**, **Thompson JP**, **Vale JA**. 754 exposures to reed diffusers reported to the United Kingdom National Poisons Information Service 2010-2014. Clin Toxicol 2016; 54: 333-8.#

Ramasubbu B, James D, Scurr A, **Sandilands EA**. Serum alkalinisation is the cornerstone of treatment for amitriptyline poisoning. BMJ Case Reports 2016. Published online 11/4/16.

Rehman B, Wind K, Wood DM, **Thanacoody R**, Bailey GP, Nash S, Archer JRH, **Eddleston M**, **Thompson JP**, **Vale JA**, **Thomas SHL**, Dargan PI. Taking stock: UK national antidote availability increasing, but further improvements are required. Eur J Hosp Pharmacy 2016; 23: 145-50.

Richardson JL, **Stephens S**, **Yates LM**, Diav-Citrin O, Arnon J, Beghin D, Kayser A, Kennedy D, Cupitt D, Te Winkel B, Peltonen M, Kaplan YC, **Thomas SH**. Pregnancy outcomes after maternal varenicline use; analysis of surveillance data collected by the European Network of Teratology Information Services. Reprod Toxicol 2017; 67: 26-34.

Rivoli L, Vliegenthart B, de Potter C, van Bragt J, Tzoumas N, Gallacher P, Farrah TE, Dhaun N, **Dear JW**. The effect of renal dysfunction and haemodialysis on circulating liver specific miR-122. Br J Clin Pharmacol 2016. Published online 21/10/16.

Roberts L, Ford L, Patel N, **Vale JA**, **Bradberry SM**. 11 analytically confirmed cases of mexedrone use among polydrug users. Clin Toxicol 2017; 55: 181-6.

van Eijkeren JCH, Olie JDN, **Bradberry SM**, **Vale JA**, de Vries I, Clewell HJ III, Meulenbelt J, Hunault CC. Modeling the effect of succimer (DMSA; dimercaptosuccinic acid) chelation therapy in patients poisoned by lead. Clin Toxicol 2017; 55: 133-41.

van Eijkeren JCH, Olie JD, **Bradberry SM**, **Vale JA**, de Vries I, Meulenbelt J, Hunault CC. Modelling dimercaptosuccinic acid (DMSA) plasma kinetics in humans. Clin Toxicol 2016; 54: 833-9.

Vliegenthart ADB, Berends C, Potter CMJ, Kersaudy-Kerhoas M, **Dear JW**. MicroRNA-122 can be measured in capillary blood which facilitates point-of-care testing for drug-induced liver injury. Br J Clin Pharmacol 2017. Published online 3/3/17.

Vliegenthart B, Kimmitt RA, Seymour JH, Homer N, Clarke JI, Eddleston M, Gray A, Wood DM, Dargan PI, Cooper JG, Antoine DJ, Webb DJ, Lewis SC, Bateman DN, **Dear JW**. Circulating acetaminophen metabolites are toxicokinetic biomarkers of acute liver injury. Clin Pharmacol Ther 2016. Published online 30/11/16.

Waugh J, Najafi J, **Hawkins L**, **Hill SL**, **Eddleston M**, **Vale JA**, **Thompson JP**, **Thomas SH**. Epidemiology and clinical features of toxicity following recreational use of synthetic cannabinoid receptor agonists: a report from the United Kingdom National Poisons Information Service. Clin Toxicol 2016; 54: 512-8.

Winterfeld U, Merlob P, Baud D, Rousson V, Panchaud A, Rothuizen LE, Bernard N, Vial T, **Yates LM**, Pistelli A, Ellfolk M, Eleftheriou G, de Vries LC, Jonville-Bera AP, Kadioglu M, Biollaz J, Buclin T. Pregnancy outcome following maternal exposure to pregabalin may call for concern. Neurology 2016; 86: 2251-7.

Yates LM, **Thomas SHL**. Prescribing medicines in pregnancy. Medicine 2016; 44: 438-43.

Published congress abstracts

Adams RD, **Cooper G**, **Jackson G**, **Eagling VA**, **Stewart D**, **Thomas SHL**, **Thompson JP**, **Vale JA**, **Eddleston M**. Examining methotrexate exposures reported to the UK National Poisons Information Service 2004–2015: highlighting adverse reactions and avoidable therapeutic errors. Clin Toxicol 2016; 54: 424-5.

Anderson M, **Hawkins L**, **Eddleston M**, **Thompson JP**, **Vale JA**, **Thomas SHL**. Severe and fatal accidental pharmaceutical poisoning in young children in the UK. Clin Toxicol 2016; 54: 460.

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