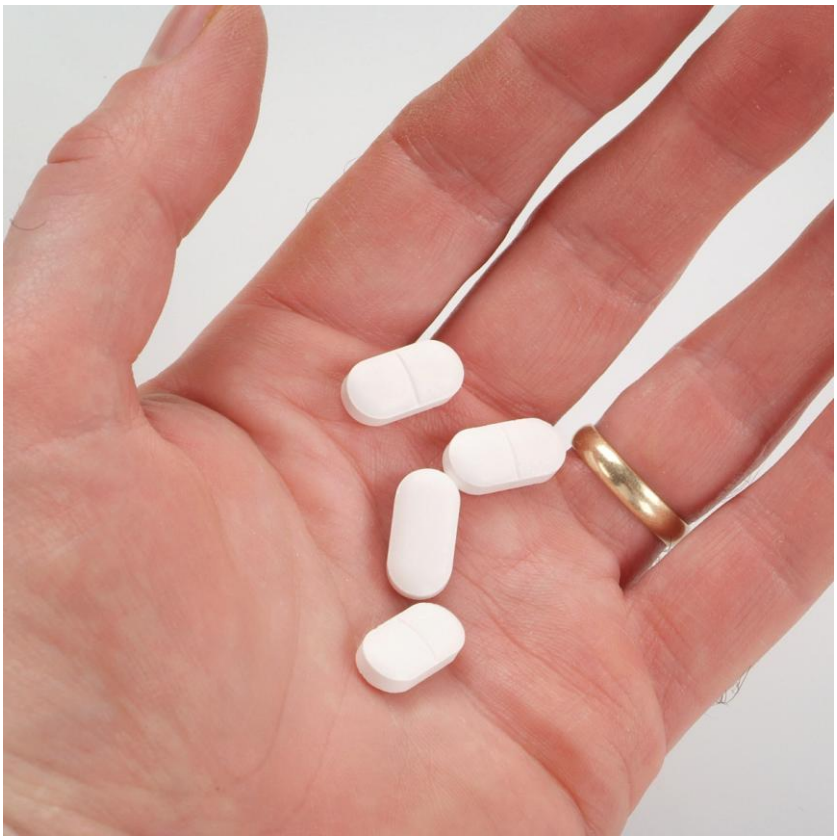
Public Health England

NPIS

National Poisons Information Service
Report 2020/21



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

National Poisons Information Service

The 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 United Kingdom. Poisoning is a common cause of hospital admission in the UK, being similar in number to admissions to other common medical emergencies. NPIS advice ensures that healthcare professionals not only have access to up to date information about treating poisoned patients, but also information to safely manage appropriate cases of minor poisoning at home, thus reducing unnecessary use of NHS resources. The major workload of the NPIS is to advise hospital emergency departments, NHS telephone advice services (NHS 111, NHS 24 and NHS Direct) and also primary care services.

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Foreword

Every day in the United Kingdom hundreds of people present to front-line NHS healthcare professionals because of concerns about exposure to drugs or chemicals. These exposures commonly involve accidental contact with substances found in households or gardens; these occur in all age groups but are particularly common in young children. Exposures also commonly occur as drug overdoses in the context of self-harm or as a result of drug misuse, with adolescents and younger adults disproportionately involved. Less common are occupational exposures or involvement of natural toxins such as snake envenomation.

The numbers of different substances that may be involved in human exposures are very large and include medicines, household and garden products, substances of misuse, industrial chemicals and plant or animal toxins. NHS healthcare professionals do not have the necessary knowledge and training to manage all of these potential exposures, so they need clinical support to provide high quality care. This includes a source of high quality information about the health effects that might be expected from exposure to different drugs and chemicals, advice on appropriate patient care and the opportunity to discuss cases with a clinical expert.

The National Poisons Information Service (NPIS) is commissioned to provide this clinical support by Public Health England, which acts on behalf of the English Department of Health and Social Care, the Scottish Government, the Welsh Government and the Northern Ireland Department of Health. Information and advice about thousands of drugs and chemicals are available via our internet database TOXBASE and the TOXBASE app, which are freely available to all UK healthcare professionals as well as colleagues in PHE and the Ministry of Defence. For complex cases our 24-hour telephone advice line is available, staffed by specialists in poisons information and supported by an on-call rota of consultant clinical toxicologists for advice on more serious or challenging cases. The NPIS also provides services to the Republic of Ireland, commissioned by Beaumont Hospital, Dublin, on behalf of the Irish Government. Services are provided by four NHS hospitals located in Birmingham, Cardiff, Edinburgh and Newcastle, which work together to deliver a fully-integrated national service.

The unborn child is particularly vulnerable to in-utero effects of drugs and chemicals, so the NPIS also provides the UK Teratology Information Service (UKTIS), which is the designated UK source of expert advice regarding exposure to illicit drugs and other chemicals during pregnancy. Information and advice about exposures to hundreds of drugs and chemicals are published openly on the internet, while NHS health professionals can access more detailed and fully-referenced information via TOXBASE, and obtain specialist advice by telephone during office hours.

The information and advice provided by the NPIS, including UKTIS, supports the high quality clinical management of patients with suspected poisoning. This improves the care of those at risk of serious complications, but also avoids unnecessary referrals, admissions and treatments for those who are not at risk. The NPIS also performs research and education activities and collects and shares surveillance data that is important for public health and health security.

This annual report is published as a statement of the activity, accountability and governance of the NPIS during the reporting year.

Simon Thomas
Chair, NPIS Clinical Standards Group

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

Executive summary

Poisoning is an important public health issue with approximately 160,000 hospital presentations occurring annually in the United Kingdom as a result of exposure to pharmaceutical agents, chemicals, plants or fauna. These episodes may involve accidental exposures, medication errors, self-harm or drug misuse. Many more patients are managed in the community, including by primary care and NHS advice services such as NHS 111, NHS 24 and NHS Direct. While the majority of episodes do not produce severe clinical effects, several thousand people die each year as a result of poisoning.

The National Poisons Information Service (NPIS) is commissioned to provide 24-hour information and advice to NHS healthcare professionals across the UK to support the management of patients with suspected poisoning. This information is provided primarily via TOXBASE, an online database containing information on more than 17,000 agents. TOXBASE is also available as an app which users can access both on- and offline. A 24-hour telephone advice service, staffed by specialists in poisons information and supported by consultant clinical toxicologists, is also available for more complex cases if required. 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 also hosts the UK Teratology Information Service (UKTIS), the national source of information and advice about exposures to drugs and chemicals during pregnancy.

Activity

During 2020/21 (changes from 2019/20 in parentheses) there were:

NPIS

- 784,868 TOXBASE user sessions (+14.5%) from 7,161 different registered UK healthcare departments. Hospital departments and the NHS telephone advice services NHS 111, NHS 24 and NHS Direct were the most frequent users.
- 274,513 app accesses (+22.1%) from 24,231 TOXBASE app subscribers.
- 39,853 telephone enquiries received (+4.3%), of which 2,366 were referred to an NPIS consultant clinical toxicologist (+6.2%). The most frequent telephone enquirers were NHS telephone advice services and other healthcare professionals working in primary care.

- 4,241 TOXBASE entries written or updated and 37,000 safety data sheets added to the NPIS Product Data Centre (bringing the total to more than 311,000)

UKTIS

- 1.84 million downloads of publically available information about drugs in pregnancy provided by the ***bumps*** website (+66% compared with 2019-20).
- 31,078 (+6.2%) accesses by healthcare professionals to the detailed information on drugs and chemical exposures in pregnancy held on TOXBASE.
- 894,750 accesses to the openly available summaries on the UKTIS website. Note that access data to publically available websites is not directly comparable year to year because of a change to search engine algorithms.
- 852 enquiries (-26.1%) about specific patients handled by the UKTIS telephone advice service.

Quality

The NPIS has strict clinical governance procedures and our quality assurance exercises continue to demonstrate that all of the services provided have very high user satisfaction. The proportion of respondents scoring services as five or six out of six (very good or excellent) was 95.1% for TOXBASE online, 95.5% for the NPIS telephone poisons information service and 100% for the UKTIS telephone service.

Surveillance

The NPIS continues to collect clinical information on important causes of poisoning from across the UK. This helps us improve our clinical advice for health professionals and provides valuable information for public health surveillance of poisoning. Examples of work carried out during 2020/21 include drugs of misuse, pesticides, carbon monoxide and dinitrophenol. The NPIS has also analysed the effect of the COVID-19 pandemic and enquiries about exposures that may have been considered as treatments. Further details about these can be found in section six of this report.

1. Introduction

It is common for people to be exposed to substances that are not intended for human use, such as accidental ingestion of a household product or exposures to potentially harmful substances that might be encountered in the environment, such as carbon monoxide or animal venoms. Inappropriate exposures to medicines and other drugs are also common and might involve use by someone who was not prescribed the medicine or accidental or deliberate ingestion of excessive doses ('overdose'). Drug misuse is also common and may involve licensed medicines or non medicinal substances. While many of these exposures do not have severe adverse health consequences, some produce adverse clinical effects ('poisoning'), which may be severe or even fatal. This is an important public health issue in the UK, accounting for around 160,000 NHS emergency department presentations each year and many more consultations with primary care and NHS advice services such as NHS 111, NHS 24 and NHS Direct. Severe poisoning is also common and there were 4,393 registered deaths attributed to drug poisoning in England and Wales[1], 1,264 in Scotland[2] and 191 in Northern Ireland[3] in 2019.

The majority of episodes of poisoning in adults are caused by drug overdose in the context of self-harm, although drug misuse is an important cause of mortality. Accidental exposures are common in children, but occur across all ages including the elderly. Many thousands of different substances may be involved, making it very difficult for NHS staff to keep up to date on risk assessment, diagnosis and management. The vast majority of UK hospitals do not have specialist clinical toxicology services, therefore 24-hour access to high quality information and clinical advice concerning people with exposure to drugs and chemicals, including those with overt poisoning, is essential for their safe and effective management.

The National Poisons Information Service (NPIS) is a network of dedicated poisons units commissioned by Public Health England (PHE) on behalf of the UK health departments to provide poisons information to healthcare professionals. The role of the NPIS within the NHS is to support the appropriate triage, referral, assessment and treatment of patients with poisoning or where there is concern about possible health consequences from exposures. This is achieved by the provision of advice to emergency departments, GP practices 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. Information and advice are provided in the first

[1] Deaths related to drug poisoning in England and Wales: 2019 registrations
[2] Drug related deaths in Scotland in 2019
[3] Drug related and drug misuse deaths registered in Northern Ireland 2009-2019

instance via TOXBASE®,[4] an online poisons information database, but there is also a 24-hour telephone advice line for provision of specific advice on individual cases. The information on TOXBASE is updated regularly using published literature, experience from NPIS telephone enquiry data, and direct clinical experience of NPIS-linked clinical departments.

A key component of the service provided by the NPIS is obtaining information 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.

Drug and chemical exposures during pregnancy can cause particular concern because these may affect the fetus as well as the mother. The UK Teratology Information Service (UKTIS) is the designated service in the UK to provide advice to healthcare professionals and patients about this and is hosted by the NPIS. As well as providing information and advice, UKTIS also collects new information on the potential adverse fetal effects of exposure to drugs and chemicals during pregnancy, including the therapeutic use of medicines.

The NPIS (including UKTIS) is funded primarily through 'government grant-in-aid' from UK health departments, with commissioning managed by PHE. The service also receives some contract income for providing services in other countries, as well as research income for specific projects. Overall funding for (and staffing of) the service has reduced in real terms in recent years and funding constraints remain a challenge. However, providing a high quality responsive service to NHS users, including maintaining our essential and highly-used online platforms, remains a priority.

[4] 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) participate in a 24-hour national telephone enquiry rota; the Edinburgh unit receives telephone enquiries during working hours only as it's main focus is on the editing and production of TOXBASE.

The four units also take telephone calls about chemical exposures and liaise with the Centre for Radiation, Chemical and Environmental Hazards (CRCE) of PHE regarding management of chemical incidents.

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

The primary source of information provided by the NPIS is its online database, TOXBASE, which is available without charge to all UK NHS healthcare units, including hospital departments, primary care practices and NHS advice services – NHS 111, NHS 24 and NHS Direct. Ensuring that the information on TOXBASE is current and evidence-based is of paramount importance for patient safety and to maintain the confidence of healthcare professionals. It is essential that the great majority of enquiries are made via TOXBASE as NPIS telephone services do 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 mobile devices is also available without charge to UK NHS healthcare professionals and has the advantage of being available on personal mobile devices both online and offline.

While TOXBASE provides a wealth of information, it cannot provide all the answers for individual patients or complex cases and healthcare workers are encouraged to discuss

such cases with the NPIS. To address this, the NPIS provides a 24-hour telephone information service for healthcare professionals using a single national telephone number (0344 892 0111). NPIS activity is reflected in TOXBASE user session data and accesses to individual entries as well as telephone enquiry numbers and consultant referrals.

Telephone enquiries are managed by specialists in poisons information (SPIs) who may have a scientific, nursing or pharmacy background and are qualified at least to degree level, with the majority also holding postgraduate qualifications in toxicology. In determining the severity of each clinical case, the SPIs use the WHO/IPCS/EC/EAPCCT poisoning severity score (PSS).[5] Enquiries about complex or severe cases are referred on to NPIS consultants (Figure 2.1).

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. Details of all telephone enquiries made since 2007 are held within UKPID, making it an invaluable resource for studying the patterns of poisoning in the UK. To safeguard this data, and improve usability, development of an updated version of UKPID is currently ongoing.

In Northern Ireland, the Regional Medicines and Poison Information Service in Belfast provides a poisons information service during working hours while out-of-hours enquiries are referred to the NPIS. The NPIS is also contracted to 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 (NPIC) in Dublin. The NPIS also provides direct out-of-hours telephone support to health professionals and the general public in Ireland.

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

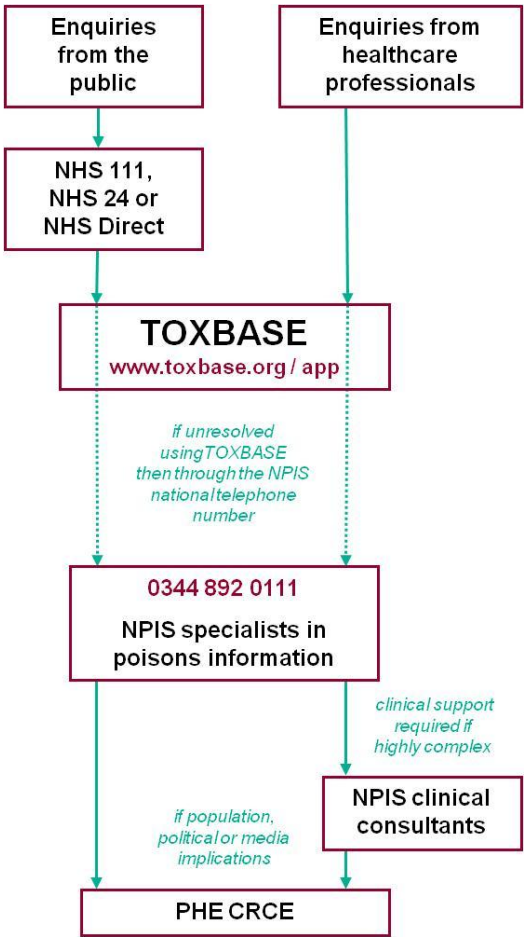

Figure 2.1 How poisons enquiries are answered

Information on the potential toxicity to the unborn child from maternal exposure to drugs and chemicals in pregnancy is provided by UKTIS. Information is provided for healthcare professionals by telephone and TOXBASE, but summary advice is also openly available on the UKTIS website and public advice leaflets are held on the ***bumps*** website.

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 available to NPIS staff on TOXBASE.

Commissioning issues are dealt with by the PHE NPIS Commissioning Group, while clinical issues, including clinical governance, are discussed by the NPIS Clinical Standards Group. Both of these groups meet at least quarterly and are attended by a representative of the commissioner, and a senior clinician and manager from each of the four units. Invitations are also extended to representatives of the NPIC in Dublin. Other senior NPIS staff are invited to attend as observers on a rotational basis.

There are regular teleconferences of the TOXBASE Editing Group to ensure consistent and nationally agreed database content (see section 3.2). The NPIC 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 ensure the database remains an effective and reliable record of clinical enquiries to the NPIS.

To ensure a consistent 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 SPIs to present updates on current topics, research and audit projects, and to discuss complex clinical cases and governance issues. These events occur several times a year, both virtually and face- to-face, and are hosted by all NPIS units in turn, although all meetings have taken place virtually this year because of the pandemic. Clinicians and SPIs are also encouraged to attend and present at international toxicology conferences such as the annual congress of the European Association of Poisons Centres and Clinical Toxicologists (EAPCCT).

Cost benefit of NPIS

The NPIS provides timely reassurance and expertise in response to routine and complex cases of poisonings. It is a well used front line clinical service and is an intrinsic component of the UK health security arrangements, fulfilling national and international requirements. Commissioning the NPIS uses significant resource and so it is important to justify these costs by the 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. Research demonstrating the cost-effectiveness of the service as a result of avoided emergency department referrals has previously been published.[6]

[6] 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 2020/21

3.1 Overall service profile

There was increased demand for all NPIS services in 2020/21.

Patient related telephone enquiries increased by 4.3% and referrals to a consultant toxicologist increased by 6.2%. TOXBASE online user sessions increased by 14.5% and use of the TOXBASE app increased by 22.1%.

- 7,161 registered UK healthcare departments used TOXBASE online (+10.3%) in 2020/21. This generated 784,868 user sessions (+14.5%) and over 2 million page views.
- 24,231 individual UK and international TOXBASE app users generated 274,513 page accesses. There was a 28.3% increase in the number of users and a 22.1% increase in the number of pages accessed.
- 39,853 telephone enquiries were received from healthcare professionals seeking poisons information advice (+4.3%). 2,366 of these telephone enquiries were referred to a consultant toxicologist for advice (+6.2%).
- 4,241 TOXBASE entries were written or updated while 37,000 safety data sheets (SDS) were added to the NPIS Product Data Centre (which now holds more than 311,000 SDS).

Figure 3.1.1 shows the annual number of TOXBASE user sessions, TOXBASE app accesses, telephone enquiries and consultant referrals from 2000 to 2020/21. TOXBASE user sessions are defined as one login by a registered user where the user may access one or more pages several times; average four page views per session.

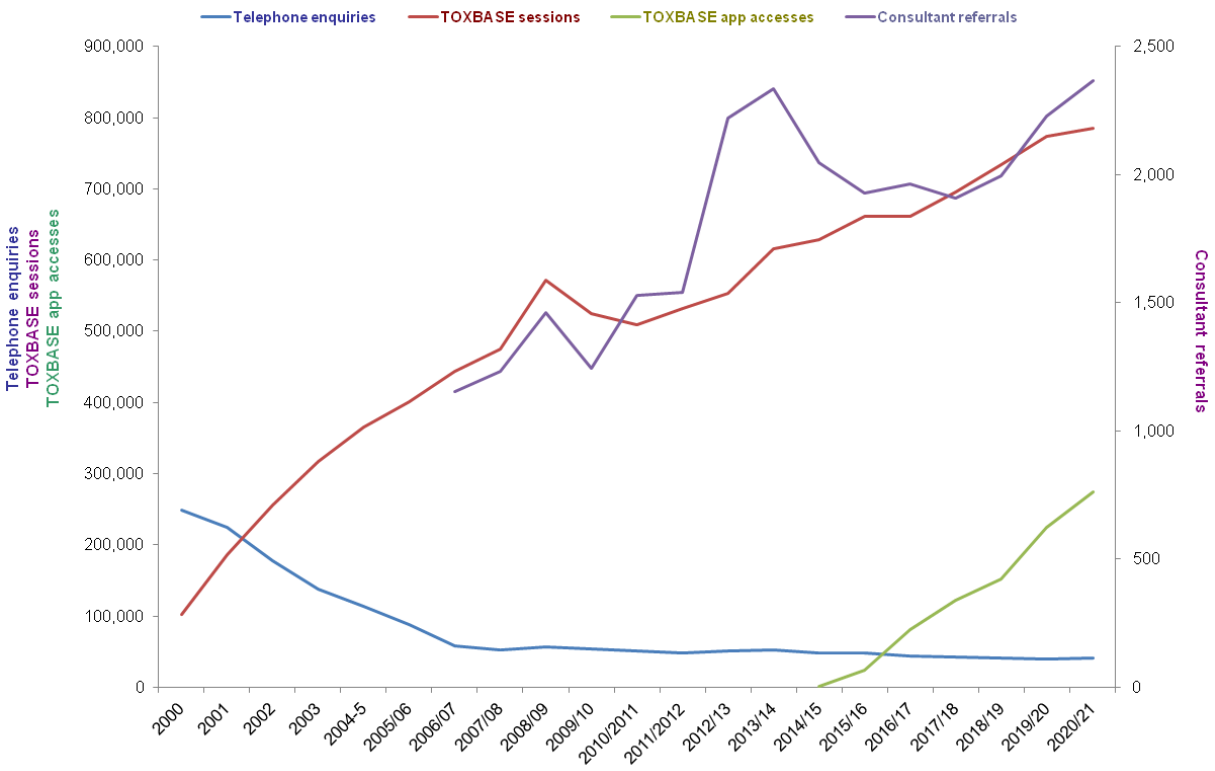

Figure 3.1.1 Number of TOXBASE sessions, TOXBASE app accesses, telephone enquiries and consultant referrals from 2000 to 2020/21

The total number of online user sessions and app accesses relative to the number of registered online departments and individual app subscribers are shown alongside each other in Table 3.1.1, along with the source of patient related telephone enquiries.

Emergency departments are the highest users of TOXBASE online (53.1% of all user sessions) with the ambulance service being the highest user of the TOXBASE app (49.3% of all accesses). The majority (42.9%) of patient related telephone enquiries are from telephone triage services (NHS 111, NHS 24 and NHS Direct).

Table 3.1.1 Use of NPIS services by workplace type as of 31 March 2021

Workplace type	No. TOXBASE online user sessions (% of total)	No. TOXBASE online registered departments (% of total)
Emergency department	378,344 (53.1)	315 (4.4)
NHS 111, NHS 24 and NHS Direct	140,468 (19.7)	43 (0.6)
Ambulance	72,083 (10.1)	184 (2.6)
Medicines Information	17,850 (2.5)	126 (1.8)
Out-of-hours services	15,170 (2.1)	73 (1.0)
	No. TOXBASE app page accesses (% of total)	**No. TOXBASE app Individual subscribers (% of total)**
Ambulance	135,422 (49.3)	11,697 (48.3)
Emergency department	61,919 (22.6)	3,745 (15.5)
Admissions / Assessment	19,979 (7.3)	1,714 (7.1)
General Practice	11,219 (4.1)	2,248 (9.3)
ITU / HDU	9,004 (3.3)	1,031 (4.3)
	No. of patient related telephone enquiries (% of total)	
NHS 111, NHS 24 and NHS Direct	17,109 (42.9)	
Hospital	9,413 (23.6)	
General Practice	6,829 (17.1)	
Ambulance	4,068 (10.2)	
Prison	1,155 (2.9)	

NPIS advice is most frequently sought with respect to pharmaceuticals. Table 3.1.2 details the most commonly accessed products.

Enquiries regarding the use of antidotes are also frequently received, with the most common enquiries detailed in Table 3.1.3).

Table 3.1.2 Most commonly viewed product pages on TOXBASE online and the TOXBASE app, and the most common agents involved in telephone enquiries in 2020/21

	TOXBASE online	No. page views	TOXBASE app	No. accesses	Telephone enquiries	No. calls
1	Paracetamol	202,077	Paracetamol	22,013	Paracetamol	6,698
2	Ibuprofen	58,567	Sertraline	5,835	Ibuprofen	2,598
3	Codeine	48,224	Ibuprofen	4,753	Codeine	1,941
4	Sertraline	40,877	Amitriptyline	4,584	Ethanol	1,682
5	Diazepam	34,330	Diazepam	4,386	Sertraline	856
6	Quetiapine	27,181	Quetiapine	4,026	Naproxen	773
7	Pregabalin	24,384	Mirtazapine	3,507	Detergents	754
8	Mirtazapine	23,530	Codeine	3,209	Multivitamins	745
9	Propranolol	22,406	Pregabalin	3,025	Mirtazapine	719
10	Amitriptyline	20,951	Zopiclone	2,932	Aspirin	589

Table 3.1.3 Most commonly accessed antidote pages on TOXBASE online and the TOXBASE app in 2020/21

	TOXBASE online	No. page views	TOXBASE app	No. accesses
1	Acetylcysteine	32,140	Atropine	557
2	Fomepizole	1,579	Acetylcysteine	541
3	Naloxone	1,217	Naloxone	383
4	Flumazenil	1,114	Glucagon	228
5	Procyclidine	550	Cyanide antidotes	187
6	Desferrioxamine	524	Ethanol	172
7	Ethanol	469	Berlin blue	171
8	ViperaTab (antivenom)	321	Flumazenil	162
9	Digoxin antibodies	309	Calcium chloride	148
10	Cyanide antidotes	281	Calcium gluconate	136

3.2 TOXBASE online

As of 31 March 2021 there were 7,161 healthcare departments registered for TOXBASE online, a 10.3% increase on 2019/20.

TOXBASE has over 17,000 product pages, each holds peer-reviewed and evidence-based information on expected clinical features of toxicity and how to manage an exposure to a given pharmaceutical, household product, chemical, plant or animal. Table 3.2.1 details the most commonly accessed pharmaceuticals and household products by category. TOXBASE contains a wide range of information on plants; Table 3.2.2 details the most commonly accessed plant entries by Latin binomial.

Table 3.2.1 Most commonly accessed pharmaceuticals and household products by category, as viewed on TOXBASE online 2020/21

	Pharmaceuticals	No. accesses	Household products	No. accesses
1	Analgesic (non-opioid)	208,450	Bleach	19,566
2	Antidepressants	159,364	Liquid detergent capsules	11,667
3	Anti-inflammatories	75,584	Alcohol hand gels	11,121
4	Anti-epileptics	68,161	Disinfectant/sanitisers	6,776
5	Opioid analgesics	65,985	Descalers	5,427
6	Antihypertensives	61,730	Reed diffuser liquid	4,881
7	Antipsychotics	56,510	Air freshener liquids	4,453
8	Anxiolytics	45,636	Dishwasher tablets	3,443
9	Anti-allergics	35,110	Antifreeze	2,856
10	Anti-insomnia	34,054	Washing up liquid	2,607

Table 3.2.2 Most commonly accessed plants by Latin binomial, as viewed on TOXBASE online 2020/21

	Latin name (common name)	No. accesses
1	*Taxus baccata* (Yew)	1,129
2	*Arum maculatum* (Lords & Ladies)	596
3	*Prunus laurocerasus* (Cherry Laurel)	545
4	*Digitalis purpurea* (Foxglove)	530
5	*Ilex aquifolium* (Holly)	433
6	Amaryllidaceae family (e.g. Daffodils)	416
7	*Sambucus nigra* (Elderberry)	403
8	*Heracleum mantegazzianum* (Giant hogweed)	356
9	*Atropa belladona* (Deadly Nightshade)	321
10	*Conium maculatum* (Hemlock)	295

3.3 TOXBASE app for iOS and Android mobile devices

The TOXBASE app offers convenient mobile access to up to date poisons advice at the point of care. It is synchronised with online TOXBASE content and provides offline access when no internet connection is available, making it an invaluable resource for emergency responders. The app is available from the iOS app store and Google Play.

The design of the app is regularly updated to improve usability, and to ensure compatibility with the ever-changing market of mobile devices. Examples of screenshots from the current app are shown in Figure 3.3.1.

The app provides NHS, PHE and Ministry of Defence (MOD) users with full and free TOXBASE access on validation of professional email addresses. For other users, a paid version of the app is available. Funding from the small fee charged contributes towards ongoing development and hosting costs.

The number of subscribers changes daily as accounts are created, lapse and are renewed; on 31 March 2021 there were 24,231 current subscribers (23,369; 96.4% NHS/PHE/MOD and 862; 3.6% other). NPIS clinicians and SPIs have access to the app to support their NPIS duties and to increase service resilience in case of interruptions to internet access. The most frequent workplace types are shown in Table 3.1.1 above; ambulance personnel were the most common.

During the 2020/21 reporting year, app subscribers (excluding NPIS users) accessed 274,513 pages including 198,857 product entries and 75,656 antidote and information entries. Tables 3.1.2 and 3.1.3 above show the top product and antidote pages accessed on the app.

There was a 28.3% increase in the number of subscribers from 2020/21 and a 22.1% increase in the number of pages accessed (Figure 3.3.2).

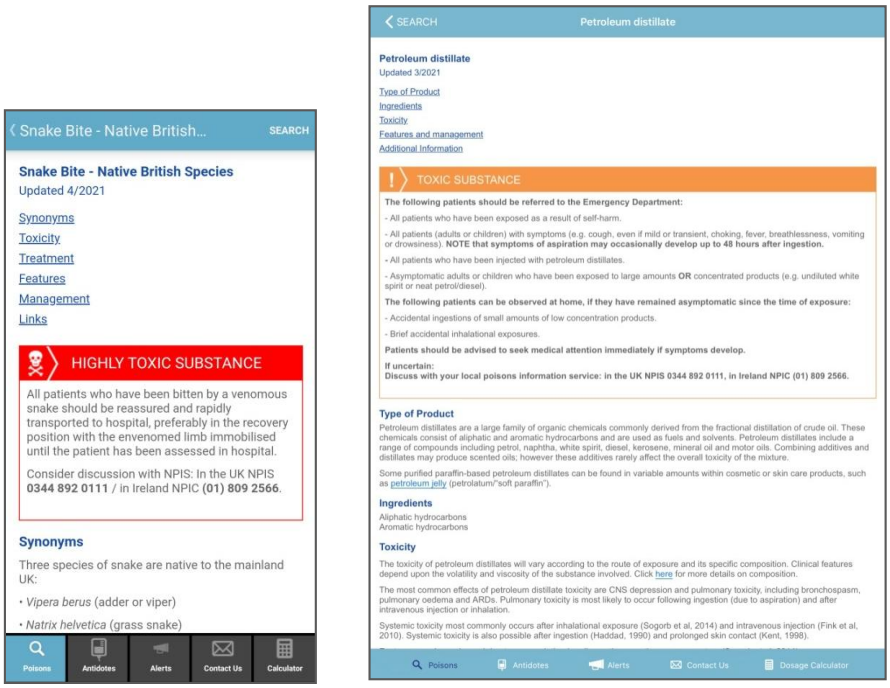

Figure 3.3.1 TOXBASE app screenshots

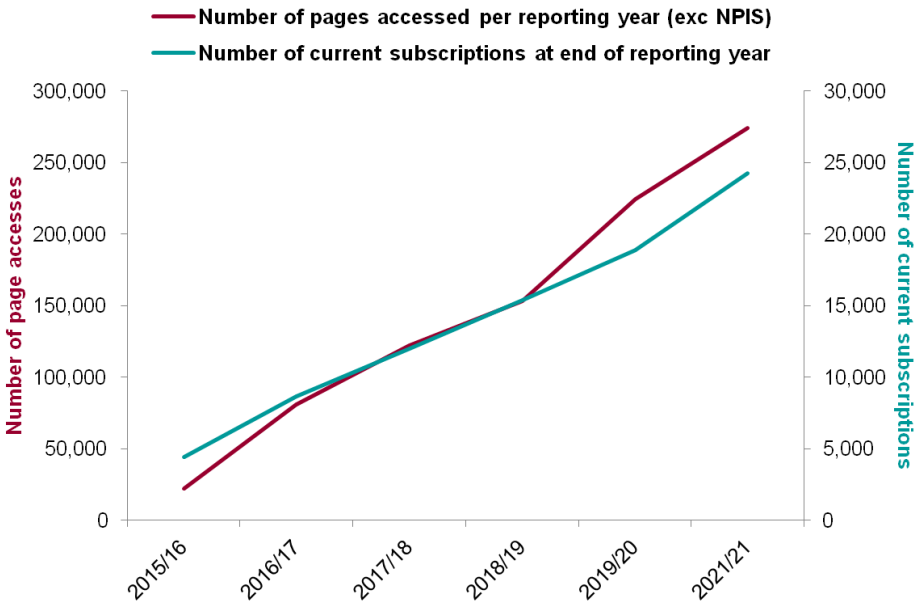

Figure 3.3.2 TOXBASE app subscriptions and pages accessed 2015/16 to 2020/21

3.4 Telephone answering

The NPIS uses a bespoke BT Cloud Contact™ system to deliver telephone enquiries received from healthcare professionals across the UK via a single number (0344 892 0111) to SPIs in the four units. This system has several benefits including conference call functionality and a comprehensive reporting tool. The latter enables close monitoring of workload, wait times, dropped (abandoned) calls and call duration at national, individual unit and individual scientist level. It also allows assessment of compliance with the PHE stipulated key performance indicator (KPI) that 95% of telephone requests will be answered within five minutes of the call being made. Not all telephone enquiries received are recorded onto the enquiry logging system (UKPID). Examples of these enquiries include line tests, repeat calls made by healthcare professionals with additional case specific details and healthcare professionals contacting the NPIS to provide follow-up data on previously discussed cases.

Telephone enquiry data were assessed retrospectively for the period 1 April 2020 to 31 March 2021 using the BT Cloud data reporting tool and analysed using Microsoft Excel and MiniTab statistical software. Figure 3.4.1 summarises the flow of telephone enquiries through the BT platform.

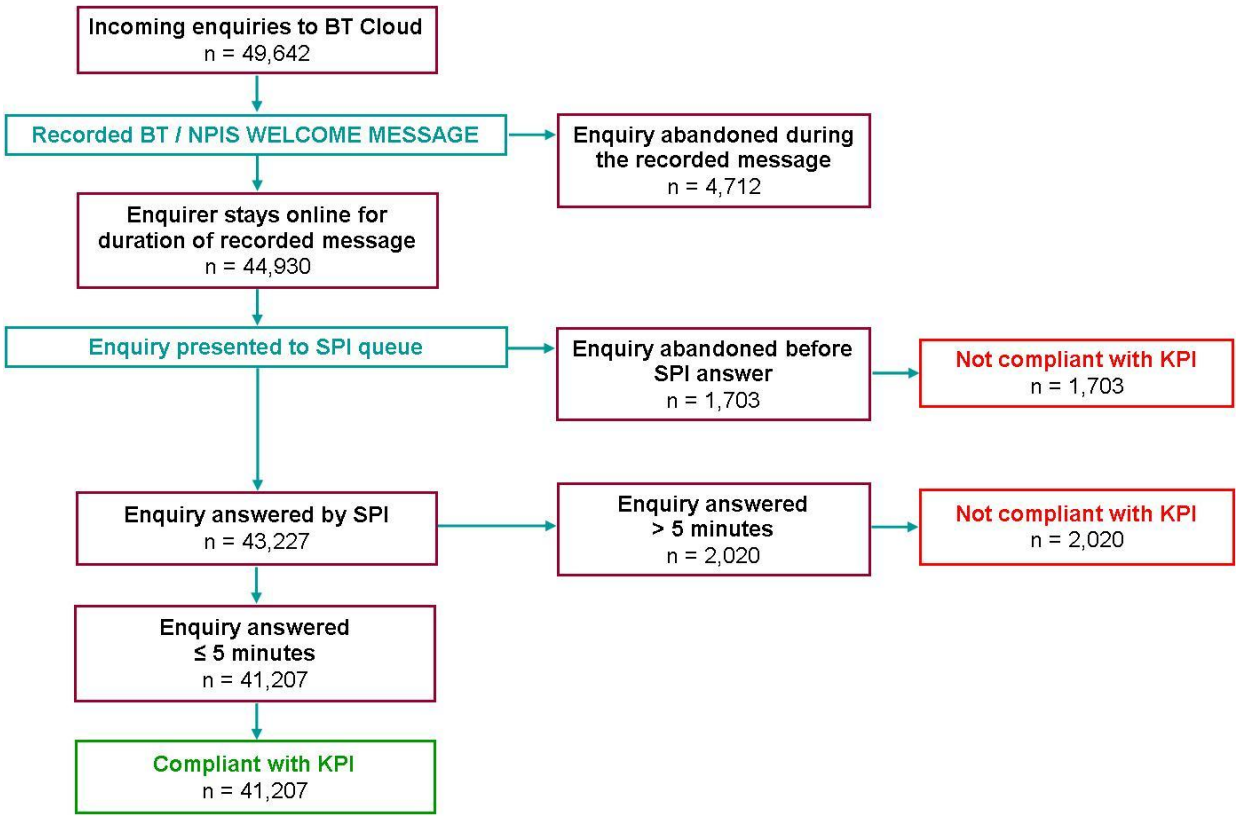

Figure 3.4.1 Summary of telephone enquiry flow through the BT platform 2020/21

The median wait time for a call presented to the SPI queue to be either answered or abandoned was 20 seconds (IQR, 12-38 seconds). Less than 1% (413) of enquirers waited longer than 10 minutes for their call to be answered.

Of the 43,227 enquiries that were answered, the median talk time was 4.6 minutes (279 seconds, IQR, 194- 416 seconds) with 10.4% of answered enquiries lasting 10 minutes or more (4,492). The longest enquiry lasted over 57 minutes.

The proportion of enquiries that were abandoned before being answered by a SPI was low at 3.8% (1,703), the median wait time before abandonment was 93 seconds (IQR, 21-258 seconds). Seventy-seven (4.5%) users waited in the SPI queue for more than 10 minutes before abandoning their call.

There were 3,723 (8.6%) enquiries that were not answered within five minutes, the majority (2,412, 64%) of which were received between midday and 10pm.

These data demonstrate that the NPIS provides a robust service, answering 96.2% of all presented enquiries and the large majority (91.7%) with a wait time of five minutes or less. The service, however, is tasked to answer 95% of enquiries within five minutes; additional resources are required to open additional telephone lines during busy periods to achieve this target.

3.5 Consultant referrals

Background

The NPIS operates a national consultant clinical toxicology on-call rota for the UK and the Republic of Ireland (out-of-hours). Sixteen consultant clinical toxicologists (thirteen from the four NPIS units and three from hospitals in York and London) contribute to out-of-hours cover (weekdays 18:00-09:00, weekends and public holidays). All are involved in the care of poisoned patients in their own local NHS hospitals. A nationally agreed protocol is used to determine when SPIs should refer enquiries to a consultant. The national consultant rota is managed from NPIS Edinburgh.

Daytime cover is provided by SPIs in each NPIS unit, who may be supported by consultants, academic clinical staff and specialist registrars, with appropriate supervision where needed.

Units provide cross-cover in emergencies and occasionally support colleagues in other units. NPIS Edinburgh also provides consultant support for enquiries from Northern Ireland during the working week. Details of all telephone calls to the NPIS are logged on the UKPID database 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.

Referrals

There were 2,366 referrals to NPIS consultants in 2020/21 which represents 5.9% of all telephone enquiries. Of these 1,258 (53.2%) were received during working hours and 1,108 (46.8%) out-of-hours. The median number of referrals per day was six (IQR 3.5). There were 1,955 (82.6%) consultant referrals from hospitals (Table 3.5.1), with calls from NHS 111, NHS 24 and NHS Direct (171; 7.2%) and GPs/primary care (165; 7.0%) being the second and third most common sources respectively.

Table 3.5.2 shows the most common types of agents involved in referrals to consultants. The list reflects both agents that are commonly ingested and those associated with more complex poisoning where consultant input into patient care is often required. Analysis of consultant referrals is used to improve the services offered by the NPIS. Issues highlighted by difficult or complex calls are discussed among NPIS staff at regular TOXBASE Editing Group meetings with any necessary improvements made to TOXBASE itself.

Table 3.5.1 NPIS consultant referrals from hospital by department in 2020/21

Source	Number of referrals from hospital	% of total referrals (1,955)
Emergency departments	877	44.9
Intensive care units	413	21.1
Paediatrics	247	12.6
Other hospital units	125	6.4
General medicine	120	6.1
Admission/assessment units	106	5.4
Unspecified hospital units	42	2.1
Medicines information & pharmacy	21	1.1
Minor injuries units	4	0.2

Table 3.5.2 Agents commonly involved in NPIS consultant referrals in 2020/21

Rank	Agent	Number of Referrals	% of total referrals (2,366)
1	Paracetamol (inc. combination products)	593	25.1
2	Drugs of misuse	154	6.5
3	Quetiapine	82	3.5
4	Ethylene glycol/methanol/antifreeze	80	3.4
4	Bites and stings	80	3.4
5	Ibuprofen	79	3.3
6	Sertraline	78	3.3
7	Propranolol	76	3.2
8	Bisoprolol	67	2.8
9	Digoxin	65	2.7
10	Salicylates	64	2.7
10	Plants (inc. mushrooms)	64	2.7

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.

3.6 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. NPIS Birmingham acts as the UK 'Appointed Body' under EU Classification Labelling and Packaging Regulation (1272/2008) and is responsible for collecting and disseminating chemical safety information to other UK Poison Centres. This information is held securely on the NPIS Product Data Centre, to which all NPIS staff have 24-hour access, and is used for updating TOXBASE, enabling end-users to obtain specific advice on many common products.

NPIS Birmingham liaises with manufacturers to ensure that the data held are comprehensive and up to date. In 2020/21, some 37,000 Safety Data Sheets (SDS) were added to the NPIS Product Data Centre to increase the number held to more than

311,000. The database is indexed by product name, manufacturer, date of SDS, and the accession date for the SDS to the database. The database is also fully text searchable, which enables searches to be made on other criteria, e.g. active ingredients or use.

On 1 January 2021, Annex VIII of the EU Classification, Labelling and Packaging (CLP) Regulation was implemented in Northern Ireland. This annex mandated that chemical safety information is submitted in a harmonised, consistent format (specified by the European Chemicals Agency (ECHA)). As a consequence of the UK's departure from the European Union, the NPIS is not able to access the centralised European system and has had to upgrade its own individual national submission system to accept the new EU format.

Following extensive collaboration with the Department of Health and Social Care, PHE and an external supplier, the NPIS has developed a bespoke submission system that is capable of handling the specific harmonised EU format of data without access to the centralised portal. Within the first three months of operation, the NPIS had successfully received 2,104 Annex VIII PCN submissions.

3.7 NPIS website

The NPIS website is focused primarily on providing information to our stakeholders. It contains information on the structure and function of the NPIS and details of the range of services provided. Visitors to the website can also download NPIS publications including annual reports back to 2004.

Healthcare professionals can access links to affiliated organisations and relevant websites, as well as to TOXBASE where they can complete an online registration form to gain access. Examples of research undertaken by the NPIS and presented at international toxicology conferences are also now accessible on the website.

Members of the public are signposted to appropriate sources of emergency advice as well as provided with free access to leaflets and posters about poisoning in the home and garden.

In addition, information specifically for industry who engage with NPIS has been made available on the website to clarify the requirements of both UK and EU specific legislation as a consequence of the UK's departure from the EU.

3.8 Social media

The @TOXBASE Twitter account was launched in 2020. Utilising this social marketing tool has allowed the NPIS to connect and engage with our user base, to raise global awareness of TOXBASE and the NPIS, and signpost potential new users to our service.

The @TOXBASE account has a modest, but growing, number of followers. The most popular tweet to date was posted in April 2020 when TOXBASE responded to unsafe practices highlighted in the media to treat COVID-19 (Figure 3.8.1). Almost 13,000 Twitter users interacted with this tweet by re-tweeting, sharing, liking or following the account. It was eventually viewed by around 112,000 individuals.

Figure 3.8.1 Tweet from the @TOXBASE Twitter account, 24 April 2020

3.9 TOXBASE overseas

TOXBASE is a well recognised source of poisons information. In recent years TOXBASE use internationally has steadily grown and there are currently TOXBASE online or app subscribers in over 90 countries worldwide. International poison centres generated the most user sessions (35,322; 48.7%), followed by professional colleagues in international hospitals (17,480; 24.1%). An ethical subscription model has been introduced as a means of providing this high quality source of information to colleagues in international poison centres.

4. UKTIS activities in 2020/21

Overview

The UK Teratology Information Service (UKTIS) is the designated UK source of expert advice regarding medication and chemical exposures in pregnancy. The unborn infant is particularly vulnerable to in-utero effects of drugs and chemicals, the consequences of which can cause significant, life-long morbidity. UKTIS maintains an information service for healthcare professionals and women to provide advice and guidance, undertakes surveillance for teratogenic signal detection, and is highly active in a number of national and international research activities in the area of reproductive toxicology.

Service activity

UKTIS provides detailed and fully referenced systematic evidence reviews, providing data for almost 700 drug and chemical exposures, for registered healthcare professionals via TOXBASE. Abstracts of these documents are openly available on the UKTIS website. The service also provides corresponding information for the general public via its ***bumps*** website. This information is produced and maintained by a small team of experienced scientists and an obstetric clinician. UKTIS online resources have become the preferred method of accessing pregnancy safety data. However, UKTIS also provides information and advice for health professionals via a dedicated phone line, where pregnancy related enquiries can be discussed with a scientific expert in teratology or for more complex cases, a consultant teratologist.

In 2020/21 UKTIS responded to over 2.7 million information requests when considering telephone enquiries and online accesses together, which is a significant increase compared to 2019/20 (Table 4.1). Demands for online information and a fall in telephone enquiries from healthcare providers to the service in the past financial year are likely to reflect restrictions in patient access to GPs and healthcare during the COVID-19 pandemic.

UKTIS have continued to collaborate with other UK organisations within the Medicines & Healthcare products Regulatory Agency (MHRA) Safer Medicines in Pregnancy and Breastfeeding Consortium. The Head of Teratology, Dr Hodson, has become a member of the MHRA Medicines in Women's Health Expert Advisory Group. In 2020/21 UKTIS were also contracted to support NHS Digital in reviewing and approving pregnancy information on the NHS web site A-Z pages.

Table 4.1 Telephone enquiries, UKTIS full systematic evidence reviews and *bumps* patient information leaflet downloads for the past five years

	Telephone enquiries		TOXBASE		UKTIS		*bumps*		
Year	n	%	n	%	n	%	n	%	Total
2016/17	1,876	0.10	43,584	2.4	300,412	16.8	1,445,045	80.7	1,790,917
2017/18	1,689	0.06	38,461	1.4	541,476	20.0	2,138,290	79.0	2,719,916
2018/19	1,432	0.05	34,729	1.3	590,805	21.4	2,134,774	77.3	2,761,740
2019/20	1,153	0.07	29,264	2.0	191,136	13.1	1,239,794	84.8	1,461,347
2020/21	852	0.03	31,078	1.1	894,750	32.2	1,848,974	66.6	2,775,654

Response to COVID-19

UKTIS has supported the national provision of COVID-19 related information to pregnant women and their healthcare providers in collaboration with the Royal College of Obstetricians and Gynaecologists (RCOG), and the Royal College of Midwives. UKTIS wrote and designed a leaflet on vaccination for pregnant women that is currently available from the RCOG website. Throughout the pandemic UKTIS have responded to requests for the delivery of webinars to NHS healthcare providers on the pregnancy related effects of COVID 19.

UKTIS have provided up to date, freely accessible online systematic evidence reviews on the fetal effects of drugs used in the RECOVERY trial, which recruited pregnant women, for the treatment of COVID-19. At the beginning of 2021 the service also reviewed the available literature for non-live vaccines to guide decision-making for COVID-19 vaccination in pregnant women.

UKTIS are collaborating with PHE (Vaccines in Pregnancy group) and the MHRA regarding the fetal effects of vaccination in pregnancy. From the beginning of the COVID-19 vaccination programme, UKTIS, together with the UK Obstetric Surveillance Survey, provided an emergency, interim surveillance system for England and Wales, collecting data on pregnant women receiving the COVID-19 vaccination. Pregnancy outcome data is still being collected as pregnancies complete. Analysis and publication of the data is anticipated by December 2021.

Research and development

UKTIS continue to provide expertise in the improvement of pregnancy data collection and the development of novel methods for signal detection on an international platform. UKTIS remain active in a five year research study, ConcePTION, supported by the Innovative Medicines Initiative. This is the third year of the project and progress has been made in development of common standards, tools for pregnancy data collection and analysis methods.

The service also continue to work with the National Congenital Anomaly and Rare Disease Registration Service (NCARDRS) and the NHS Business Services Authority (NHSBSA) on further developing a data linkage system for detecting potential teratogenic therapeutic agents.

Future work

A recent collaboration with Inflammatory Bowel Disease (IBD) specialists in the UK have provided an opportunity to set up an IBD Pregnancy Registry. Further work will be carried out to set this up in 2022.

5. Clinical governance

The NPIS has always made patient safety and the quality of the clinical services we provide our highest priority. We have described our approaches to clinical governance in detail in previous annual reports, including analysis of critical events and a comprehensive system of user feedback.

This section includes details of critical events reviewed and user feedback received during 2020/21. The COVID-19 pandemic has had a substantial impact on many of our services, as described in detail in section 6.5, and in particular it has impacted our ability to perform user feedback, as documented below.

5.1 Analysis of critical events

During 2020/21 there were seven events discussed nationally with five involving the advice provided on TOXBASE relating to paracetamol (two events), corrosive ingestion, use of lipid emulsion therapy, and sodium nitrate/nitrite. In all cases minor adjustments were made to the relevant TOXBASE entries to improve the clarity of the advice provided. One further critical event involved a limited failure of the search facility on TOXBASE; the issue was fixed rapidly by the developer and the risk of recurrence is considered low.

Finally, the current extended period of low numbers of specialists in poisons information (SPIs) in the NPIS is considered to be of critical importance. This has arisen because of a longer-term reduction in funding and staffing over the last decade.

5.2 Quality assurance exercises

Telephone information service user satisfaction

Since 2002, NPIS units have gathered information by postal questionnaire on user satisfaction with the telephone enquiry service to monitor service performance, user requirements/expectations and identify any areas for improvement. There has been a consistent fall in the proportion of quality assurance (QA) questionnaire responses in recent years (Table 5.2.1).

Table 5.2.1 Response rate

	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	Trial 1 Jan to 31 Mar 21
QA type	Postal	Postal	Postal	Postal	Postal	Postal	Email
Response rate	26.6%	23.5%	24.3%	22.5%	18.9%	17.3%	11.7%

The QA exercise was suspended in 2020/21 given the unprecedented pressures and demands faced by the NHS during the COVID-19 pandemic. This temporary suspension allowed the NPIS to reflect on the methods used to gauge user satisfaction with the aim of improving the response rate.

The QA questionnaire was modified and data collection via email was piloted for a random sample of telephone enquiries handled between 1 January and 31 March 2021. The Edinburgh Unit surveyed every 5th call and all 24-hour units (Birmingham, Cardiff and Newcastle) surveyed every 10th call. If an enquirer declined to provide an email address this was noted in the comments section of the UKPID record. If an email was not recorded for an enquiry which was due to be surveyed, the next enquiry with a valid email address was selected. Every 5th or 10th enquiry thereafter was then surveyed.

Survey results

Between 1 January and 31 March 2021 1,140 questionnaires were sent out via email; 133 (11.7%) were returned. The low response rate may have resulted from the unprecedented NHS workload during the pandemic.

One of the questions in the survey asked the user if they spoke to an NPIS consultant toxicologist when they telephoned the NPIS. Of the 133 responses, 59% stated they did not speak to an NPIS consultant toxicologist, 35% stated yes and 6.7% did not know. The yes response rate was unusually high; it appears some users of the service may think when they phone the NPIS that they are speaking to an NPIS consultant

toxicologist whereas the telephone service is manned by SPIs who are generally scientists or nurses. If a call is complex or serious in nature only then would the SPI discuss with the on-call consultant toxicologist. This question will be reworded to “Did the Specialist in Poisons Information (the initial call responder) seek advice from or pass your call on to a Consultant Toxicologist (a medical doctor qualified in Toxicology)?”.

From 1 April 2021 this new method of QA survey will be adopted by the NPIS.

Satisfaction scores are shown in Table 5.2.2. Respondents continue to have an excellent level of satisfaction with the service overall.

Table 5.2.2 Telephone information satisfaction scores

	Strongly disagree				Strongly agree	
Question / score	1	2	3	4	5	Unknown
	% of respondents					
Was your call answered promptly without delay?	-	0.75	4.5	15.8	78.9	-
Was the SPI that you spoke to polite and helpful?	-	-	-	0.8	99.2	-
Were you provided with appropriate information to answer your enquiry?	-	-	-	3.0	95.5	1.5
Did you have confidence in the information provided by the SPI?	-	-	-	2.3	97.7	-

TOXBASE

Formal QA 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 QA 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 1,351 returns were received during the 2020/21 reporting year. Users were asked to grade a series of statements on a Likert scale of one to six where one = disagree completely, and six = agree completely. TOXBASE user satisfaction scores is shown in Table 5.2.3.

Overall satisfaction with TOXBASE on a scale of one to six was indicated on 1,326 returns; 95.1% 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 QA 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.

Table 5.2.3 Summary of TOXBASE user satisfaction scores

Rank	Number of responses	Question	Satisfaction score (%)*	
			2019/20	2020/21
1	421	"I had confidence in the information for my query"	95.1	96.4
2	421	"Logging on to the database was easy"	91.3	91.2
3	457	"The information was sufficient for managing this case"	88.7	91.0
4	473	"Finding the information I required was easy"	93.3	90.3

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

TOXBASE quality assurance forms: free text comments

Free text comments were included in 214 returns (15.8%), which can be grouped as shown in Table 5.2.4.

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

Type of comment	Number (% value) *
Positive comments and thanks	155 (72.4%)
Suggestions	43 (20.1%)
Comment related to other NPIS services	11 (5.2%)
Specific issues	8 (3.7%)
Negative comments	4 (1.9%)
Information technology	0 (0%)

* users often offered multiple comment types within one response

UKTIS

In 2020/21 UKTIS sought feedback via paper questionnaire sent to a random sample of telephone enquirers with a response rate of 52 out of 350 (15%) questionnaires. The responses that were received indicated a very high degree of satisfaction with the service, with 100% of responders reporting that enquiry staff were polite and helpful, the service was easy to contact, the enquiry was answered in an acceptable time frame, the information received was relevant and useful, and they had confidence in the reply. Of the 50 people who rated the service on a 6 point scale (1=poor and 6=excellent), 36 (72%) gave a rating of 6 and the remaining 14 (28%) gave a rating of 5.

5.3 Education and training

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.

All NPIS staff are encouraged to participate in research and submit papers to peer reviewed journals and national and international meetings such as the British Toxicology Society (BTS) and the European Association of Poisons Centres and Clinical Toxicologists (EAPCCT). Despite the cancellation of these annual face-to-face meetings in 2020 and other operational challenges related to the COVID-19 pandemic, NPIS staff have submitted research to virtual conferences held in 2020, and to those due to be held in 2021.

Education and training

NPIS 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.

It is the responsibility of the CPD lead, an NPIS consultant appointed by the unit directors every three years, to organise the rolling programme of meetings. An NPIS scientist is also appointed every three years, to ensure the needs of the scientific staff are well represented within the educational programme. New appointments to both positions were made in 2020. 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.

The NPIS annual CPD programme since 2017 consisted of two-day meetings held twice each year, with all NPIS units hosting in turn, allowing staff greater opportunity for CPD along with the benefit of networking during an evening social event. The COVID-19 pandemic has impacted on this, resulting in the cancellation of the March 2020 CPD meeting. A two day virtual CPD event was held in September 2020 over an online video conferencing platform at minimal added financial cost (Box 5.3.1). This was well received with a substantially larger audience than previous regular CPD meetings (overall 74 participants across two days; with a maximum of 64 participants per day). Feedback was excellent and very positive in response to the changes made to the delivery mechanism.

Use of video conferencing technology has also allowed for secure storage of recorded presentations for future exclusive use of NPIS staff further maximising educational benefit.

In view of the ongoing government mandated restrictions related to the COVID-19 pandemic, a new structure of delivering regular CPD sessions virtually has been established with bimonthly sessions. Two sessions have already delivered (Box 5.3.2) and plans are in place for a face-to-face, two day CPD event in September 2021 in line with the UK government's roadmap out of lockdown.

Box 5.3.1 NPIS Virtual CPD event, hosted by NPIS Birmingham

Day 1: Wednesday 20 September2020

Public health aspects of lead exposure *Sarah Dack, PHE*

Teratology - future developments *Dr Ken Hodson, UKTIS Newcastle*

Synthetic cannabinoids: chemistry, nomenclature and mechanisms *Dr Simon Hill, NPIS Newcastle*

Colchicine *Victoria Eagling, NPIS Edinburgh*

Nicotine cartridge ingestion *Karen Osinski, NPIS Edinburgh*

ECMO treatment in a poisoned child *Dr Mark Anderson, NPIS Newcastle*

A journey with thallium: experimental use & subsequent toxicity *Thomas Wallbridge, WMPU Birmingham City Hospital*

Heme arginate overdose: a case of the unknown? *Nandesh Patel, NPIS Birmingham*

Day 2: Thursday 24 September 2020

Adder anti-venom study *Prof Michael Eddleston, NPIS Edinburgh & Edinburgh University*

Exotic envenomations referred to NPIS *Pardeep Jagpal & Hayley Williams, NPIS Birmingham*

Exotic snake anti-venoms *Prof David Warrell, Oxford University*

Detection of novel agents causing QT prolongation using UKPID *Dr James Coulson, NPIS Cardiff*

Update on management of corrosive ingestions *Stephen Wiltshire, NPIS Newcastle*

Does fomepizole have a role in treating severe paracetamol poisoning? *Prof James Dear, NPIS Edinburgh & Edinburgh University*

EU exit projects / NPIS website demo *Pardeep Jagpal & Ted Cheung, NPIS Birmingham*

Box 5.3.2 NPIS Virtual CPD sessions

January 2021

Gardeners' world - plant poisoning, toxic plants *Dr Laurence Gray, NPIS Cardiff*

March 2021

Tricyclic antidepressants *Dr Ruben Thanacoody, NPIS Newcastle*

Spring babies - COVID-19 in pregnancy: new therapies, new vaccines, and new pharmacovigilance? *Dr Ken Hodson, UKTIS Newcastle*

The NPIS CPD team wish to recognise and thank our preceding colleagues, Dr Ruben Thanacoody and Leonard Hawkins, for leading and organising NPIS CPD in recent years.

TOXlearning – a clinical toxicology e-learning resource

A clinical toxicology e-learning resource has been provided to NHS healthcare professionals across the UK by NPIS Edinburgh since 2005. The TOXlearning resource is available to all NHS staff, as well as UK medical, nursing and paramedic students, PHE staff and UK and international TOXBASE subscribers (Figure 5.3.1).

The resource provides a useful and accessible training resource for those wishing to learn how to use TOXBASE effectively when handling enquiries about poisoning, and also learn more about the management of common overdoses. It is especially useful for NHS 111, NHS 24 and NHS Direct staff learning how to use TOXBASE effectively when handling enquiries about poisoning, as well as training in the management of common overdoses.

The NPIS recommends that TOXBASE users of all types and grades complete the 'Using TOXBASE' module (see Box 5.3.3). 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 CPD files.

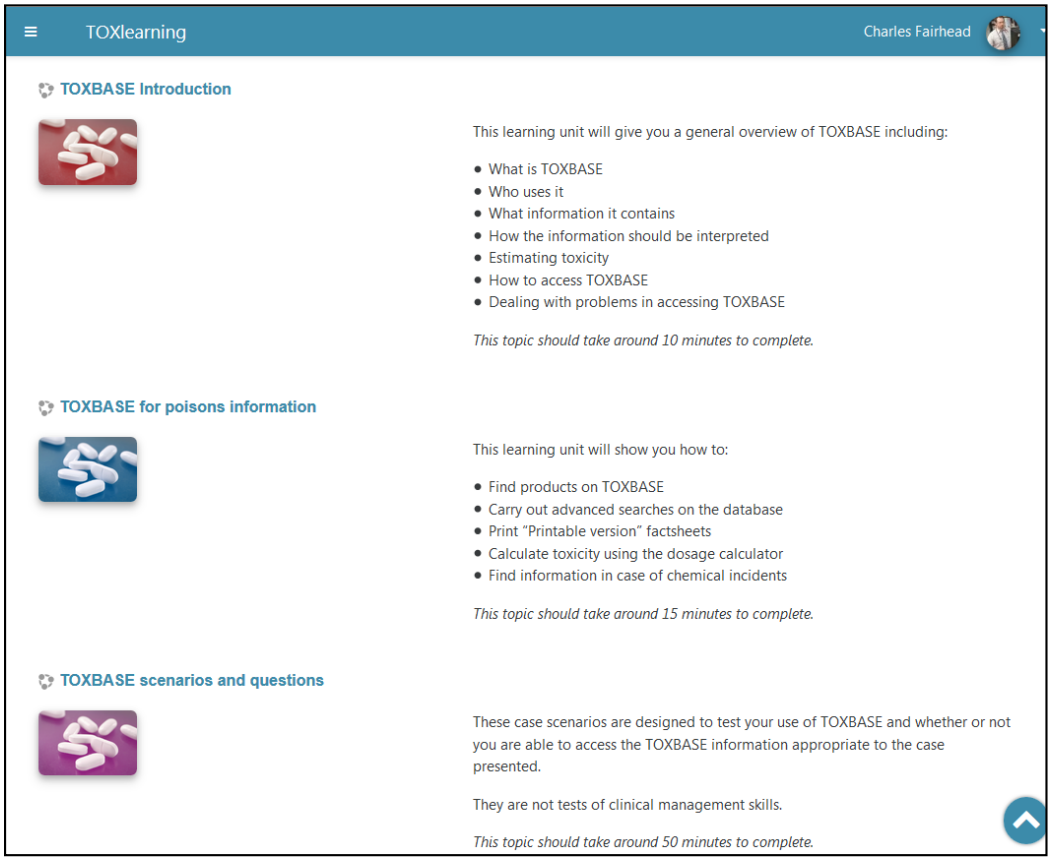

Figure 5.3.1 Screenshot from TOXlearning

Box 5.3.3 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

6. Areas of interest in 2020/21

6.1 Drugs of misuse

Introduction

The number of NPIS telephone enquiries and the volume of TOXBASE online and app accesses give an indirect indication of the drugs of misuse most commonly encountered by health professionals using our services. The data can be used to follow trends with time, including the emergence of new substances, and to characterise features of toxicity reported for different substances. These data are useful for monitoring and assessing toxicity relating to drugs of misuse and are shared periodically with responsible agencies including PHE and the Advisory Council on the Misuse of Drugs (ACMD).

Methods

As in previous years, telephone enquiries are included in this analysis if the exposure is to a substance with no other purpose than drug misuse, or when the exposure has been classified as 'recreational' by the information scientist receiving the call, irrespective of the substance involved and including medicinal drugs. This has the advantage of identifying substances not previously recognised as being involved in misuse.

The intent of the exposure is not available when using TOXBASE access data. Analysis of TOXBASE access data for prescription drugs does not allow insight into whether the access related to an exposure resulting from recreational drug misuse, self-harm or therapeutic error. For this reason accesses to TOXBASE pages that relate to licensed medications are omitted from cumulative data, with the exceptions of diazepam, methylphenidate, ketamine and methadone, which are under specific surveillance.

Overall activity

It is important to consider drugs of misuse activity in the context of this very unusual year caused by the COVID-19 pandemic. This year, while the total NPIS telephone call volume was relatively stable, the number of TOXBASE accesses increased by 14.5%. During the 2020/21 reporting year there were 991 telephone enquiries to the NPIS meeting the drug misuse criteria described above, a 10.8% decrease compared to 2019/20. Of these 991 calls 79.7%, 8.7%, 5.6% and 4.3% were from England, Ireland, Scotland and Wales respectively. These enquiries related to 319 different substances or products and accounted for 2.5% of all NPIS telephone enquiries. The reduction in telephone enquiries related to drugs of misuse is larger than in previous years. The

impact of COVID-19 during the year and the increasing use of TOXBASE online and especially via the app may be responsible factors.

There were also 110,428 TOXBASE online accesses, an increase of 11.5%. These related to 1,014 different substances or products and accounted for 14.1% of all TOXBASE online accesses.

As mentioned in previous reports, the data for drug misuse TOXBASE app accesses included inadvertent accesses for a number of chemicals present on the app front page. An in-year software update has now resolved this issue and from the forthcoming year all app data will be included in the annual report. This year they are therefore excluded from detailed analysis for accuracy, although there were in total 17,450 app drug of misuse accesses using the same criteria as for TOXBASE online accesses, a 10.6% increase and accounting for 6.36% of all TOXBASE app accesses.

Activity related to individual drugs of misuse

The top 10 substances of abuse involved in telephone enquiries and TOXBASE online accesses are shown in Table 6.1.1.

Table 6.1.1 Top 10 drugs/substances of misuse involved in telephone enquiries and TOXBASE online accesses

	Telephone enquiries	Number 2020/21	% change from 2019/20	TOXBASE accesses	Number 2020/21	% change from 2019/20
1	Cocaine	212	-13.1	Diazepam**	36,512	18.3
2	Cannabis	153	-1.9	Cocaine	15,577	10.5
3	Diazepam	78	30.0	Cannabis	7,546	37.9
4	MDMA	69	-36.1	MDMA***	6,097	-20.5
5	Methadone	68	15.3	Heroin	5,258	2.6
6	Heroin	50	-43.2	Methylphenidate**	5,044	-2.1
7	Amfetamine	47	11.9	Ketamine**	4,971	20.5
8	Drug of misuse NK*	43	-32.8	Methamfetamine	3,367	45.5
9	Ketamine	42	16.7	Methadone	3,120	75.4
10	Nitrous oxide	37	3600.0	Synthetic cannabinoids	3,060	11.5

* 'Drug of misuse NK' refers to calls where the clinician knows that the person has taken a drug of misuse but not which one/s
** May include TOXBASE accesses relating to therapeutic use
*** Note change this year in methodology

Patterns of NPIS activity for selected substances over time

Figures 6.1.1 and 6.1.2 show NPIS activity related to selected substances of interest over the last seven years.

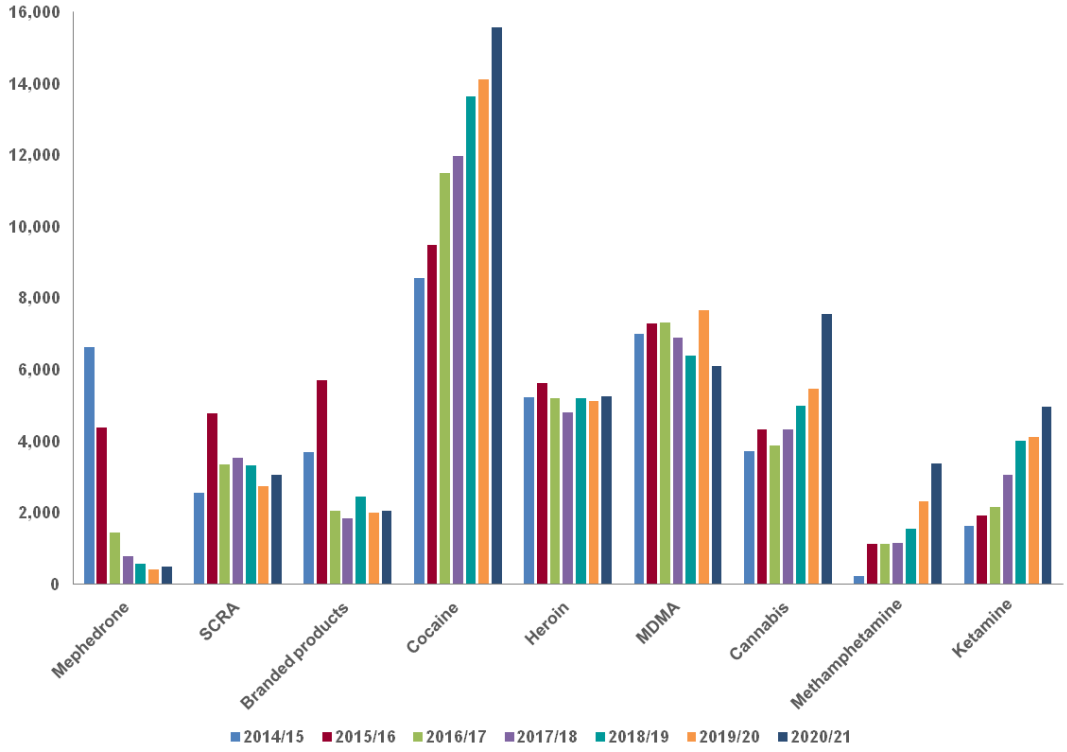

Figure 6.1.1 TOXBASE accesses by year for selected substances 2014/15 to 2020/21

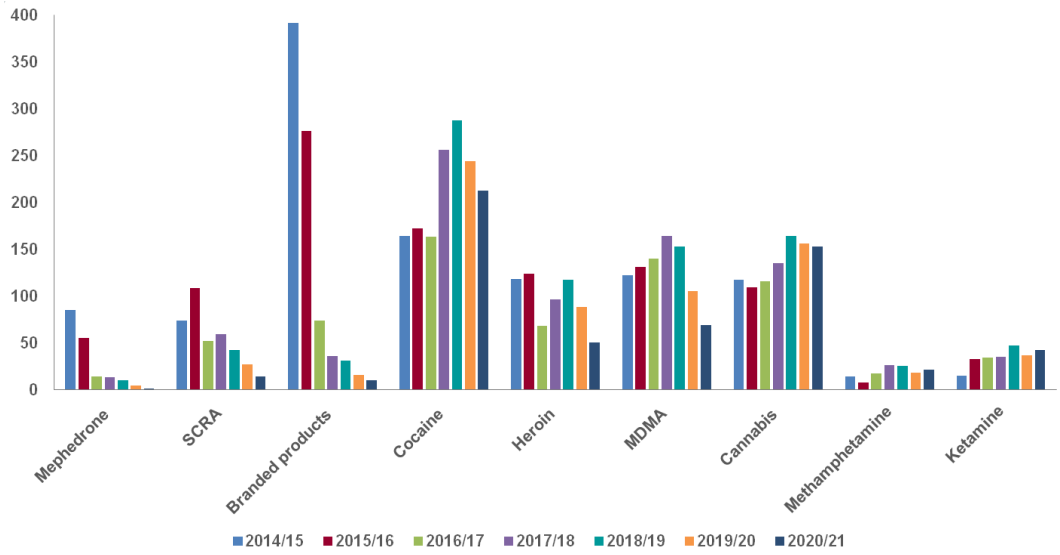

Figure 6.1.2 NPIS telephone enquiries by year for selected substances 2014/15 to 2020/21

Commentary

Classical drugs of misuse such as diazepam, cocaine, cannabis, MDMA and heroin continue to dominate NPIS activity. The previously reported reduction in NPIS activity related to New Psychoactive Substances including synthetic cannabinoids and branded products (most of which contained synthetic cannabinoids when analysed) and mephedrone has continued. These changes began shortly before the Psychoactive Substances Act was enacted in May 2016.

TOXBASE accesses involving cocaine, cannabis, ketamine and methamphetamine activity have increased yearly, although telephone enquiries have remained relatively constant by total number (note an overall reduction in NPIS telephone activity over a number of years may disguise a proportionate rise in telephone activity relating to these substances). In view of the potential toxicity of these substances, further monitoring of these trends is appropriate.

There were no telephone enquiries and very few TOXBASE accesses related to synthetic fentanyl derivatives or other novel opioids. Novel benzodiazepines such as etizolam also generated very limited activity. Nitrous oxide appears in the top 10 telephone enquiries list for the first time.

6.2 Pesticides

The NPIS pesticide surveillance system was established in 2004 under 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 character 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 via the Health and Safety Executive's Chemicals Regulation Directorate.

Currently, 1,602 TOXBASE entries for pesticides and biocides are being tracked, an increase from the 1,596 tracked during 2019/20. 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 2020/21, there were 4,059 accesses to TOXBASE about pesticides of interest and information on 461 potential exposures was collected via the NPIS telephone enquiry service.

Overall, information was gathered on 693 potential exposures involving pesticides (a reduction from 912 in 2019/20)

The fall in number of potential exposures appears to have been due to the COVID-19 pandemic. While the number of TOXBASE accesses and telephone enquiries to the NPIS was similar between 2019/20 and 2020/21, due to changes in workplace practices brought about by COVID-19, fewer questionnaires were administered by the NPIS and a decision was made to suspend formal follow up during the height of the first wave of COVID-19 in the UK to alleviate pressure on healthcare professionals.

Of the 693 potential exposures available for analysis, there were 26 cases where symptoms were thought not to be related to the pesticide exposure, e.g. where a pre-existing illness or concomitant infection was the likely cause of symptoms. These cases were excluded, leaving 667 exposures for further analysis. The results presented below include both unintentional acute cases (547; 82.0%) and chronic exposures (37; 5.5%) and deliberate self-harm cases (54; 8.1%).

Most acute unintentional exposures were graded as PSS 0 (312 cases; 46.8%) or PSS 1 (205; 30.7%). A smaller number were graded moderate (PSS 2; 6; 0.9%). None were graded severe (PSS 3) and there were no fatalities reported.

Agents of interest

The agents most commonly involved in exposures are shown in Table 6.2.1. In addition, there were 105 cases involving unknown rodenticides.

In 2020/21, patients potentially exposed to pesticide products comprised 356 adults (13 years or older - 53.4%) and 293 children (12 years or younger - 43.9%). There were 372 (55.8%) male patients and 289 (43.3%) female patients.

There were seven enquiries involving pregnant patients reported in 2020/21 (11 in 2019/20). All seven exposures were acute, unintentional and graded PSS 0/PSS 1.

The classes of product most commonly involved in exposures are shown in Figure 6.2.1. Multiple/combination products were involved in some incidents.

Table 6.2.1 Pesticides most frequently reported by respondents in suspected pesticide exposures during 2020/21 compared with 2019/20, ordered by rank in 2020/21

Ingredient	2019/20	2020/21
	Frequency ≥20	
Permethrin	90	68
Glyphosate	87	64
Brodifacoum	20	34
Bromadiolone	30	34
Phenols/cresols	40	32
Difenacoum	57	29
Tetramethrin	25	26
Cypermethrin	31	26

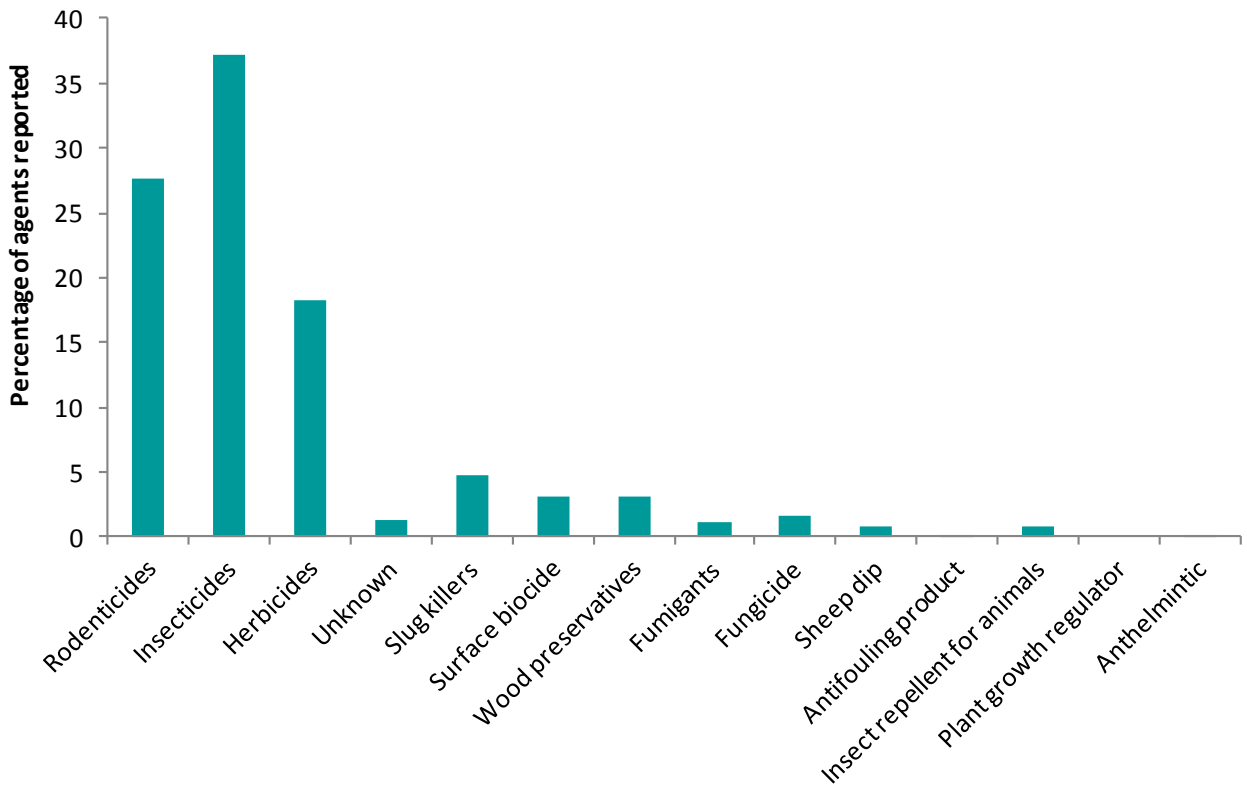

Figure 6.2.1 Pesticide exposures by class of product (as reported by respondent) in 2020/21 (681 agents)

6.3 Carbon monoxide

Since June 2015, the NPIS has received funding from the CO Research Trust (formerly known as the Gas Safety Trust) to analyse all enquiries relating to carbon monoxide (CO) exposure in the UK.

The epidemiology of CO poisoning is difficult to elucidate accurately due to complexities in identification, categorisation and reporting of exposures. Exposures may be intentional (self-harm) or accidental, which may be further subdivided into exposures related to fires (where additional toxicity such as cyanide may contribute), and non-fire related CO exposures. The primary objective of our study was to assess accidental non-fire related CO exposures as these pose a serious public health challenge since patients may not be aware of the risks and subsequent symptoms of CO exposure.

We have recently published 4.5 years of NPIS data[7] and below we provide data for the 2020 calendar year.

During the period 1 January 2020 to 31 December 2020 data were available for 663 patient related CO exposures. One hundred and fifty (22.7%) patients were male, while 177 (26.8%) were female [gender not specified for 336 (50.8%) patients]. Exposures comprised 473 adults (≥13 yrs, 71.6%) and 111 children (≤12 yrs, 16.8%). Age was not specified in 79 exposures (12.0%). Eighteen exposures involved pregnant women (2.7%).

The highest proportion of exposures resulted from faulty domestic boilers (178, 26.9%). Exposures were most commonly of low severity (522, 78.9%) and associated with no symptoms or mild symptoms only. One (0.2%) fatality was reported during this period. Central nervous system symptoms were most prominently observed, with headache reported with the highest frequency.

Whilst a raised carboxyhaemoglobin concentration (COHb%) is considered necessary to confirm an exposure, clinical interpretation is complex. It may be affected by patient related factors such as smoking status, activity and co-morbidity, and environmental factors such as atmospheric CO concentration at the scene, exposure duration, time since exposure and administration of oxygen. In this cohort, blood COHb% concentrations were reported in 163 (24.7%) patients and ranged from 0% to 40.0% (median = 3.3%). As many patients were not acutely unwell at the time of presentation, this may explain why an invasive blood COHb% was measured in only 25% of patients.

[7] Gentile D, Adams A, Klatka M, Bradberry S, Gray L, Thanacoody R, Jackson G, Sandilands EA. Carbon monoxide exposures reported to the UK National Poisons Information Service: a 4-year study. J Public Health 2021 fdab132.

We are continuing to collect and analyse data to assess if there is a statistically significant correlation between measured COHb% and poisoning outcome.

These data demonstrate that the NPIS is uniquely placed to collect valuable epidemiological information on all aspects of CO poisoning (demographics, source, clinical features and poisoning outcome) from patients across the UK.

6.4 Dinitrophenol

2,4-Dinitrophenol (DNP) is a toxic industrial chemical that blocks the normal mechanisms for storage of energy in the body, including fat, and is sometimes ingested by users to produce weight reduction, 'fat burning' or 'body sculpting'. Unfortunately, DNP can cause serious health effects in humans including high fever, rapid heart rate, agitation, headache, diarrhoea, vomiting, convulsions, acidosis, muscular rigidity and multi-organ failure. These effects can be fatal in spite of intensive medical treatment.

The NPIS first reported an increase in enquiry numbers and deaths relating to DNP in 2013 and has since been monitoring and reporting these to PHE and the Food Standards Agency on a quarterly basis and also publishing data regularly in our annual reports. Various actions have been taken in response to the increase in enquiry numbers, including provision of warnings to the public and information to healthcare professionals, as detailed in previous annual reports.

The information provided here has been obtained using the same methodology as described in previous annual reports. Quarterly numbers of DNP-related TOXBASE accesses and individual cases of systemic exposure reported in telephone enquiries since January 2011 are shown in Figure 6.4.1. During the 2020/21 reporting year there were seven further cases of systemic DNP exposure referred to the NPIS including one fatality. This compares to 15, 14 and 18 cases annually in the three previous reporting years. In total there have now been 142 cases of systemic DNP exposure discussed by phone with the NPIS since 2007, including 95 males and 47 females. Of these, 26 (18.3%) are known to have died, including 17 males and 9 females. The NPIS is aware of at least six further fatal cases reported by the Food Standards Agency or the Office of National Statistics that were not discussed with the NPIS at any stage, so there have been at least 32 DNP-related deaths in the UK since 2007, including 24 since January 2015.

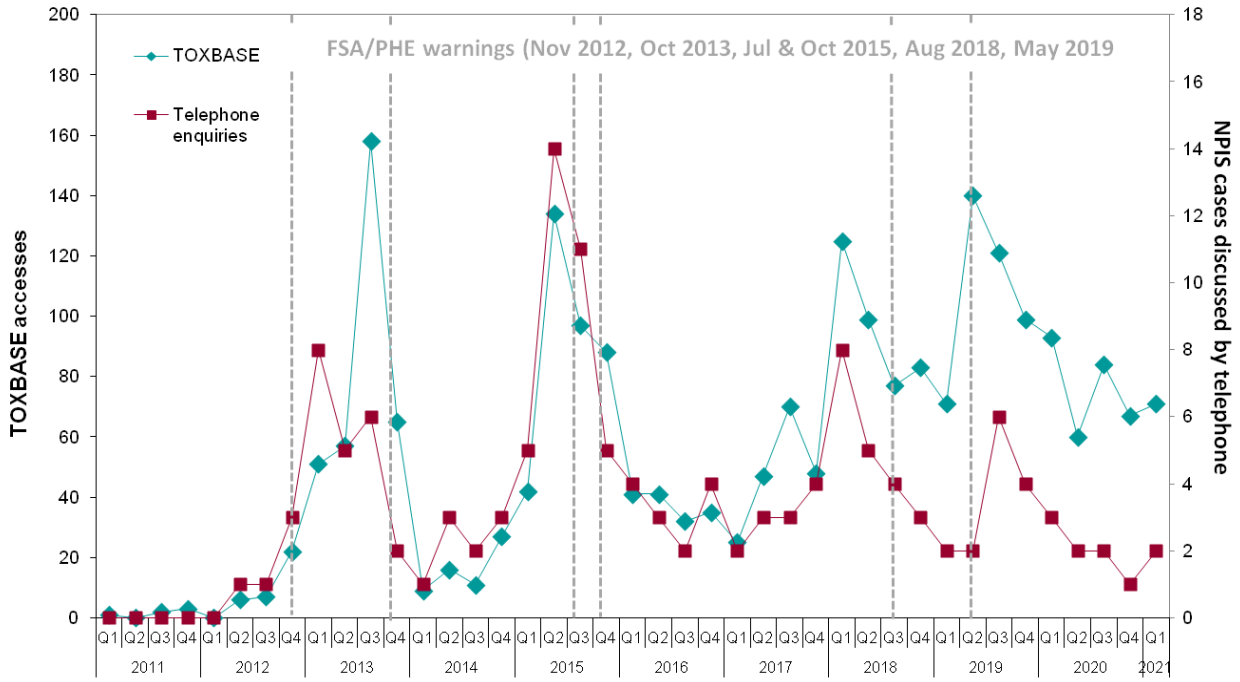

Figure 6.4.1 Quarterly numbers of NPIS cases referred by telephone and TOXBASE accesses relating to systemic DNP exposure, January 2011-March 2021

The NPIS has recently been working with international partners to compare this UK experience with rates of DNP toxicity in other countries. Collaborative work with poisons centers in the United States demonstrated increasing US cases of DNP poisoning over the last decade, although population-adjusted rates were substantially lower than in the UK. Combined US and UK data demonstrated that acidosis, rapid heart rate, agitation/confusion and high fever were all independent predictors of mortality.[8] Work is currently ongoing in partnership with the World Health Organisation to obtain similar data for other countries. Provisional unpublished information indicates higher population-adjusted rates of DNP toxicity reported in the UK compared with most other countries providing information.

Systemic exposures to DNP, although uncommon, carry a high case fatality and occur more often in the UK than in most other countries, in spite of the public health measures taken so far. The NPIS continues to encourage responsible UK government agencies to consider further actions to restrict exposures to this highly toxic chemical.

[8] Potts AJ, Bowman NJ, Seger DL, Thomas SHL. Toxicoepidemiology and predictors of death in 2,4-dinitrophenol (DNP) toxicity. Clin Toxicol 2020 Oct 6:1-6. doi: 10.1080/15563650.2020.1826505. Epub ahead of print. PMID: 33021407.

6.5 Toxicovigilance during COVID-19

Toxicovigilance is the active process of identifying and assessing the threat or potential toxicity from exposure in a community or population to consumer products, pesticides, pharmaceuticals, environmental and industrial chemicals, controlled substances, and natural toxins. It involves the monitoring of data to identify potential and confirmed trends in poisoning exposures and the emergence of new risks associated with toxic substances, as well as assessing the effectiveness of preventative measures. Since the emergence of COVID-19, a number of preventative proposed novel treatments have been identified, including a range of chemical and pharmaceutical preparations. In addition, due to changes in behaviour, some members of the public may be at increased risk of being exposed to domestic chemicals, such as cleaning products. PHE and the NPIS has undertaken an analysis of UK poisoning data to evaluate whether, due to changes in behaviour, there are any potential public health risks related to toxic substances as a result of the pandemic. This was also informed by anecdotal reports of poisoning or exposures from NPIS staff and was supported by a PHE review of international reports of poisoning identified via routine and Enhanced Events Based Surveillance (EEBS).

Overview

A review of NPIS data between January and December 2020, when compared to the equivalent period in 2019, has found that there is limited evidence to suggest that there has been an increase in enquiries for preventing or treating COVID-19 through the intentional use of (hydroxy)chloroquine, bleach, disinfectants and essential oils. Following the first lockdown and analysing data from March to June 2020 there was a small increase in telephone enquiries related to inhalation of cleaning products, rising from 110 in 2019 (average 6.5 per week) to 138 (average 8.1 per week) in 2020 and although the overall enquiry numbers are low, a high proportion of those enquiries involved the mixture of cleaning products, which can result in the release of toxic gases. The most relevant signals identified from NPIS data have been in relation to dental analgesics and hand sanitisers which are described in more detail below.

Dental analgesics

An analysis of NPIS enquiries involving paracetamol (and compound preparations), aspirin, other non-steroidal anti-inflammatory drugs (NSAIDs), and codeine-containing preparations was undertaken. These were further narrowed by enquiry records that mentioned preparations that were taken to treat dental pain. The analysis showed that during the first lockdown (March to June 2020) there was an increase in enquiries in relation to dental patients in comparison to the same time period in the previous year, rising from 357 (25.5 average per week) to 551 (39.4 average per week), primarily due to supratherapeutic (excessive) dosages with analgesic pharmaceuticals.

This increase was observed following a reduction in available dental services due to lockdown measures. Interestingly, following an analysis of data since non-emergency dental practices reopened on 8 June the number of dental analgesic enquiries have shown an increase when compared to the equivalent dates in the previous year, rising from 1,018 telephone enquiries (24.8 average per week) to 1,599 (39.0 average per week) (Figure 6.5.1). Over 97% of these episodes were recorded as having taken place in the home. Of these enquiries, one enquiry in 2020 reported severe symptoms, two reported moderate symptoms, and all others were mild or asymptomatic at the time of enquiry. However, delayed symptoms following analgesic overdose are possible.

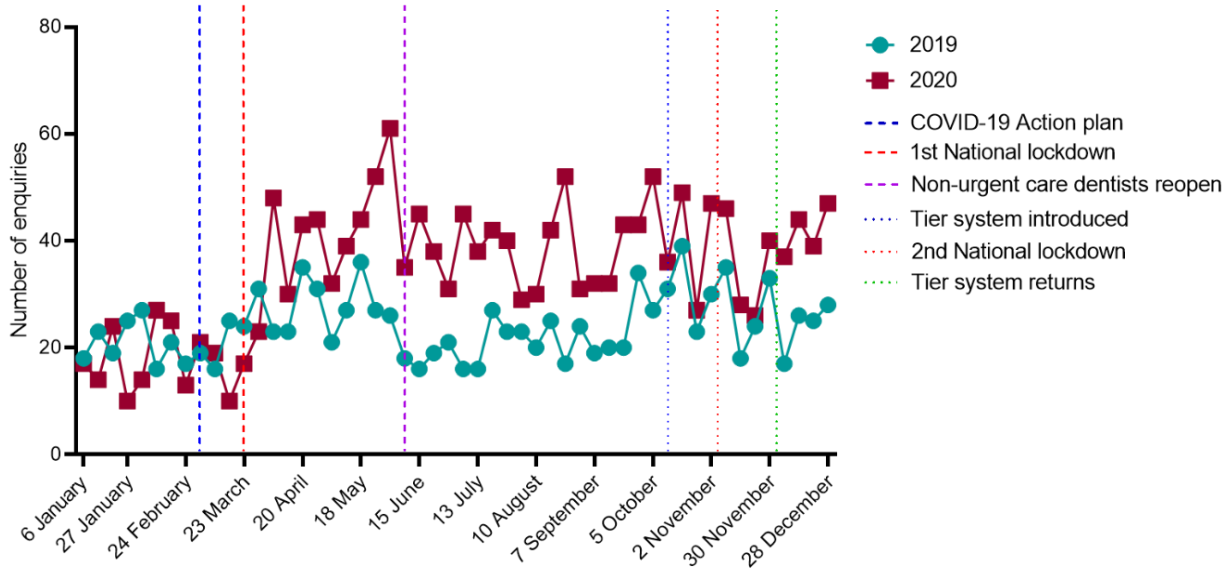

Figure 6.5.1 Dental analgesic telephone enquiries during COVID-19

Hand sanitisers

Throughout the COVID-19 pandemic there has been an increase in telephone enquiries relating to hand sanitisers in all age groups, rising from 221 (average 4.1 per week) in 2019 to 519 (average 13.5 per week) in 2020, with 423 of these calls relating to children under 6 years of age. Since lockdown measures started to be eased (from 11 May 2020), hand sanitiser enquiries have remained elevated compared to the same period in 2019 (Figure 6.5.2). These enquiries may reflect increased use of, and potential exposure to, hand sanitisers during the COVID-19 pandemic. This increase could also reflect inappropriate storage of hand sanitisers. At the time of enquiry, two cases were recorded as having severe symptoms, three moderate symptoms and all other cases were minor or asymptomatic. The severe cases were a result of intentional exposure in adults (recreational abuse due to alcohol content) rather than accidental exposures in children. During scanning of international news reports on poisoning, severe eye toxicity was noted in some cases which has led to an update on the clinical advice on TOXBASE.

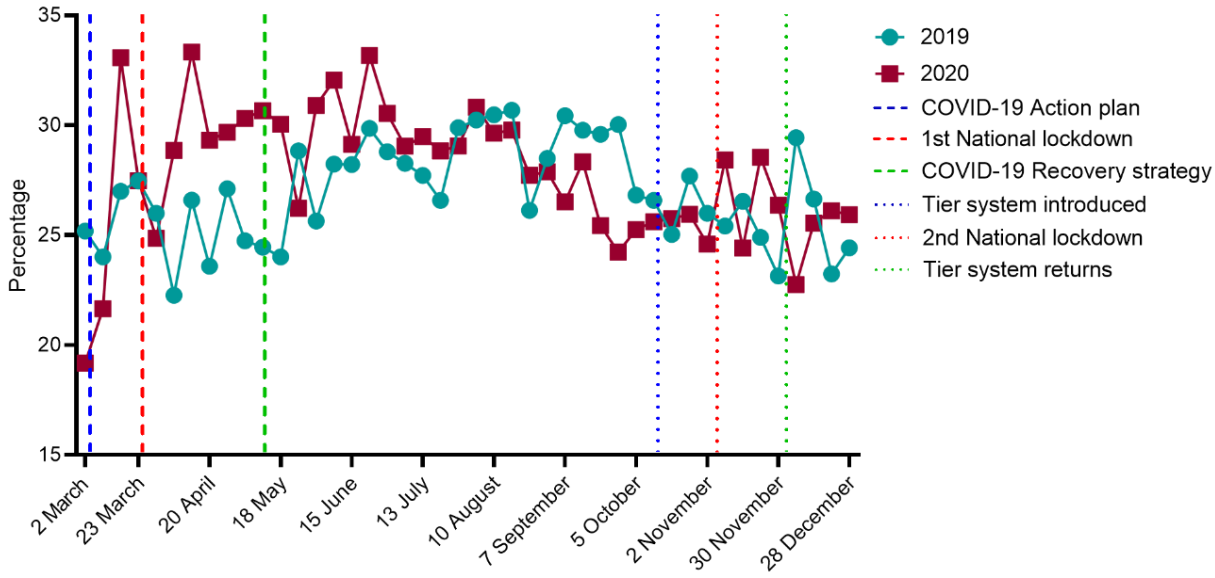

Figure 6.5.2 Hand sanitiser telephone enquiries during COVID-19

Public Health actions

As a result of the toxicovigilance data collected by NPIS, a number of public health actions were instituted. PHE updated handwashing and surface cleaning advice (tweets) to include advice on the safe storage of hand sanitisers and the risks of mixing cleaning chemicals. Similar warnings were published in the PHE Chief Nurse newsletter and the Regional PHE Children and Young People's newsletter. In addition, the PHE Dental Public Health team disseminated warnings around the use of dental analgesics through avenues such as the NHS England Primary Care Bulletin and to link to relevant guidance on pain relief for dental pain.

The full PHE and NPIS COVID-19 Toxicovigilance and Chemical Surveillance Summary Reports can be found on the PHE Knowledge and Library Hub under "Resources for UK based health professionals" see Finding the evidence: Coronavirus.

6.6 Retirement of Professor Allister Vale

Allister Vale has had a continuous association with the NPIS since its inception, first as a specialist in poisons information, then as a registrar and finally as one of its consultants and director of NPIS Birmingham.

The NPIS was founded in 1963. In October 1963, Dr Roy Goulding, the Director of the London Unit, advertised for two medical students at Guy's Hospital (where the unit was based) to cover NPIS enquiries from 5-9 pm on weekdays and 9-5 pm at weekends. The enquiries were taken overnight by Roy Goulding directly. Allister Vale was one of the two students appointed. As the service expanded, the number of students increased substantially, but Allister continued in this poisons information role throughout his undergraduate career.

After qualification, Roy Goulding encouraged Allister to continue his association with the NPIS, and he was invited to all the weekly academic and business meetings held by the London unit. When Allister became a medical registrar, Roy proposed that he apply for the post of registrar in intensive care and clinical toxicology, which he held for two years. One of the enthusiastic junior doctors he mentored around this time was Nicholas Bateman who recalled ‘In 1972 I remember a smart guy in a suit that was very similar to the type he has worn all his life. I was managing my first ever aspirin OD by forced alkaline diuresis at that time’. House physician and registrar were to go on to become friends and colleagues and both to make substantial contributions to the NPIS, in Newcastle, Edinburgh and Birmingham.

In 1982 Dr Noel Wright, the director of the Regional Poisoning Treatment Centre in Birmingham and its associated poisons information service, decided to emigrate to Canada. Allister was encouraged to apply for this post to which he was appointed. The post also included a considerable general medical commitment and a peritoneal dialysis service. After gaining substantial regional funding for the development of the Treatment Centre (renamed the West Midlands Poisons Unit) and the Poisons Information Service, the latter became part of the national service at the same time as the Newcastle unit. Allister considered it essential for the NPIS to contribute to toxicological activities locally, nationally, and internationally. He has been involved in the University of Birmingham's MSc(Tox) degree since its inception in the 1980s. He was President of the British Toxicology Society and the European Association of Poisons Centres and Clinical Toxicologists (EAPCCT) and has been instrumental in encouraging other NPIS colleagues to accept senior leadership roles in these organisations. As EAPCCT

President, Allister was the driving force to establishing a long overdue proper structure based on democracy. He was a Trustee of the American Academy of Clinical Toxicology (AACT) and brought the endeavours of the AACT and EAPCCT together through collaboration with his great friend Ed Krenzelok – one of their joint achievements being spearheading the publication of Position Statements that provided internationally agreed evidenced-based guidelines on key areas of toxicological management. In 2011 Allister co-founded and was the first President of the Clinical and Translational Section of the Society of Toxicology.

Within the NPIS Allister is highly respected for his attention to detail, uncompromising passion for excellence, willingness to share his wealth of clinical knowledge and his commitment to promoting best practice. He played a vital role in steering TOXBASE towards a more evidence-based standardised approach of information provision. Starting with the extensive literature database held initially on old Kalamazoo file in Edinburgh, Allister developed, and for 25 years edited, 'Current Awareness in Clinical Toxicology', a comprehensive monthly listing of all relevant citations on toxicology for NPIS staff and members of the International Clinical Toxicology Societies. Allister has always been generous with his time and happy to provide advice day or night. He has enthusiastically taught and mentored most of the Consultant Clinical Toxicologists practising in the UK today and many from further afield.

Allister's prolific publication record spans more than 40 years. The first edition of Goulding and Vale's 'A concise guide to the management of acute poisoning' was published in 1979. This ran to two editions then morphed into Vale JA, Meredith TJ: 'Poisoning: diagnosis and treatment' in 1981 – an important text in its time that ran to three editions. Allister has since contributed to several hundred publications, usually written with NPIS colleagues, and indicating his extensive toxicological interests, particularly the toxicology of metals, pesticides and chemical warfare agents. More recently, Allister has coordinated 15 papers on the toxicity of household products, publications that have demonstrated the great value of using NPIS data. Allister's reputation as a gifted writer is not only toxicological. In 2020 he published (with John Scadding) the widely acclaimed study on 'Winston Churchill's Illnesses 1886-1965: Courage, Resilience, Determination'. He is presently working predominantly with his long-term friend and colleague Alex Proudfoot to complete the 'Clinical Toxicology of Pesticides'.

Since stepping back from acute clinical practice Allister has continued to advise and support colleagues within the NPIS and he remains Consulting Clinical Toxicologist to NPIS Birmingham and the West Midlands Poisons Unit. Colleagues past and present are indebted to him for helping to establish the NPIS as the world class clinical toxicological service it is today.

7. Conclusions

The COVID-19 pandemic, coupled with the challenging financial circumstances faced by the service, has made this a particularly challenging year for the NPIS. The service smoothly transitioned to home working when this was necessary and not only maintained research and surveillance projects but additionally undertook surveillance work looking for evidence of increasing toxicity involving some specific substances arising as a result of the pandemic. This is a testament to the hard work, commitment and flexibility of all our staff.

Increasing use of TOXBASE and the TOXBASE app during the year are welcome, because these are highly cost-effective methods for the immediate delivery of written information and clinical advice. The growing use of ***bumps*** as a publicly accessible source of advice about drugs and chemicals in pregnancy is also welcome, especially at a time when women may have found it more challenging to discuss their concerns directly with their doctor or midwife. The work done by UKTIS to support national advice on the safety of COVID-19 treatments and vaccines should also be commended.

The recent departure of the UK from the European Union has implications for the NPIS in terms of chemicals legislation and safety. The upgrading of our national submission system to accept product composition data in the new EU format and the continuing ability of NPIS Birmingham to manage the substantial growth of that database are further indicators of success.

Currently, in spite of very favourable user feedback, more than 8% of telephone enquiries take more than 5 minutes to be answered and 4% of enquiries are abandoned by the caller before the call is answered at all, with afternoons and evenings being the times of highest pressure. This means that healthcare professionals managing patients who may be critically unwell may face unreasonable delays in receiving the clinical advice they need. Additional resources are required to reduce call waiting times and options are currently being explored with PHE as its commissioner regarding additional funding requirements.

8. Recommendations

Outcome of recommendations for NPIS in 2020/21

1. Continue to work with PHE, Department of Health and Social Care and other partners to identify further resources or reductions in services and expenditure to allow the NPIS and its constituent units to operate with balanced budgets.

The NPIS has continued to work with PHE to develop additional income streams where possible and to identify potential areas of cost savings. Budgets have been balanced by short-term income streams, but longer term solutions are needed to secure the service responsiveness and quality in the long term.

2. Redesign the user satisfaction survey for telephone enquirers with the aim of improving response rates, reducing workload for our staff, and reducing impact on the environment.

Methods for obtaining QA responses from users by email have been piloted and are being put into regular use.

3. Support toxicovigilance work being led by PHE in the context of the current COVID-19 pandemic and publish findings.

The NPIS has monitored episodes of poisoning relating to several substances where exposures might increase in the context of the pandemic. The information obtained has been shared with PHE and disseminated appropriately.

4. Continue support of PHE in delivery of global public health initiatives relating to poisons centres, where funding is available.

The NPIS has provided the support commissioned.

5. Continue to monitor episodes of poisoning of public health importance, reporting to responsible government agencies as appropriate.

This activity continues and has been described in section six of this report.

Recommendations for NPIS in 2021/22

1. **Continue to work with PHE, DHSC and other partners to identify further resources or reductions in services and expenditure to allow the NPIS and its constituent units to operate within a balanced budget.**

2. **Continue to work with PHE, DHSC and other partners to ensure the NPIS is appropriately resourced to fulfil its role as Appointed Body under chemical safety regulations. This will include further development and maintenance of the NPIS Product Data Centre.**

3. **Continue to monitor episodes of poisoning of public health importance, reporting to responsible government agencies as appropriate.**

APPENDIX A Senior NPIS staff

NPIS Consultants and Senior Staff

NPIS Birmingham

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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 FAACT FBPhS
Consultant Physician and Clinical Toxicologist, Chair of Drugs and Therapeutics Committee and Trust Lead for Mortality Surveillance and Review, Co-Chair of Medication Safety Committee, Guy's and St Thomas' NHS Foundation Trust and King's Health Partners, London; Reader in Clinical Toxicology, 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 DipMedTox
Consultant Emergency Physician with Toxicology, St John's Hospital, Livingston and 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

Professor S M Bradberry

INTERNATIONAL SOCIETIES

President: Clinical and Translational Toxicology Speciality Section, Society of Toxicology
Fellow: American Academy of Clinical Toxicology
Fellow: European Association of Poisons Centres and Clinical Toxicologists

UK ADVISORY COMMITTEES

Member: PHE Lead exposure in children surveillance system steering group
Member: Home Office, Office for security and counter terrorism. Chemical Expert Panel

ACADEMIC ACTIVITIES

Honorary Professor: School of Pharmacy, University of East Anglia
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

Dr M E M O Elamin

INTERNATIONAL SOCIETIES

Member: Abstract Review Committee, MENATOX (Middle East & North Africa Clinical Toxicology Association)

ACADEMIC ACTIVITIES

Member: MRCP Part 1 & 2 Specialty Question Writing Group
Visiting Lecturer in Clinical Toxicology: Faculty of Medicine, Al-Neelain University, Sudan
Lecturer: NPIS/RCEM Clinical Toxicology Training Days

Mr P S Jagpal

INTERNATIONAL ACTIVITIES

External Expert: for Rapid Risk Assessment: European Commission Scientific Committee on Health and Environmental Risks

NPIS Cardiff

Dr J Coulson

INTERNATIONAL ACTIVITIES

Consultancy in Clinical Toxicology to WHO

UK ADVISORY COMMITTEES

Member: Committee on Toxicity

Co-opted member: Tramadol subcommittee to the Advisory Panel on Substance Misuse

NHS NATIONAL AND REGIONAL COMMITTEES

Chair: New Medicines Group

ACADEMIC ACTIVITIES

Honorary Professor of Clinical Pharmacology & Toxicology: Cardiff Metropolitan University

Visiting Professor of Clinical Pharmacology: University of South Wales

Dr L A Gray

NHS NATIONAL AND REGIONAL COMMITTEES

Chair: All Wales Prescribing Advisory Group (AWPAG) for All Wales Medicine Strategy Group

ACADEMIC ACTIVITIES

Medical Advisor: Diploma in Medical Toxicology, Cardiff University

Member: Prescribing Safety Assessment (PSA) Assessment Board, British Pharmacological Society

Lecturer: Cardiff Update in Medical Toxicology

Dr A Thomas

NHS NATIONAL AND REGIONAL COMMITTEES

Medical Director: Yellow Card Centre Wales

Member: Deputy Member, All Wales Medicines Strategy Group

ACADEMIC ACTIVITIES

PSA Lead: Cardiff University School of Medicine

Theme Lead: BDS Human Disease Course, Cardiff University

Member: Programme Management Committee, Certificate/Diploma/MSc in Medical Toxicology, Cardiff University

Member: Programme Management Committee, Certificate/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

Fellow: European Association of Poison Centres and Clinical Toxicologists

Fellow: American Academy of Clinical Toxicology

UK ADVISORY COMMITTEES

Deputy Chair: 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

Member: Executive Committee, 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

ACADEMIC ACTIVITIES

Member: Programme Management Committee Certificate/Diploma/MSc in Medical Toxicology; Therapeutics; and Occupational Health, Policy and Practice, Cardiff University

NPIS Edinburgh

Professor J Dear

INTERNATIONAL ACTIVITIES

Member: Expert Advisory Group EU IMI TransBioLine Consortium, Critical Path Institute Acute Kidney Injury Working Group

INTERNATIONAL JOURNALS

Executive Editor: British Journal of Clinical Pharmacology

NHS NATIONAL AND REGIONAL COMMITTEES

Deputy Director: Yellow Card Centre, Scotland

Member: Lothian Formulary Committee

Member: British Pharmacological Society Clinical Section Committee

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 Environment, Climate Change and Health

External Examiner: Postgraduate diploma in Pesticide Risk Management, University of Cape Town, South Africa

INTERNATIONAL JOURNALS

Senior Editorial Board Member: Clinical Toxicology

UK ADVISORY COMMITTEES

Member: UK Department of Health Expert Advisory Group on Antivenoms

NHS NATIONAL AND REGIONAL COMMITTEES

Member: Scottish Commission on Medicines

Member: Area Drug & Therapeutics Committee, NHS Lothian

Dr G Jackson

INTERNATIONAL ACTIVITIES

External Expert: European Commission Scientific Committee on Health and Environmental Risks

UK ADVISORY COMMITTEES

Medical Sub Group Member: The All-Party Parliamentary Carbon Monoxide Group

NHS NATIONAL AND REGIONAL COMMITTEES

Member: National Safety Alerts Oversight group

Dr E Morrison

UK ADVISORY COMMITTEES

Member: New Drugs Committee, Scottish Medicines Consortium

Member: National Review Panel for PACS Tier 2, Healthcare Improvement Scotland

NHS NATIONAL AND REGIONAL COMMITTEES

Chair: NHS Lothian Area Drugs and Therapeutics Committee

Member: Individual Patient Treatment Request panel, NHS Lothian

Dr E A Sandilands

UK ADVISORY COMMITTEES

Advisor: Consortium of Local Education Authorities for the Provision of Science in Schools (CLEAPSS)

NHS NATIONAL AND REGIONAL COMMITTEES

Member: Lothian Drug and Therapeutics Committee

ACADEMIC ACTIVITIES

MBChB Deputy Assessment Lead: University of Edinburgh

MBChB Year 4 Clinical Placement Lead: University of Edinburgh

MSc Critical Care, Toxicology Lead: Royal College Physicians Edinburgh & University of Edinburgh

Dr A Veiraiah

NHS NATIONAL AND REGIONAL COMMITTEES

Medical Lead: SPSP Medicines

ACADEMIC ACTIVITIES

Faculty: Primary Care Improvement Programme, Healthcare Improvement Scotland

NPIS Newcastle (including UKTIS)

Dr S Hill

UK ADVISORY COMMITTEES

Member: New Psychoactive Substances sub group of the Advisory Council on the Misuse of Drugs

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
Member: British Pharmacological Society Clinical Committee

ACADEMIC ACTIVITIES

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)
Educational Supervisor: PHE Funded Advanced Fellowship in Clinical Toxicology
Deputy Director of Medical Education (Undergraduate Lead): Newcastle Upon Tyne Hospitals NHS Foundation Trust

Dr K K Hodson

INTERNATIONAL SOCIETIES

Member: ENTIS (European Network of Teratology Information Services)

UK ADVISORY COMMITTEES

Member: MHRA Medicines for Women's Health Expert Advisory Committee
Member: RCOG COVID-19 Vaccination in Pregnancy Working Group

NHS NATIONAL AND REGIONAL COMMITTEES

Executive Member: MacDonald UK Obstetric Medicine Society
Executive Member: UK Maternal Cardiac Society
Member: MHRA Optimising Data on the Safety of Use of Medicines in Pregnancy
Member: MHRA Safer Medicines in Pregnancy and Breastfeeding Consortium

ACADEMIC ACTIVITIES

Lead Consultant: Maternal Medicine Training in NE England
Lecturer: Maternal Medicine Teaching Courses, RCP London and Royal College of Obstetricians and Gynaecologists

Dr H K R Thanacoody

ADVISORY COMMITTEES

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

ACADEMIC ACTIVITIES
Member: Joint Royal Colleges MRCP (Part 1) Exam Board
Module Leader: Experimental Medicine and Therapeutics, MRes in Translational Medicine, Newcastle University
Course Director: Clinical Pharmacology Therapeutics and Prescribing, MBBS, Newcastle University
External Examiner: Therapeutics, MBBS, Brighton & Sussex Medical School

Professor S H L Thomas
INTERNATIONAL SOCIETIES
Fellow and Past president: European Association of Poisons Centres and Clinical Toxicologists
Fellow: American Academy of Clinical Toxicology
INTERNATIONAL JOURNALS
Deputy Editor: Clinical Toxicology
UK ADVISORY COMMITTEES
Member: Advisory Council on the Misuse of Drugs
Member: Technical Committee, Advisory Council on the Misuse of Drugs
Chair: Advisory Council on the Misuse of Drugs Novel Psychoactive Substances Committee.
Member: Ministry of Defence Advisory Group on Military and Emergency Response Medicine
NHS NATIONAL AND REGIONAL COMMITTEES
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
Member: North of Tyne Area Prescribing Committee, Formulary Subcommittee
ACADEMIC ACTIVITIES
Regional Speciality Advisor (North East), Clinical Pharmacology and Therapeutics

Other consultants providing on-call support for the NPIS

Professor P I Dargan
INTERNATIONAL ACTIVITIES
Immediate Past Chair: European Association of Poison Centres and Clinical Toxicologists Scientific Committee
Member: American College of Medical Toxicology International Committee
Abstract Reviewer: American Academy of Clinical Toxicology
Expert Adviser: World Health Organization and United Nations Office on Drugs and Crime
Member: GSK Global Analgesics Panel
Member: WHO/UN Global Alliance to Eliminate Lead from Paint
Member: WHO Global Burden of Disease Expert Panel
INTERNATIONAL JOURNALS
Senior Editorial Board Member: Clinical Toxicology

Editorial Board Member: Toxicologie Analytique et Clinique

UK ADVISORY COMMITTEES

Expert Adviser: Advisory Council on Misuse of Drugs

Co-chair: College of Emergency Medicine Antidote Guideline Group

ACADEMIC ACTIVITIES

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

Member: MRCP (UK) Scenario Editorial Committee

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

Member: WHO Global Burden of Disease Expert Panel

PI: Janssen ENSEMBLE 2 COVID Vaccine Study

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

ACADEMIC ACTIVITIES

Honorary Senior Lecturer: Hull York Medical School

Dr D M Wood

INTERNATIONAL ACTIVITIES

Member: American Academy of Clinical Toxicology Scientific Review Committee

Member: Clinical Toxicology Collaborative: Activated Charcoal Systematic Review

Member: EXtracorporeal TReatments In Poisoning (EXTRIP) 2 workgroup

Expert Advisor: European Monitoring Centre for Drugs and Drug Addiction (EMCDDA)

Expert Advisor: United Nations Office on Drugs and Crime (UNODC)

Expert Advisor: World Health Organisation

INTERNATIONAL SOCIETIES

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

INTERNATIONAL JOURNALS

Editorial Board Member: Journal of Medical Toxicology

International Scientific Committee Member: Toxicologie Analytique et Clinique

UK ADVISORY COMMITTEES

Member: UK Advisory Council on the Misuse of Drugs (ACMD)
Member: ACMD Chemsex, Monitoring, Technical and Novel Psychoactive Working Groups
Member: COMed Working Group/All-Party Parliamentary CO Group (on behalf of the NPIS)

NHS NATIONAL AND REGIONAL COMMITTEES

Member: Department of Health Early Warning System
Member: Public Health England NPS Clinical Network
Member: Steering Group of the PHE RIDR project
Co-Chair: South East London Medicines and Pathway Review Group
Co-Vice Chair: South East London Integrated Medicines Optimisation Committee
Member: South East London Joint Formulary Committee (as Guy's and St Thomas' NHS Foundation Trust representative)

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 2020/21

58 contributions to the scientific literature were published in 2020/21 by NPIS staff*

* NPIS staff are given in **bold** type
# early online publication details for these publications were previously listed in the 2019/20 NPIS report

Peer-reviewed papers

Bell CC, Chouhan B, Andersson LC, Andersson H, **Dear JW**, Williams DP, Söderberg M. Functionality of primary hepatic non-parenchymal cells in a 3D spheroid model and contribution to acetaminophen hepatotoxicity. Arch Toxicol 2020; 94: 1251-63.

Bracchi RC, Tseliou F, Copeland L, Routledge PA, **Thomas A**, Woods F, Adams A, Walker J, Jadeja M, Atkinson MD, Ashfield-Watt P. Public awareness in Wales of the UK Yellow Card scheme for reporting suspected adverse drug reactions. BJCP published online 2/1/21.

Cariappa MP, **Veiraiah A**, Khera A. Coronavirus disease 2019 prevention, control and modelling metrics. Med J Armed Forces India 2020; 76: 476-7.

Ceulemans M, Foulon V, Panchaud A, Winterfeld U, Pomar L, Lambelet V, Cleary B, O'Shaughnessy F, Passier A, **Richardson JL**, Allegaert K, Nordeng H. Vaccine willingness and impact of the COVID-19 pandemic on women's perinatal experiences and practices – a multinational, cross-sectional study covering the first wave of the pandemic. Int J Environ Res Public Health published online 24/3/21.

Chew C, O'Dwyer P, **Sandilands E**. Radiology for medical students: Do we teach enough? Br J Radiol 2021; 94: 111920201308.

Cook MA, **Jagpal PS**, Hnin Pwint K, San LL, Kyaw Thein SS, Pyone T, Thit WMM, **Bradberry SM**, Collins S. Systematic review of human poisoning and toxic exposures in Myanmar. Int J Env Res Pub Health 2021; 18: 3576.

Craven TH, Walton T, Akram AR, Scholefield E, McDonald N, Marshall ADL, Humphries DC, Mills B, Campbell TA, Bruce A, Mair J, **Dear JW**, Newby DE, Hill AT, Walsh TS, Haslett C, Dhaliwal K. Activated neutrophil fluorescent imaging technique for human lungs. Sci Rep 2021; 11: 976.

Dear JW, Ng ML, Bateman DN, Leroy Sivappiragasam P, Choi H, Khoo BBJ, Ibrahim B, Drum CL. A metabolomic analysis of thiol response for standard and modified N-acetylcysteine treatment regimens in patients with acetaminophen overdose. Clin Transl Sci published online 20/3/21.

Eddleston M, Chowdhury FR. Organophosphorus poisoning: the wet opioid toxidrome. Lancet 2021; 397: 175-7.

Gunnell D, Appleby L, Arensman E, Hawton K, John A, Kapur N, Khan M, O'Connor RC, Pirkis J, COVID-19 Suicide Prevention Research Collaboration. Suicide risk and prevention during the COVID-19 pandemic. Lancet Psychiatr 2020; 7: 468-71.

Jones NK, Stewart K, Czopek A, Menzies RI, Thomson A, Moran CM, Cairns C, Conway BR, Denby L, Livingstone DEW, Wiseman J, Hadoke PW, Webb DJ, Dhaun N, **Dear JW**, Mullins JJ, Bailey MA. Endothelin-1 mediates the systemic and renal hemodynamic effects of GPR81 activation. Hypertension 2020; 75: 1213-22.[#]

Lamb T, **Stewart D**, Warrell DA, Lalloo DG, **Jagpal P**, Jones D, **Thanacoody R**, **Gray L**, **Eddleston M**. Moderate-to-severe *Vipera berus* envenoming requiring ViperaTAb antivenom therapy in the UK. Clin Toxicol published online 15/3/21.

Laurent D, Semple F, Starkey Lewis PJ, Rose E, Black HA, Coe J, Forbes SJ, Arends MJ, **Dear JW**, Aitman TJ. Absolute measurement of the tissue origins of cell-free DNA in the healthy state and following paracetamol overdose. BMC Med Genomics 2020; 13: 60.

Leedale JA, Mason CL, Brillant N, Webb SD, **Dear JW**. Mathematical modelling and statistical analysis of indocyanine green and other biomarkers of hepatic function and drug-induced liver injury. Computational Toxicol 2020; 16: 100134.

Marín-Romero A, Tabraue-Chávez M, **Dear JW**, Sánchez-Martín RM, Ilyine H, Guardia-Monteagudo JJ, Fara MA, López-Delgado FJ, Díaz-Mochón JJ, Pernagallo S. Amplification-free profiling of microRNA-122 biomarker in DILI patient serums, using the luminex MAGPIX system. Talanta 2020; 219: 121265.

Matthews O, Morrison EE, Tranter JD, Starkey Lewis P, Toor IS, Srivastava A, Sargeant R, Rollison H, Matchett KP, Kendall TJ, Gray GA, Goldring C, Park K, Denby L, Dhaun N, Bailey MA, Henderson NC, Williams D, **Dear JW**. Transfer of hepatocellular microRNA regulates cytochrome P450 2E1 in renal tubular cells. EBioMedicine 2020; 62: 103092.

Mudera CP, Bavdekar RD, Kumar N, **Veiraiah A**, Nair RK. Reaching out to the millions: A 5 key messages rapid IEC campaign during the COVID-19 pandemic. Int Q Community Health Educ published online 16/3/21.

Osinski K, Ross H, Clarke L, **Dear J**, **Veiraiah A**. A case of ingestion of two vape cartridges. Clin Toxicol published online 6/11/21.

Potts AJ, Bowman NJ, Seger DL, **Thomas SHL**. Toxicoepidemiology and predictors of death in 2,4-dinitrophenol (DNP) toxicity. Clin Toxicol 2020; 6: 1-6.

Preston H, Swan I, Davies L, Dummer S, **Veiraiah A**, Beh YY. Lockman A. Improving VTE risk assessment and prophylaxis prescribing rate in medical patients: integrating risk asse ssment tool into the workflow. BMJ Open Quality 2020; 9: e000903.

Pyper K, Robertson C, **Eddleston M**, **Sandilands E**, Bateman DN. Use of the online poisons information database TOXBASE and admissions rates for poisoned patients from emergency departments in England and Wales during 2008 to 2015. J Am Coll Emerg Phys Open 2020;1: 1078-89.

RECOVERY Collaborative Group. Azithromycin in patients admitted to hospital with COVID-19 (RECOVERY): a randomised, controlled, open-label, platform trial. Lancet 2021; 397: 605-12.

RECOVERY Collaborative Group. Dexamethasone in hospitalized patients with Covid-19. NEJM 2021;384: 693-704.

Rupprechter SAE, Sloan DJ, Oosthuyzen W, Bachmann TT, Hill AT, Dhaliwal K, Templeton K, Matovu J, Sekaggya-Wiltshire C, **Dear JW**. MicroRNA-122 and cytokeratin-18 have potential as a biomarkers of drug-induced liver injury in European and African patients on treatment for mycobacterial infection. Br J Clin Pharmacol 2021 published online 11/1/21.

Scullion KM, Vliegenthart ADB, Rivoli L, Oosthuyzen W, Farrah TE, Czopek A, Webb DJ, Hunter RW, Bailey MA, Dhaun N, **Dear JW**. Circulating argonaute-bound microRNA-126 reports vascular dysfunction and treatment response in acute and chronic kidney disease. iScience 2020; 24: 101937.

Wood C, **Coulson J**, **Thompson J**, Bonner S. An intentional aconite overdose: a case report. J Crit Care Med 2020 ;6 :124-9.[#]

Books and chapters

Dear JW. Poisoning and drug overdose. In 'Clinical Pharmacology and Therapeutics (Lecture Notes)', McKay GA, Walters MR, Ritchie ND. 10th Edition, Wiley, 2021.

Thanacoody R. Chapter 14.1 - Caffeine: massive accidental caffeine overdose treated with continuous veno-venous hemodiafiltration. In 'Toxicology Cases for the Clinical and Forensic Laboratory', Ketha H, Gard U (Eds). Elsevier, 2020: 239-42.

Thomas SHL, White J. Poisoning. In 'Davidson's Principles and Practice of Medicine', Colledge NR, Walker B, Ralston S (Eds). 24th Edition, Elsevier, 2021.

Vale JA, **Bradberry SM**, Bateman DN. Poisoning by drugs and chemicals. In 'Oxford Textbook of Medicine', Firth J, Conlon C, Cox T (Eds). 6th Edition, Oxford University Press, 2020.

Published congress abstracts

Alrossies A, Ross J, Harnett J, Lane K, Archer JRH, Wood DM, Dargan PI, **Hill SL**, **Thomas SHL**, **Thanacoody RHK**. Efficacy of a 12h intravenous acetylcysteine (SNAP) regimen following single acute paracetamol overdose. Clin Toxicol 2020; 58: 597.

Beech MJ, **Sandilands EA**, **Thanacoody RHK**, **Thompson JP**, **Bradberry SM**. Hydrofluoric acid exposure: a five year review of enquiries made to the UK National Poisons Information Service (NPIS). Clin Toxicol 2020; 58: 509-10.

Brooke N, Bedada G, Kebede S, Jones D, Carter G, **Stewart D**, **Jagpal PS**, **Elamin MEMO**, **Thanacoody RHK**, Chilcott S. Supporting the establishment of an Ethiopian Poisons Centre. Clin Toxicol 2020; 58: 590-1.

Coulson JM, Wayte A, Ferner RE. The value of post-mortem toxicology in deciding whether a death is drug-induced. Clin Toxicol 2020; 58: 602-3.

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Dear J, Tranter J, Chahman-Vos L, Dhaun N, Bailey M. Drug-induced liver injury cannot be accurately assessed by standard assays for circulating microRNA-122 due to the presence of isomiRs. Br J Pharmacol 2020; 177: 2652-3.

Eagling VA, **Sandilands EA**, **Lupton DJ**, **Thomas SHL**, **Thompson JP**, **Bradberry SM**, **Eddleston M**. Colchicine: telephone enquiries to the UK's National Poisons Information Service (NPIS) and UK trends in TOXBASE® accesses and prescribing data. Clin Toxicol 2020; 58: 508-9.

Eagling VA, **Sandilands EA**, **Thomas SHL**, **Thompson JP**, **Bradberry SM**. An analysis of cases of methaemoglobinaemia reported in telephone enquiries to the UK's National Poisons Information Service (NPIS). Clin Toxicol 2020; 58: 509.

Ferner RE, **Brookes R**. The association between phenytoin (diphenylhydantoin) and permanent cerebellar damage. Clin Toxicol 2020; 58: 621.

Jagpal PS, **Sandilands EA**, **Thanacoody RHK**, **Thompson JP**, **Bradberry SM**. Yew (*Taxus baccata*) exposures reported to the UK National Poisons Information Service over 10 years (2009–2019). Clin Toxicol 2020; 58: 538-9.

Jagpal P, **Williams H**, **Eddleston M**, Lalloo D, Warrell D, **Sandilands E**, **Thanacoody R**, **Gray L**, **Bradberry S**. Bites and stings: an analysis of enquiries to the UK National Poisons Information Service (NPIS) between 2009 and 2019. Clin Toxicol 2020; 58: 1153.

Jagpal P, **Williams H**, **Eddleston M**, Lalloo D, Warrell D, **Sandilands E**, **Thanacoody R**, **Gray L**, **Bradberry S**. Bites from non-native *Viperidae* and *Elapidae* snakes reported to the UK National Poisons Information Service 2009-2019. Clin Toxicol 2020; 58: 1153-4.

Lee HMR, **Bradberry SM**, Ford L, **Elamin MEMO**. Using "symptom search" to resolve an unusual case of poisoning reported to the UK National Poisons Information Service (NPIS). Clin Toxicol 2020; 58: 620.

Markham CJ, **Coulson JM**. Arsenic exposure and peripheral neuropathy. Clin Toxicol 2020; 58:580.

Matthews O, **Morrison EE**, Tranter JD, Lewis PS, Toor IS, Srivastava A, Sargeant R, Rollison H, Matchett KP, Kendall TJ, Gray GA, Goldring C, Park K, Denby L, Dhaun N, Bailey MA, Henderson NC, Williams D, **Dear JW**. Transfer of hepatocellular microRNA regulates cytochrome P450 2E1 in renal tubules. Br J Pharmacol 2020; 177: 2650-1.

Moyns EJ, Lee HMR, **Sandilands EA**, **Thanacoody RHK**, **Thompson JP**, **Bradberry SM**. A 10-year review of enquiries to the UK National Poisons Information Service involving high-dose insulin (HDI). Clin Toxicol 2020; 58: 619.

Scullion K, Vliegenthart B, Farrah T, Dhaun N, **Dear J**. MicroRNA-126 is a marker of vascular dysfunction in chronic kidney disease. Br J Clin Pharmacol 2020; 86: 1211-12.

Stedman S, Vliegenthart B, Wei C, del Pozo J, **Dear J**. Modelling the global challenge of drug-induced liver injury in zebrafish. Br J Pharmacol 2020; 177: 2652.

Stewart D, **Bradberry SM**, **Thomas SHL**, **Thompson JP**, **Sandilands EA**, **Eddleston M**. An analysis of envenoming features in adder bite cases referred to the UK National Poisons Information Service (NPIS). Clin Toxicol 2020; 58: 638.

Thomas SHL, Vidler D, Dunn M, Officer J, Hudson S, **Hill SL**, Hardy G, Dargan PI, Wood DM, Haden M, Keating L, **Eddleston M**. Reduction in analytically confirmed exposures to new psychoactive substances in patients attending emergency departments with severe clinical toxicity in the United Kingdom, 2015-2019. Clin Toxicol 2020; 58: 1082-3.

Thomas SHL, Vidler D, **Hill SL**, Officer J, Issa S, Ketchin A, Cantle F, Cooper JG. Continuing low prevalence of analytically confirmed exposure to fentanyl and fentanyl analogues in patients with suspected severe heroin toxicity in the United Kingdom. Clin Toxicol 2020; 58: 1236-7.

Vidler D, Dunn M, Officer J, Roper C, **Hill SL**, Dargan PI, Wood DM, **Eddleston M**, **Thomas SHL**. Analytically-confirmed exposure to N-ethylpentylone in the UK: a report from the IONA study. Clin Toxicol 2020; 58: 578-9.

Vidler D, Dunn M, Officer J, Roper C, **Hill SL**, Dargan PI, Wood DM, **Eddleston M**, **Thomas SHL**. Analytically-confirmed exposure to new psychoactive substances in patients with severe clinical toxicity in the UK, 2015-2018: a report from the IONA study. Clin Toxicol 2020; 58: 595-6.

Watt A, **Thomas SHL**, **Thompson JP**, **Bradberry SM**, Jackson G, **Sandilands EA**. Kambô: a healing potion or a poisonous toxin? Clin Toxicol 2020; 58: 639.

Other

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Thanacoody R. Opiate overdose. BMJ Best Practice 2021; 13 March. Review.