



UK Health  
Security  
Agency



# National Poisons Information Service Report 2022 to 2023

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

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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 medicines, drugs or chemicals. These exposures commonly involve unintentional contact with substances found in households or gardens and, although they occur in all age groups, they are particularly common in young children. Exposures also commonly occur as medicine overdoses in the context of self-harm or as a result of drug misuse, with adolescents and younger adults disproportionately involved. Occupational exposures or involvement of natural toxins such as snake envenomation are less common.

The numbers of different substances that may be involved in human exposures are very large and include medicines, household and garden products, drugs of misuse, industrial chemicals and plant or animal toxins. Most 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 appropriate 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 by the UK Health Security Agency (UKHSA) to provide this clinical support, which acts on behalf of the English Department of Health and Social Care (DHSC), 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 UKHSA 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. The NPIS service is provided by 4 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 delivers the UK Teratology Information Service (UKTIS), which is the designated UK source of expert advice regarding exposure to medicinal and illicit drugs as well as 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. This is particularly important at this time of stress in the National Health Service. The NPIS also performs research and education activities, while collecting and sharing surveillance data that are important for public health and health security in the UK and internationally.

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

Michael Eddleston  
Chair, NPIS Clinical Standards Group

Raquel Duarte-Davidson  
NPIS Commissioner, Radiation, Chemicals and Environmental Hazards Directorate, UK  
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## Executive summary

Poisoning is an important public health issue, with poisoning incidents as a percentage of all emergency department diagnoses continuing to increase year on year. In England alone, there have been over 350,000 hospital presentations per year for the period 2018 to 2019 through to 2021 to 2022 where the primary or secondary diagnosis was poisoning (including overdose) (1)\*. 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 patient 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 21,000 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 UK Teratology Information Service (UKTIS) provides information and advice nationally about exposures to drugs and chemicals during pregnancy.

### Activity

During 2022 to 2023 (changes from 2021 to 2022 activity in parentheses) there were:

#### NPIS

- 812,380 (+7.6%) TOXBASE user sessions from 8,357 (+6.7) different registered UK healthcare departments; hospital departments and the NHS patient advice services were the most frequent users

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\* A different coding structure was introduced into the Emergency Care Data Sets (ECDS) in 2020 to 2021. Data presented in this report for 2020 to 2021 and 2021 to 2022 reflects ECDS primary and secondary diagnosis codes combined so is comparable to the Comparison of A&E Diagnoses reported in the Hospital Episode Statistics for 2018 to 2019 and 2019 to 2020 (1).

- 2,583,323 (-0.6%) TOXBASE online page views (average 3.2 page views per online user session)
- 284,833 (+6.4%) app accesses from 28,323 TOXBASE app subscribers
- 38,709 (-0.96%) telephone enquiries received, of which 2,142 were referred to an NPIS consultant clinical toxicologist (-3.1%); the most frequent telephone enquirers were NHS patient advice services and healthcare professionals working in hospitals
- 4,343 (-24.8%) TOXBASE monographs written or updated and 32,151 safety data sheets submitted to the NPIS Product Data Centre, bringing the total to more than 370,000

## UKTIS

- 2,077,196 (+4.1%) downloads of publicly available information about drugs in pregnancy provided by the 'bumps' website
- 26,648 (-8.5%) accesses by healthcare professionals to the detailed information on drugs and chemical exposures in pregnancy held on TOXBASE
- 1,842,555 (+53.6%) accesses to the openly available summaries on the UKTIS website. Note that access data to publicly available websites are not directly comparable year to year because of a change to search engine algorithms
- 754 enquiries (-24.1%) about specific patients handled by the UKTIS telephone advice service

## Quality

The NPIS has strict clinical governance procedures and quality assurance exercises continue to demonstrate that all of the services provided have very high user satisfaction. The proportion of respondents scoring services as very good or excellent was 96.7% for TOXBASE online, 96.6% for the NPIS telephone poisons information service, and 96.3% 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 2022 to 2023 include work on poisoning with drugs of misuse, pesticides, carbon monoxide, dinitrophenol, nitrous oxide and propranolol.

# Introduction

Poisoning is an important public health issue in the UK, accounting for over 115,000 hospital presentations in 2021 to 2022, in England alone, where the primary or secondary diagnosis was poisoning (including overdose) (1), and many more consultations with primary care and NHS patient advice services such as NHS 111, NHS 24 and NHS Direct.

Poisoning can be categorised according to type of exposure, substance involved or circumstances of exposure. Inappropriate exposures to medicines and other drugs are a common source of poisoning and might involve use by someone who was not prescribed the medicine, or accidental or deliberate ingestion of excessive doses (an 'overdose'). Recreational drug misuse is a major public health problem in the UK and may involve licensed medicines or non-medicinal substances. Finally, people may be exposed to substances that are not intended for human use (for example household cleaning products), or an environmental toxin (for example carbon monoxide), or plant or animal (for example mushrooms, snakes).

The majority of episodes of poisoning in the adult UK population are caused by drug overdose in the context of self-harm, although drug misuse is an important cause of mortality. In children, accidental exposures are common, particularly involving substances found within the household. Many thousands of different substances may be involved in these cases, making it very difficult for NHS staff to keep up to date on risk assessment, diagnosis and management. The great 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 is essential for their safe and effective management.

The NPIS is a network of dedicated poisons units commissioned by the UKHSA 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 advice services 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 instance via TOXBASE®, an online poisons information database, with 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.

Drug and chemical exposures during pregnancy can cause particular concern because these may affect the fetus as well as the mother. UKTIS, hosted by the NPIS, is a designated service providing advice to healthcare professionals and patients about potential effects on the unborn child. As well as providing information and advice, UKTIS 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 UKHSA. The service also receives some contract income for providing services in other countries, as well as research income for specific projects. Providing a high-quality responsive service to NHS users, including maintaining our essential and highly used online platforms, remains an NPIS priority.

# National Poisons Information Service

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 4 NPIS units are currently based within NHS teaching hospitals (2 in England and one each in Scotland and Wales). Birmingham, Cardiff and Newcastle participate in a 24-hour national telephone enquiry rota; the Edinburgh unit receives telephone enquiries during working hours only as its main focus is on the editing and production of TOXBASE.

The 4 units also take telephone calls about chemical exposures and operate an early warning alerting system providing advice resulting in the best possible patient care, ensuring efficient use of resources. The units liaise with the UKHSA Radiation, Chemicals and Environmental Hazards Directorate (RCE) and Public Health Scotland (PHS) regarding real-time management of chemical incidents.

The service has 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 4 NPIS units and colleagues from 2 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 dispersed expertise is important for resilience and health security in the UK. Due to the NPIS receiving many enquiries about children, UKHSA has commissioned additional support from a consultant specialising in paediatrics.

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 patient advice services. TOXBASE is the National Institute for Health and Care Excellence (NICE) mandated, and Department of Health and Social Care (DHSC) recommended, initial source of poisons information for healthcare professionals in the UK. 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 also 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. Uninterrupted access to TOXBASE is therefore crucial to the service and the NPIS strives to ensure that it remains operational at all times, with robust systems in place to respond to outages.

The TOXBASE app for mobile devices is also available without charge to UK NHS, UKHSA and Ministry of Defence (MOD) 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 requirement, 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 monographs 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 World Health Organization (WHO)'s Poisoning Severity Score (PSS), developed by the International Programme on Chemical Safety, the European Commission and the European Association of Poisons Centres and Clinical Toxicologists (EAPCCT) ([2](#)). Enquiries about complex or severe cases, or where a review by an NPIS consultant might allow a patient to either not be admitted to hospital or be discharged home earlier, are referred on to NPIS consultants. Figure 1 illustrates how poisons enquiries are answered by the NPIS.

Enquiries via healthcare professionals, including the NHS patient advice services who handle poisons enquiries made by the public, should initially be made via TOXBASE. If an enquiry is unresolved using TOXBASE, then contact with NPIS should be made through the NPIS national telephone number 0344 892 0111. Calls to NPIS are handled by SPIs. Where necessary, if clinical advice is required, these specialists will refer calls to NPIS clinical toxicology consultants. If calls are received which have population, political or media implications, referral is made to UKHSA RCE or PHS as appropriate.

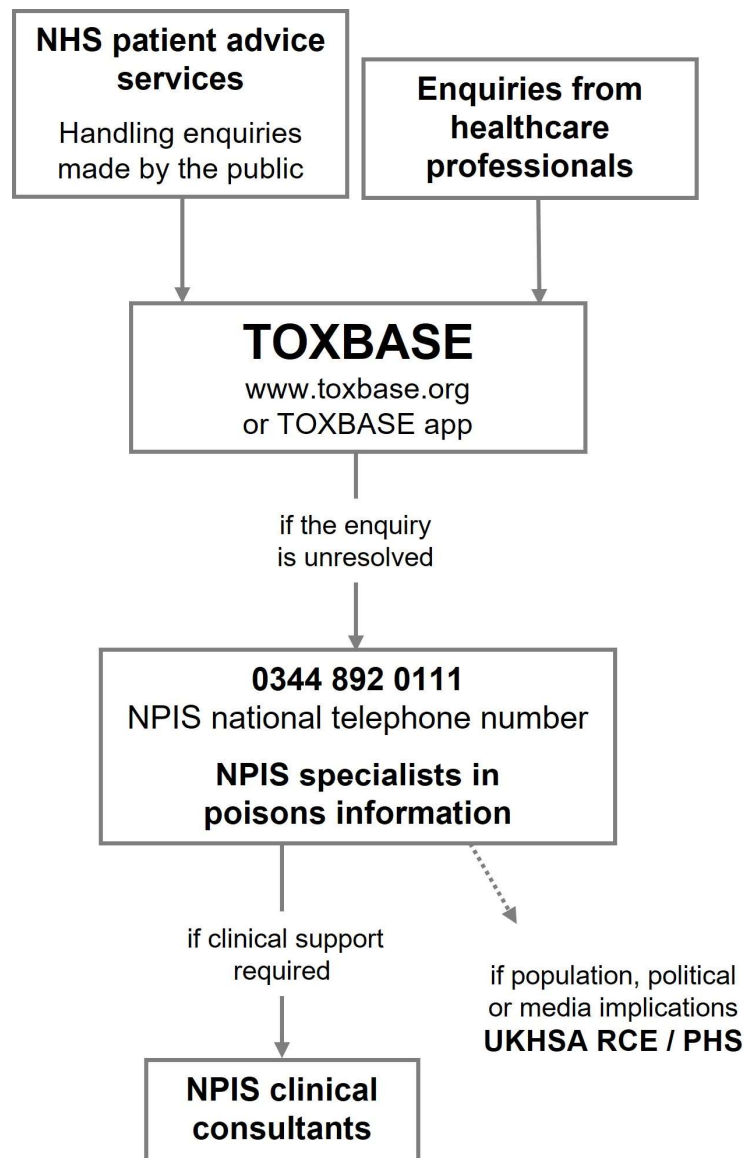
Audio recordings of all NPIS telephone enquiries are retained for governance purposes and clinical data are logged within a specially designed national database, the UK Poisons Information Database (UKPID). Data are uploaded to a central server, allowing access by other NPIS units that may be involved in the subsequent management of any 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 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 automatically routed 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.

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.

**Figure 1. How poisons enquiries are answered by the NPIS**



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 a closed area of TOXBASE.

Commissioning issues are dealt with by the UKHSA 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 4 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. 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. Clinicians and SPIs are also encouraged to attend and present at international toxicology conferences such as the annual congress of the EAPCCT.

### Cost benefit of NPIS

The NPIS provides timely reassurance and expertise in response to both routine and complex cases of poisonings. It is a well-used front line clinical service and an intrinsic component of the UK health security arrangements, fulfilling national and international requirements. The NPIS service uses significant resource; it is therefore important to assess 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. The NPIS has previously published research demonstrating its cost-effectiveness through reducing referrals to emergency department as a result of its advice (3).

# NPIS activities

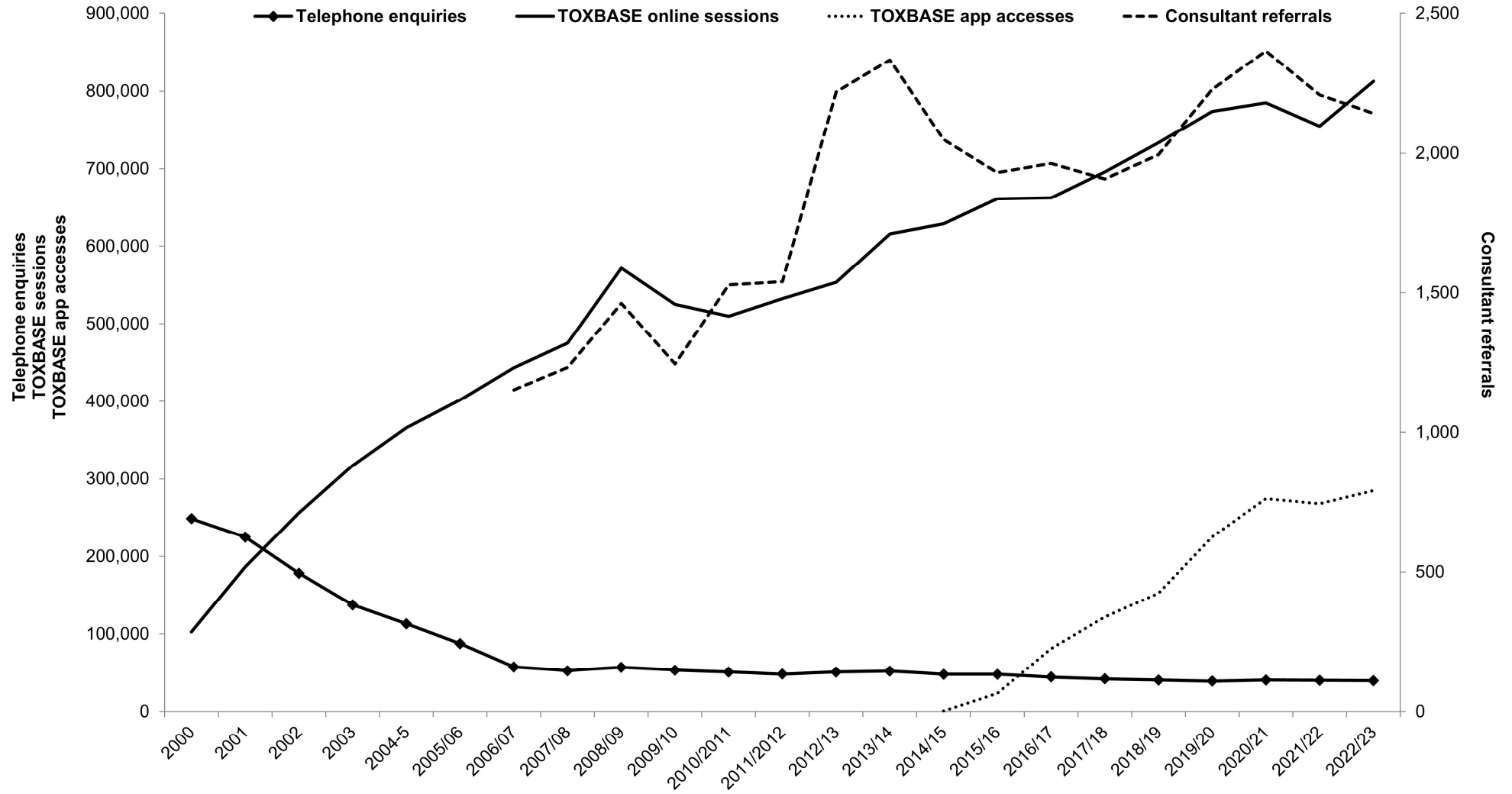
## Overall service profile

The overall activity for UK NPIS services in 2022 to 2023 is summarised below (change from 2021 to 2022 in brackets):

- 8,357 (+6.7%) healthcare departments registered to use TOXBASE online
- 812,380 (+7.6%) TOXBASE online user sessions (defined as one login by a registered user where the user may access one or more pages several times, the average being 3)
- 2,583,323 (-0.6%) TOXBASE online page views; average 3.2 page views per online user session (-7.8%)
- 28,323 (+9.7%) individual TOXBASE app users
- 284,883 (+6.4%) TOXBASE app page accesses
- 38,709 (-0.96%) patient related telephone enquiries answered
- 2,142 (-3.1%) telephone enquiries referred to a consultant toxicologist
- 4,343 (-24.8%) TOXBASE monographs written or updated

Figure 2 shows that the annual number of enquiries via TOXBASE online and the app have increased compared to 2021 to 2022, when demand for NPIS services decreased during the pandemic. Consultant referrals fell (down 3.1%) in 2022 to 2023 compared to 2021 to 2022. The number of enquiries received via the national helpline also decreased by 0.96%. Overall service use has risen steadily over the past 23 years and the lower numbers reported in 2021 to 2022, during the COVID-19 pandemic, have not altered the overall trend as demonstrated by the 2022 to 2023 data reported herein.

**Figure 2. Number of TOXBASE online sessions, TOXBASE app accesses, telephone enquiries and consultant referrals between 2000 and 2022 to 2023**



## UK service profile

In 2022 to 2023, there were 721,092 TOXBASE online user sessions generated in the UK (a further 91,288 user sessions were generated overseas) compared to 676,509 in 2021 to 2022 (+6.6%). Hospital departments were the source of 64.5% (465,329) of all UK user online sessions to TOXBASE; 87.9% (409,171) of which originated in ED departments. The majority of accesses to the TOXBASE app were from UK ambulance services (57.5%). The UK patient advice services were the heaviest users of the NPIS national helpline number (accounting for 39.4% of all enquiries received, followed by hospital departments). The total number of TOXBASE online user sessions, TOXBASE app accesses and patient related telephone enquiries generated by UK users of NPIS services are shown by workplace type in Table 1.

During the reporting year (changes from 2021 to 2022 in brackets) there were:

- 44,583 (+6.6%) more TOXBASE online UK user sessions, including 38,272 more sessions from hospital users
- 9,145 (+3.8%) more UK TOXBASE app accesses, with the increase seen across all user categories
- 38,709 (-0.96%) fewer patient related telephone enquiries answered, including 217 more enquiries from hospitals, 192 more enquiries from patient advice services and 155 more enquiries from ambulance services, but 177 fewer enquiries from members of the public, and 68 fewer enquiries from GPs

Table 2 lists the most common subjects of views/enquiries received across all routes of access to NPIS (TOXBASE online, TOXBASE app and telephone enquiries). It shows that UK healthcare professionals continue to need most help managing poisonings from analgesics, in particular paracetamol, and antidepressants.



**Table 1. Use of NPIS services by workplace type as of 31 March 2023 (UK only)**

<b>Workplace type</b>	<b>Number of TOXBASE online user sessions (% of total)</b>
Emergency department	409,171 (56.7)
NHS patient advice services	135,580 (18.8)
Ambulance	73,253 (10.2)
Primary care	34,958 (4.8)
Medicines Information	17,648 (2.5)
Pharmacy	11,749 (1.6)
Paediatrics	6,591 (0.9)
Admissions / Assessment	6,383 (0.9)
All others	25,759 (3.6)

<b>Workplace type</b>	<b>Number of TOXBASE app page accesses (% of total)</b>
Ambulance	144,195 (57.5)
Emergency department	46,065 (18.4)
Admissions / Assessment	15,308 (6.1)
General Practice	9,159 (3.7)
ITU / HDU	7,711 (3.1)
NHS patient advice services	1,592 (0.6)
All others	26,837 (10.7)

<b>Workplace type</b>	<b>Number of patient related telephone enquiries (% of total)</b>
NHS patient advice services	15,414 (39.4)
Hospital	10,339 (26.5)
General Practice	5,559 (14.2)
Ambulance	4,073 (10.4)
Prison	1,226 (3.1)
All others	2,098 (6.4)

**Table 2. Most commonly viewed product pages on TOXBASE online and the TOXBASE app, and the most common agents involved in telephone enquiries in 2022 to 2023 (UK only)**

Rank	TOXBASE online	Number of page views
1	Paracetamol*	177,137
2	Ibuprofen	49,565
3	Sertraline	33,538
4	Diazepam	24,551
5	Pregabalin	24,024
6	Codeine*	23,597
7	Quetiapine	22,641
8	Propranolol	21,787
9	Mirtazapine	20,084
10	Amitriptyline	18,750

Rank	TOXBASE app	Number of accesses
1	Paracetamol*	23,827
2	Sertraline	5,309
3	Ibuprofen	5,201
4	Amitriptyline	4,422
5	Diazepam	4,116
6	Quetiapine	3,735
7	Mirtazapine	3,662
8	Codeine	3,620
9	Pregabalin	3,343
10	Zopiclone	2,932

\* does not include product accesses for combination products or those listed under proprietary names, for example co-codamol or Zapain

Rank	Telephone enquiries	Number of calls
1	Paracetamol	7,493
2	Codeine	2,023
3	Ibuprofen	3,040
4	Ethanol	968
5	Sertraline	880
6	Naproxen	855
7	Multivitamins	707
8	Mirtazapine	696
9	Quetiapine	600
10	Diazepam	566

In addition to TOXBASE product pages, additional pages providing guidance on antidote use are available to our users. In 2022 to 2023, via TOXBASE online, there were 44,886 accesses to antidote pages compared to 46,054 in 2021 to 2022, a 2.5% decrease. There was no change between years in the list of most commonly accessed antidote pages.

Table 3 lists the most commonly accessed antidote pages on TOXBASE online and the app.

**Table 3. Most commonly accessed antidote pages on TOXBASE online and the TOXBASE app in 2022 to 2023 (UK only)**

Rank	TOXBASE online	Number of page views
1	Acetylcysteine	32,945
2	Fomepizole	1,752
3	Digoxin antibodies	1,607
4	Naloxone	1,189
5	Flumazenil	914
6	Desferrioxamine	548
7	Procyclidine	542
8	Antivenom (adder)	442
9	Ethanol	355
10	Methylthioninium chloride	338

Rank	TOXBASE app	Number of page accesses
1	Naloxone	296
2	Acetylcysteine	259
3	Atropine	200
4	Glucagon	86
5	Flumazenil	83
6	Cyanide antidotes	59
7	Methylene blue	53
8	Fomepizole	49
9	Ethanol	47
10	Prussian blue	37

## TOXBASE online in the UK

As of 31 March 2023, there were 8,357 healthcare departments registered to use TOXBASE online in the UK (+6.7% on 31 March 2022). In 2022 to 2023 there were over 2.1 million individual page accesses via TOXBASE online:

- 20,822 currently active product (predominantly medicines and household chemicals) and plant pages of which 11,910 (57.2%) different pages were viewed a total of 1,325,286 times
- 163 currently active antidote pages of which 143 (87.7%) different antidote pages were viewed a total of 44,886 times
- 2,632 currently active further information pages (for example common features and management, toxic doses, help interpreting ECGs, administration of antidotes, etc) of which 1,694 (64.4%) different information pages were viewed a total of 822,977 times
- 4,343 pages written or updated in 2022 to 2023

The most common product page and antidote accesses are detailed in Tables 2 and 3 above, respectively. Table 2 shows that paracetamol is the most frequently accessed product page. The paracetamol product page is one of the most complex on TOXBASE. A series of links are provided to allow users to navigate to the appropriate management advice they need, relative to the case they are treating. Table 4 shows which paracetamol management advice our users used. The data suggests that adults (and children aged 6-years and over) are most likely to present to healthcare facilities within 8 hours following an acute paracetamol ingestion (representing 38.6% of all accesses to the paracetamol product page), and that overdose following intravenous exposures rarely occurs (0.5%).

Our information pages on toxic doses are frequently accessed: 245,984 accesses in 2022 to 2023 or 29.9% of all information page accesses. The most commonly accessed toxic dose information pages are: NSAIDs (25,937), opioid (22,519) and SSRIs (17,309). TOXBASE's dosage calculator is also frequently utilised by UK users (191,821; 23.3% of all information page accesses).

**Table 4. Paracetamol management information pages accessed in 2022 to 2023 (UK only)**

Paracetamol management information page	Number of page accesses (% of total)
Adults and children ( $\geq 6$ -years) if less than 8 hours since acute ingestion	67,034 (38.6%)
Adults and children ( $\geq 6$ -years) if 8 to 24 hours since acute ingestion	36,909 (21.3%)
All patients staggered overdose	25,281 (14.6%)
Adults and children ( $\geq 6$ -years) if more than 24 hours since acute ingestion	14,836 (8.5%)
All patients therapeutic excess	12,181 (7.0%)
Children (<6-years) if less than 8 hours since acute ingestion	9,033 (5.2%)
Children (<6-years) if 8 to 24 hours since acute ingestion	4,810 (2.8%)
Children (<6-years) if more than 24 hours since acute ingestion	2,683 (1.5%)
All patients intravenous overdose	803 (0.5%)

## 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 a particularly 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. Figure 3 shows examples of screenshots from the current app (the co-codamol entry on an Android device, and the vinyl chloride entry on an iPad).

The app provides NHS, UKHSA and 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 2023 there were 28,323 current subscribers (27,393; 96.7% NHS/UKHSA/MOD and 930; 3.3% 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 UK workplace types are shown in Table 1; ambulance personnel were the most common.

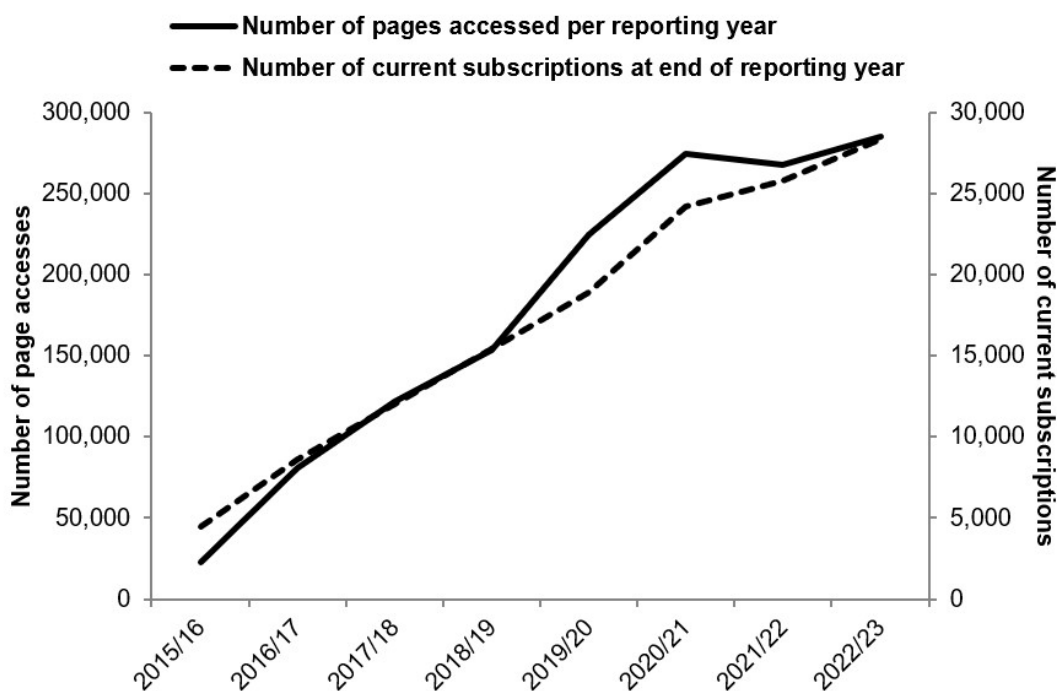
During the 2022 to 2023 reporting year, app subscribers (excluding NPIS users) accessed 284,833 pages including 204,355 product monographs and 80,528 antidote and information pages. Tables 2 and 3 above show the top UK product and antidote pages accessed on the app.

There was a 9.7% increase in the number of subscribers from the previous year and a 6.4% increase in the number of pages accessed, as shown in Figure 4.

Figure 3. TOXBASE app screenshots



**Figure 4. TOXBASE app subscriptions and pages accessed between 2015 to 2016 and 2022 to 2023**

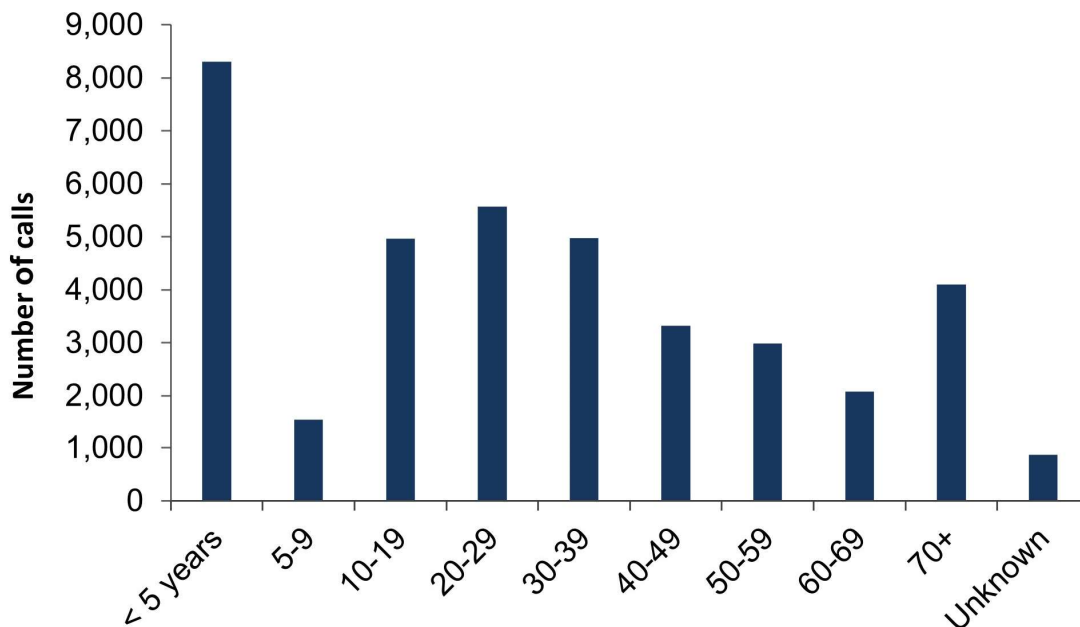


## NPIS national telephone enquiry helpline

TOXBASE is the NICE mandated and DHSC recommended initial source of poisons information for healthcare professionals in the UK. It is supported by the NPIS national telephone enquiry helpline, available for more complicated enquiries due to multiple agents ingested, patient co-morbidities, where the patient is severely unwell, or less experienced TOXBASE users. The enquiry line provides 24-hour access to advice from SPIs and, when required, a network of UK consultant toxicologists.

As in previous years, there were more enquiries about female patients than male patients (53% vs 46%, respectively 1.0% unknown). Figure 5 shows the age ranges of the patients involved; patients aged 9 years or less were most common, representing 25% (9,851) of all poisoned patients. Poisonings were predominantly accidental (14,624; 37.8%; Table 5), by ingestion (51,398; 88.4%; Table 6) and occurred at home (33,227; 85.8%; Table 7). The national telephone enquiry helpline continues to be an invaluable resource for users and is vital to a functioning poisons information service in the UK. Providing urgent advice regarding the management of severely unwell patients at any time of the day.

**Figure 5. Age ranges of patients reported to NPIS during telephone enquiries in 2022 to 2023**



**Table 5. Circumstances of poisonings reported to the NPIS during telephone enquiries in 2022 to 2023**

Circumstance	Number (% of total)
Accidental	14,624 (37.8)
Intentional deliberate self-harm (new 1 January 2022)*	8,658 (22.4)
Therapeutic error	6,600 (17.1)
Intentional therapeutic excess (new 1 January 2022)*	3,483 (9.0)
Medical error (new 1 January 2022)*	1,291 (3.3)
Unknown	1,009 (2.6)
Intentional	875 (2.3)
Recreational misuse	764 (2.0)
Other	732 (1.8)
Adverse reaction	475 (1.2)
Malicious potential (new 1 January 2022)*	117 (0.3)
General information	81 (0.2)

\* the definitions of circumstance used by NPIS to classify poisoning cases were expanded in January 2022, compared to previous years, to facilitate more precise reporting



**Table 6. Exposure route of poisonings reported to the NPIS during telephone enquiries in 2022 to 2023**

<b>Route of exposure</b>	<b>Number* (% of total)</b>
Ingestion	51,398 (88.4)
Inhalation	2,534 (4.4)
Skin contact	1,388 (2.4)
Eye contact	880 (1.5)
Sub Cutaneous	342 (0.6)
Intravenous	240 (0.4)
Insufflation	226 (0.4)
Intramuscular	180 (0.3)
Bite or sting	169 (0.3)
Needlestick	116 (0.2)
Other	661 (1.1)

\* the number of exposure routes exceeds the total number of enquiries because patients may be exposed via multiple routes / multiple agents during one episode of poisoning, for example ingestion and skin contact, or inhalation and eye contact

**Table 7. Location of poisonings reported to the NPIS during telephone enquiries in 2022 to 2023**

<b>Location</b>	<b>Number (% of total)</b>
Home/domestic	33,227 (85.8)
Prison	1,184 (3.1)
Nursing/care home	979 (2.5)
Work	914 (2.4)
Hospital	679 (1.8)
Public area	538 (1.4)
School	469 (1.2)
Unknown	396 (1.0)
Other	216 (0.6)
GP surgery	67 (0.1)
Agricultural workplace	40 (0.1)

## Telephone enquiry handling

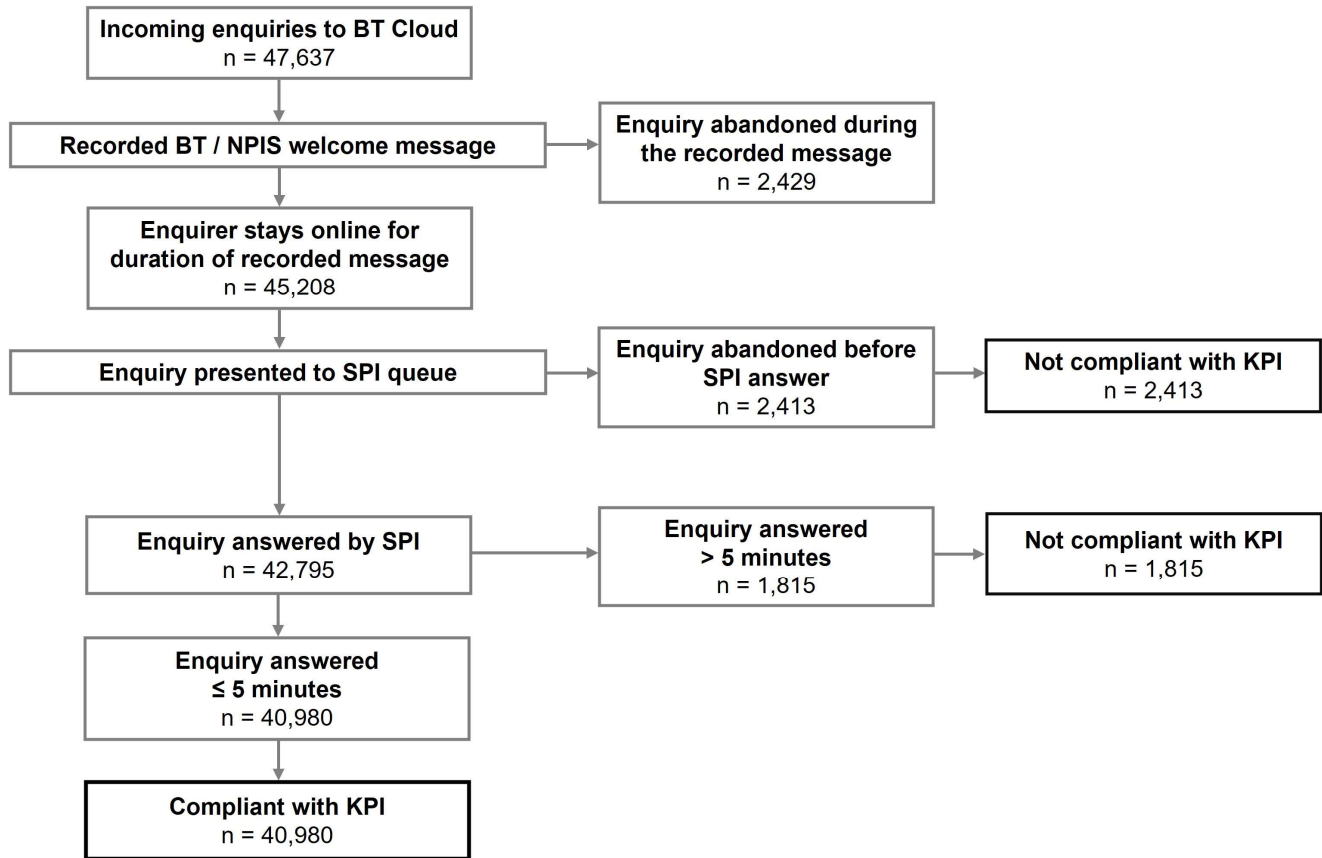
The NPIS uses a bespoke BT Cloud Contact™ system to deliver telephone enquiries received from healthcare professionals across the UK via a single number (0344 892 0111) to SPIs in the 4 units. This system has several benefits including conference call functionality and a comprehensive reporting tool. The latter enables close monitoring of workload, wait times, dropped (abandoned) calls and call duration at national, individual unit and individual scientist level<sup>2</sup>. It also allows assessment of compliance with the UKHSA stipulated key performance indicator (KPI) that 95% of telephone requests will be answered within 5 minutes of the call being made. Telephone enquiry data were assessed retrospectively for the period 1 April 2022 to 31 March 2023 using the BT Cloud data reporting tool and analysed using Microsoft Excel. Figure 6 summarises the flow of telephone enquiries through the BT platform.

The median wait time in 2022 to 2023 for a call presenting to the SPI queue to be either answered (94.7%) or abandoned (5.3%) was 34 seconds (IQR, 30-45 seconds). Approximately 1% (473) of enquirers waited longer than 10 minutes for their call to be answered - delays were due to the phone lines being busy with other callers. Of the 42,795 enquiries that were answered, the median talk time was approximately 5 minutes (295 seconds, IQR, 205- 440 seconds) with 12.4% of answered enquiries lasting 10 minutes or more (5,308). The longest enquiry lasted one hour and 5 minutes. The proportion of enquiries that were abandoned before being answered by a SPI was low at 5.3% (2,413), the median wait time before abandonment was 38 seconds (IQR, 23-159 seconds). Eighty-eight (3.6%) users waited in the SPI queue for more than 10 minutes before abandoning their call. There were 4,228 (9.4%) enquiries that were not answered within five minutes, the majority (2,467, 58.3%) of which were received between midday and 10pm. These data demonstrate that the NPIS provides a robust service, answering 94.7% of all presented enquiries and the large majority (90.6%) within a wait time of five minutes or less. However, since the service is tasked to answer 95% of enquiries within five minutes, further assessment of the staffing resources required to open additional telephone lines during busy periods is underway.

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<sup>2</sup> 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.

**Figure 6. Summary of telephone enquiry flow through the BT platform in 2022 to 2023**



## Consultant referrals

Daytime cover of the national telephone number is provided by SPIs in each NPIS unit, who are supported by consultants, academic clinical staff and/or specialist registrars, with appropriate supervision where needed.

The NPIS operates an out-of-hours national consultant clinical toxicology on-call rota for the UK and the Republic of Ireland. There are 17 consultant clinical toxicologists (14 from the 4 NPIS units and 3 from hospitals in York and London) contributing 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.

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.

There were 2,142 referrals to NPIS consultants in 2022 to 2023, which represents 5.4% of all telephone enquiries. Of these 1,102 (51.4%) were received during working hours and 1,040 (48.6%) out-of-hours. The median number of referrals per day was 6 (IQR 4 to 8). By far the most consultant referral calls - 2,000 (93.4%) - came from hospitals (Table 8), with calls from GPs/primary care (84; 3.9%) and NHS patient advice services (30; 1.4%) being the second and third most common sources respectively.

Table 9 shows the most common types of agents involved in referrals to consultants. The list reflects agents that are commonly ingested and those associated with more complex poisoning where consultant input into patient care is often required; it also highlights the number of calls relating to unknown agents. A referral to a consultant may also be made when a consultant review may avoid the patient being referred to hospital or allow earlier discharge than normal. Analysis of consultant referrals is used to improve the services offered by the NPIS, in particular TOXBASE. Issues highlighted by difficult or complex calls are discussed among NPIS staff at regular TOXBASE Editing Group meetings which facilitates necessary revisions to the advice provided on TOXBASE.

**Table 8. NPIS consultant referrals from hospital by department in 2022 to 2023**

<b>Source</b>	<b>Number of referrals from hospital (% of total hospital referrals: 2,000)</b>
Adult emergency departments	944 (47.2)
Intensive care units	465 (23.3)
Other hospital units	151 (7.5)
Paediatrics	126 (6.3)
General medicine	86 (4.3)
Admission/assessment units	80 (4.0)
Unspecified hospital units	30 (1.5)
Medicines information and pharmacy	18 (0.9)

**Table 9. Agents commonly involved in NPIS consultant referrals in 2022 to 2023**

<b>Rank</b>	<b>Agent</b>	<b>Number of referrals (% of total referrals: 2,142)</b>
1	Paracetamol (inc. combination products)	436 (20.4)
2	Unknown agent	179 (8.4)
3	Drugs of misuse	159 (7.4)
4	Digoxin	115 (5.4)
5	Propranolol	101 (4.7)
6	Ethylene glycol/methanol/antifreeze	89 (4.2)
7	Amlodipine	81 (3.8)
8	Bites and stings	75 (3.5)
9	Ibuprofen	65 (3.1)
10	Iron compounds	63 (2.9)

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 monographs, and informing the need for research in a number of areas.

## NPIS Product Data Centre

NPIS Birmingham is responsible for collecting and disseminating chemical safety information to other UK Poison Centres. On 1 January 2021, Annex VIII of EU Classification, Labelling and Packaging Regulation (1272/2008) was implemented in Northern Ireland. This has meant that the UK is currently operating a dual system of chemical safety information submission.

Whether information is submitted in the harmonised European format for Northern Ireland, or the non-harmonised format for Great Britain, it is securely held on the NPIS Product Data Centre, to which all NPIS staff have 24-hour access. This composition information is used to advise healthcare professionals contacting the NPIS for the acute management of poisoned patients as well as to update TOXBASE, enabling end-users to obtain specific advice on many common products.

In 2022 to 2023 a total of 32,151 (13,421 of which were in the EU harmonised format) submissions were made to the NPIS, with the Product Data Centre now holding composition information on more than 370,000 products.

Operating a dual system for chemical safety submission is challenging and the NPIS is working with UKHSA and DHSC to determine how best to submit EU specified harmonised information directly to the NPIS national submission system, especially because following EU Exit, the UK no longer has access to the EU's centralised European Chemicals Agency (ECHA) Poison Centre Notification Portal.

## Electronic engagement

The NPIS has a long history of engaging with service users electronically, going back as far as the early 1980s when TOXBASE was first developed as a response to increasing numbers of poisons enquiries. TOXBASE was, at that time, revolutionary in information delivery for poisons information.

Forty years later the [TOXBASE website](#) and the TOXBASE app for Android and iOS remain a unique format for poisons information provision internationally.

UKTIS deliver information to healthcare professionals via the [UKTIS website](#) and provide lay information at the ['bumps' website](#).

The [@TOXBASE](#) Twitter account was launched in 2020. Utilising this social marketing tool has allowed the NPIS to connect and better engage with our user base, raising global awareness and signposting potential new users to our service.

The [NPIS website](#) is focused on providing information to our stakeholders. It holds information on the structure and function of the NPIS and details the range of services offered to healthcare professionals on all aspects of poisoning and links to affiliated organisations and relevant websites. Visitors to the website can download NPIS publications,

including annual reports dating back to 2004. The website was created and is maintained by NPIS Birmingham with collaboration from the other units. Examples of research undertaken by the NPIS and presented at international toxicology conferences are also 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 for submitting product safety data information to the service.

## NPIS interactions with overseas users

As of 31 March 2023, there were 317 overseas departments registered for TOXBASE online and 1,140 TOXBASE app individual registered users in 126 countries outside the UK.

In 2022 to 2023 there were 91,288 TOXBASE online user sessions (11% of all TOXBASE online user sessions), an increase of 12,931(16.5%) user sessions than in 2021 to 2022. 390,174 page access were made, an average of 4.3 pages viewed per online user session. Brazil, Ireland and the Philippines made the most use of TOXBASE with the majority (68,655, 75.2%) of user sessions originating in overseas poison information centres. Overseas users made 267,149 accesses to 8,786 different product pages online, an increase of 15% and 3%, respectively, compared with 2021 to 2022. The majority (221,554, 82.9%) of all product accesses were also made by overseas poison information centres.

As is seen in the UK, paracetamol was the most commonly accessed product by overseas users. However, compared to UK users, international users view pharmaceuticals proportionately less; 68.1% of all product accesses compared to 81.2% of all UK product accesses. Furthermore international users were more likely to look at agrochemicals and chemicals (10.7% and 10.3% respectively) than UK users (6.4% and 4.9%, respectively).

TOXBASE app users, in 102 different countries, made 24,734 product page accesses to 2,096 different product pages; individuals from Saudi Arabia, the Philippines and Italy made the most use of the TOXBASE app. The most commonly accessed products via the app were paracetamol, quetiapine and ibuprofen, as shown in Table 10.

TOXBASE continues to be a well-regarded source of poisons information internationally and its international use has grown steadily. Paid subscriptions to TOXBASE online from upper middle and high income countries are available, although they represent only 11% of our overseas users. Such paid subscriptions enable us to continue with our ethical subscription model which allows us to offer TOXBASE to many poisons centres within low-income and middle-income countries, improving resilience and capacity in poison centres and hospitals in these countries.

**Table 10. Top product pages accessed by overseas users via TOXBASE online and the TOXBASE app in 2022 to 2023**

<b>Rank</b>	<b>Product page</b>	<b>Number of TOXBASE online accesses</b>
1	Paracetamol	10,223
2	Clonazepam	5,414
3	Sertraline	4,561
4	Quetiapine	3,982
5	Amitriptyline	3,434
6	Ibuprofen	2,918
7	Fluoxetine	2,875
8	Escitalopram	2,845
9	Diazepam	2,567
10	Alprazolam	2,518

<b>Rank</b>	<b>Product page</b>	<b>Number of TOXBASE app accesses</b>
1	Paracetamol	972
2	Quetiapine	444
3	Ibuprofen	368
4	Clonazepam	300
5	Amlodipine	283
6	Escitalopram	270
7	Amitriptyline	254
8	Olanzapine	252
9	Sertraline	252
10	Carbamazepine	234



# UK Teratology Information Service

UKTIS supports informed decision-making by providing accurate, up to date information about the effects of medication and other exposures during pregnancy to women and healthcare professionals in the UK. Many women need to take medicines in pregnancy to control chronic or acute health conditions to maintain their health and that of their unborn baby; others take medicines during acts of self-harm. Some pregnant or lactating women may be inadvertently exposed to medication, chemicals or other hazards either occupationally or through environmental exposure. Pregnancy safety data is often limited and of varying quality, making it difficult for healthcare workers to provide patient risk assessments regarding continued medication use in pregnancy, or to establish the risk of fetal harm.

UKTIS continually assess and evaluate the available data to produce systematic evidence reviews for healthcare workers, and 'bumps' (Best Use of Medicines in Pregnancy Summary) patient information. UKTIS provides a telephone service for individual, complex queries regarding the risks and benefits of medication use in pregnancy. UKTIS undertakes surveillance for teratogenic signal detection and is highly active in several national and international research activities in the area of reproductive toxicity. All activities within UKTIS are aimed at reducing preventable birth defects and other adverse pregnancy outcomes.

## Service activity

UKTIS provides detailed, fully referenced systematic evidence reviews that critically appraise the published data, for over 700 drug and chemical exposures, for registered health professionals via the [UKTIS website](#). An updated version of this website was launched in December 2022. Document summaries are openly available to all. The service also provides similar information for a lay audience at the ['bumps' website](#). The systematic reviews and patient information leaflets are written 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 by healthcare providers as demonstrated by an increase in accesses and fall in telephone enquiries.

In 2022 to 2023 UKTIS responded to almost 4 million information requests from both telephone enquiries and online accesses (Table 11). Hits on information leaflets on both UKTIS and 'bumps' websites increased in 2022 to 2023 when compared to 2021 to 2022. This is likely due to the increased visibility of the service following the work carried out as part of the IMI ConcePTION project, the COVID-19 Vaccination in Pregnancy national programme, academic output and social media presence. A new UKTIS.org website was launched in December 2022. Service users are encouraged to register on the website to receive UKTIS information (previously this information was only available via TOXBASE; numbers of accesses via TOXBASE has therefore fallen).

There was a reduction in the number of telephone enquiries received to the service this year, most likely due to increased use of online UKTIS pregnancy information. Telephone enquiries are monitored - where demand for information on a particular medication becomes apparent, UKTIS responds by producing online systematic reviews (resulting in a reduction in calls). One example is the new monograph on vortioxetine in response to an increasing number of calls relating to its use.

Public health campaigns and changes to prescribing recommendations/regulations have resulted in new literature on the treatment of monkey pox in pregnancy and the publication of two position statements: one regarding a study investigating childhood cancer risk following high-dose folic acid use in women with epilepsy in pregnancy, and the other on the updated Librium® (chlordiazepoxide) Summary of Product Characteristics (May 2022).

**Table 11. Telephone enquiries, TOXBASE accesses for UKTIS reviews, UKTIS full systematic evidence reviews, and ‘bumps patient information leaflet downloads for the past 5 years (% is the proportion of total accesses/enquiries).**

Year	Number of telephone enquiries (%)
2018 to 2019	1,432 (0.05)
2019 to 2020	1,153 (0.07)
2020 to 2021	852 (0.03)
2021 to 2022	993 (0.03)
2022 to 2023	754 (0.019)

Year	Number of TOXBASE accesses for UKTIS reviews (%)
2018 to 2019	34,729 (1.3)
2019 to 2020	29,264 (2.0)
2020 to 2021	31,078 (1.1)
2021 to 2022	29,117 (0.9)
2022 to 2023	26,648 (0.67)

Year	Number of UKTIS full systematic evidence reviews (%)
2018 to 2019	590,805 (21.4)
2019 to 2020	191,136 (13.1)
2020 to 2021	894,750 (32.2)
2021 to 2022	1,199,357 (37.6)
2022 to 2023	1,842,555 (46.7)

Year	Number of 'bumps' patient information leaflet downloads (%)
2018 to 2019	2,134,774 (77.3)
2019 to 2020	1,239,794 (84.8)
2020 to 2021	1,848,974 (66.6)
2021 to 2022	1,995,918 (61.4)
2022 to 2023	2,077,196 (52.6)

Year	Total information requests
2018 to 2019	2,761,740
2019 to 2020	1,461,347
2020 to 2021	2,775,654
2021 to 2022	3,185,385
2022 to 2023	3,947,153

## New UKTIS.org website

A new website for UKTIS online resources was designed, built and launched in 2022 to 2023. The new website has been designed to reflect the changes in the way healthcare practitioner access information, with the new interface incorporating a much more prominent search function for increased availability of information for clinicians. Healthcare practitioners are able to access summary information or register, free of charge, on the website to view full UKTIS systematic evidence reviews. Space on the homepage for current issues and important changes to prescribing in pregnancy has also been created.

At present, UKTIS systematic reviews can be accessed either via TOXBASE or UKTIS.org. Although TOXBASE users can continue to log into the site for information, they are now automatically redirected to full UKTIS systematic evidence reviews on UKTIS.org.

## External collaborations

UKTIS is a key stakeholder in collaborating with other UK organisations within the MHRA Safer Medicines in Pregnancy and Breastfeeding Consortium and the MHRA Medicines in Women's Health Expert Advisory Group. In 2022 to 2023 UKTIS continued to support NHS England with the nhs.uk medicines A-Z pages, reviewing pregnancy and fertility content for 80 product pages.

In 2022 to 2023 UKTIS staff supported various teaching and training events including for the Drug Safety Research Unit, The UK Perinatal Pharmacist Network, PgDip Medical Toxicology, MacDonald Obstetric Medical Society, International Colloquium Hyperemesis Gravidarum Conference and The Policy Institute at Kings College, London.

UKTIS has provided expertise to the following guidelines: British Society for Haematology Guideline for Anticoagulant Management of Pregnant Individuals with Mechanical Heart Valves, the British Society for Rheumatology (BSR) Guideline on Prescribing Drugs in

Pregnancy and Breastfeeding: comorbidity medications used in rheumatology practice, the BSR guideline on prescribing drugs in pregnancy and breastfeeding: immunomodulatory anti-rheumatic drugs and corticosteroids, and the Royal College of Obstetricians and Gynaecology guidelines on the Management of Nausea and Vomiting and Hyperemesis in Pregnancy (to be published soon).

Collaboration has continued with the UK Obstetric Surveillance Survey and the UKHSA Vaccines in Pregnancy group to analyse data collected from women receiving COVID-19 vaccination in pregnancy during the first 3-4 months of the vaccination programme.

## Research and development

UKTIS provides input and direction on national and international platforms to improve pregnancy data collection, and the development of novel methods for signal detection. Collaborative work has continued with the European Network of Teratology Services, the National Congenital Anomaly Rare Disease Registration Service and the NHS Business Services Authority.

UKTIS is currently working with colleagues in Europe on the final year of a five-year project, ConcePTION ([imi-conception.eu](http://imi-conception.eu)), which is supported by the Innovative Medicines Initiative. UKTIS have been central to the development of a core data elements framework, designed to standardise data collection procedures, improving data harmonisation and evidence synthesis capabilities. Details of how this framework was developed have now been published ([4](#)). The data elements are openly available on the European Network of Teratology Information (ENTIS) website.

## Future work

An upgrade to the 'bumps' website is planned for 2023 to 2024. The new site will offer improved accessibility to patient information and the 'bumps' pregnancy registry.

## Clinical governance

Our approach to clinical governance is detailed in previous annual reports; it includes analysis of critical and near miss events and a comprehensive system of user feedback. Patient safety and the quality of the clinical services provided continue to remain the highest priorities within the UK NPIS. This section includes details of critical and near miss events reviewed, and user feedback received, during 2022 to 2023.

### Analysis of critical and near miss events

There were no critical incidents and 17 near miss events recorded during 2022 to 2023.

One event related directly to patient care. Due to an internal NPIS miscommunication antivenom delivery was delayed by 30 minutes. This incident was reported as a near-miss and as a result, the recommendations were revised to highlight the importance of recording all consultant referrals where possible and encouraging SPIs to summarise the NPIS consultant's advice back to the consultant to ensure good understanding. SPIs should also be encouraged to complete documentation and peer review the enquiry promptly.

There were a further 16 non-patient related events discussed nationally: 11 involved incidents when the national telephone rota could not be filled. This totalled 54 hours when there was a sub-optimal number of SPIs available to answer poisons information enquiries. Due to a funding boost in 2022 to 2023, NPIS units are currently recruiting into SPI roles which should help ensure optimal staff numbers in the future.

There were 4 incidents involving TOXBASE: 2 full outages and 2 partial losses of function. On 12 December 2022, TOXBASE was offline for 15 minutes (9.15 am to 9.30 am) and, on the 21 March 2023, TOXBASE was offline for 10 minutes (4.00 pm to 4.10 pm). Outages were attributed to issues with the Traffic Manager System. The outages were noted within a few minutes and corrected within 15 minutes - highlighting that our monitoring and reporting processes relating to full outages are highly responsive and functioning optimally. No increase in phone enquiry numbers were noted during these outages.

For a period on Saturday 30 April 2022 (8 am to 6.30 pm) all monographs beginning with the letter M were not directly searchable and on Tuesday 21 March 2023 (8 am to 10:30 am) all monographs beginning with the letter N were not directly searchable.

On both occasions users would have seen an automated message stating that their search had failed and advising them to try searching via the A-to-Z listing. All monographs remained available via these A-to-Z listings. An update to the search engine is routinely run; if the update encounters a technical difficulty a partial loss of function may occur.

In response, NPIS has revised the schedule of updating to run only on weekday mornings. This increases the chance that, should an error re-occur, it will be noted and fixed promptly.

Furthermore, an upgrade to TOXBASE is scheduled for early 2024, which will include updating the existing search facility to avoid such issues in the future.

In addition, the NPIS Early Warning System (EWS) was not fully operational on the 22 May 2022 between 8 am and 6 pm. The system failed to recognise the 22 May 2022 as a public holiday and so the out-of-hours centres did not receive the urgent alerts (alerts generated by accesses to agents of special interest on TOXBASE). The roll over mechanism for urgent alerts had not been triggered. In response, the NPIS is considering fully automating this process; whilst this remains a manual process, protocols have been updated to minimise risk of this type of incident reoccurring.

## Quality assurance exercises

### Telephone information service user satisfaction

Since 2002, NPIS have gathered information on user satisfaction with the telephone enquiry service to monitor overall service performance, user requirements/expectations, and to identify areas for improvement.

During the 2021 to 2022 reporting year, the response rate to the quality assurance (QA) questionnaire sent to enquirers had fallen (consistent with the trend for recent years), despite modification to the questionnaire and data collection method at the beginning of the year. Therefore, the QA exercise was suspended temporarily from 1 April 2022 to 30 June 2022 to allow the NPIS to reflect on the methods of data collection to gauge user satisfaction, with the objective of improving the response rate.

The QA questionnaire was modified in two main ways. Firstly, the questionnaire was revised to a more concise version with only 5 questions that could be answered using a star rating with the aim of increasing response rate by significantly decreasing the time taken to fill out the questionnaire. Secondly, the questionnaire was created using Microsoft Forms with the aim of increasing the accessibility and ease of use for respondents, and to allow automatic data collection and analysis.

The questionnaire was comprised of the following 5 key questions for which users were asked to give a star rating between 1 and 5, with 1 being low satisfaction and 5 being high satisfaction (Figure 7).

**Figure 7. Telephone information QA questionnaire**

The image shows a screenshot of a questionnaire with five questions, each followed by a five-star rating system. The questions are:

1. How would you rate your overall experience with NPIST?  
☆ ☆ ☆ ☆ ☆
2. How satisfied were you with the wait time for your call to be answered?  
☆ ☆ ☆ ☆ ☆
3. How satisfied were you that your query was answered with the appropriate amount of information?  
☆ ☆ ☆ ☆ ☆
4. How would you rate the politeness of the advisor you spoke to?  
☆ ☆ ☆ ☆ ☆
5. Do you have any comments to help us improve our service?  
Enter your answer

### Survey results

The revised form was sent by email to a random sample of telephone enquiries between 1 July 2022 and 31 March 2023. All the 24-hour units (Birmingham, Cardiff and Newcastle) sampled 10% of the telephone enquiries, whereas 20% of the calls from the Edinburgh unit were surveyed to account for the fewer telephone enquiries taken by this unit. Between 1 July 2022 and 31 March 2023, 3250 questionnaires were sent out and 404 (12.4%) were returned. The response rate was 9.6% during the 2021-2022 reporting year.

Table 12 shows the number of respondents (and the percentage of overall respondents) that selected each score for the first four questions.

**Table 12. Telephone information satisfaction scores in 2022 to 2023**

Question	Number of respondents (%)				
	1 Low	2	3	4	5 High
How would you rate your overall experience with NPIS?	2 (<1%)	1 (<1%)	6 (<1%)	27 (6.7%)	363 (89.9%)
How satisfied were you with the wait time for your call to be answered?	2 (<1%)	1 (<1%)	5 (<1%)	32 (7.9%)	358 (88.6%)
How satisfied were you that your query was answered with the appropriate amount of information?	2 (<1%)	1 (<1%)	5 (<1%)	28 (6.9%)	363 (89.9%)
How would you rate the politeness of the advisor you spoke to?	1 (<1%)	1 (<1%)	0 (0%)	7 (1.7%)	387 (95.8%)

The majority of users (>96%) rated the service as good/ highly satisfactory, grading the service with 4 or 5 stars for each question. Of the two users who rated a satisfaction score of 1 or 2, one user commented that they were not eligible to access the service which was the reason for their dissatisfaction. The other enquirer did not provide comments on the reasoning.

Finally, we asked ‘Do you have any comments to help us improve our service?’, for which 225 out of 404 users responded. Many of the users simply used this section for positive feedback. Some also commented on the reason they contacted the service, which included products not being on the TOXBASE database, or that they were seeking clarity from TOXBASE.

Overall, the QA results show that users continue to be highly satisfied with the service. Using a shorter and more simplified version of the questionnaire between 2022 to 2023 correlated with a small 2.8% increase in respondents from the previous year, although the response rate remains below pre-COVID-19 response rates. Although this has not brought the response rate back up to pre-pandemic levels, it does not follow the trend of a consistent decline in response rate as had been seen before 2022 (Table 13).

**Table 13. Response rate and percentage of respondents that selected highly/extremely satisfied between 2014 to 2023**

Year	2014/ 2015	2015/ 2016	2016/ 2017	2017/ 2018	2018- 2019	2019/ 2020	2021 (1 Jan – 31 March)	2021/ 2022	2022/ 2023
QA Type	Postal	Postal	Postal	Postal	Postal	Postal	Email	Email	MS Forms
Response rate (%)	26.6	23.5	24.3	22.5	18.9	17.3	11.7	9.6	12.4
Satisfaction (% highly/extremely satisfied)	95.4	96.3	97.3	97.3	98.3	98.7	98.3	96.2	96.9



## 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 5 to 15 database logins; this number is also varied throughout the year. A total of 1,136 returns were received during the 2022 to 2023 reporting year.

Users were asked to grade a series of statements on a Likert scale of 1 to 6 where 1=disagree completely, and 6=agree completely. TOXBASE user satisfaction scores are shown in Table 14. Satisfaction scores remain good.

Overall satisfaction with TOXBASE on a scale of 1 to 6 was indicated on 1,124 returns; 96.7% scored either 5 (good) or 6 (excellent).

**Table 14. Summary of TOXBASE user satisfaction scores in 2022 to 2023**

Satisfaction score is the percentage of respondents who agree 'completely' (6) or 'a lot' (5).

Number of responses	Question	Satisfaction score
362	"I had confidence in the information for my query"	95.8
352	"Logging on to the database was easy"	93.1
332	"Finding the information I required was easy"	91.5
351	"The information was sufficient for managing this case"	88.9

### TOXBASE user feedback and service improvements

User feedback is an important component in the review process of TOXBASE monographs. 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 monographs are dealt with as they arise or may be collated for discussion at the TOXBASE Editing Group or Clinical Standards Group meetings.

Free text comments were provided on 195 TOXBASE quality assurance (QA) returns (17.2%), which can be grouped as shown in Table 15.

**Table 15. Summary of free text comments on TOXBASE from quality assurance returns in 2022 to 2023**

Type of comment	Number (% value) *
Positive comments and thanks	135 (69.2)
Suggestions	46 (23.6)
Comment related to other NPIS services	10 (5.1)
Negative comments	8 (4.1)
Specific issues	4 (2.1)
Information technology	2 (1.0)

\* users often offered multiple comment types within one response

## UKTIS

In 2022 to 2023 UKTIS sought feedback via paper questionnaire sent to a random sample of telephone enquirers with a response rate of 30 out of 40 (75%) questionnaires. The responses that were received indicated a high degree of satisfaction with the service, with 96% of responders reporting that they found it easy to contact the service, enquiry staff were polite and helpful, the service was easy to contact, the enquiry was answered in an acceptable time frame and at an acceptable pace, the information received was relevant and useful, and they had confidence in the reply. Of the 27 people who rated the service on a 6-point scale (1=poor and 6=excellent), 18 (67%) gave a rating of 6, 8 (30%) gave a rating of 5, and 1 (4%) gave a rating of 4.

## Education and training

### Training for scientific staff

Each NPIS unit provides structured in-house training and assessment in both clinical and non-clinical (for example 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.

## 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.

To ensure the needs of both clinical and scientific staff are well represented within the educational programme, an NPIS consultant and an NPIS scientist (appointed every 3 years) work together to organise the rolling programme of meetings. 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 during 2017 to 2020 consisted of 2-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.

Following the start of the COVID-19 pandemic and its related restrictions, regular bimonthly virtual CPD sessions using an online video conferencing platform at minimal added financial cost were established.

This platform allowed for secure storage of recorded presentations for future exclusive use of NPIS staff, further maximising educational benefit. Feedback was very positive in response to these changes.

In the 2022 to 2023 year, a series of 4 virtual CPD sessions were organised, including an annual session showcasing external NPIS scientific contributions, in addition to a special Christmas CPD event with a guest international speaker. In addition, 2 annual hybrid face-to-face with virtual access 2- day CPD events have been successfully organised with good physical and virtual attendance.

Current plans are to continue a hybrid model of an annual face-to-face meeting and regular virtual bimonthly sessions for NPIS staff for the foreseeable future.

## **Box 1. NPIS CPD event, hosted by NPIS Newcastle**

### **Day 1: Wednesday 8 June 2022**

60 years of national service; a brief history of the NPIS (Prof Philip Routledge CBE, Cardiff University)

History of chemical warfare agents: chlorine, mustard and nerve agents (Prof Allister Vale, University of Birmingham)

History of recreational drug use and IONA (Dr Simon Hill, NPIS Newcastle)

The history of UKTIS: from fetus to childbearing age (Dr Ken Hodson, UKTIS Newcastle)

From MacDonnell to McGill, a brief history of Anaesthesia in Ireland (Dr Joe Tracey, Retired Director, NPIC Dublin)

A case of mistaken identity (Dr Edel Duggan, NPIC Dublin)

Toxicological future considerations (Dr Steve Emmett, DSTL)

### **Day 2: Thursday 9 June 2022**

Forensic toxicology for the uninitiated (Prof Robin Ferner, University of Birmingham)

Physostigmine for anticholinergic toxicity (Prof Andrew Dawson, University of Sydney)

Deaths from paediatric poisoning (Dr Mark Anderson, NPIS Newcastle)

Aluminium phosphide (Dr Stephen Wiltshire/Yasmin Gatrell, NPIS Newcastle)

Overview of UKHSA new structure and lines of work (Prof Raquel Duarte-Davidson, UKHSA)

## 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, UKHSA staff, and UK and international TOXBASE subscribers.

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 patient advice services staff.

The NPIS recommends that TOXBASE users of all types and grades complete the ‘Using TOXBASE’ module. Box 2 shows the topics included within each module, and Figure 8 shows a screenshot of the ‘Using TOXBASE’ module from the resource. 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. 1,610 people were active on the resource during 2022 to 2023.

### Box 2. TOXLearning modules

#### **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 and drugs of misuse.

Figure 8. Screenshot from TOXlearning

The screenshot displays the TOXlearning interface. At the top, there is a blue header with the TOXlearning logo on the left and the user name 'Charles Fairhead' with a profile picture on the right. Below the header, the page is divided into three sections, each with a pill icon and a title:

- TOXBASE Introduction**: Accompanied by a red pill icon. The text states: 'This learning unit will give you a general overview of TOXBASE including:' followed by a bulleted list: 'What is TOXBASE', 'Who uses it', 'What information it contains', 'How the information should be interpreted', 'Estimating toxicity', 'How to access TOXBASE', and 'Dealing with problems in accessing TOXBASE'. It concludes with 'This topic should take around 10 minutes to complete.'
- TOXBASE for poisons information**: Accompanied by a blue pill icon. The text states: 'This learning unit will show you how to:' followed by a bulleted list: 'Find products on TOXBASE', 'Carry out advanced searches on the database', 'Print "Printable version" factsheets', 'Calculate toxicity using the dosage calculator', and 'Find information in case of chemical incidents'. It concludes with 'This topic should take around 15 minutes to complete.'
- TOXBASE scenarios and questions**: Accompanied by a purple pill icon. The text states: 'These case scenarios are designed to test your use of TOXBASE and whether or not you are able to access the TOXBASE information appropriate to the case presented.' and 'They are not tests of clinical management skills.' It concludes with 'This topic should take around 50 minutes to complete.'

A blue circular button with a white upward-pointing arrow is located in the bottom right corner of the page.

# Areas of interest

## 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 service. These 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 the Office for Health Improvement and Disparities (OHID), the UKHSA and the Advisory Council on the Misuse of Drugs (ACMD).

### Methods

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 either online or using the TOXBASE app. 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. Consequently, 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

Overall this year there has been an increase in the absolute number of telephone enquiries and TOXBASE app accesses related to drugs of abuse while TOXBASE online activity is unchanged. During the 2022 to 2023 reporting year, there were 764 telephone enquiries to the NPIS meeting the drug misuse criteria described above, a 10.6% in absolute activity compared to 2021 to 2022. Of these 764 calls 78.4%, 7.9%, 7.1%, 5.1% and 1.5% were from England, Ireland, Wales, Scotland and Northern Ireland respectively. These enquiries related to 243 different substances or products and accounted for 1.93% of all NPIS telephone enquiries, compared to 1.72% last year. There were also 88,192 TOXBASE online accesses, an almost identical number to last year. These related to 1,011 different substances or products and accounted for 6.7 % of all TOXBASE online accesses, compared to 6.4% of all

TOXBASE activity last year. There were 14,238 TOXBASE app accesses related to drug of misuse, a 5.7% increase and accounting for 7.9% of all TOXBASE app accesses, compared to 5% last year.

## Activity related to individual drugs of misuse

The top substances of misuse involved in telephone enquiries and TOXBASE online and app accesses are shown in Table 16.

**Table 16. Top drugs/substances of misuse involved in telephone enquiries and TOXBASE online and app accesses in 2022 to 2023 (% change from 2021 to 2022)**

Rank	Telephone enquiries	Number
1	Cocaine	105 (-0.9)
2	Cannabis	95 (6.7)
3	Nitrous oxide	83 (176.7)
4	MDMA	61 (19.6)
5	Ketamine	42 (27.3)
6	Unknown drug of misuse *	38 (0)
7	Pregabalin	33 (32)
8	Diazepam	25 (-37.5)
9	Alprazolam	25 (4.2)
10	Poppers	25 (4.2)

Rank	TOXBASE online accesses	Number
1	Diazepam**	24,560 (-12.3)
2	Cocaine	13,873 (2)
3	Cannabis	5836 (-5.2)
4	Methylphenidate**	5,681 (1.9)
5	Ketamine	5312 (24.9)
6	Nitrous oxide	4,454 (176.1)
7	MDMA	4200 (8)
8	Heroin	4175 (-2)
9	Street benzodiazepines	2,490 (-14.3)
10	Methadone	2,074 (-4.4)

Rank	TOXBASE app accesses	Number
1	Diazepam**	4,229 (3.9)
2	Cocaine	2038 (7.9)
3	Ketamine	973 (26)
4	Cannabis	737 (2.1)



Rank	TOXBASE app accesses	Number
5	Heroin	658 (-9.6)
6	Methylphenidate**	627 (-15.6)
7	MDMA	602 (29.2)
8	Nitrous oxide	451 (173.3)
9	GHB	402 (-0.5)
10	SCRA***	390 (-37.5)

\* 'Unknown drug of misuse' refers to calls where the clinician suspects that the person has taken a drug of misuse but does not know which specific substance(s)

\*\* May include TOXBASE accesses relating to therapeutic use

\*\*\* SCRA is an abbreviation for synthetic cannabinoid receptor agonist

## Patterns of NPIS activity for selected substances over time

Figures 9 and 10 show NPIS activity related to selected substances of interest over the last 8 years.

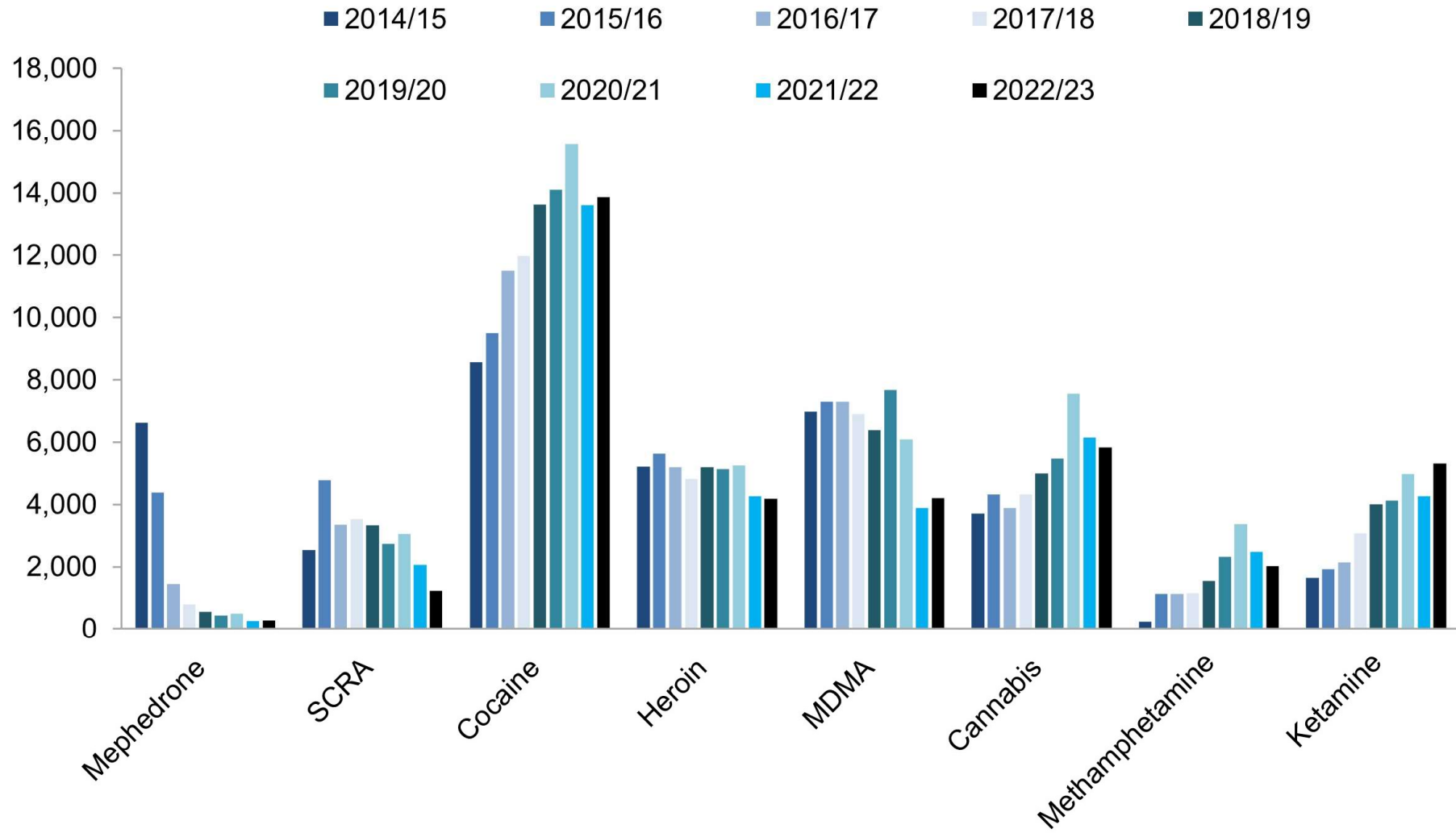
This year has seen a ~175% increase in all forms of NPIS activity related to nitrous oxide and is consistent with wider UK use and harm metrics. NPIS activity regarding ketamine has continued to increase across all forms of NPIS activity by ~25%. Activity related to synthetic cannabinoids has continued to reduce while the other most common substances have remained largely static, such as cocaine, diazepam, heroin and MDMA.

### Substances of particular interest

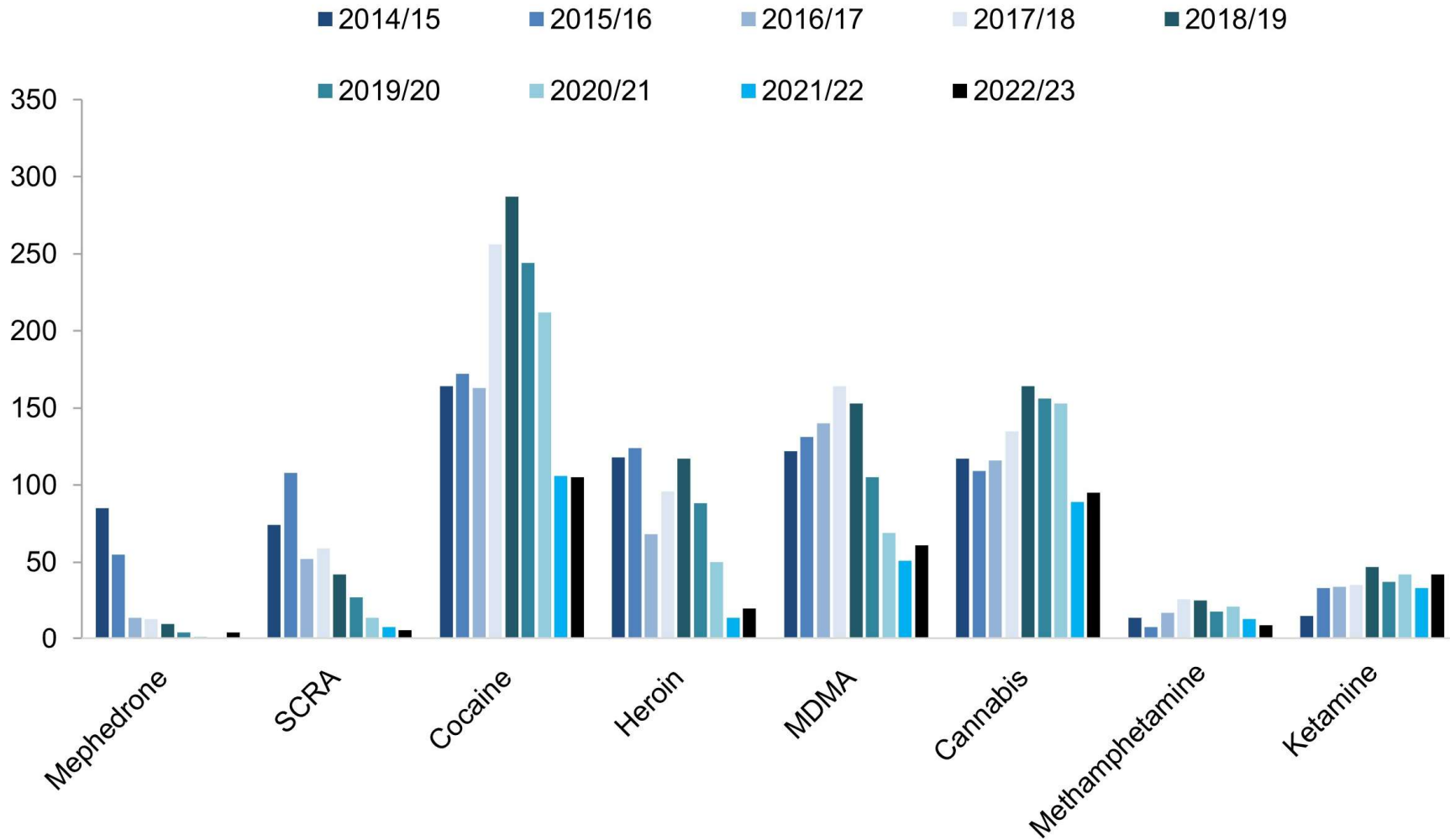
We continue to watch NPIS activity carefully in regard to synthetic opioids, given the harm they have caused globally. NPIS received only 1 telephone enquiry for synthetic opioid toxicity, specifically for fentanyl, although we recognise that it is not possible for clinicians to identify synthetic opioids from classical opioids without laboratory analysis. TOXBASE accesses for synthetic opioids remain low and similar to last year with 212 accesses. However, the pattern of substances involved has changed this year with a reduction in accesses for nitazene compounds, especially isotonitazene which is now the second most common nitazene behind metonitazene. Other synthetic opioids have increased their NPIS activity, such as desomorphine (27 accesses), tianeptine (23 accesses) and cyclopentylfentanyl (18 accesses).

NPIS telephone enquiries for benzodiazepines were dominated by diazepam (25 calls) and alprazolam (25 calls) while novel benzodiazepine calls were rare – 1 for tofisopam and 1 for flualprazolam only. TOXBASE activity for novel benzodiazepines included etizolam (147 accesses), tofisopam (69 accesses), nitrazolam (53 accesses) and clonazepam (47 accesses).

**Figure 9. TOXBASE accesses by year for selected substances 2014 to 2015 to 2022 to 2023**



**Figure 10. NPIS telephone enquiries by year for selected substances between 2014 to 2015 and 2022 to 2023**



## 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 are collated and both quarterly and annual reports are submitted to the government's Expert Committee on Pesticides via the Chemicals Regulation Directorate of UK Health and Safety Executive (HSE).

Currently, 1,619 TOXBASE monographs for pesticides and biocides are being tracked, a slight increase from the 1,608 tracked during 2021 to 2022. Incident information is obtained from follow-up of TOXBASE enquiries by an online or postal questionnaire, and from data collected during NPIS telephone enquiries.

During the year, there were 3,709 accesses to TOXBASE about pesticides of interest and information on 382 potential exposures was collected via the NPIS telephone enquiry service. The number of TOXBASE accesses [3,709 (2022 to 2023) vs 3,685 (2021 to 2022)] regarding pesticide poisoning increased slightly by 0.7% between periods. There was also a 2.4% increase in the number of calls (382 in 2022 to 2023 vs 373 in 2021 to 2022).

Overall, information was gathered on 579 potential exposures involving pesticides during 2022 to 2023. From these exposures, the number of cases identified for further analysis was 568.

The results presented below include both unintentional acute (462; 81.3%) and chronic cases (36; 6.3%) and cases of deliberate self-harm (70; 12.3%).

Of the 568 cases, 499 cases (87.9%) were graded as PSS 0 (not at all poisoned) or PSS 1 (mild). Eight cases (1.4%) were graded moderate (PSS 2), and 11 cases (1.9%) were graded severe (PSS 3). There were no fatalities reported.

### Agents of interest

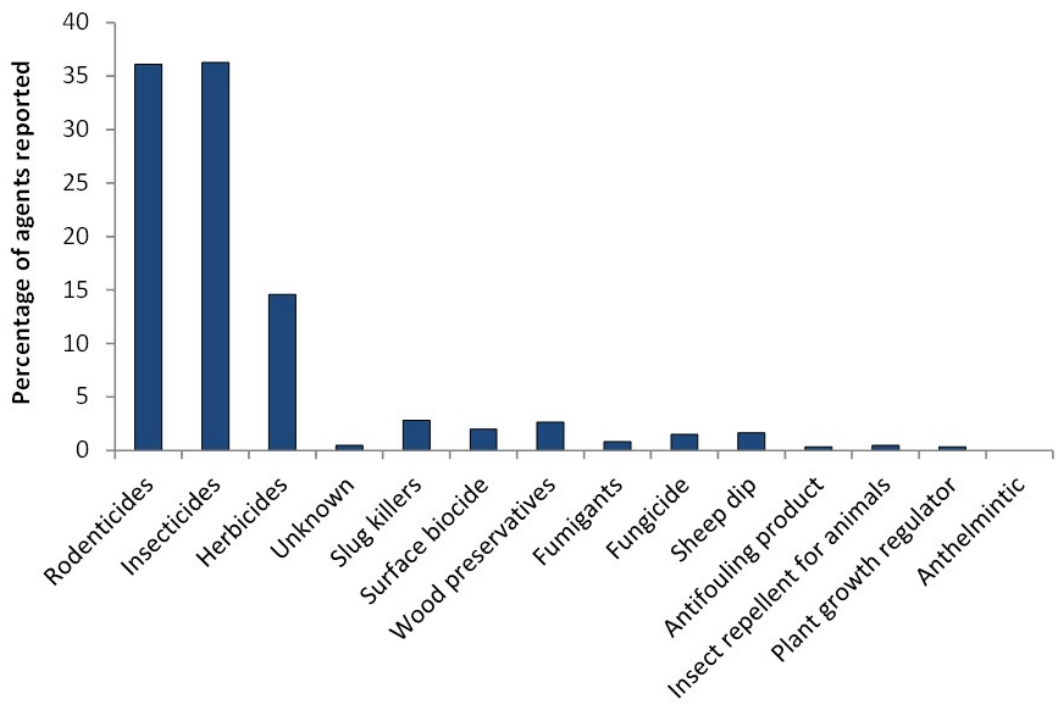
The agents most commonly involved in exposures are shown in Table 17. In addition, there were 110 cases involving unknown rodenticides.

In 2022 to 2023, patients potentially exposed to pesticide products comprised 343 adults (60.4% 13 years or older) and 210 children (37.0% 12 years or younger). There were 301 (53.0%) male patients and 265 (46.7%) female patients. There were four enquiries involving pregnant patients reported in 2022 to 2023 (eight in 2021 to 2022). All four exposures were acute, unintentional and graded PSS 0/PSS 1. The classes of product most commonly involved in exposures are shown in Figure 11. Permethrin, difenacoum, brodifacoum and glyphosate were the most commonly involved substances. Multiple/combination products were involved in some incidents.

**Table 17. Pesticides most frequently (≥20) reported by respondents in suspected pesticide exposures during 2022 to 2023 compared with 2021 to 2022, ordered by rank in 2022 to 2023**

Ingredient	2021 to 2022	2022 to 2023
Permethrin	51	70
Difenacoum	35	43
Brodifacoum	31	42
Glyphosate	45	40
Tetramethrin	24	33
Phenols/cresols	35	26
Bromadiolone	25	23
Cypermethrin	32	22

**Figure 11. Pesticide exposures by class of product (as reported by respondent) in 2022 to 2023 (604 agents)**



## Carbon monoxide

Since June 2015, the NPIS has received funding from the Carbon Monoxide Research Trust (CORT; 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. Whilst exposures may be intentional (self-harm), we focused on accidental exposures which may be related to fires (where additional toxicity such as cyanide may contribute), or those that are non-fire related. Assessment of accidental non-fire related CO exposures was the primary objective of this study 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 published 4 years of NPIS data ([5](#)) and below we provide data for the 2022 calendar year.

During the period 1 January 2022 to 31 December 2022, data were available for 455 patient-related CO exposures. One hundred and fifty-two (33.4%) patients were male, while 193 (42.4%) were female (gender not specified for 110 (24.2%) patients). Exposures comprised 308 adults ( $\geq 13$  years, 67.7%) and 91 children ( $\leq 12$  years, 20.0%). Age was not specified in 56 exposures (12.3%). Seven exposures involved pregnant women (1.5%).

The highest proportion of exposures resulted from faulty domestic boilers (115, 25.3%). Exposures were most commonly of low severity (328, 72.1%) and associated with no symptoms or mild symptoms only. One (0.2%) fatality was reported to the NPIS 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 92 (20.2%) patients and ranged from 0.1% to 40% (median = 2.2%). As many patients were not acutely unwell at the time of presentation, this may explain why an invasive blood COHb% was measured in less than one quarter of patients. 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 surveillance data on CO poisoning (including demographics, source, clinical features and poisoning outcome) from patients across the UK.

## Dinitrophenol

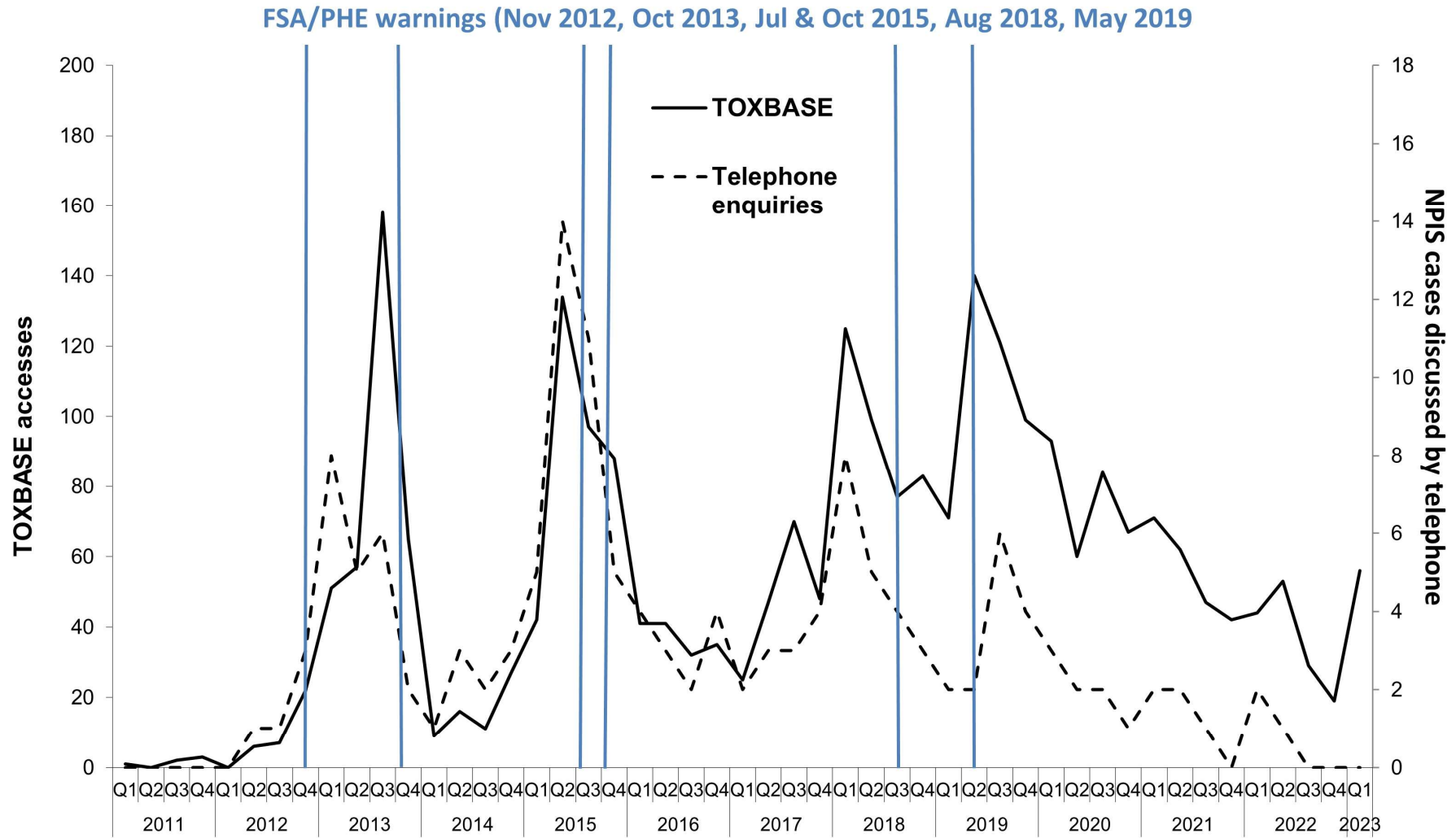
2,4-Dinitrophenol (DNP) is a toxic industrial chemical that blocks the normal mechanisms for storage of energy in the body, including fat, and is sometimes ingested by users to produce weight reduction, 'fat burning' or 'body sculpting'. Unfortunately, DNP can cause serious health effects in humans including 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. DNP was previously classified as a poison under the Poisons Act 1972 until 1996.

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 UKHSA 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 previously. Quarterly numbers of DNP-related TOXBASE accesses and individual cases of systemic exposure reported in telephone enquiries since January 2011 are shown in Figure 12. During the 2022 to 2023 reporting year there was 1 further case of systemic DNP exposure referred to the NPIS and no fatality. This compares to 18, 7 and 5 cases annually in the three previous reporting years. In total there have now been 148 cases of systemic DNP exposure discussed by phone with the NPIS since 2007, including 100 males and 48 females. Of these, 26 (17.6%) are known to have died, including 17 males and 9 females. Together with at least seven 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 in previous years, there have been at least 33 DNP-related deaths in the UK since 2007, including 26 since January 2015. The NPIS also received an enquiry in 2022 to 2023 about a fatality relating to use of a caffeine supplement where reported clinical features could have been due to DNP. However, there was no analytical confirmation of exposure.

NPIS responded to the consultation by the Home Office on reclassification of DNP. It was announced in January 2023 that DNP would be reclassified as a poison under the Poisons Act 1972, making it more difficult for members of the public to acquire DNP.

**Figure 12. Quarterly NPIS telephone enquiries and TOXBASE accesses relating DNP, January 2011 to March 2023**





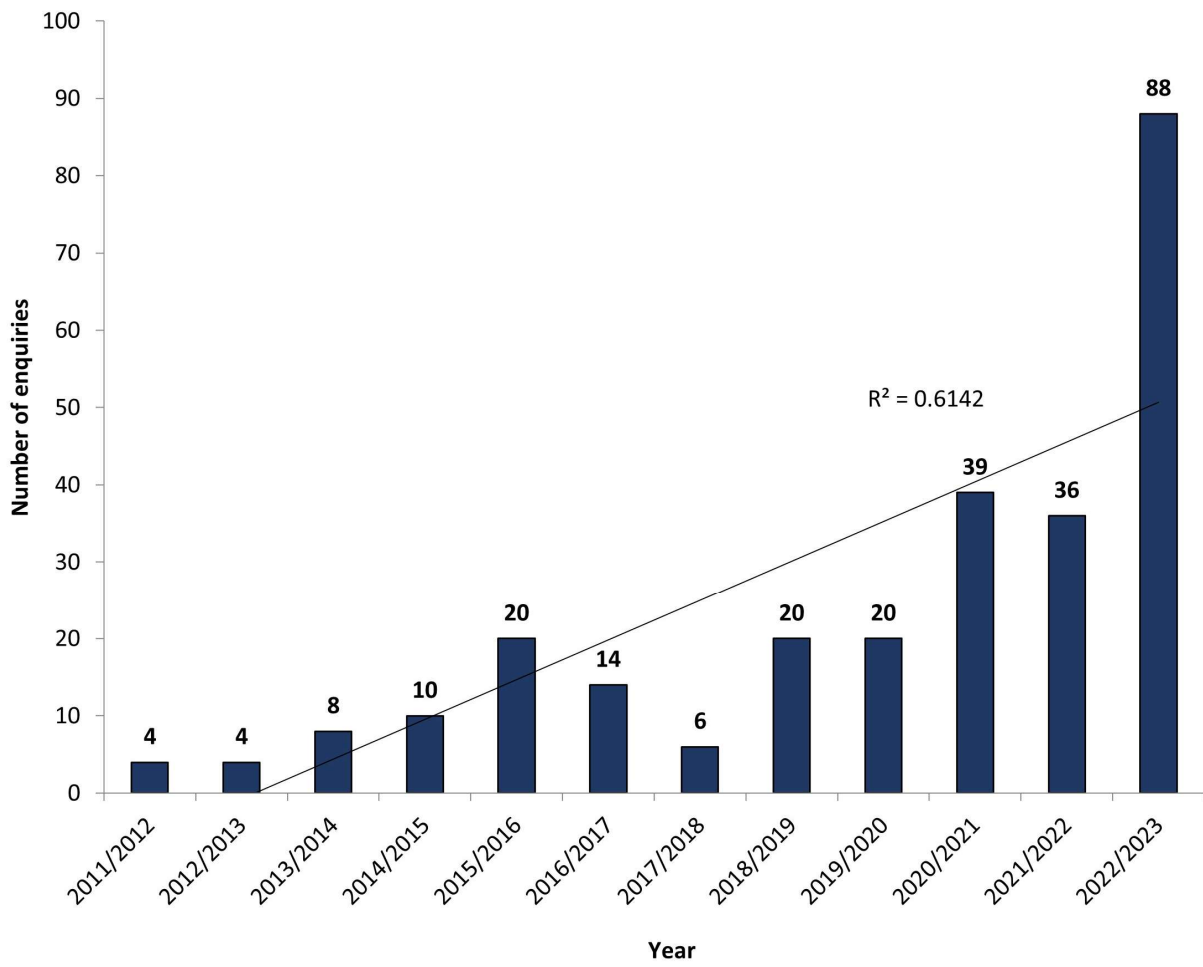
## Nitrous oxide

Nitrous oxide (N<sub>2</sub>O), also known as “laughing gas”, is the second most misused illicit drug in the UK. N<sub>2</sub>O irreversibly inactivates vitamin B12 resulting in functional B12 deficiency, which leads to a failure in the production of myelin and bone marrow failure. Chronic recreational misuse can result in N<sub>2</sub>O-related myeloneuropathy, a syndrome ranging from mild damage to peripheral nerves to severe spinal cord damage, known as subacute combined degeneration of the cord. An increasing number of cases of N<sub>2</sub>O-related myeloneuropathy have been reported in recent years, despite the supply of N<sub>2</sub>O being illegal in the UK since the introduction of the Psychoactive Substances Act in 2016.

Several NPIS consultants were on the working group for the Government commissioned Advisory Council on the Misuse of Drugs (ACMD) review on nitrous oxide, published in March 2023. NPIS consultants regularly give local and national presentations on the clinical toxicology of nitrous oxide, to increase awareness amongst clinicians about how to recognise and treat N<sub>2</sub>O-related myeloneuropathy. National guidelines for treatment recommendations have now been published by the Association of British Neurologists ([6](#)) and the Royal College of Emergency Medicine ([7](#)).

Telephone enquiries to the NPIS relating to N<sub>2</sub>O have increased steadily over the past ten years, with a rapid increase in the number of enquiries in the last year (Figure 13). In 2022 to 2023, the NPIS received 88 enquiries relating to recreational N<sub>2</sub>O misuse representing a 144% increase since the previous year. Fifty-three (60%) patients were male and 35 female, with a mean age of 21.8 years (range 15 to 36 years). Consistent with a 10-year retrospective review of N<sub>2</sub>O enquiries to the NPIS, most cases (92%) resulted in minor or moderate toxicity. Paraesthesia (33%) and hypoaesthesia (20%) were the 2 most prevalent features reported following misuse of N<sub>2</sub>O. It is likely that many, perhaps most, cases of N<sub>2</sub>O-related myeloneuropathy are not discussed with the NPIS and are managed locally by emergency physicians and neurologists. These numbers are therefore likely to be marked underestimates of the problem in the UK.

**Figure 13. Telephone enquiries to the NPIS about nitrous oxide from 2011 to 2023**



## Propranolol

Propranolol is widely prescribed in the management of medical conditions including migraine prophylaxis, anxiety, portal hypertension, thyrotoxicosis and tachyarrhythmias. Between 2007 and 2017 propranolol dispensing in the UK increased by some 41%. In the same period, deaths in England and Wales following propranolol overdose increased by 205%.

In 2020, the UK Healthcare Safety Investigation Branch (HSIB) published a report on the potential under-recognised risk of harm from the use of propranolol (8). The HSIB described a fatal case of propranolol overdose in a woman to whom it was prescribed for migraine prophylaxis. The HSIB made a series of recommendations including recommendations for the NPIS to work closely with ambulance services and to review the provision of information to healthcare professionals through TOXBASE.

Since this time the NPIS has continued to monitor enquiries involving propranolol overdose. Previous data on these cases have been presented both nationally and internationally (9,10,11,12).

In 2022 to 2023, the service received 459 enquiries involving propranolol. Of these, 358 enquiries (321 exposures in 318 patients) involved intentional propranolol overdose. Three patients took 2 separate overdoses during the time period.

Patient ages ranged from 12 to 86 years with a median (IQR) age of 33 (22-44) years. Females (n=222) accounted for the majority (69%) of exposures.

A poisoning severity score was recorded in 311 of the 321 exposures. Moderate (n=34) or severe (n=61) toxicity was observed in 95 exposures. A fatal outcome was documented in 12 cases.

In 173 of the 321 exposures, propranolol was a prescribed medication, with 108 prescriptions for the management of symptoms of anxiety. The dose of propranolol ingested was documented in 97 of 108 exposures. The median (IQR) dose was 320 (200-1120) mg. Eight patients ingested in excess of 3000 mg and the highest reported ingested dose was 6400 mg. The median (IQR) dose was 3800 (1760-3920) mg in the 7 fatal cases for whom the ingested dose was recorded.

The NPIS has presented its data to national and international congresses and is in the process of writing up a report that aims to raise awareness of the risk of harm following propranolol overdose. Benefits will likely result from a careful assessment of the appropriateness of prescribing propranolol to individuals at risk of self-harm.

## Conclusions

Despite the challenges presented by COVID-19 pandemic, the NPIS and UKTIS have continued to provide information and advice to NHS health professionals about the management of patients with suspected poisoning and about drug and chemical exposures in women who are pregnant. Our excellent user feedback reflects the quality of the services provided and the continuing commitment and hard work of all our staff. The service has developed robust systems to ensure quality of information and advice during future periods when home working may be required.

Increasing use of TOXBASE and the TOXBASE app remain 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 similarly welcome, especially at a time when pregnant women may have found it more challenging to discuss their concerns directly with their doctor or midwife.

Additional funding has been secured for the financial years 2022 to 2023 and 2024 to 2025 to ensure the stability of the service and the high-quality of the support it is able to offer 24 hours per day, 365 days per year.

# Recommendations

## Outcome of recommendations for NPIS in 2022 to 2023

1. Continue to work with UKHSA, 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.

The UKHSA has identified additional funding in the 2022 to 2023 and 2024 to 2025 financial years which will address many of the service's resource issues for the next 3 years. At the same time, the NPIS has continued to develop additional income streams where possible and to identify areas of cost savings.

2. Continue to work with UKHSA, DHSC and other partners to ensure the NPIS is appropriately resourced to support receipt and management of material data sheets for chemicals sold in Northern Ireland and in Great Britain.

UK HSA have now been assigned as the appointed body for receipt of and management of material data sheets for chemicals sold in Northern Ireland and in Great Britain.

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

The NPIS has monitored episodes of poisoning relating to pesticides, carbon monoxide, drugs of misuse, nitrous oxide, dinitrophenol and propranolol as detailed in this report. It has provided the information obtained to UKHSA and other government departments and public bodies such as HSE and ACMD which have acted upon this input.

## Recommendations for NPIS in 2023 to 2024

1. Continue collaborative working between Cardiff and Vale University Health Board, Sandwell and West Birmingham NHS Trust, Newcastle Upon Tyne Hospitals NHS Foundation Trust and NHS Lothian to provide NPIS Services. Work closely with UKHSA to maintain service provision and the agreed level of staffing within each poisons unit, whilst maximising resources available to allow the service to function effectively for its users.
2. Continue to work with UKHSA, as the newly appointed body and the HSE to fulfil their obligations to receive, store and manage material data sheets for chemicals sold in Northern Ireland and in Great Britain utilising the resources available. Ensure the NPIS has access to this information when needed.
3. Continue to monitor episodes of poisoning of public health importance, retrospectively and in real-time via the NPIS Early Warning System, reporting to responsible government agencies as appropriate and promoting the role of the UK NPIS in public health.
4. Work with UKHSA to improve the national response to chemical incidents, including reviewing current processes and contributing toxicology expertise in the detection, reporting and management of incidents.
5. Continue to utilise NPIS data sets as the primary source of poisoning data in the UK to provide healthcare services, improvements to those services, contribute to cutting edge research in toxicology and provide public health surveillance for the UK, reporting to responsible government agencies across the UK as appropriate.
6. Continue to organise high-quality hybrid and online continuing professional development for NPIS staff to ensure users of the service are confident about the reliability and quality of the information provided.
7. Explore ways of increasing feedback to the service to ensure the views of users are heard and acted upon in improving TOXBASE and the national helpline service.
8. Continue to improve poisons information provision in low and middle-income countries worldwide (as defined by the Organisation for Economic and Cooperation and Development's Development Assistant Committee list of official development assistance recipients) by providing direct access to TOXBASE.
9. Continue to play a world-leading role as a national network of poisons information centres involved in research, policy change and poisons information centre capacity building that aims to improve outcomes for poisoned patients globally.

## APPENDIX A Senior NPIS staff

### NPIS Birmingham

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

Dr M E M O Elamin MBBS DTM&H PgCertClinEd MSc(Med Tox) FRCP  
Consultant Physician and Clinical Toxicologist, NPIS Birmingham and West Midlands  
Poisons Unit, Birmingham City Hospital

Mr P S Jagpal BSc MSc MCMI  
Service Manager, NPIS Birmingham

Dr M Pucci MBChB MRCP(UK) DipMedTox BSc MSc  
Consultant in Acute Medicine and Clinical Toxicology, Birmingham City Hospital

### NPIS Cardiff

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

Professor J Coulson BSc MBBCh LL.M MD DipMedTox DipTher MFPH FRSB FBPhS FRCP  
FRCPE ERT  
Professor in Clinical Pharmacology & Toxicology, Centre for Medical Education, Cardiff  
University and Honorary Consultant, Cardiff and Vale University Health Board

Dr L A Gray BA MBBCh MRCP  
Medical Director, NPIS Cardiff; Consultant Physician in Clinical Pharmacology and  
Therapeutics, Cardiff and Vale University Health Board

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

### NPIS Edinburgh

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

Professor M Eddleston ScD FRCPE FRSE FEAPCCT FBPhS  
Professor of Clinical Toxicology, University of Edinburgh; Consultant Clinical Toxicologist,  
NPIS Edinburgh and Royal Infirmary of Edinburgh; Clinical lead for the NPIS & Chair of the  
NPIS Clinical Standards Group

Dr G Jackson BSc DipMedTox PhD  
Manager, NPIS Edinburgh

Dr E Morrison, MBChB(Hons), PhD BSc(Hons), MRCP  
Consultant in Acute Medicine, Medicines Management and Toxicology, Royal Infirmary of  
Edinburgh

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

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

## NPIS Newcastle (including UKTIS)

Mrs S Bradley BSc MSc  
Information Services Manager, NPIS Newcastle

Dr S L Hill BSc MBBS FRCP  
Consultant Physician and Clinical Toxicologist, Newcastle upon Tyne Hospitals NHS  
Foundation Trust; Honorary Clinical Senior Lecturer, Translational and Clinical Research  
Institute, Newcastle University

Dr K K Hodson MD MRCP(UK) MRCOG DipTher  
Head of Teratology, UKTIS; Consultant in Obstetrics and Maternal Medicine, Newcastle  
upon Tyne Hospitals NHS Foundation Trust; Associate Clinical Lecturer, Translational and  
Clinical Research Institute, Newcastle University

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

Dr H K R Thanacoody MD FRCP FRCPE  
Director, NPIS Newcastle and UKTIS; Medical Director, Regional Drugs and Therapeutics  
Centre; Consultant Physician and Clinical Toxicologist, Newcastle upon Tyne Hospitals NHS  
Foundation Trust; Honorary Senior Clinical Lecturer, Translational and Clinical Research  
Institute, Newcastle University



### Other consultants providing on-call support for the NPIS

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

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

Dr D M Wood MD FRCP FEAPCCT FACMT 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

## 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

Fellow: American Academy of Clinical Toxicology

Fellow: European Association of Poisons Centres and Clinical Toxicologists

Past President: Clinical and Translational Speciality Section, Society of Toxicology

#### 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 Professor: School of Biosciences, University of Birmingham

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

Educational and Clinical Supervisor: Sandwell and West Birmingham NHS Trust

Dr M E M O Elamin

#### INTERNATIONAL SOCIETIES

Board Member (at Large): MENATOX (Middle East and North Africa Clinical Toxicology Association)

Member: Scientific Committee, MENATOX (Middle East and North Africa Clinical Toxicology Association)

#### UK ADVISORY COMMITTEES

Member: UKHSA Expert Advisory Group on Antivenoms

#### ACADEMIC ACTIVITIES

Member: MRCP Part 1 and 2 Specialty Question Writing Group

Honorary Senior Clinical Lecturer: School of Biosciences, University of Birmingham

Honorary Clinical Lecturer: Warwick Medical School – Biomedical Sciences, Warwick University

Casual Lecturer: Masters in Pharmacotoxicology, Faculty of Medicine and Surgery, University of Malta

External Marker: MRes Toxicology and MRes Translational Medicine and Therapeutics, Faculty of Medical Sciences, Newcastle University

Lecturer: NPIS/RCEM Clinical Toxicology Training Days

Mr P S Jagpal

**INTERNATIONAL ACTIVITIES**

Board Member: European Association of Poison Centres and Clinical Toxicologists

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

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

Dr M Pucci

**UK ADVISORY COMMITTEES**

Co-opted member: Advisory Committee on the Misuse of Drugs (ACMD) for the Review on Nitrous Oxide: updated harms assessment

**NHS NATIONAL AND REGIONAL COMMITTEES**

Member: Birmingham and Solihull Integrated Medicines Optimisation Committee

**ACADEMIC ACTIVITIES**

Honorary Clinical Lecturer: MSc (Toxicology), University of Birmingham

Educational and Clinical Supervisor: University Hospitals Birmingham NHS Foundation Trust

Senior Author: Prescribing Safety Assessment (PSA), British Pharmacological Society

Author: University of Birmingham and Health Education England Script® e-learning programmes on drugs of misuse, and cannabis-based products for medicinal use

## NPIS Cardiff

Professor J Coulson

**INTERNATIONAL ACTIVITIES**

Consultancy in Clinical Toxicology to WHO

**UK ADVISORY COMMITTEES**

Member: Committee on Toxicity

Member: Herbal Medicines Advisory Committee, MHRA.

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 and 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

Medical Lead: Cardiff Update in Medical Toxicology

Dr A Thomas

NHS NATIONAL AND REGIONAL COMMITTEES

Medical Director: Yellow Card Centre Wales

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

## NPIS Edinburgh

Professor J Dear

INTERNATIONAL ACTIVITIES

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

INTERNATIONAL SOCIETIES

Vice-President: Clinical and Translational Toxicology Specialty Section, Society of Toxicology (SOT)

INTERNATIONAL JOURNALS

Senior Editor: British Journal of Clinical Pharmacology

UK ADVISORY COMMITTEES

Member of Scottish Medicines Consortium

NHS NATIONAL AND REGIONAL COMMITTEES

Deputy Director: Yellow Card Centre, Scotland

Member: Lothian Formulary Committee

Professor M Eddleston

INTERNATIONAL ACTIVITIES

Member (WHO Chair): 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

Board Member: South Asian Clinical Toxicology Research Collaboration, Peradeniya, Sri Lanka

INTERNATIONAL JOURNALS

Senior Editorial Board Member: Clinical Toxicology

UK ADVISORY COMMITTEES

Member: Expert Advisory Group on Antivenoms, UK Department of Health and Social Security

Member: Expert Committee on Pesticides, UK Health and Safety Executive

NHS NATIONAL AND REGIONAL COMMITTEES

Member: Area Drug and Therapeutics Committee, NHS Lothian

ACADEMIC ACTIVITIES

Director: Centre for Pesticide Suicide Prevention, University of Edinburgh

Co-Director: NIHR RIGHT4: Preventing Deaths from Acute Poisoning in Low-and Middle-Income Countries, University of Edinburgh

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

Dr E Morrison

UK ADVISORY COMMITTEES

Member: 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

Associate Director of Training: Royal College of Physicians of Edinburgh

ACADEMIC ACTIVITIES

Deputy Assessment Lead: Edinburgh Medical School, University of Edinburgh

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

Dr A Veiraiah

NHS NATIONAL AND REGIONAL COMMITTEES

Specialist Advisor: CMO (Scotland), Clinical Pharmacology, Therapeutics and Toxicology

## 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 & Assessment Lead: Specialist Advisory Committee, Clinical Pharmacology and Therapeutics, Northern Deanery Representative

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

Co-Director: Newcastle Clinical Research Facility, Royal Victoria Infirmary, Newcastle upon Tyne

Dr K K Hodson

#### INTERNATIONAL SOCIETIES

Member: ENTIS (European Network of Teratology Information Services) Scientific Committee

#### UK ADVISORY COMMITTEES

Member: MHRA Medicines for Women's Health Expert Advisory Committee

Member: RCOG COVID-19 Vaccination in Pregnancy Working Group

Member: British Rheumatological Society Guidelines for the management of rheumatological disease in pregnancy

Member: British Society of Haematology Guidelines for the management of metallic heart valves in pregnancy

#### NHS NATIONAL AND REGIONAL COMMITTEES

Member: MHRA Safer Medicines in Pregnancy and Breastfeeding Consortium

#### ACADEMIC ACTIVITIES

Lead Consultant: Obstetric Medicine Training in NE England

Course Organiser: Obstetric Medicine Teaching Course, Royal College of Obstetricians and Gynaecologists

Dr S Stephens

#### INTERNATIONAL ACTIVITIES

Secretary: European Network of Teratology Information Services (ENTIS)

#### INTERNATIONAL SOCIETIES

Secretary: European Network of Teratology Information Services (ENTIS)

#### UK ADVISORY COMMITTEES

Member: The Safer Medicines in Pregnancy and Breastfeeding Consortium, Medicines and Healthcare Products Regulatory Agency (MHRA)

#### ACADEMIC ACTIVITIES

Honorary Associate Fellow: Translational and Clinical Research Institute, Newcastle University

Dr H K R Thanacoody

#### INTERNATIONAL ACTIVITIES

Member: Acetaminophen/Paracetamol Clinical Toxicology Recommendations Collaboration

#### INTERNATIONAL SOCIETIES

Board Member: European Association of Poisons Centres and Clinical Toxicologists

Member: British Pharmacological Society

#### INTERNATIONAL JOURNALS

Executive Editor: British Journal of Clinical Pharmacology

#### UK ADVISORY COMMITTEES

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

#### ACADEMIC ACTIVITIES

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

Member: BSc Pharmacology Curriculum Committee, Newcastle University

### Other consultants providing on-call support for the NPIS

Professor P I Dargan

#### INTERNATIONAL ACTIVITIES

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

President Elect: European Association of Poison Centres and Clinical Toxicologists

Member: American College of Medical Toxicology International Committee

Abstract Reviewer: American Academy of Clinical Toxicology

Expert Adviser: World Health Organization, United Nations Office on Drugs and Crime, and European Monitoring Centre for Drugs and Drug Addiction

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

Commissioner to the UK Commission on Human Medicines

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

PI: Astra Zeneca AZD2816 COVID-19 Vaccine Study  
PI: Moderna mRNA-1273-P305 COVID-19 Vaccine Study  
CI: Atea Bemnifosbuvir [AT-03A-017] COVID-19 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

#### 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: Clinical Toxicology Collaborative: Paracetamol 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 Technical, Novel Psychoactive and Nitrous Oxide Working Groups  
Member: COMed Working Group/All-Party Parliamentary CO Group (on behalf of the NPIS)  
Member: Royal College of Emergency Medicine Nitrous Oxide Guidelines Group  
Member: Consensus on Acute Behavioural Disturbance in the United Kingdom (CABDUK) Study Group

#### NHS NATIONAL AND REGIONAL COMMITTEES

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)



Case Reviewer: National Confidential Enquiry into Patient Outcome and Death Epilepsy, Community Acquired Pneumonia and Alcohol-related liver disease studies

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

73 contributions to the scientific literature were published in 2022 to 2023 by NPIS staff\*

\* NPIS staff are given in **bold** type, except where NPIS staff were part of a collaborative group

# early online publication details for these publications were previously listed in the 2021 to 2022 NPIS report

### Peer-reviewed papers

Araya RA, Tauqeer F, Ceulemans M, Gerbier E, Maisonneuve E, Passier A, **Oliver A**, Panchaud A, Lupattelli A, Nordeng H. 'Pregnancy- and birth-related experiences among postpartum women during the third wave of the COVID-19 pandemic - a multinational European study'. *Pharmacoepidemiology* 2023: volume 2, pages 54-67

Armstrong SK, Oosthuyzen W, Gow AG, Salavati Schmitz S, **Dear JW**, Mellanby RJ. 'Investigation of a relationship between serum concentrations of microRNA-122 and alanine aminotransferase activity in hospitalised cats'. *Journal of Feline Medicine and Surgery* 2022: volume 24, pages e289-e294

Barlow NL, **Bradberry SM**. 'Investigation and monitoring of heavy metal poisoning'. *Journal of Clinical Pathology* 2022: volume 76, pages 82-97

Beaulieu J, Roberts DM, Gosselin S, Hoffman RS, Lavergne V, Hovda KE, Megarbane B, Lung D, **Thanacoody R**, Ghannoum M. 'Treating ethylene glycol poisoning with alcohol dehydrogenase inhibition, but without extracorporeal treatments: a systematic review'. *Clinical Toxicology* 2022: volume 60, pages 784-797#

Ceulemans M, Sillis L, Foulon V, Panchaud A, Winterfeld U, Pomar L, Cleary B, O'Shaughnessy F, Passier A, **Richardson JL**, Nordeng H. 'Comment to "Pregnancy and COVID-19, focus on vaccine and pharmacological treatment" '. *Journal of Reproductive Immunology* 2022: published online 10 May

Craft S, Dunn M, Vidler D, Officer J, Blagbrough IS, Pudney CR, Henderson G, Abouzeid A, Dargan PI, Eddleston M, Cooper J, **Hill SL**, Roper C, Freeman TP, **Thomas SHL**. 'Trends in hospital presentations following analytically confirmed synthetic cannabinoid receptor agonist exposure before and after implementation of the 2016 UK Psychoactive Substances Act'. *Addiction* 2022: volume 117, pages 2899-2906

Czopek A, Moorhouse R, Gallacher PJ, Pugh D, Ivy JR, Farrah TE, Godden E, Hunter RW, Webb DJ, Tharaux PL, Kluth DC, **Dear JW**, Bailey MA, Dhaun N. 'Endothelin blockade prevents the long-term cardiovascular and renal sequelae of acute kidney injury in mice'. *Science Translational Medicine* 2022: volume 14, eabf5074

**Coulson JM**, Adams A, **Gray LA**, Evans A. 'COVID-19 "Rebound" associated with nirmatrelvir/ritonavir pre-hospital therapy'. *The Journal of Infection* 2022: volume 85, pages 436-480

Dao K, Shechtman S, Diav-Citrin O, **George N**, **Richardson JL**, Rollason V, Pistelli A, Eleftheriou G, Berlin M, Ekobena P, Rousson V, Addor M, Baud D, Buclin T, Panchaud A, Winterfeld U. 'Reproductive safety of trazodone after maternal exposure in early pregnancy: a comparative ENTIS cohort study'. *Journal of Clinical Psychopharmacology* 2023: volume 43, pages 12-19

Damkier P, **Hodson K**. 'Shelter from the storm: Acetaminophen (paracetamol) in pregnancy, urogenital malformations, and childhood neurodevelopment'. *Obstetric Medicine* 2022: volume 15, pages 77-78

**Dear JW**. 'Fomepizole should not be used more liberally in paracetamol overdose'. *British Journal of Clinical Pharmacology* 2023: volume 89, pages 599-601

Deslandes PN, Bracchi R, Jones K, Haines KE, Carey E, Adams A, Walker J, **Thomas A**, Routledge PA. 'Changes in suspected adverse drug reaction reporting via the yellow card scheme in Wales following the introduction of a National Reporting Indicator'. *British Journal of Clinical Pharmacology* 2022; volume 88, pages 3829-3836#

Evans A, Qi C, Adebayo JO, Underwood J, **Coulson J**, Bailey R, Lyons R, Edwards A, Cooper A, John G, Akbari A. 'Real-world effectiveness of molnupiravir, nirmatrelvir-ritonavir, and sotrovimab on preventing hospital admission among higher-risk patients with COVID-19 in Wales: A retrospective cohort study'. *The Journal of Infection* 2023: published online 10 February

Farrah TE, Melville V, Czopek A, Fok H, Bruce L, Mills NL, Bailey MA, Webb DJ, **Dear JW**, Dhaun N. 'Arterial stiffness, endothelial dysfunction and impaired fibrinolysis are pathogenic mechanisms contributing to cardiovascular risk in ANCA-associated vasculitis'. *Kidney International* 2022: volume 102, pages 1115-1126

Gaughan EE, Quinn TM, Mills A, Bruce AM, Antonelli J, MacKinnon AC, Aslanis V, Li F, O'Connor R, Boz C, Mills R, Emanuel P, Burgess M, Rinaldi G, Valanciute A, Mills B, Scholefield E, Hardisty G, Findlay EG, Parker RA, Norrie J, **Dear JW**, Akram AR, Koch O, Templeton K, Dockrell DH, Walsh TS, Partridge S, Humphries D, Wang-Jairaj J, Slack RJ, Schambye H, Phung D, Gravelle L, Lindmark B, Shankar-Hari M, Hirani N, Sethi T, Dhaliwal K. 'An inhaled galectin-3 inhibitor in COVID-19 pneumonitis: a Phase Ib/IIa randomized controlled clinical trial (DEFINE)'. *American Journal of Respiratory and Critical Care Medicine* 2023: volume 207, pages 138-149

**Gentile D**, **Adams R**, **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'. *Journal of Public Health (Oxford)* 2022: volume 44, pages 565-574#

Gerbier E, Favre G, Tauqeer F, Winterfeld U, Stojanov M, **Oliver A**, Passier A, Nordeng H, Pomar L, Baud D, Panchaud A, Meyer-Masseti C, Ceulemans M. 'Self-reported medication

use among pregnant and postpartum women during the third wave of the COVID-19 pandemic: a European multinational cross-sectional study'. *International Journal of Environmental Research and Public Health* 2022: volume 19, 5335

González-Recio I, Simón J, Goikoetxea-Usandizaga N, Serrano-Maciá M, Mercado-Gómez M, Rodríguez-Agudo R, Lachiondo-Ortega S, Gil-Pitarch C, Fernández-Rodríguez C, Castellana D, Latasa MU, Abecia L, Anguita J, Delgado TC, Iruzubieta P, Crespo J, Hardy S, Petrov PD, Jover R, Avila MA, Martín C, Schaeper U, Tremblay ML, **Dear JW**, Masson S, McCain MV, Reeves HL, Andrade RJ, Lucena MI, Buccella D, Martínez-Cruz LA, Martínez-Chantar ML. 'Restoring cellular magnesium balance through Cyclin M4 protects against acetaminophen-induced liver damage'. *Nature Communications* 2022: volume 13, 6816

Haden M, **Wheatley N, Gray LA, Bradberry SM, Sandilands EA, Thanacoody RH, Coulson J**. 'Potential cyanide poisoning reported to the UK national poisons information service: 2008-2019'. *Clinical Toxicology* 2022: volume 60, pages 1051-1058

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# About the National Poisons Information Service

The role of the 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, with similar numbers of 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 patient advice services (NHS 111, NHS 24 and NHS Direct) and also primary care services.

## NPIS Birmingham unit

City Hospital, Birmingham, hosted by Sandwell and West Birmingham NHS Trust  
Director: Professor S M Bradberry BSc MD FRCP FAACT FEAPCCT

## NPIS Cardiff unit

University Hospital Llandough, Cardiff, hosted by Cardiff and Vale University Health Board  
Director: Dr L A Gray BA MBBCh MRCP

## NPIS Edinburgh unit

Royal Infirmary of Edinburgh, hosted by NHS Lothian  
Director: Dr E A Sandilands BSc MD FRCPE

## NPIS Newcastle unit

Regional Drug and Therapeutics Centre, Newcastle, hosted by Newcastle upon Tyne Hospitals NHS Foundation Trust  
Director: Dr H K R Thanacoody MD FRCP FRCPE

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