Reflections on the 2011 report of the US National Poison Data System

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Clinical toxicologists at US poison control centers (PCCs) are an important component of the public health safety net with roles in the provision of poison information, public poisoning prevention education, medical toxicology supervision, professional education, and advocacy. Data is collected during their routine service to the community, and this data is a window to the toxicological well-being of the nation. The December, 2012, issue of Clinical Toxicology contains the cumulative data report culled from 57 U.S. PCCs in 2011 including 2,334,004 individual human exposures to pharmaceuticals, toxins, and chemicals among 3,624,063 total calls. In this commentary, we reflect on the broad scope of the US National Poisoning Data System (NPDS) report, and the changing landscape of medication and drug usage in the US.

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Human exposure calls to US PCCs peaked in 2007 and remain at over 6000 per day. There has been a steady increase in calls originating from health care facilities since 2000 (a 4.8% increase seen between 2010 and 2011) and this reflects a higher acuity of illness being handled by PCCs. Of calls originating from sites other than health care facilities, PCCs were able to handle at least 86% on site with a resultant reduction in emergency department utilization and prevention of health care expenditure.

Some aspects of the 2011 NPDS report are similar to those in previous years. Poison centers continue to consult on over a million children per year, and of the xenobiotic exposures reported in 2011, 48% were among children aged less than 6 years and 62% involved children aged 19 years or younger. The top five categories of xenobiotics implicated in human exposure calls to US poison centers remains unchanged for 5 years, and with the exception of sedative or antipsychotic medications, tend to reflect medications, chemicals, and objects commonly encountered by children within their homes (analgesics, cosmetics, personal care products, cleaning substances, and foreign bodies/toys). However, human exposures to several pharmaceuticals increased this year, with the largest increases recorded for the analgesics, sedative-hypnotics, cardiovascular drugs, and antihistamines.

The treatment of poisoning and antidote usage has changed over time and these changes are reflected in the 2011 NPDS report. Treatments such as gastric lavage (“pumping the stomach”), and administration of syrup of
Protective therapies, such as activated charcoal or ipecac, were at one time perceived to be synonymous with the practice of medical toxicology, but have fallen to use in only 0.2%, 0.01%, and 2.9% of exposures, respectively, in 2011. Activated charcoal administration was, in fact, implicated in the deaths of two patients (fatality case #97 and #118) – a finding that may raise many toxicologists’ eyebrows. Among administered antidotes, the intravenous form of n-acetylcysteine has become increasingly favored to the enteral form since 2006. Insulin was administered in 1793 PCC cases, but it isn’t clear how many of those uses involved “high dose insulin/euglycemia” therapy as described by Engbretsen. Lipid emulsion therapy has become a “hot” antidote in clinical toxicology, but is not found within Table 15 of this report – hopefully coding will allow future tracking of the use of this novel therapy.

Unlike teams in college football polls, toxicologists do not relish being declared to be “#1.” Yet, that happened in 2009 when the U.S. Centers for Disease Control (CDC) found poisoning to have become the leading cause of death due to injury among adolescents and young adults, and this observation did not even take into account motor-vehicle collision deaths that could be attributed to drunken-, stoned-, or drugged-driving. Great public gains have been achieved in preventing childhood poisoning mortality, and death reports related to children less than 6 years of age to poison centers continue to decline. But poisoning deaths among adults have been reported to PCCs with increasing frequency every year, except one, since 1985. The CDC estimated that every day in the U.S., 87 people die as a result of unintentional poisoning. The subset of those poisoning deaths contained in this year’s NPDS includes 2765 human exposure fatalities (of which 1995 deaths were judged to be attributable to poisoning). A pediatric fatality review group has paid particular attention to the preventable tragedy of childhood poisoning deaths and report their findings in this issue of Clinical Toxicology.

Prescription opioid abuse has been recognized to be an important ongoing health epidemic and the 2011 NPDS illustratively contains 143 deaths associated with hydrocodone, 136 with oxycodone, and 134 with methadone. Opioid analgesics are the most common cause of death in the 2011 NPDS database and are a rising cause of death in teens. Overdose from acetaminophen, cardiovascular drugs, antidepressant and antipsychotic medications, and inhalational exposure to smoke and carbon monoxide prove to be deadly every year; but, this year, interesting trends in deaths due to stimulant drugs can be seen. Methamphetamine deaths outnumbered cocaine deaths for the second consecutive year, possibly reflecting a change in drug-use patterns nationwide. Cocaine remains a common cause of stimulant mortality, particularly among older adults. But the 2011 NPDS report shows a large number of deaths among young adults associated with the use of phenethylamine-derived stimulants notoriously sold as “bath salts”, “plant food”, and other monikers. Deaths associated with novel synthetic cannabinoid use are also described. Fatalities associated with use of diphenhydramine were reported as well, and the dangerous potential for misuse of this common household pharmaceutical, particularly in teens, may be underappreciated. Metformin, introduced as a safer anti-diabetic drug alternative to phenformin, also appears associated with a surprising number of fatality reports. The NPDS report includes narratives of select xenobiotic-related fatalities. Among the most sensational is Case 124 which details the murder of a young woman by injection of cyanide into her buttock (followed by the suicide by cyanide of her attacker).

It is interesting to note that this year’s NPDS report is derived from 57 poison control centers; these centers serve the entire population of the U.S., but represent the fewest number of centers active since 1986. The Lewin Group, a private healthcare policy research firm, recently highlighted the value of PCCs and suggested a cost savings of nearly 14 dollars for each dollar invested. Part of that investment results in the annual NPDS report. The profile of poisoning derived from this 29th annual report from the American Association of Poison Control Centers’ National Poison Data System is not perfect. Reports made to poison centers are typically voluntary and communicated by phone, therefore, NPDS underestimates the true incidence of poison exposures. Instances of substance abuse and environmental or occupational chemical contact are likely to be grossly underestimated, and mortality data may vary from that collected from other sources such as the CDC or medical examiners’ offices. The data itself may also be subject to selection bias, information bias, and misclassification. Despite deficiencies, PCC data seems to give a robust, reproducible image of the populations that utilize PCC resources, and this image seems to mirror trends noted from other data sources. This year’s NPDS report reflects the power, and the changing scope, of the U.S. Poison Center system and the data within reflects the changing landscape of medication and drug use in the United States. The living, breathing, real-time growth of the NPDS makes the data a unique resource and infrastructure for clinical toxicologists and policy-making officials.

Declaration of interest
The authors report no declarations of interest. The authors alone are responsible for the content and writing of the paper.

References