Poisoning and poisoning advice: availability, toxico-vigilance and research

Geoffrey K Isbister[1,2]

Poisons Information Centres provide health services and the general public across Australia with the most up-to-date advice available

The study by Huynh and colleagues[1] underlines the importance of Poisons Information Centres (PICs) for mapping the epidemiology of poisoning in Australia. The authors report that more than 200 000 calls were made to the national PIC network during 2015. Most exposures were of adults under 74 (40%) or toddlers (36%). Prescription medications were more frequently implicated in exposures in adults (mainly antidepressants, sedatives and antipsychotics) than in children of any age; about half the exposures of Australians over 74 involved prescription medications. These data confirm that the substance or toxin ingested is usually the most readily available, whether household cleaners or over-the-counter medications in unintentional poisonings of children, or prescription medications in deliberate self-poisonings or medication errors in adults.

Poison centres arose worldwide during the 1960s because of concerns about unintentional poisonings in children and the significant mortality and morbidity associated with readily available toxic substances, such as kerosene and barbiturates.[2,3] Over the past five decades, the mortality attributable to poisoning in childhood in developed countries has declined to almost zero because there are now fewer toxic substances in homes, and active public health interventions, such as child-resistant containers, prevent children accessing toxic substances.[4] This is confirmed by Huynh and her co-authors, who report that most cases of poisoning in children involve far less toxic household chemicals and medications than in the past. There has also been a decline in the numbers of calls to the New South Wales PIC and of hospital presentations and admissions of children with unintentional poisoning.[5]

In contrast, poisoning now appears to be a greater problem among older adults, with an increasing population of older Australians requiring more medications. Huynh and colleagues report that exposures in this population frequently involve ingestion of more toxic medications, including cardiac, antihypertensive, analgesic and anticoagulant medications.[1] A recent hospital study reported increasing numbers of overdoses with cardiovascular medications among older adults, with hypotension and arrhythmias as complications of poisoning more frequent in patients over 65.[6] The epidemiology of poisoning in this age group again reflects

the availability of potentially toxic medications. With our growing senior population, there will be an increasing burden for both PICs and emergency departments in the future.

A unique feature of the PIC network in Australia is that it facilitates direct interaction between specialist doctors (clinical toxicologists) and specialists in poisons information (usually pharmacists) on a national level. Few other specialist health care services provide a national 24/7 service with this span of expertise. For example, a doctor at a small rural hospital treating a patient who has ingested a pesticide can quickly receive the advice of an experienced medical toxicologist, or the antidote for a rare mushroom poisoning can be recommended by an international expert.

The national PIC network also provides an important interface between clinical research and health care advice infrastructure, allowing poisons and toxins research in a clinical environment. Information flows both ways. In Australia, the PIC network facilitates large multicentre studies, such as the Australian Toxicology Monitoring (ATOM) study[7] and the Australian Snakebite Project (ASP),[8] and the advice infrastructure of the PICs allows clinician researchers access to patients at the time of acute poisoning, for both prospective observational and interventional studies.

Perhaps more importantly, research is rapidly translated into clinical practice in Australia through PIC policy and guidelines, expedited by the small number of PICs and the close collaboration with a relatively small group of clinical toxicologists. This was shown by the recent ASP study of 10 years of snakebites in Australia: the median antivenom dose employed has rapidly declined after research indicated that a single vial was usually sufficient.[8]

PICs have an important role in toxico-vigilance, providing early information about the toxicity of newly introduced medications,[9]

[1]Clinical Toxicology Research Group, University of Newcastle, Newcastle, NSW. [2]Calvary Mater Newcastle, Newcastle, NSW. geoff.isbister@gmail.com
doi: 10.5694/mja18.00523 ▪ See Research, p. 74

the misuse of prescription medications,[10] and the rapidly changing epidemiology of recreational and synthetic drug misuse.[11] Following the introduction of bupropion as a short term intervention for smoking cessation in 2000, New South Wales PIC data collected during the first 6 months identified the toxicity associated with overdose.[9] Data from the PIC network in Australia has provided important insights into the misuse of prescription drugs, and, more importantly, the effect of public health interventions, such as re-scheduling of substances.[10] PICs provide up-to-date information on the toxicity of substances available in the community, and on the frequency of unintentional and intentional exposures. This information can be used to modify access to particular toxins, whether by removing them from the market, re-scheduling them, or providing public education about their storage and safe use.

The national PIC network and the close collaboration between specialists in poisons information and clinical toxicologists have meant that health services across our large country have access to the most recent evidence and to international expertise when seeking advice. Data from PICs provide a wide range of information about deliberate, unintentional, and recreational poisonings, and also about the effectiveness of public health interventions in changing patterns of poisoning.

Acknowledgements: Geoffrey Isbister is a National Health and Medical Research Council Senior Research Fellow in clinical toxicology.

Competing interests: Geoffrey Isbister is a visiting medical officer contracted to the NSW Poisons Information Centre as a consultant clinical toxicologist. He is currently a co-investigator on NHMRC grants with Andrew Dawson and Nicolas Buckley, but was not aware of the study reported in this issue (Reference 1) until invited to contribute this Editorial, and was blinded to its authors until the Editorial was finalised for publication.

Provenance: Commissioned; externally peer reviewed. ■

© 2018 AMPCo Pty Ltd. Produced with Elsevier B.V. All rights reserved.

1 Huynh A, Cairns R, Brown JA, et al. Patterns of poisoning exposure at different ages: the 2015 annual report of the Australian Poisons Information Centres. *Med J Aust* 2018; 209: 74-79.

2 Isbister C. Poisoning in childhood, with particular reference to kerosene poisoning. *Med J Aust* 1963; 2: 652-656.

3 Phelan PD. Accidental poisoning in childhood. *Med J Aust* 1963; 2: 656-658.

4 Garrettson LK. The child resistant container: a success and a model for accident prevention. *Am J Public Health* 1977; 67: 135-136.

5 Bell JC, Bentley JP, Downie C, et al. Accidental pharmacological poisonings in young children: population-based study in three settings. *Clin Toxicol (Phila)* 2018; 15: 1-8.

6 Pillans PI, Page CB, Ilango S, et al. Self-poisoning by older Australians: a cohort study. *Med J Aust* 2017; 206: 164-169. https://www.mja.com.au/journal/2017/206/4/self-poisoning-older-australians-cohort-study

7 Chiew AL, Isbister GK, Kirby KA, et al. Massive paracetamol overdose: an observational study of the effect of activated charcoal and increased acetylcysteine dose (ATOM-2). *Clin Toxicol (Phila)* 2017; 55: 1055-1065.

8 Johnston CI, Ryan NM, Page CB, et al. The Australian Snakebite Project, 2005–2015 (ASP-20). *Med J Aust* 2017; 207: 119-125. https://www.mja.com.au/journal/2017/207/3/australian-snakebite-project-2005-2015-asp-20

9 Balit CR, Lynch CN, Isbister GK. Bupropion poisoning: a case series. *Med J Aust* 2003; 178: 61-63. https://www.mja.com.au/journal/2003/178/2/bupropion-poisoning-case-series

10 Cairns R, Brown JA, Buckley NA. The impact of codeine re-scheduling on misuse: a retrospective review of calls to Australia's largest poisons centre. *Addiction* 2016; 111: 1848-1853.

11 Waugh J, Najafi J, Hawkins L, et al. Epidemiology and clinical features of toxicity following recreational use of synthetic cannabinoid receptor agonists: a report from the United Kingdom National Poisons Information Service. *Clin Toxicol (Phila)* 2016; 54: 512-518. ■