



National Safety Council

Position/Policy Statement

Children's **Pre-Adult** Acute Poisoning Prevention

~~The Educational Resources Division submits to the National Safety Council's Board of Directors for approval a position statement on the prevention of children's acute poisonings. This paper also includes background information and rationale.~~

The National Safety Council **supports** ~~contends~~ that preventive measures are the key to reducing the poisonings occurring to infants and young children **pre-adults**. **The term pre-adult encompasses the range of human development of neonates, infants, toddlers, children, and adolescents. Adults can provide a vital role in preventing injury and death by poisoning to pre-adults which expectedly have less or no knowledge of risk and harm from chemical products.** Preventive measures that the Council promotes and endorses include new product development and engineering improvements in current products and packaging such as: development of child resistant latches for cabinets; improved child-resistant container closures/caps that provide less resistance to older adults but enough to children; use of child resistant closures on all medication containers; imprinting on solid medications—both over the counter (OTC) and prescription; and the inclusion of bittering agents in mild to moderately toxic house, garden and automotive consumer products. The Council also promotes and endorses adult education of preventive measures, especially to expectant parents, grandparents and paid professional adult care givers; it also promotes and endorses careful and proper in-home storage of toxic materials and children's supervision, especially when toxic materials are open and in use. The Council acknowledges that appropriate and timely responses to poisoning occurrences are essential in reducing fatalities; therefore, **T**he Council promotes and endorses **and promotes** the use of our nation's growing network of certified, regional **accredited** poison control centers. ***A system of responsible adults (e.g., parents, guardians, grandparents, etc.) is proposed to engage in mutual learning (e.g., web resources), poisoning-prevention practices, and related continuing education for each pre-adult.*** Educational audiovisual electronic applications and games should be developed to augment learning about poisoning to reduce injuries and prevent deaths. This topic should be covered early for parents/guardians by physicians (family, obstetrician), midwives (if applicable), and mentioned at child-birth classes.

Comment:

America's Poison Centers

The American Association of Poison Control Centers modernized its brand and changed its name to America's™ Poison Centers (APC) in October of 2022. [APC, News Alerts] *“Some centers prefer the term “poison control center” while others use “poison center”, however there is no difference in the services or expertise.”* [APC, Our Members]

These centers service their designated geographic area by providing a Poison Help Line (1-800-222-1222), Public Education and Outreach, and Health Professional Education. Additional services may include: disaster preparedness and response, HAZMAT response, reportable disease monitoring, pill identification, and others. [ibid] The APC reports for 2021 that 93% of their cases occurred in a residence and 75% were an unintentional exposure. [APC, Data System]

Web Resources for Public on Poisoning Education and Prevention

There is widespread availability of numerous well-organized and informative on-line sources of information presentable for public education to prevent and reduce harm from chemical products. A few are listed below from searching “prevention of child poisoning”.

AboutKidsHealth	https://www.aboutkidshealth.ca/article?contentid=1958&language=english
American Academy of Pediatrics, Healthychildren.org	https://www.healthychildren.org/English/safety-prevention/all-around/Pages/Poison-Prevention.aspx
Children's Safety Network	https://www.childrensafetynetwork.org/child-safety-topics/poison-prevention
National Capital Poison Center	https://www.poison.org/poison-prevention-tips-by-age/toddler
Safe Kids Worldwide	https://www.safekids.org/tip/poison-prevention-tips
U.S. Consumer Product Safety Commission	https://www.cpsc.gov/Safety-Education/Safety-Education-Centers/Poison-Prevention-Information-Center

Literature Review

The pattern and causes of acute poisonings differ between stages of pre-adult development, as well as jurisdictions where they occur. Clinical toxicology resources also differ between jurisdictions. [Banagozar-Mohammadi, 2019]

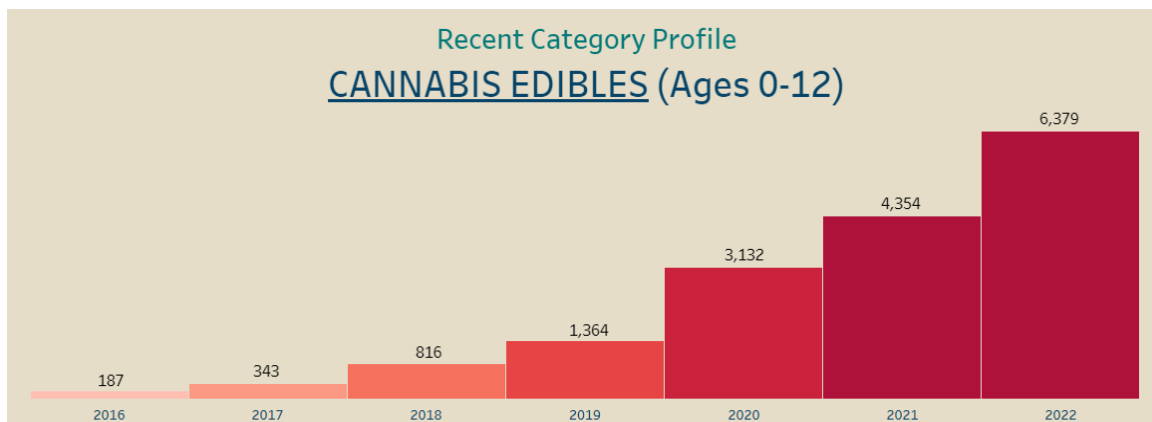
Kang and Brooks (2016) informed on poisoning of infants that, *“Because infants through 6 months of age have limited mobility, such exposures are expected to be less frequent and therapeutic (or dosing) errors should be more frequent.”* [Kang, p.1]

Gaw and Osterhoudt (2019) informed on infants and young children with ethanol intoxication that *“Improper storage of clear alcoholic spirits in alternative beverage containers has been a repeatedly documented route of exposure for ethanol poisoning among infants.”* [Gaw, p.728] Older infants and toddlers *“may ingest ethanol when items such as hand sanitizers, mouthwash, or opened alcoholic beverage containers are left in places accessible”* [ibid., p.723] Their education to physicians includes, *“Referral to child protective services or law enforcement may be warranted to determine safe disposition if there is suspicion of neglect or intentional administration.”* [ibid., p.728]

Hauptman et al. (2017) reported on childhood lead poisoning that, “*Infants and children are at higher risk than adults for lead exposure due to their smaller size and proportionately larger dose of ingested toxins, their proximity to ground dirt and indoor dust, their energy and curiosity, their oral exploratory and pica behaviors, their proportionately larger daily water and milk intake, and dietary preferences that differ markedly from those of adults.*” [Hauptman, p.181] Pre-adults are also more susceptible than adults to toxic effects because of the incorporation of lead into a developing nervous system. [ibid., p.182] They provide numerous specific recommendations on home lead hazard reduction measures. [ibid., p.187]

Wynn et al. (2016) conducted a systematic review of studies on interventions to reduce childhood poisonings in the home and informed, “*Parents should be provided with poison prevention education, cupboard/drawer locks and emergency contact numbers to use in the event of a poisoning.*” [Wynn, p.3] They concluded, “*Interventions involving parent education and provision of home safety equipment should be considered alongside broader strategies (e.g. packaging legislation, PCCs) to prevent childhood poisoning.*” [ibid., p.25]

The National Poison Center System (<https://www.aapcc.org/>) reports (accessed Sep. 29, 2023) the following data on cannabis edibles in those up to age 12 years:



Grabska et al. (2022) reviewed 38 studies and found unintentional poisonings dominate younger children and commonly involve medications and household products such as cleaning solutions/detergents, personal care items, and cosmetics. The majority of poisonings for adolescents were intentional suicide attempts [Grabaska, 2022, p.33] and commonly involve over-the-counter analgesics.

Li et al. (2021) studied acute poisoning of hospitalized children in a mainly rural region of China and found 90.4% occurred at home and most commonly with pesticides (35.4%) and drugs (25.6%). [Li, p.1] Accidental cases were 70.2% and suicidal were 16.4%. [ibid.] Poisoning from drugs “was predominantly caused by psychotropic, cardiovascular, and cold medicines”. [ibid., p.6] “*The majority of suicide cases were adolescents and females*” [ibid., p.8] and “*all children had life or study disputes with family members, classmates, or teachers before committing suicide*” [ibid.]. They concluded, “*Optimizing the package and distribution channels of pesticides and drugs, raising safety awareness of children to avoid accidental injuries, and paying attention to children’s mental health are measures that are necessary to prevent poisoning in children.*” [ibid., p.1]

Hunter et al. (2022) reported on psychotropic medication ingestions in adolescents from U.S. Poison Center data that SSRIs were most frequently reported (34%) followed by atypical antipsychotics (17%) and methylphenidate (15%). [Hunter, p.243] “*Unintentional ingestions were most prominent in patients 0–12 years of age (79%), whereas, in patients age 13–18 years, 76% were intentional.*” [ibid] From 2009 to 2018, there was an increase in exposures from mood stabilizers. They conveyed, “*This overall increase in exposures is likely due to an increase in the prevalence of mental health disorders in children in addition to in the general population making these medications more readily available in the home and accessible by young children [7,8].*” [ibid., p.246] They alert, “*To prevent unintentional exposures, continued emphasis on medication safety needs to be emphasized when prescribing these medications, such as safe storage [16]. For the adolescent age group, caregivers should be particularly careful about safe storage and administration of both the adolescent’s and caregiver’s psychotropic medications along with other household medications [17].*” [ibid., pp.247-248]

Spiller et al. (2019) found from U.S. Poison Center data that a “significant increase (from 125% to 299%) from 2011 to 2018” of intentional suspected-suicide self-poisoning for those 10-18 years old. [Spiller, p.201] The increase for those 10-18 years old were “driven predominantly by females”. [ibid.] They conveyed, “*During the period when the increased rates of suicide attempts are most pronounced (after 2011), there have been a number of society-shifting changes that may impact a number of these underlying factors, including the advent of social media and smartphones, the manner and frequency with which youth relate to one another, and the impact of the opiate crisis.*” [ibid., 204]

Whittaker et al. (2017) informed that “*older adults with low health literacy are at increased risk of nonadherence, accidental drug exposure, and adverse events.*” [Whittaker, 2017, p.100] Their study found that an “*interactive game significantly improved knowledge regarding use of child-resistant cap, interpreting a drug facts label, medication list documentation, and who to call for advice*” [p.100] rather than review of brochures.

References:

America’s Poison Centers (APC),
Accessed Oct. 1, 2023,
News Alerts, <https://poisoncenters.org/news-alerts/12950051>
Members, <https://poisoncenters.org/about/our-members>
Data System, <https://poisoncenters.org/national-poison-data-system>

Banagozar-Mohammadi, A., Delirrad, M., Alizadeh, A., Majidi, & M., Balali-Mood, M. (2020).
Status of clinical toxicology education and ethics in medical care of poisoned patients in the Islamic Republic of Iran and a comparison with other countries,
Basic and Clinical Pharmacology and Toxicology, 126, 475-483.
<https://doi.org/10.1111/bcpt.13380>

Gaw, C.E. & Osterhoudt, K.C. (2019).
Ethanol Intoxication of Young Children,
Pediatric Emergency Care, 35(10), 722-730.
<https://doi.org/10.1097/PEC.0000000000001946>

- Grabska, K. & Pilarska, I. (2022).
Acute poisoning among children and adolescents: a narrative review,
Medical Science Pulse, 16(3), 33-39.
<https://doi.org/10.5604/01.3001.0015.9656>
- Hauptman, M., Bruccoleri, R. & Woolf, A.D. (2017).
An Update on Childhood Lead Poisoning,
Clinical Pediatric Emergency Medicine, 18(3), 181-192.
<https://doi.org/10.1016/j.cpem.2017.07.010>
- Hunter, K., Poel, K., Pennington, S., Bindseil, I., Banerji, S., Leonard, J. and Wang, G.S. (2022).
Trends of prescription psychotropic medication exposures in pediatric patients, 2009–2018,
Clinical Toxicology, 60(2), 243-251,
<https://doi.org/10.1080/15563650.2021.1946556>
- Kang, A.M. & Brooks, D.E. (2016).
US Poison Control Center Calls for Infants 6 Months of Age and Younger,
Pediatrics, 137(2), e2 0151865, 1-7.
<https://doi.org/10.1542/peds.2015-1865>
- Li, A., Xiao, L., Yang, L., Li, S., & Tan, L. (2021).
Characterization of Acute Poisoning in Hospitalized Children in Southwest China,
Frontiers in Pediatrics, 9:727900, 1-9.
<https://www.frontiersin.org/articles/10.3389/fped.2021.727900/full>
- Spiller, H.A., Ackerman, J.P., Spiller, N.E. & Casavant, M.J. (2019)
Sex- and Age-specific Increases in Suicide Attempts by Self-Poisoning in the United States among Youth and Young Adults from 2000 to 2018,
The Journal of Pediatrics, 210, P201-208.
<https://doi.org/10.3389/fped.2021.727900>
- Whittaker, C.F., Toma, S.E., Bivensc, A., & Klein-Schwartz, W. (2017)
Evaluation of an Educational Intervention on Knowledge and Awareness of Medication Safety in Older Adults with Low Health Literacy,
American Journal of Health Education, 48(2), 100-107.
<https://doi.org/10.1080/19325037.2016.1271754>
- Wynn, P.M., Zou, K., Young, B., Majsak-Newman, G., Hawkins, A., Kay, B., Mhizha-Murira, J. & Kendrick, D. (2016).
Prevention of childhood poisoning in the home: overview of systematic reviews and a systematic review of primary studies,
International Journal of Injury Control and Safety Promotion, 23(1-3), 3-28,
<http://dx.doi.org/10.1080/17457300.2015.1032978>

Background

The American Association of Poison Control Center's National Data Collection System states that 1,098,894 and 1,166,940 human exposures were reported in 1986 and 1987 respectively.¹ This collection system's data indicates, on the basis of 57 reporting centers, that the majority of all their reported exposures: involve children under six years (47% under three years), take place in the home (schools accounted for about 8%), involve only one substance (about 93%) and are accidental (about 89%). Victims under 12 years are the only population that indicate a male predominance. Although most exposures involve children, about 63% under six years, the majority of fatalities involve intentional ingestions by individuals over 17 years. Ingestions account for about 78% of all poisonings; other exposure routes—dermal, ophthalmic and inhalation, account for between 5% to 6% each and bites/stings for about another 3%.

Product Development and Engineering

In the area of product development and engineering, the development of child resistant closures have made great strides in reducing poisonings by aspirin and other over the counter (OTC) drugs and prescription medicines. Child resistant closures and other protective packaging measures have helped prevent children from being able to ingest potentially dangerous materials. Product developers, however, need to continue researching newer approaches to child resistant closures, including opaque blisters and strips, to offer a wider variety of resistant closures to suit the needs and limitations of a broader group of consumers, including older adults. Additionally, marketing and sales agents should be quick to adopt and place innovative solutions in consumer outlets.

Another method of trying to prevent infants and children from poisonings by mild to moderately toxic liquids is to make the product taste so awful that ingestion may be severely limited. One of the bitterest substances in the world is denatonium benzoate. It was discovered in the late 1950's and was found to be detected by taste at 10 parts per billion (ppb) and was recognizably bitter at 50 ppb. Denatonium benzoate is odorless, colorless and nontoxic. When added to products at a level of 10 parts per million, the product will become so bitter that many children will reject the product upon, or shortly after, tasting it. Some research shows that it significantly reduces the likelihood of an ingestion involving multiple swallows. (It should be noted that with some products any ingestion at all is fatal, so that the inclusion of a bittering agent in those products would be useless.) Denatonium benzoate should be added by manufacturers to all mild-to-moderately toxic products, where appropriate, especially household, garden and automotive chemicals in an attempt only to mitigate the severity of a poisoning episode.

In addition to the inclusion of bittering agents where appropriate, there is another step that some manufacturers can take to help mitigate loss from poisonings—across the board solid drug imprinting. Imprinting assists health professionals in the identification of substances involved in poisonings. Currently, less than half our states require drug manufacturers to imprint solid prescription medications (tablets, capsules and caplets) with an alpha-numeric code. Imprinting all solid medications with a code can result in improved product identification which can favorably impact upon: treatment outcomes, identification of counterfeit brand name drugs, and quality control maintenance

¹The number of reporting poison control centers increased from 1986 to 1987. The data represented covers approximately 57% of the U.S. population; thus the 1987 projected statistics would indicate over two million exposures. ©1989 National Safety Council

in hospital and pharmacy distribution activities. It would be in the best public interest to have all manufacturers of prescription and/or OTC drugs to imprint their products in the same manner. We encourage the eventual development of a universal coding language, possibly through the World Health Organization, to allow for speedy drug identification worldwide.

Education

Regardless of the progress made in product development and engineering, some poisonings will continue to occur. Education is a key component in reducing poisoning problems and can lead to an informed society concerning poison prevention. Everyone should be educated about poison prevention, but special efforts should be aimed at parents, grandparents, expectant parents, and child care providers. Before their child is mobile, parents should make certain their home is safe for babies and toddlers. Medicines should be placed in enclosures in a high location with latches or locks. Outdated prescriptions should be properly discarded. If medicine cabinets need to be locked, use a combination lock. Grandparents will need to remember to take special care with their OTC and prescription drugs when grandchildren are visiting.

Day care staff and other care givers, community outreach groups, early childhood educators, babysitters and pediatric health professionals all need proper background information and educational materials. The American Association of Poison Control Centers' certified regional poison control centers, among others, are able to provide up-to-date and reliable information about childhood poisonings and how they can be prevented.

A variety of persons should be involved in educating the public about poisoning prevention. These include community and public health educators, day care/nursery school staff, pediatricians, pediatric health nurses, poison control center staff, national non-profit safety and health organizations, early childhood and elementary school teachers, and consumer representatives for industry.

Supervision

The importance of continuous, adequate supervision of young children cannot be under-emphasized. Studies show that nearly 75% of poisoning accidents occurred when the victim was not supervised. However, another important fact is that most poisonings involving household products occur while the product is in use. Parents need to be alerted to the accident potential when they turn their back to a child or pause during household cleaning activities for a phone call or doorbell ring. Grandparents and babysitters need to be informed of the importance of proper supervision of children in their care. Paid day care staff, early childhood and primary school educators need basic information on the importance of continuous, adequate supervision of children and knowledge of emergency response including basic first aid.

Emergency Response

Even though we hope that product development and engineering, education and proper supervision can decrease accidental childhood poisonings, we must continue to be prepared for the actual poisoning occurrence. Parents and child care providers must keep the telephone number of the nearest certified regional poison control center posted next to each telephone. Additionally, the name, telephone number, etc. of the child's physician and hospital should be available.

~~It is important that proper emergency action for poisoning be taken. The most effective approach to take includes: 1) identifying the drug or chemical that caused the poisoning, 2) contacting the poison control center for medical advice, and 3) closely following the instructions given by the poison information specialist(s). 4) If unable to contact them, call your local emergency number (911 in most areas) or a hospital emergency room.~~

~~Parents and child care providers will want to keep ipecac syrup available in their locked medicine cabinet. (It is recommended that one, one-ounce, bottle be kept for each child five years or older.) This medication, available without a prescription, induces vomiting and is often recommended when a child ingests a harmful substance. However, ipecac syrup should only be given under the advice and supervision of poison control center information specialist or a physician.~~

~~In closing, the Council would like to acknowledge that there are numerous factors, environments and vehicles that went unmentioned in this paper. This is not to diminish the importance of topics such as lead in interior house paint and drinking water, chemical splashes and fume inhalation from home rehabilitation work, or poisonous spiders, snakes and plants. However, it is the intent of this paper to address only the most common and acute poisoning occurrences to infants and young children.~~

An Aside: Technical Reviewers

~~Many members of the Educational Resources Division worked on the development of this position paper, most notably Dr. Dale Ritzel who acted as the volunteer coordinator of the project, and Linda Basehore of the Indiana Poison Control Center who set many activities in motion with her lecture during our 1988 Congress. Additionally we would like to acknowledge special assistance from British pediatrician Dr. Jo Sibert and his research work on the use of bittering agents, staff from MacFarlan Smith Ltd., of Edinburgh and Robeco Chemical, and key staff of the American Association of Certified~~

~~Poison Control Centers including President William Robertson, M.D. of the Seattle Poison Control Center at Children's Hospital and Kathy Wruk of the Rocky Mountain Poison Control Center.~~

ADID Members Draft Edits – December 8, 2023

This position statement reflects the opinions of the National Safety Council but not necessarily those of each member organization.

Submitted by the Educational Resources Division Approved by the Board of Directors,
May 5, 1989