

# Accidental Poisoning: Selected Aspects of its Epidemiology and Prevention

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Unintentional or accidental poisoning continues to be an important health threat throughout the world including Malaysia. It is particularly a problem among children under the age of 5 years<sup>1</sup>, primarily due to developmental incompetencies<sup>2</sup> and their dependence on adults for their care and well being<sup>3</sup>. In the United States for every poisoning death among children under the age of 5, 80,000-90,000 non-fatal cases are said to be seen in emergency rooms and about 20,000 children are hospitalised. Studies have shown that poisonings occur 10 times more often among children under the age of 5 than among primary school children. Children at greatest risk are the 1- and 2-year olds<sup>4</sup>. However, unintentional poisoning is also known to occur in all ages. This problem has in fact been reported in both elderly<sup>5</sup> and younger adults<sup>6</sup>. The morbidity and mortality due to unintentional poisoning has important implications of costs and potential years of life lost. The magnitude of this is large since the common victims are children.

Poisoning due to medical drugs is a major problem in children as well as adults. Lashely and St. John in their review of 348 children admitted for unintentional poisoning in Barbados found that 34 per cent of the cases seen were due to medications<sup>7</sup>. Common medications and drugs such as vitamins and iron supplementation, analgesics, antipyretics, and hypnotics are often implicated, particularly in children<sup>8</sup>. Some others that are responsible include antipsychotics, antimalarials, antidepressants, and antimicrobials. Most of these are due to overdose, either accidental, or in the course of treatment<sup>9</sup>. Though less common, adults are not excluded from the risk of unintentional poisoning from drugs. Holright and Jahangiri reported a case of accidental ingestion of podophyllin, used in the topical treatment of warts, that was mistaken for cough linctus<sup>10</sup>.

Traditional medicines can also be a source of poisoning and in Malaysia, where this is used, medical practitioners have to be aware of this risk in some of the patients they may see. In a retrospective study of cases in Zimbabwe, the majority (80%) of whom were less than 30 years, traditional medicines were implicated in 22.9 per cent of the cases while therapeutic drugs were responsible in 16.7 per cent of the cases<sup>11</sup>. Drug interactions can be fatal too, as in the case of methocarbamol (Robaxin), a carbamate derivative used as a muscle relaxant with sedative effects, interacting with ethanol. Acute alcohol intoxication combined with carbamate usage can lead to combined central nervous system depression as a result of the sedative-hypnotic interaction of the compounds<sup>12</sup>.

A major cause of household unintentional poisoning that is virtually universally implicated is kerosene (paraffin). This is due to its widespread use in stoves and lamps. In the Zimbabwe study mentioned earlier, kerosene was a major component of household agents responsible for poisoning<sup>11</sup>. In India, kerosene ingestion is the most common cause of accidental poisoning among children<sup>13</sup>. Elsewhere in Barbados, kerosene poisoning contributed to 2 per cent of cases<sup>7</sup>. Purchase of kerosene in soft drink bottles is not uncommon and poses dangers to children, if not stored properly. Azizi in this issue reports that poisons were easily accessible to the children who were

victims; storage of medications in child proof containers was observed in only 10.5 per cent of cases; and kerosene was mostly ingested from soft-drink containers.

Pesticides, insecticides and rodenticides are major agents of unintentional poisoning too, both directly as well as indirectly. In recent years, pesticides have caused numerous cases of poisoning, many of whom are children. Worldwide, an estimated half a million poisonings per year are said to be caused by exposure to agricultural pesticides<sup>14</sup>. This occurs when pesticides are left in open containers in homes or in areas where children play<sup>8</sup>. The use of pesticides on commercial vegetable crops is often extensive in order to obtain higher yields and better returns. Indiscriminate, excessive spraying of stronger dosages of these chemicals are often resorted to achieve this end<sup>15</sup>. In 1993 there were about 400 deaths due to pesticide poisoning from over 1400 reported cases, of which 45 per cent were non-suicidal in nature<sup>16</sup>. Ministry of Health figures based on government hospitals data revealed that in 1992, 138 cases of pesticide poisoning were unintentional in nature, mostly at work, with two deaths<sup>16</sup>. Elsewhere, reports of organophosphorous toxicity due to absorption through the skin has been reported<sup>17</sup>. Organophosphates, found in pesticides, were commonly implicated in cases seen in Jordan with an annual mortality rate of about 35.3 per cent. It was also reported that 74 per cent of the cases were among children less than 10 years<sup>18</sup>. Aplastic anemia, pure red cell aplasia, leukemia, lymphoma and other hematologic disorders following exposure to the pesticide pentachlorophenol (PCP) has been reported, suggesting that exposure to chemicals that linger long in the environment can lead to mutagenic, hemolytic and carcinogenic effects<sup>19</sup>. Arsenic commonly found in insecticides, herbicides and industrial materials are involved in heavy metal poisonings and most commonly in children<sup>20</sup>. A herbicide of importance in unintentional poisoning, resulting from accidental ingestion, is paraquat. A 9-year-old is reported to have been poisoned after using an empty bottle of paraquat for drinking water from a water tank<sup>21</sup>. Rodenticides too are known to give rise to poisoning. A superwarfarin compound (brodifacoum) used as a rodenticide resulted in a child being poisoned<sup>22</sup>.

Exposure to harmful airborne contaminants are also known to predispose one to unintentional poisoning. Usually in the industrial workplace, exposure to a specific pollutant is likely for several hours per day. Associations between exposure of people to pollutants in the outdoor air are weaker than for occupational exposure. Non-occupational indoor environment exposure to indoor pollutants has attracted attention in recent years as many persons in some societies may spend as much as 80 per cent of their time indoors of which less than 25 per cent is in the occupational environment<sup>23</sup>. Children and adults in countries like Korea, have experienced carbon monoxide poisoning resulting from charcoal or wood used for heating and when there is inadequate ventilation. Exposure to tobacco smoke, unvented combustion products, radon, formaldehyde from building products and furnishings, and organic chemical compounds from consumer products, can also occur and the effects may often be enhanced by reduced ventilation rates<sup>24,25</sup>. Methodological issues have limited the amount of research in this important area. However the WHO has recommended ways to overcome this and findings on this is expected to increase.

A few other causes or factors of poisoning are now considered. Deaths due to car exhaust fumes as a cause of accidental poisoning, have been declining in the USA as a result of declining toxicity of car exhaust fumes following imposition of emission controls, whereas in Great Britain, where there have been no similar controls over the same period, death rates due to this have increased slightly<sup>26</sup>. Biological causes such as vegetable poison, poisonous fish, snakes and insects have also been responsible for poisoning events<sup>8</sup>. Some other factors that contribute to poisoning particularly in children include hypersensitivity, allergy and malnutrition. Genetic defects such as glucose 6-phosphate dehydrogenase deficiency in the presence of certain substances such as naphthalene and sulphonamide drugs can lead to severe hemolysis in some cases<sup>8</sup>.

There are several measures which can be taken to reduce the problem of unintentional poisoning. In addressing poisoning due to medications, Lashely and St. John<sup>7</sup> recommended disposal of old medicines, locking medicines away, not storing poisonous substances near food nor in food containers or beverage bottles. There is a need for medicines to be appropriately packed in child-safe containers that cannot be easily be opened by children. This can also be extended to household products other than medications that may be potential poisoning agents. Several studies have shown declines in poisoning mortality and hospitalisations as a result of the simple, cost-effective measure of introducing child-proof packaging<sup>27,28</sup>. It has also been recommended that certain drugs that are extremely toxic to children, (e.g. tricyclics, iron salts, lomotil,) be distributed using a double-barrier approach, which involves dispensing such drugs in opaque plastic strip cells or blister packs and enclosing them in child-proof containers<sup>29</sup>. Further, malflavouring the plastic strip material could discourage very young children and act as a deterrent<sup>28</sup>. These measures can easily be implemented if manufacturers, pharmacists, physicians, consumers, and regulatory agencies worked together to accomplish it<sup>1</sup>.

Several recommendations to reduce paraffin or kerosene poisoning have been made. Distributing kerosene in distinctive containers, flavouring it to be unpalatable, making it coloured rather than colourless, not transferring to beverage bottles, collecting it instead in child-proof containers, and keeping it out of reach of children have been some of the recommendations<sup>9</sup>. Public media campaigns, and improvements in education and literacy levels though possibly more expensive, can support more cost-effective measures such as use of child-proof containers. The latter can be complemented by incentives such as reduced prices for consumers using such containers<sup>9</sup>, which can be a motivating factor for change as is illustrated by encouraging consumers to use unleaded fuel in this country through reduced prices.

Community-based prevention education programmes are an important component to preventing poisonings and have been shown to change parental poison-storage habits<sup>30</sup>. The public and health workers need to be more aware and constantly reminded of the problem. Poison control centres in the country are an important community resource for this as they can provide information and guidance to the general public and health professionals, particularly about first aid and medical management of poisonings.

Studies have shown that some measures may not work very well. For example, pictorial stickers to be placed on containers of hazardous material to deter children, have been tried elsewhere and found to be ineffective and unsuitable<sup>31,32</sup>.

An effective surveillance and data-base system is necessary to monitor the situation and trends, as well as to evaluate programmes and activities that are implemented to deal with the problem of poisonings. Research too continues to be needed if we are to identify risk factors and solutions to this problem, especially as 'new' types of poisoning appear. Policy makers, planners and decision makers cannot act in the absence of valid information.

In general, a multifaceted comprehensive approach with education and environmental modification efforts, as well as use of simple, cost effective measures such as use of child-proof containers, are useful in educating parents and the public about poisonings and its prevention. The responsibility to deal with this problem is a collective one involving the community, public health workers, policy-makers, consumer groups, non-governmental organisations, and the private sector, to name but a few.

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