

REVIEW ΑΝΑΣΚΟΠΗΣΗ

Message 4: “Guard against accidental poisoning”

Poisoning is the third commonest cause of unintentional injury death in the European Union (EU). In 2000, an estimated 315,000 people worldwide died as a result of unintentional poisoning. This paper presents: (a) the magnitude and the socio-economic burden of this epidemic in the countries of the EU, (b) the underlying risk factors and (c) the evidence based preventive practices that reduce the likelihood of poisoning occurrence. Some of these measures are therefore included in the European Code Against Injuries (ECAI) aiming to raise public awareness regarding injury prevention. Although poisoning involves all age groups, children under the age of 5 and older people above the age of 65 are at greater risk; thus a particular attention has been given to these two age groups.

1. DEFINITION

The World Health Organization (WHO) defines poisonous substances as: “substances which, when ingested, inhaled, or absorbed, or when applied to, injected into, or developed within the body in relatively small amounts may, by their chemical action, cause damage to structure or disturbance of function.”¹ The European Code Against Injuries focuses on acute unintentional poisonings in childhood and late adulthood. Food poisoning, allergic reactions, chronic poisonings such as lead poisoning and those undertaken as a deliberate act of self-harm are excluded.

Within the European Union (EU), medicinal products are responsible for the majority of poisonings in childhood.²⁻⁶ Household products, are the second most common group of agents responsible for childhood poisoning.²⁻⁶ Other agents such as plants, alcohol and carbon monoxide are rarer causes of childhood poisoning.²⁻⁵ The agents most commonly involved in medicinal poisoning are analgesics, anxiolytics and antidepressants,²⁻⁴ whilst those most commonly involved in poisoning from household products are detergents, petroleum products and pesticides.²⁻⁶

2. MAGNITUDE OF THE PROBLEM

There is likely to be considerable under reporting of poisoning mortality and morbidity. This may arise through difficulty in ascertaining the intent of poisoning, lack of

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ΑΡΧΕΙΑ ΕΛΛΗΝΙΚΗΣ ΙΑΤΡΙΚΗΣ 2008, 25(Συμπλ 1):27-33

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Μήνυμα 4: «Προφυλαχθείτε
από τις δηλητηριάσεις»

Περίληψη στο τέλος του άρθρου

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access to medical care, attribution of symptoms to other causes or variable levels of recording mortality and morbidity data in different countries.

Poisoning in the WHO European Region accounted for approximately 107,000 deaths in 2000, which comprised one third of all poisoning deaths worldwide. 2.3 million DALYs were lost due to poisoning in the WHO European Region in 2000, comprising 28% of the total DALYs lost worldwide due to poisoning.⁷ Poisoning is the sixth commonest cause of unintentional injury death for children aged under 15 years in Europe.⁸

Poisoning is a particular problem in low and middle income countries, since more than 94% of poisoning deaths worldwide occur in low and middle income countries.⁷ In the WHO European Region the death rate from poisoning in low and middle income countries (21.5/100,000 population in 2000) is almost seventeen times higher than that in high income countries (1.3/100,000 population in 2000).⁷ Males in the low and middle income countries of the WHO European Region account for the highest number of DALYs lost due to poisoning worldwide.⁷

The importance of poisoning as a cause of mortality and morbidity varies by age. In low and middle income countries in the WHO European Region it is the 9th most common cause of death in children aged 0-4 years and the 5th in children aged 5-14 years. Poisoning is not amongst the 15 most common causes of death in childhood in

high-income countries in the European Region.⁷ In terms of burden of disease, poisoning is responsible for the 12th greatest loss of DALYs for all causes in children aged 0–4 years in low income countries in the European Region. In high income countries poisoning does not fall within the top 15 causes of DALYs lost for any age group.⁷

Poisoning mortality rates vary considerably between countries in the EU, as shown in figure 1 which presents poisoning mortality rates for children aged 0–14 years for the 27 members of the EU per 100,000 population for the latest 3 years for which data were available.

- Health service use

poisoning accounts for considerable health service utilisation. In the UK in 2002 more than 31,000 children aged 0-14 years attended Emergency Departments following a poisoning.⁹ In the UK approximately one third of childhood poisoning attendances result in admission to hospital.⁵ Data from Spain suggest that 15% of Emergency Department attendances result in hospital admission and 1.5% result in admission to intensive care units.⁴ There is evidence that the number of Emergency Department

attendances and hospital admission rates for poisoning amongst children are reducing in the UK.^{5,10} Such declines may represent a reduction in the incidence of poisoning, but may also reflect changes in medical management, hospital admission policies or increased availability of community based services providing advice following poisoning incidents.

- Financial burden

there are little data available regarding the financial burden of poisoning. Data from the USA estimated a cost per case for poison-related hospitalisations of \$4968 in 1995,¹¹ the total medical costs of poisoning to be \$2236 million and the lost productivity costs to be \$23,707 million in the USA for the year 2000.¹²

3. RISK FACTORS

3.1. Demographic risk factors

Poisoning is predominantly a problem in young children.^{4,6,13,14} The majority of medically attended poison-

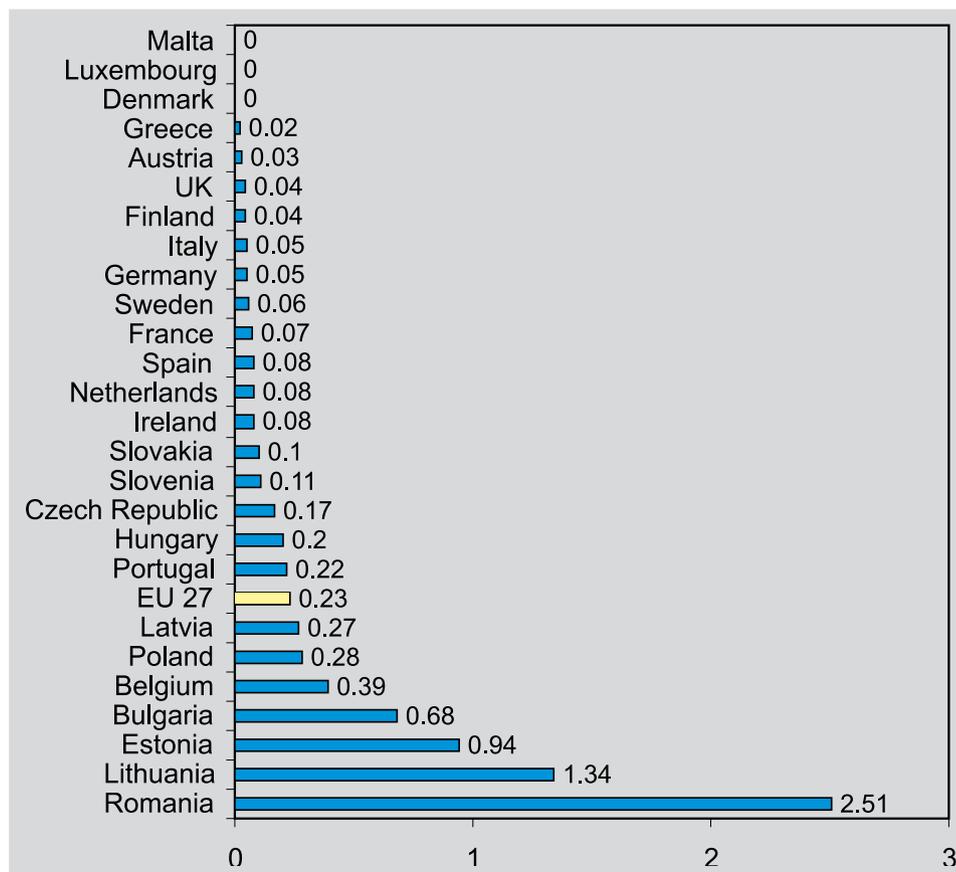


Figure 1. Mortality rates due to poisoning for children aged 0–14 years (per 100,000 population) for the latest 3 years for which data are available (circa 2002-2004) in the European Union (EU-27)*.

*Data for Cyprus are not available.

ings occur between the ages of 1 and 4 years, with the peak incidence in the second year of life.^{4,6,14} Boys have higher mortality rates than girls in the WHO European Region, with a greater differential in gender mortality rates between older children (5 to 14 years) than younger children (0–4 years).⁷ Boys also have higher hospital admission rates during childhood than girls.^{2,6,10}

A range of social factors have been associated with increased risk of childhood poisoning. These include social deprivation,^{2,13,15} parental unemployment,¹⁶ single parenthood,¹⁷ young maternal age,¹⁷ lower parental educational level,¹⁵ and recent house moves.¹⁸ Work from Canada suggests that pregnancy increases the risk of iron poisoning, with a doubling of the risk of hospital admission for iron poisoning in the six months before and after the birth of a sibling.¹⁹

In terms of rurality, there is little work comparing the incidence of poisoning between urban and rural areas in Europe. Data from Australia suggests poisoning rates are higher amongst children aged 0–4 years residing in rural and remote areas than those for children in metropolitan areas.^{20,21}

3.2. Environmental risk factors

Numerous studies have demonstrated that children are exposed to unsafe storage of possible poisonous products in the home.^{6,22–25} Transferring products from original containers,^{6,15,26} not returning substances to their usual storage place after use,^{27,28} use of non child resistant containers²⁶ and improper closure of child resistant containers²⁶ have all been associated with childhood poisoning. Children's exposure to medicines within the home is also increased by failure to dispose of expired or unused medicines.^{29,30} Recent qualitative work suggests that parents' choice of poison prevention strategies often occurs in response to the child's behaviour and interests, making the child vulnerable to poisonings through changes in the home environment, their stage of development or changes in parental supervision.³¹

3.3. Behavioural risk factors

Depression, stress or distress in mother or family is associated with an increased risk of childhood poisoning,^{17,18,32,33} as those situations affect child behaviour.^{17,25,33} Imitative child behaviour, curiosity and the ability to open child resistant containers have been identified as antecedents to poisoning.^{25,26} Absence of a caregiver has also been associated with childhood poisoning.^{27,34}

4. EFFECTIVE PREVENTIVE PRACTICES

- Primary prevention of poisoning: legislation on packaging

Legislation requiring the use of child resistant closures on containers for medicines has been found to be effective in reducing childhood poisoning deaths^{35,36} and hospital admissions for poisoning in childhood.³⁷ Legislation requiring the use of blister packs or strips has been associated with a significant reduction in poison control centre calls and with mortality for iron ingestion in children younger than six years old.³⁸ One study from South Africa found a lower incidence of kerosene ingestion in areas that had received free child resistant kerosene containers, than in a control area without a kerosene container distribution programme.³⁹ The cost effectiveness of child resistant containers for kerosene in low and middle income countries has been estimated at between \$61 (3% discounting rate) and \$96 (6% discounting rate) per DALY.⁴⁰

However child resistant packaging is not always child-proof. Some CRCs are difficult for adults to open, and for this reason they may either not be closed properly or products may be transferred to containers without child resistant closures. Even when child resistant closures have been properly closed, some children can still open them.²⁶ It is possible that the effectiveness of child resistant packaging could be further increased by improved design in order to facilitate easier opening for adults and by storing products in child resistant packaging out of reach of children.²⁸ Further evaluation of the impact of such strategies is required.

- Reducing the attractiveness of products

There is little, but conflicting evidence evaluating the effect of changing the design of packaging and labels on the attractiveness of products to children.^{41,42} There is also some evidence that changing the colour of products, to prevent confusion with drinks, has been associated with a reduction in kerosene poisonings in Australia.⁴³

- Safe storage of potentially poisonous products

Although unsafe storage of products has been identified as a risk factor for poisoning in many studies, few studies have examined the effect of safe storage of products on the incidence of poisoning. A recent systematic review and meta-analysis of randomized controlled trials, non-randomized controlled trials and controlled before-and after studies found only 3 studies which measured the

incidence of poisoning. All 3 studies provided poison prevention education and 2 provided cupboard or drawer locks. There was a lack of evidence that the interventions were effective in reducing rates of poisonings (OR: 1.03; 95% CI: 0.78–1.36), but the analysis was underpowered due to the small number of studies and the small number of person years.⁴⁴

The same systematic review and meta-analysis found strong evidence that home safety education which in some cases included the provision of cupboard, drawer or cabinet locks, was effective in increasing safe storage of medicines (OR: 1.57; 95% CI 1.22–2.02) and cleaning products (OR: 1.63; 95% CI 1.22–2.17). Providing free or subsidised safety equipment with education tended to produce a greater effect than providing education alone. The number needed to treat to result in one additional family storing medicines safely was 14 (95% CI: 10–29) and storing cleaning products safely was 9 (95% CI 6–21).⁴⁴

- Safe disposal of unused or out-of-date medicines

Many families keep unused or out-of-date medicines at home²⁹ and many dispose of such medicines either by throwing them out in household waste or by putting them down the sink or toilet.^{29,30,45} In recent years there has been increasing concern about the effect of such disposal of medicines on the environment.^{45–47} Safe disposal schemes such as returning medicines to pharmacies^{48,49} have been established, but their impact on childhood poisoning requires evaluation.

- Increasing poison prevention knowledge

Several studies have demonstrated that school-based educational sessions can improve children's poison prevention knowledge.^{50,51} However, the extent to which such knowledge translates into poison prevention practices or reduces the incidence of poisoning is unclear.

- Effective child supervision

Although absence of a care-giver has been associated with childhood poisoning,^{27,34} there are no evaluations of the impact of interventions aimed at improving supervision on childhood poisoning.

- Secondary prevention of poisoning: emetic agents

Agents such as syrup of ipecac have been recommended to induce vomiting following poisoning in childhood. How-

ever, recent work from the USA suggests it does not reduce Emergency Department use post poisoning or improve other outcomes⁵² and its use is no longer recommended by the American Academy of Pediatrics.⁵³

- Bittering agents

Bitter tasting agents have been recommended as additions to household products of mild or moderate toxicity to reduce the quantity of substance ingested by children.⁵⁴ The impact of their use requires further evaluation.^{55,56}

- Poison control centres

Poison control centres have been operational in the USA since the 1950s. They provide free telephone advice from toxicology professionals. Callers receive immediate information and treatment advice regarding suspected toxic exposures to drugs, chemicals, plants, and other substances.⁵⁷ They have been demonstrated to be cost-effective in terms of reducing health care resource use in both rural and urban areas.^{57–59} A cost-benefit analysis from the USA found that poison control centers reduced the number of patients who were medically treated but not hospitalized for poisoning by 24% and the number of hospitalizations by 12% and the average call to a poison control center prevented \$175 in other medical spending (based on costs in 1992).⁵⁷

A recent systematic review and meta-analysis demonstrated that education was effective in increasing the proportion of families who had the Poison Control Centre number accessible (OR: 3.67; 95% CI: 1.84–7.33), and the number needed to treat to result in one additional family having the Poison Control Centre number accessible was only 3 (95% CI: 2–7).⁴⁴

5. CONCLUSION

Accidental poisoning accounts for approximately 10,000 deaths in the European Union most of them involving young children and older people.⁶⁰ Nevertheless poisoning is preventable and can be avoided. Evidence shows that there are several prevention measures, which are capable to reduce the poisoning incidence especially among children. In brief those measures consist of approaches that combine education, environmental modifications and passive safety measures in order to prevent the occurrence of poisoning or measures that can be adopted in order to eliminate injury severity or even death in case

of accidental poisoning. More specifically the following preventive measures are strongly recommended:

- Keep dangerous substances away from children: use child resistant closures, but remember none of these is 100% child-proof. Store products safely, either locked away or out of reach of children.
- Remember that many products can be potentially dangerous, e.g. household detergents, medicines, and garage items like antifreeze and pesticides. Store these products in their original containers.
- Store food and non-food products separately. Always read the use and storage directions of products. In case of poisoning, read the labels on product containers, which often give important first-aid information.
- Make sure you have an emergency number next to the telephone in case of a suspected poisoning.

ΠΕΡΙΛΗΨΗ

Μήνυμα 4: «Προφυλαχθείτε από τις δηλητηριάσεις»

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Οι δηλητηριάσεις είναι η τρίτη αιτία θανάτου από ακούσιο τραυματισμό στην Ευρωπαϊκή Ένωση. Το 2000, περίπου 315.000 θάνατοι παγκοσμίως αποδόθηκαν σε δηλητηριάσεις. Αυτή η εργασία παρουσιάζει: (α) την έκταση και τις κοινωνικο-οικονομικές επιπτώσεις που έχουν οι ακούσιες δηλητηριάσεις στις χώρες της Ευρωπαϊκής Ένωσης, (β) τους υποκείμενους παράγοντες κινδύνου και (γ) τις επιστημονικά αποδεδειγμένες πρακτικές που μειώνουν την πιθανότητα δηλητηριάσεων. Μερικές από αυτές τις πρακτικές έχουν συμπεριληφθεί στον Ευρωπαϊκό Κώδικα Κατά των Ατυχημάτων ώστε το κοινό να ενημερωθεί σχετικά με την πρόληψη ατυχημάτων. Παρόλο που οι δηλητηριάσεις αφορούν όλες τις ηλικιακές ομάδες, τα παιδιά ηλικίας κάτω των 5 ετών και τα άτομα ηλικίας άνω των 65 ετών είναι σε μεγαλύτερο κίνδυνο· συνεπώς ιδιαίτερη έμφαση έχει δοθεί σε αυτές τις δυο ηλικιακές ομάδες.

Λέξεις ευρητηρίου: Δηλητηριάσεις, Ευρωπαϊκός Κώδικας Κατά των Ατυχημάτων, Πρόληψη

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