

Epidemiology of domestic injuries. A survey in an emergency department in North-East Italy

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Key words

Domestic injuries • Epidemiology • Emergency care

Summary

Introduction. Home injuries (HI) represent a social and public health problem worldwide. In Italy, there are 1,300,000-1,700,000 admissions to Emergency Department (ED) for HI and 130,000 hospitalizations every year, but the data are incomplete and fragmentary. A study of the phenomenon was carried out in Emergency Department (ED) of Civil Hospital of Verona to evaluate prevalence, characteristics and possible preventive actions.

Methods. In 2007, 3120 admission for HI have been registered at the ED of the Civil Hospital of Verona. The distribution was calculated in relation to sex, age, month, code of urgency, outcomes, type and location of trauma.

Results. Children in pre-school age, men between 30 and 40 years and women over 60 years are the population groups most at risk, with a fairly homogeneous incidence distribution. Both

sexes have similar distributions up to 41-50 years followed by an increase in females and a decrease in males at higher age. The traumas are generally slight (49.8% white code and 42.1% green code) and the hospitalizations represent 5.7% of all recorded HI. The most frequent injuries are wounds/abrasions (28.7%), contusions/crushing (27.7%) and fractures/distortions/dislocations. The most affected body parts are hands and wrists (25.9%). Head trauma is significantly more frequent in children and elderly people, fracture in elderly people, and burn in adult women and male children.

Every year about 30% of the admissions to emergency departments are caused by HI. Even though 92% of the times the events aren't serious, the sanitary cost is consistent due to the elevated number of admissions. It is therefore important to do prevention through sanitary education and adequate building legislation.

Introduction

The HI represents a relevant social and public health problem worldwide.

They are an important cause of morbidity and mortality even though people consider their house the safest place for excellence.

There is not a specific definition of "home accident" by the WHO, which considers them as injuries which occurred within the residence and its dependencies [1-4].

The Italian National Institute of Statistics (ISTAT) in 2006 conducted an annual survey on multi-lifestyle families based on interviews held on a sample of 797,000 households: (13.7% of Italian population) which referred a total of 915,000 accidents. The research estimates that home accidents have involved more than 3 million people corresponding to 55% subjects in 2006. Elderly people over 80 years and children under 6 years are the subjects most at risk and over 60% of all accidents regards women. It follows that the risk is correlated to amount of time spent at home [5].

Other data can be derived from SINIACA (National Information System on Accident at Civilian Residences)

that since 1999 made surveillance of admissions to Italian ED for HI. It is estimated that every year there are 1,300,000 to 1,700,000 admissions throughout the national territory, of which approximately 130,000 require hospitalization [1, 2, 6, 7].

Relatively to mortality data, in Italy death certificates for trauma are codified according to ICD-9 classification of death causes, so that the codes for external cause of injury (E codes) do not explicitly indicate home accident. This was until 1998, when ISTAT has added to those certificates an item concerning the place of accident. Analyzing ISTAT data and a study by Simoncini [8], it can be estimated that there is an amount of 4,500 deaths per year due to HI, with an incidence rate of 7.8 deaths per 10⁵ inhabitants/year [1, 2, 6].

In Italy the phenomenon appears particularly important even if it is underestimated because the data are still incomplete and fragmentary.

Since the detection system of HI admission to ED does not cover evenly the territory throughout the country (33.6% of all population) [2], in this study it was decided to evaluate the phenomenon at the ED of the Civil Hospital in the city of Verona.

Methods

This was an observational study, conducted between January and December 2007 in the ED of Civil Hospital of Verona in Northern Italy.

Inclusion criteria was based on the consecutive enrollment of all the patients admitted for HI defined as any accident that takes place in and around the home including the garden, garage, terrace, courtyard etc., without counting people in some form of employment (residential people, home help, baby-sitter...).

The protocol of this study was carried out according to the Helsinki Declaration and approved by the local ethical committee, and the data were collected and processed in compliance with the national law on privacy (Law N. 196/2003 - Code concerning the protection of personal data).

Patients admitted several times for planned checks after the accident, or whose including criteria didn't correspond to a HI were eliminated from the collected data. At the end of the selection the total number of patients admitted to ED for home injuries was of 3120 people out of 82,227 total admissions.

The distribution of HI was calculated according to the number of admissions according to: month, sex, age class, time of acceptance, type of accident (injury from irritants; contusion/crushing; foreign body; wound/abrasion; fracture/distortion/dislocation; stretch/ripping; concussion; burn), body parts interested by the HI (hip/thigh/leg; head/neck; hand/wrist; multiple seat; eye; foot/ankle; shoulder/arm/forearm; chest/abdomen), codes of urgency assigned when patients arrive (white: less severe case, patient could have contacted his general practitioner or an outpatient first-aid service, the patient is included in waiting list with very low priority and will be assisted only when all emergencies are treated; green: deferrable care case, patient is generally affected by no serious illness; yellow: severe case with evolving risk for life, relative priority reducing waiting time at minimum possible; red: very severe case, consistent threat for life, high priority with immediate intervention of the emergency team) and outcomes (hospitalization, resignation, sending to doctor of general medicine).

STATISTICAL ANALYSIS

The data collected were processed by computer using EPI-info 3.5.1, supplied by the Centers for Disease Control and Prevention, Atlanta, USA. Frequencies were compared by χ^2 test. A p value ≤ 0.05 was considered significant.

Results

The studied sample was composed of 3,120 subjects (56.3% women and 43.7% men). The age ranges were 3 months – 99 years for females and 4.5 months – 96 years for males, with an average of 49 years (54 for females and 42 for males).

Tab. I. Monthly distribution rate of HI in relation to total admissions.

| Month | Admission for HI % | Total admissions % | Admission for HI on all admission % |
|-----------|--------------------|--------------------|-------------------------------------|
| January | 9.3% | 7.8% | 5.5 |
| February | 7.8% | 7.4% | 4.9 |
| March | 8.4% | 8.5% | 4.6 |
| April | 7.9% | 8.6% | 4.3 |
| May | 8.1% | 9.1% | 4.2 |
| June | 9.5% | 8.8% | 5.0 |
| July | 7.5% | 9.0% | 3.9 |
| August | 7.6% | 8.1% | 4.3 |
| September | 8.0% | 8.1% | 4.6 |
| October | 8.2% | 8.6% | 4.5 |
| November | 8.0% | 7.9% | 4.7 |
| December | 9.7% | 8.0% | 5.6 |
| Total | 100.0 | 100.0 | 4.7 |

The admissions for HI represent about one-fifth of all admissions and show three peaks: in January, in June and in December, without significant difference within the year. Observing instead the trend of total admission throughout the year, data show that admission is high in winter and decreases in summer (Tab. I).

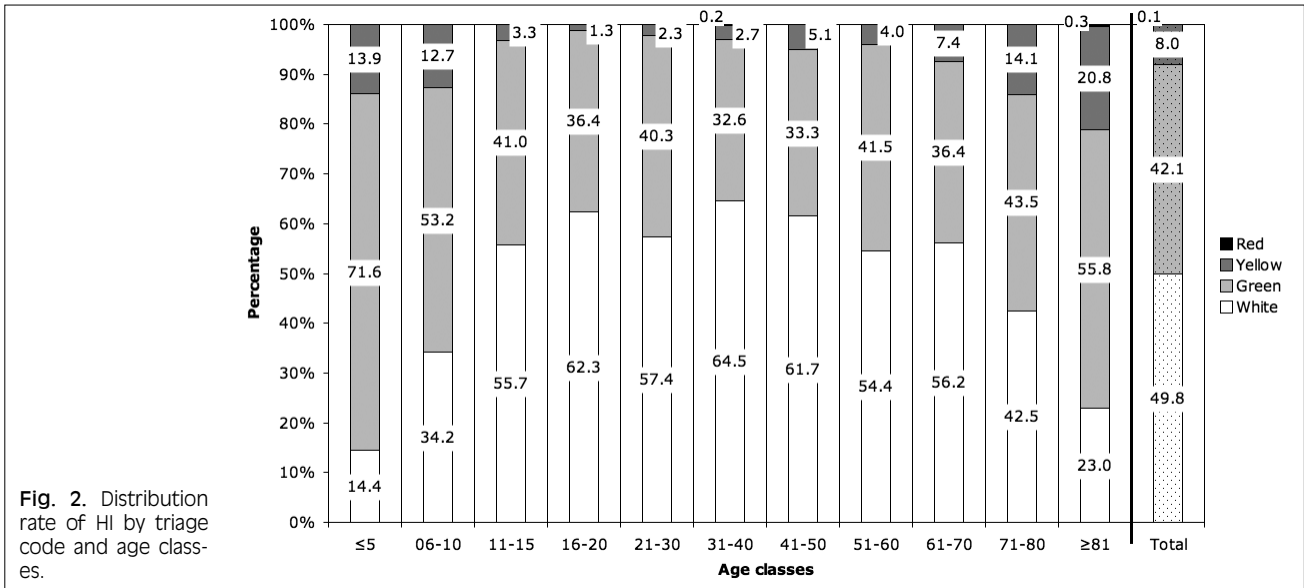
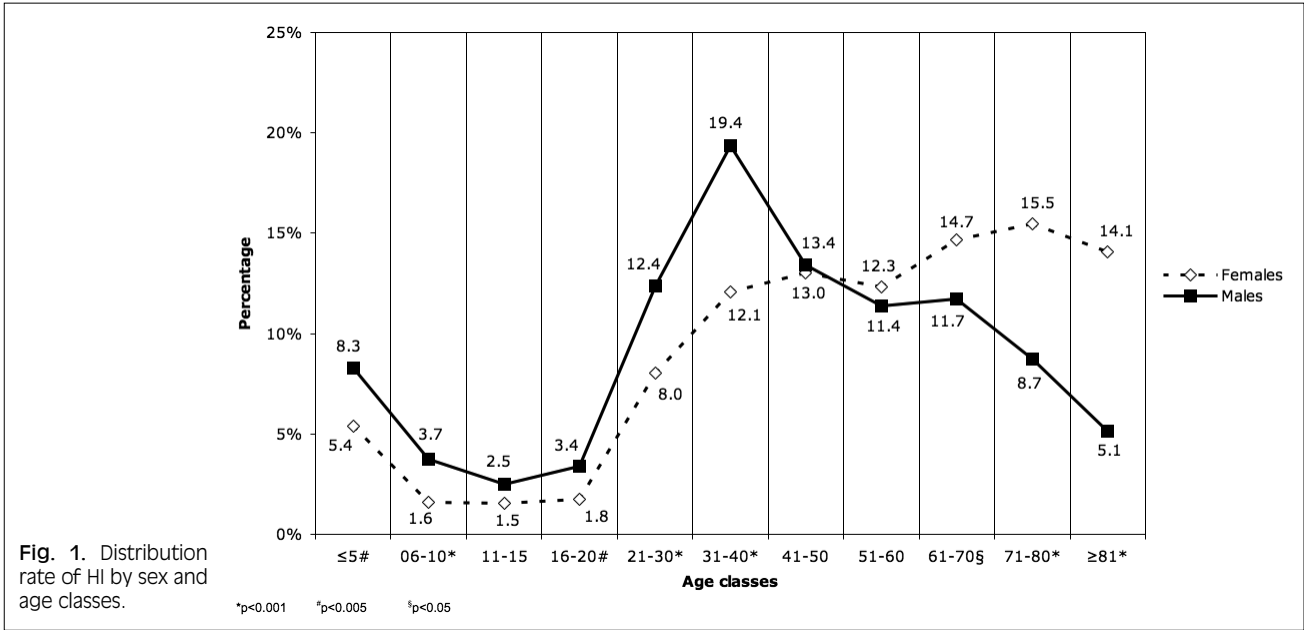
Analyzing the global distribution of HI by age and sex, males have systematically higher frequencies in comparison with females up to age class 31-40. Then the females show a steady growth until they reach a higher number of HI. A significant difference by sex was found in the majority of age classes except between 11-15 and 41-60 years (Fig. 1).

The distribution of the frequency of admission to the ED is similar in the two sexes, with highest values in the morning between 9 and 11 a.m. (19.0%), followed by two smaller peaks respectively at 2 and 8 p.m. (both 6.5%). In each one of these three cases, women represents almost 60% of admission and men 40%.

In the study almost 91.9% of admissions are not due to particularly severe injuries (49.8% white codes and 42.1% green codes), and are concentrated in young people and adults. On the contrary, the severe cases (8.0% yellow codes and 0.1% red codes) are concentrated in children under 10 years (26.6%) and in the elderly people over 70 years (35.2%) (Fig. 3).

Only 5.7% of all studied patients are hospitalized. The hospitalizations concern most of the times moderate to severe cases (45.1% green codes and 45.8% yellow codes) and usually concern patients over 60 years of age (81.6% of all hospitalized) and, among them, especially women (74%). Children under 10 years are hospitalized in 6.1% of cases. The patients who are not hospitalized (94.3%), are mostly sent to the family doctor (87.3%).

The main types of injury is represented by wounds/abrasions (28.7%), contusions/crushing (27.7%) and fractures/dislocations/distortions (26.6%). Women re-



port significantly more than men contusions/crushing, fractures/dislocations/distortions ($p < 0.0001$) and burn ($p < 0.005$), while men report more foreign body and wounds/abrasions ($p < 0.0001$) (Fig. 5).

Figure 5 describes the most affected body locations in HI, showing that hands and wrists are the body parts most commonly injured without difference by sex. Body parts significantly more affected in females are chest/abdomen, multiple seats ($p < 0.0001$), hip/thigh/leg and foot/ankle ($p < 0.005$); whereas eyes in males are ($p < 0.0001$).

Analyzing HI by type of injury and body part involved (Fig. 6), men injure themselves (wound/abrasion) in their hands (16.3%) more frequently than women (11.3%) ($p < 0.0001$) and are much more subject to have the presence of a foreign body in the eye (11.6%) than women (0.5%) ($p < 0.0001$).

Women are much more subject to fractures than men (32.7% versus 18.6%; $p < 0.0001$), especially in the upper (3.9% vs. 2.1%; $p < 0.01$) and lower (3.7% vs. 2.1%; $p < 0.01$) limbs and on hands (7.5% vs. 4.0%; $p < 0.0001$) and feet (10.5% vs. 6.8%; $p < 0.0005$). Contusions are more frequent in women too, especially those regarding thorax and abdomen (7.1% vs. 3.2% of men; $p < 0.0001$).

By assessing the distribution of HI by type of injury, sex and age class (Fig. 6), a significant higher prevalence was found for head trauma in children and in the elderly for both sexes ($p < 0.0001$); for fractures/distortions/dislocations in old males ($p < 0.0005$) and females ($p < 0.0001$); for burn in adult females ($p < 0.005$) and male children ($p < 0.01$); for wounds/abrasions in female children; for foreign body in young and adult males ($p < 0.0001$).

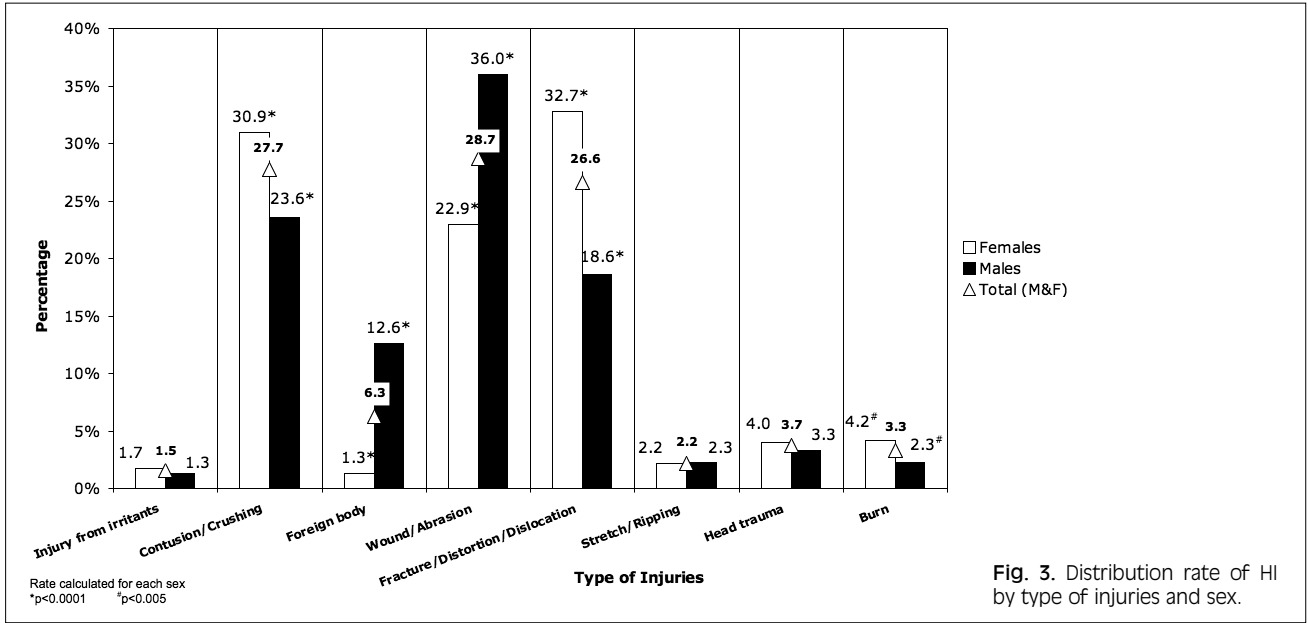


Fig. 3. Distribution rate of HI by type of injuries and sex.

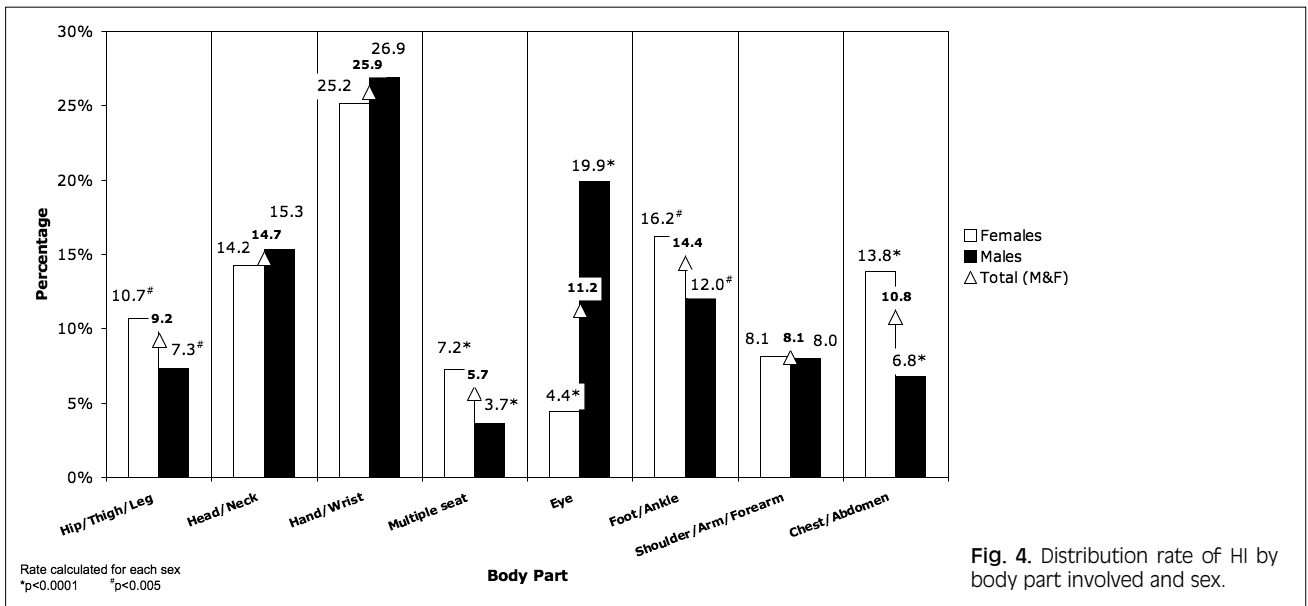


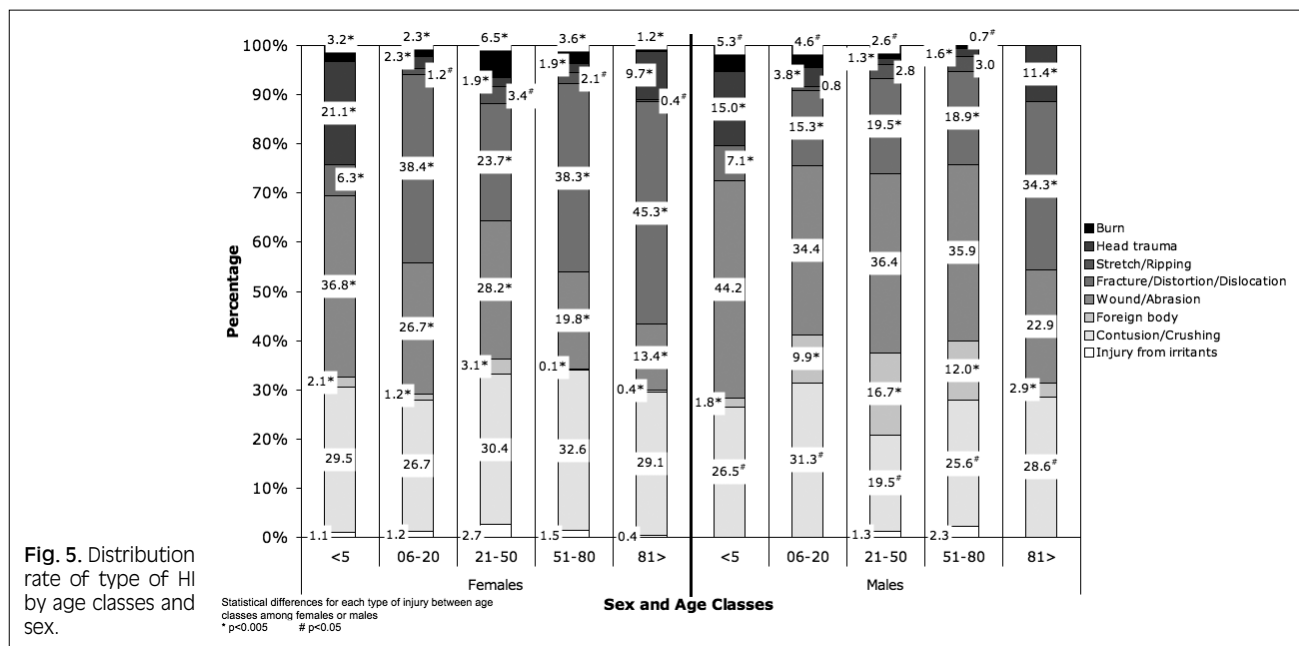
Fig. 4. Distribution rate of HI by body part involved and sex.

Discussion

Observing the distribution of HI by sex and age classes this study shows that males have systematically higher frequencies than females till the age of 50, but for elderly ages the proportion is inverted and women are represented much more than men, in accordance with other national studies [2, 3, 5, 9, 10]. The difference in trend is explained by different activities and ages of population between the sexes: young adult males (age 31-40) are more interested in do-it-yourself and repairing activities, whilst adult women are more concerned with domestic work activities and tend to manifest problems in the elderly ages. Among the elderly females show higher figures for injuries because of their greater presence in this class of population due to their higher life expectancy.

92% of admissions regards non-severe injuries, and severe cases are mostly concentrated within children and elderly groups (≤ 5 and over 80 years), representing respectively about 12% and 27% of yellow codes. Therefore, the elderly and children appear at higher risk of severe trauma, often represented by head trauma [11] that may produce severe illness resulting in significant morbidity, mortality and economic loss, sometime leading to an important cause of long-term disability in developing countries [12, 13]. Elderly and children (in a lesser proportion) are the population groups most at risk of HI: they spend more time at home and due to age-related frailty they undergo more severe injuries, therefore being hospitalized for HI more often.

Most admissions occur in June, December and January, probably because the study was conducted in an ED of a city in the hinterland where the presence of the resident



population in the city is reduced during holidays. This does not preclude that at national level there are more frequent accidents at home during the summer months [9], since at this level accidents that occur in holiday houses are considered too. The distribution rate of time of admissions is instead stackable, showing higher values in the morning between 9 and 11 a.m. and in the late afternoon at 2 and 8 p.m., both periods of greater domestic activity (domestic or repairing work) and presence of family members at home [2, 9].

As indicated in national statistics, the most frequent types of HI are wound/abrasion and contusion/crushing [2, 10, 14]. The majority of home injuries have hence minor severity, but there also was a significant proportion of more severe injuries like fractures/distortions/dislocations.

The high number of fractures is a remarkable problem in older women (significantly more involved), because it points out the importance of a better prevention of osteoporosis in order to reduce the outcome severity of a possible accident.

The registration of HI in ED is crucial to monitor the phenomenon accurately and completely, but, in addition to purely clinical data, it is equally necessary that information is registered and standardized on the place where the accident occurred (bathroom, kitchen, garden, etc.) and on how it occurred (cooking, doing gardening, etc.). This is important in order to be able to frame the phenomenon in a better way, making it possible to undertake targeted and effective prevention strategies [15]. However, a portion of “ghost” events remains outside the study and the national system for data collecting. They represent all those minor accidents that subjects solved by self-medication and are therefore difficult to detect. This phenomenon was investigated at local level, for example, through the administration of a questionnaire [16-18].

Data from international literature shows that the most effective interventions are legislative ones and those

which aim to eliminate the risks related to home-environment, while there is weak evidence in favor of interventions involving education/information of the population [19]. Interventions that encourage the use of safety devices have proven particularly effective for children [20, 21]. Evidence-based interventions designed to increase physical activity, muscular strength and sense of balance have proved to be particularly effective for the elderly [23] rather than ones which modify the household environment [22].

The target of preventive interventions cannot be limited only to housewives but must be extended to the entire population, starting from information programs and education in schools. For instance, the booklets produced and distributed by the Superior Institute for the Prevention and Security Labor [24, 25] are an example of active prevention.

Conclusion

HI involve a large number of people, but for most of them have minor health consequences for the individuals. However, a wide number of injured people, even if at low severity, requires a relevant organizational effort and resource consumption by the health services.

Hence the prevention of HI must be based on a comprehensive approach that begins with the epidemiological surveillance of the phenomenon (with the objective of extending and standardizing data collection in the National Health Plan [6, 26]), and continues with the implementation of educational programs in schools and information campaigns for the entire population. It must also be supported by specific legislation and architectural design more focused on safety issues.

These, together with all the other factors, are the key elements to preserve health and prevent accidents.

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