



## Can We Make Our Home Our Castle?

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Is our home our castle? It appears not. Indeed, the number of accidents that occur in one's own home casts doubt on the age-old maxim.

Accidents at home occur most frequently at the extreme ages of life – toddlerhood and old age. Falls in the elderly are the leading cause of accidental deaths and the seventh leading cause of death in persons over 65 years. Seventy-five percent of deaths caused by falls occur in the 12.5% of the population over 65. The rate of death due to falls rises exponentially with increasing age for both sexes and for all racial groups 75 years old and older [1], while in any given year a third to one-half of people over 65 fall [2,3]. According to the 1997 data of the Israel Central Bureau of Statistics [4], 19.6% of the community-dwelling population aged 65+ years fell during a study period of 6 months. Other studies have shown that about 20% of falls require medical attention [5]. Approximately 10% of these suffer a bone fracture [3,6], and 1–2% of falls result in a hip fracture [7]. The impact of these fractures on medical expenditure is enormous due to the permanent disability and dependency of about half of all hip fracture victims. Only 30% of those patients regain their pre-fracture level of physical functioning after 1 year [1]. A prospective study of patients who suffered a hip fracture showed a decline in transfer independence from 90% before fracture to 32% six months after the fracture and mobility independence across a room from 75% to 15% respectively [8].

In this issue of *IMAJ*, Sikron et al. [9] present a study that evaluated the incidence of home accidents compared to overall accidents and assessed the frequency of various types of accidents. They showed that home accidents comprised 34% of all accidents, with the largest group (37%) being 65 years old and older. The second largest group of home accident victims was infants and toddlers (27%), who account for 62% of all children's accidents. Falls contribute to 79% of all home injuries in all ages, comprising 97% among the aged, and 70% of children's accidents in the home. About 19% of the children injured were hospitalized due to burns (most of them under 4 years), and the number of non-Jewish children hospitalized due to burns was double that of Jewish children.

Sikron and colleagues indicate that our home is indeed not our castle. A third of all accidents requiring hospitalization occur in the

home. Their study provides important epidemiologic data about population subgroups and the most frequent causes of accidents in each group. However, there are some limitations to the study as it deals only with accident survivors who were admitted to hospital. Victims who were dead on arrival at the hospital were excluded because the exact cause of death may not have been obvious. On the other hand, patients who were discharged after treatment in the emergency department were also excluded regardless of the cause of the accident; the morbidity impact of those patients is important for the evaluation of the entire study group. Moreover, patients treated in an outpatient medical facility were also not included. Recurrent falls were not taken into account, even though this group is at high risk for repeated accidents, as approximately half of fallers have multiple falling episodes and the likelihood of falling increases with age. These patients may be candidates for more aggressive prevention programs. Also not included were nursing home populations. This population has four times the risk of fractures compared to a home-dwelling population and therefore should be evaluated separately.

The main question is whether any intervention can reduce the incidence of home accidents – especially falls. The causes of falls can be divided into intrinsic and extrinsic factors. Several studies have been carried out to identify these factors, while other studies have attempted to determine whether any efforts to influence these factors can reduce the incidence of falls and their sequelae, and whether the effort is cost-effective.

Intervention by a hospital occupational therapist following the discharge of elderly patients with a history of at least one fall event during the previous 12 months resulted in a 36% reduction in fall events ( $P = 0.001$ ) [10]. The interventions involved reducing the presence of extrinsic factors in the home, and included mainly removal of mats and rugs (48% of patients), changing footwear (24%), the use of a non-slip bathmat (15%), providing a light at night, adding a rail to external stairs, and removing electric cords. Those same interventions did not reduce fall rates in patients without a history of fall events in the year prior to the study [10].

Intervention aimed towards intrinsic risk reduction showed that treatment of postural hypotension and optimal cardiovascular

management is crucial [8]. By using a multiple-risk factor intervention, some of the risk factors can be reduced [5]. Discussion with the general practitioner and controlling over-the-counter medications were shown to reduce the number of medications used. A reduction to less than four medications, if feasible, was highly significant in lowering the incidence of falls (mainly psychotropic and sedative drugs, antidepressants, anticonvulsants and class IA anti-arrhythmic drugs). Improvement of balance and gait, and toilet transfer can be achieved by targeted physiotherapy. The endpoint – number of fall events – was lower in the intervention group (35%) compared to a similar control group (47%) ( $P = 0.04$ ). There was no significant difference between the intervention and the control group in the number of subjects who died or were hospitalized due to fall events, although those in the intervention group had fewer hospitalizations and fewer hospital days. The calculated incremental costs for prevention of one fall that required medical care in persons 65 years of age or more were US\$1,772 (at 1993 prices) [11]. Another mode of intervention for elderly people at high risk of falling is hip protectors. The latter were found to be effective in reducing the incidence of hip fractures. The respective rates of hip fracture were 21.3 (in hip protector users) and 46.0 (in control non-users) per 1,000 person-years (relative hazard in the hip-protector group 0.4, 95% confidence interval 0.2–0.8;  $P = 0.008$ ). The main disadvantage of this modality is the poor compliance in wearing these protectors [12,13].

On the other hand, healthy elderly persons without a history of falls and without symptoms or signs of gait and balance impairment might benefit from a community-based non-professional program for balance training and muscle strengthening, which may reduce the likelihood of a fall by 29–49% [12,14–16]. A Cochrane review evaluating the efficacy of studies on interventions for preventing falls in the elderly [11] summarized the results of those studies, and concluded *inter alia* that the following interventions are likely to be beneficial: individually prescribed programmed muscle strengthening and balance retraining; a 15 week Tai Chi group exercise intervention; home hazard assessment and modification that is professionally prescribed for older people with a history of falling; withdrawal of psychotropic medications; multidisciplinary, multi-factorial health/environmental risk factors screening/intervention programs, and to a lesser extent group-delivered exercise, nutritional and vitamin D supplements, and several other interventions of lesser efficacy and poorer study design.

At the other extreme of life, infants and toddlers (aged 0–5 years) are the second group of patients injured in the home. In Sikron's study, 70% of home accidents in this age group were caused by fall events and 19% by burns. Burns were more frequent in non-Jews than in Jews. Another study in a pediatric Bedouin population of southern Israel, by Broides et al. [17], was conducted in a primary care clinic and demonstrated a higher incidence of burns (36% of all injuries) compared to falls (28.5%). Sixty-eight percent of the infants with burns were under 2 years old. Miron et al. [18] studied another pediatric group in urban and rural clinics of northern Israel, including all children's injuries other than road accidents. The most frequent home injuries were burns in non-Jewish girls under 3 years of age, whereas outside the home, falls in non-Jewish males older

than 3 years were the most prevalent. The disparity in the results of Broides' and Miron's studies from that of Sikron's may be due to the differences in the study populations: hospital admissions compared to outpatient clinics in Sikron's and the other two studies respectively. Risk factors for childhood accidents were found to be adolescent mothers with young children, and a lower educational level of the children's caregivers, with more negative life event experiences in the preceding 6 months. Differences in physical or mental well-being or social support were not found to be significant risk factors [19]. Interventional studies aimed at preventing home accidents in children were shown to be of some benefit. For example, an injury-prevention program delivered by school-based home visitors to families with low incomes was associated with an increased probability of having a working smoke detector (relative risk 3.3, 95% confidence interval 1.3–8.6), and presence of ipecac at home (RR 4.7, 95% CI 3.0 to 7.3), after a 3 month follow-up compared to a non-intervention control group [20]. An intervention using a single home visit was found to be ineffective in improving the extent to which families used safety measures but was effective in reducing the overall occurrence of injuries [21]. Some strategies were shown to be effective in reducing children's accidents and injuries, and included mainly education, increasing utilization of safety products to prevent poisoning, and promoting public policies. A combination of strategies was found to be the most effective [22–25].

In summary, accidents in the home are common in the elderly and in small children. Most of the risk factors for children's accidents are extrinsic and most can be prevented by interventions – educating the parents and other caregivers towards better care as well as the use of safety equipment. For elderly populations, apart from improving the safety of the immediate environment, interventions should be targeted at better medical care and reduction of intrinsic risk factors. Multi-target interventions are more effective in reducing accidents and, hence, reducing injuries. The effort should be specific for subpopulations according to the specific risk factors and specific accident types in each population. Coordination of policies and educational programs by medical staff together with national agencies in the long term may lessen accidental injuries, thereby saving lives and reducing morbidity and expenses.

Our home may not yet be our castle, but we can do much to make it more so.

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RR = relative risk  
CI = confidence interval

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