Assessment of Home Safety Measures and Prevalence of Falling among Residents of Private and Governmental Elderly Homes in two Different Societies in Egypt

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Abstract: The study of home environments is a research domain within the field of environmental gerontology that addresses issues related to safe aging in place. Most elderly homes contain potential hazards or immediately a rounding the home. Many elderly people attribute their falls to the home hazards. Falls are the leading cause of injury deaths and disabilities among aged people. Falls among elderly homes residents are usually consequence of combination of both intrinsic and extrinsic risk factors. Use of checklist can spot possible safety problems and could remind for the home safe Practices, that in turn reduces elderly falls and related injuries that affect directly elderly health and independence. The **aim** of this study was to assess home safety measures and to recognize the prevalence of falls and fall-related injuries among private and public elderly homes. The study enrolled 240 elderly persons aged 60 years or more and residents of four private and public elderly homes, two of each sector from Alexandria governorate and the other two from Damanhour, El-Behaira, governorate. A structural pre-coded questionnaire sheet was used to obtain data of falling. As an observational standard safety checklist of Elderly Homes, as constructed by North Carolina Cooperative Extension Service, translated to Arabic language was used to assess home general safety, and home areas and a rounding safety measures. As well 7-items of elderly safety habits are included.
Results: the two of Damanhur care homes and the private of Alex., home has met 60% of the general home safety measures. The public Alex care home was the most unsafe, has met only 31% of these safety items. Also the same two care homes have fulfilled all kitchen safety items, and more than three quarters of the bathroom, 90% of the stairways and halls safety measures. For the safety of living-room the Damanhour private care home has met all this safety items, while Alex. public care home was the most unsafe for living and bed rooms areas. The highest prevalence of falling (25%) occurred in the Damanhour private care home, and the least fall prevalence (10.7%) was reported for Alex. Private care home. Falling among females exceeded those among males for all studied care homes. The only observed falling sites were bathroom, bedroom and the stairs areas, where bedroom fallings were higher among the both private care home fallers. The majority of fallings occurred at evening and night times, and the least fallings was observed at morning times. Sliding was the common falling cause among all fallers where, carpet edges and blurred vision were the common causes of fallings among only the two private care homes. The only two reported fall injuries were fractures and joint dislocations, fractures being the most common injury among fallers. The majority, (80%) of the Damanhour private setting fallers fell twice during the last 6 months. Male fallers fell due to sliding, and blurred vision, while female fallers fell due to sliding, and carpet edges. Injuries due to sliding, drowsiness, long clothes, no wall stands, blurred vision, chair uncontrolled and due to walking stick, resulted in fractures, while the majority of joint dislocations was occurred due to tripping to carpet edges.
Conclusion: the two Damanhur elderly care homes fulfilled most of the home safety measures, compared to the two elderly facilities of Alexandria. The higher prevalence of falling in the private care at Damanhour neccessates the insight look of other causes of falling in this care setting. More attention should be given to evaluate and monitor safety measures for both sector care homes at Alexandria governorate.

1.Introduction:

Falls are the leading cause of morbidity and mortality due to injury in elderly persons and are associated with substantial medical and rehabilitation costs, as well as social isolation and premature institutionalization[1],and lasting functional disability in the elderly population.[2,3] Falls are therefore a key syndrome in medical gerontology. They may be the first indicator that elderly health is not well medically, and they should prompt a diagnostic appraisal aimed at early detection and intervention.[4] Falls are considered as a significant public health concern for older adults; early identification of people at high risk for falling facilitates the provision of rehabilitation treatment to reduce future fall risk.[5] Falling is one of the most common geriatric syndromes threatening the independence of older persons.[6] So, a fall is defined as an unexpected event in which the participant comes

to rest on the ground, floor, or lower level.[7,8] A single fall is not always a sign of a major problem and an increased risk for subsequent falls. The fall may simply be an isolated event. However, recurrent falls, defined as more than two falls in a six-month period, and should be evaluated for treatable causes.[9]

The incidence rates of falls increased with increasing age, and were higher in females than in males within the age groups.[10] Rates among women exceed those of men for all age groups.[11] Women are more likely than men to experience nonfatal falls and men are more likely than women to experience fatal falls.[12] Each year in Britain a third of the population aged over 65 has a fall, and half of these people fall at least twice.[10,13-15] Women are at greater risk (particularly those living alone) than men, with half of all women aged over 85 in any one year having a fall.[13-16] In the developing world, however, there is a lack of data for many regions. For instance, there is no epidemiological data available for Africa, South Asia and the WHO Eastern Mediterranean region. last country profile of Egypt shows that the percentage of older people(more than 65 years) was 3.7% of the total population in 2009.[17] Subsequent morbidity and mortality due to falls in old age is still in need to be addressed due to the shortcomings in studies, information, and health system procedures.[18]

Fall epidemiology varies according to clinical setting. The highest fall incidence occurs in the nursing home, where 50% to 75% of the 1.63 million nursing-home residents experience a fall yearly. Falls among nursing home residents occur frequently and repeatedly.[19] Falls rank as the eighth leading cause of unintentional injury for older Americans.[20] There is a widely documented public health problem; among elders in nursing homes there is an average of 1.7 falls per bed annually.[21] Although some falls may result in serious injuries and death, falls also can have more insidious consequences, such as negative psychological impacts that result in self- or other-imposed restrictions on independent functioning and daily activities.[22] A previous study into falls has recognized three broad domains of causal factors: personal, environmental and behavioral factors. Personal, these variables have been the subject of much study involving older people residing in long-term care settings. [22, 23] Between half and three-quarters of nursing home residents fall each year,[5] that's twice the rate of falls for older adults living in the community.[24] However, falls in older people in nursing homes and hospitals have multi-factorial etiology. History of falls, use of walking aids and disability are strong predictors of future falls. (25)

Falls are the leading cause of injury deaths and disabilities among persons aged >65 years. Unintentional falls are one of the most costly and complex health issues facing older persons in the world.[26,27] The fatality rate and number of injuries reported from falls are continually rising in this age group.[28] Fall related injuries impact the older adult in both pain and the loss of independent function.[29] Patient falls make up 38% of all adverse events occurring in hospital settings, and may result in physical injury and undesirable emotional and financial outcomes.[30] Falls are the leading cause of injury-related visits to emergency departments in the United States. The mortality rate for falls increases dramatically with age in both sexes and in all racial and ethnic groups, with falls accounting for 70 % and they are often associated with significant morbidity. [9]

Injury in the home is common, accounting for approximately a third of all injuries. The majority of injuries to people aged 75 and older occur at home. Injury in the home environment is an extremely common event, accounting for around a third of injuries in all age groups.[31] Older persons, whose bones are often less dense and more brittle, are especially vulnerable to serious injuries from home accidents. A simple fall that results in a broken bone percent of accidental deaths in persons 75 years of age and older. Falls can be markers of poor health and declining, can become a serious, disabling injury that limits one's independence.[32] Although injuries can and do occur often in the home, a change in environment, such as hospitalization, travel, or any other move from a familiar environment, increases the likelihood of injury for older adults.[33]However, many elderly individuals experience complications, including restricted activity, soft tissue injuries, or fractures as a direct result of the fall event.[34] About 1,800 older adults living in nursing homes die each year from fall-related injuries and those who survive falls frequently sustain hip fractures and head injuries that result in permanent disability and 2to 6% cause fractures.[19] During follow-up 197 falls were reported by 33% of the participants: one fall by 17% and two or more falls by 16%. Injury due to a fall was reported by 45% of the fallers: 2% hip fractures, 4% other fractures, and 39% minor injuries.[35] Although the majority of fractures in older people follow a fall, only around one in 20 falls leads to a fracture.[36] Most injuries are the result of preventable factors rather than random "accidents".[37] However, there are now a number of studies demonstrating that it is possible to reduce falls and potentially injuries from falls, including fractures.[38] Where nurses can make a difference by promoting awareness so co-workers and patients can make the safest choices possible to prevent falls. By utilizing these key strategies, the nurse can help in reducing the amount of preventable injuries that occur in our elderly population. (28)

Safety is a major concern when working with or providing care to older adults. Although older adults compose approximately 11% of the population, they account for approximately 23% of accidental deaths.[33] Home hazard reduction is effective if targeted at older people with a history of falls and mobility limitations.[39] Most households contain potential hazards such as slippery floors, inadequate lighting, loose rugs, unstable furniture and obstructed walkways,[40] and many older people attribute their falls to trips or slips inside the home or immediate home surroundings.[41] In response to these observations, home safety assessment and household modifications have been suggested as integral components of falls-prevention programs.[21] However, the role of environment hazards in increasing falls risk is by no means straightforward, and neither is the amelioration of this risk by household modification. The complex interaction between an individual's physical ability and the challenges posed by their environment does not allow for a simple cause-and-effect relationship to be established.[39] Each year, according to estimates by the U.S. Consumer Product Safety Commission (CPSC), nearly 1 million people over age 65 are treated in hospital emergency rooms for injuries associated with the products they live with and use every day.[42] Public health researchers and practitioners have long recognized that housing influences health. Over the last 150 years, housing reformers and public health workers have periodically joined forces to improve health by strengthening housing regulations, advocating for better housing conditions, or reducing hazards such as fire, lead poisoning, injuries, or window falls.[43] The home environment remains increasingly important as people age. While only 5% of those over 65 live in institutions such as nursing homes.[44] Falls are a major safety concern for nursing facilities.[45]

Falls among older adults are not a normal consequence of aging; rather, they are considered a geriatric syndrome most often due to discrete multi-factorial and interacting, predisposing (intrinsic and extrinsic risks), and precipitating (dizziness, syncope) causes.[46, 47] The risk of sustaining an injury from a fall depends on the individual patient's susceptibility and environmental hazards. While the frequency of falling is related to the accumulated effect of multiple disorders super imposed on age-related changes. The likelihood of falling increases with the number of risk factors.[9] It is essential to remember that a single fall may have multiple causes, and repeated falls may each have a different etiology. Thus, it is critical to evaluate each occurrence separately.[9,45] Despite the volume of information concerning these risk factors, few studies have dealt with the issue of the differences

in risk factors for falls based on fall status, or more specifically one-time versus chronic/ recurrent fallers.[34] So, risk factors for falls are manifold and a range of screening and assessment tools exist to identify and delineate risk in older people.[38] The research on falls urgently needs to be more rigorous. Several contributory factors to falls risk are usually found in each individual. Therefore, the observed reduction in the incidence of falls is mostly attributable to the detailed and systematic nature of the overall multidimensional assessment and the appropriate action taken, rather than to single defined interventions.[4] Despite the plethora of information concerning risk factors for falls, limited research efforts have focused on the issue of the differences in risk factors for falls based on fall status.[34]

Several studies found differences in the prevalence of household hazards between fallers and non-fallers.[48,49] Environmental hazards include everything that surrounds older adults. Potential hazards are presented by the people and the variety of objects a person comes into contact with on a daily basis.[33] Environmental hazards are implicated as a contributory factor in a large proportion of falls in older people. However, the existence of home hazards alone is insufficient to cause falls. Rather, the interaction between an older person's physical abilities and their exposure to environmental stressors appears to be more important.[39] Environmental hazards accounting for about 25 to 45% in most studies. One half to two thirds of falls occur in or around the patient's home.[18,50] As most of falls are associated with one or more identifiable risk factors (e.g. weakness, unsteady gait, confusion and certain medications), and research has shown that attention to these risk factors can significantly reduce rates of falling.[51] Using a performance based assessment tool, each subject's level of mobility was evaluated within their individual home environment. Thus, the performance score reflects the number of environmental hazards in each household and the degree to which the individual can cope with these hazards. After 6 months of falls follow-up, the performance score was found to be an independent predictor of falls, after controlling for age, cognition and degree of mobility, indicating that this approach may be addressing the individual–environment interaction.[52] A casual link between the presence of environmental hazards and falls in older people has not yet been established. More definitive work in this area needs to be carried out.[40]

The extent of a person's risk-taking behavior is also an important part of the interaction between the person and their environment. It is possible that more vigorous people are more likely to take part in risk-taking behavior involving household hazards. Indeed,

a person's attitude to risk has been found to be associated with increased falls,[53] and a 'type A behavior pattern 'has been shown to be associated with an increased risk of falling in men.[54] The close interaction of habitual and intentional behaviors with situational and environmental cues assists in delineating the domain of interest for assessment. Some behaviors, actions, or decisions may be risky for one person or be less risky or pose little risk for another person.[55] Although some incidents involved familiar environmental and behavioral risk factors, the reenactments of these incidents suggest that less familiar factors also were critical contributors to the incidents.[41]

Optimal care for frail elderly patients depends on comprehensive assessment. To facilitate comprehensive assessment, as well as to generate a useful, policy-relevant patient database, standardized, multidimensional, and validated instruments are very helpful.[56] One of the most significant barriers in determining risk factors for falls is the lack of consistency in the variables/tools used in the research. As such, utilizing a standardized tool, such as the Minimum Data Set Home Care (MDS-HC,) would assist researchers in making comparisons between different settings.[34] Encouraging home assessments can find hazards in the home, environmental and behavioral, to be identified and corrected with appropriate referral and advice,[57] and institute corrective action.[58,59] The importance of reducing the number of falls was highlighted by the UK National Service Framework for Older People and in response falls risk assessment tools have been developed and implemented into clinical practice. However their predictive accuracy is generally unsubstantiated.[60] To identify those with higher falling risk, home care staff and general practitioners could use the Minimum Data Set Home Care (MDS-HC) assessment tool.[61] Falls Assessment is used for a more in-depth look at fall risk.[45] A *Home Safety Evaluation* is an assessment of a patient's home living environment with a goal of increasing the safety of the home for the elderly person who resides there. It is an attempt to obtain the best "patient and environmental match" to help minimize injury to the patient while in the home.[44] *A* home visit is invaluable for assessing modifiable risk factors and determining appropriate interventions. A home safety checklist can guide the visit and ensure a thorough evaluation.[62] It is particularly important to assess caregiver and housing arrangements, environmental hazards, and compliance with medications.[63]

Gerontological nurse has an essential role to reduce fall and its related injuries through providing safety measures, environmental modification, eliminating risk factors and improving the balance through exercise training program. Education must be directed toward helping elderly persons to identify potential hazards and changing their health practice and habits accordingly,[64] and to follow unsafe behaviors on two or more occasions during the past month.[45] Adequate physical, social and psychological rehabilitation of elderly with a history of falls and injury has to be reported to prevent further falls.[65] The elderly are a rapidly growing percentage of the population, and are increasingly at risk of falling and consequent injuries. Because accidental fall injuries are the primary cause of mortality, morbidity, and suffering among people over the age of 65, it is the nurse's responsibility to identify older people at high risk, know the contributing risk factors, and implement safety practices in the healthcare setting.[28] Nurses need a systematic way to identify who is at risk of falling and utilize preventative measures to make the healthcare environment safer for the patient.[66] In Egypt few studies have explored the problem of falls in the elderly. ([67]

Aim of the study:

The main aim of the study was to assess care home safety measures for both private and governmental sectors elderly care homes, and to recognize the prevalence of falling among the residents of private and public nursing homes.

2.Material and Methods:

1- Study setting:

The study was conducted at four geriatric care homes, two private and other two governmental homes namely: Dar Ahmos (private home) and Dar el-Hedaya (governmental home) from Alexandria Governorate. Whereas, Dar Al-Saada (private) and Dar Al-Mogama (governmental) from Damanhur city at El-Behaira Governorate, Egypt. Each of the selected settings was visited tow times a week for a period of academic year.

2- Study design:

Descriptive a cross sectional study was carried out, to check home safety measures and to determine the prevalence of falling and its associated causes among the elderly people residents of geriatric care homes.

3- Target population:

All the study participants were elderly people aged 60-years or more of both sexes, with a history of falling or injuries, and residents of geriatric care homes. The study recruited a sample of 240 elderly. All the subjects met all the inclusion requirements of participation, and accepted to participate after explanation of the nature and objectives of the study. The response of the elderly subjects was increased to participate after building a channel of trust between the researcher and the participants. Whereas,

exclusion criteria, included those refused to participate and those having any communication problems.

4- Tools:

Tool 1:

A structured interview pre-coded questionnaire sheet was used to collect the data of falling that included: gender, fall site, time of falling, causes of falling, results of falling and number of falls during the last 6 months. The tool was developed by the researcher.

Tool 2:

An observational Safety Checklist of Geriatric Homes as prepared by North Carolina Cooperative Extension Service, [32] translated into Arabic language by the searcher was used for assessment of home safety measures from each elderly studied home. The checklist included the safety items of each area of the studied homes as follow, 12-items for general safety measures, 10-items for kitchen, 9-items for bathroom, 10-items for stairways & hallways,7-items for livingroom,4- items for bedroom, and 4-items for outdoor area. The researcher added 7-items for elderly safety habits, according to the Home Assessment Profile – a reliable and valid assessment tool. [52]

5-Method:

Official permissions were obtained from the authorities of geriatric care homes, after explanation of the nature and objectives of the study. A pilot study was done to 20 elderly persons from the study population to assess the tools for their clarity and validity, and was excluded from the data of the study. Each participant was interviewed individually face to face by the researcher after a good trust and communications. Each interview time differs from the other according to respondent mood and cooperation. Each of the selected settings was visited two times a week, during the academic year 2013.

6-Statistical analysis:

Data management was done by using PC computer: The "SPSS" for windows version "19" software package was used for statistical analysis. The probability, $P<0.05$ was used for statistical significance for all significant considerations.

3.Results:

The total studied subjects was 240 elderly persons, distributed as follows: Dar al- Saada 20 subjects, Dr Ahmous 103 subjects, Dar el –Mogama 33 subjects and Dar el – hedaya 84 subjects. **Table (1):** compares the general safety measures items of the Housing safety check list according to North Carolina Cooperative Extension Service (NCCES), checklist for four elderly home. Two of which are private

settings, Dar al-Sadaa, and Dar Ahmous, while the other two, Dar el-Hedaya and Dar el-Mogama are governmental homes. It is observed that Dar Ahmous has met more than 60% (10- items of 16- items) of the general safety items, and Dar al-Saada has met more than two –third of the general safety measures. On the other side Dar el-hedaya has fulfilled only 31% (5-items of 16-items) of the general safety items. As Dar el Mogama has fulfilled more than 60% of the safety items. The common missing general safety items for the two private homes, was "absence of smoke alarms". While the common missing items for the two governmental homes were, "telephones at reach", "Medications are stored in a safe place", "Small loose rugs are not placed properly", "There are exoposed glaring bulbs" and "Lack of smoke alarms". Dar el-Hedaya governmental home was the least safe for elderly residents, according to the general safety measures. Although, no significant differences were observed between all general safety items for the four studied homes, (p=0.261 where applicable), as shown on table (1).

Table (2): Shows the distribution of both kitchen and bathroom areas safety measures. It is noticed that both Dar al-Saada private and Dar el-Mogama governmental homes in Damanhour have met all the kitchen safety measures. On the other hand, Dar ahmous private has met only 30 %(3-items of 10-items) of the kitchen safety, and Dar el-hedaya has met half of these safety items, (5- items of 10- items). The common lacking kitchen safety items for Alexandria elderly homes, were "No light switches near doors", "No hot and pan holders were available" and "drawers and cupboards were not kept closed" it was observed that both Alexandria elderly. detected between each the kitchen safety measure items for the studied homes. Concerning bathroom area safety measures, both Damanhour elderly homes have fulfilled more than three-quarters (7-items of 9- items) of the bathroom safety measures. While both Alexandria elderly homes have met only 55%, (5-items of 9- items) of these safety items. This indicates the poor condition of bathroom safety for Alexandria elderly homes. The only common missing bathroom safety item for Alex. Homes was "No bathtubs or shower has a non skid mat on the stands area". While both Damanhour elderly homes, "Lack safe supplemental heat source and ventilation system" and "the bathroom door not open outward". No significant differences were observed between each item of the bathroom safety measures of the studied homes, (*p*=0.261).

Table (3): Illustrates the distribution of safety measures for stairways and hall areas for the four studied elderly homes. It was observed that both Damanhour elderly homes have met 90% of the

stairways and halls safety items. While Alex. Private home "Dar Ahmous" has met 60% (6- items of 10- items) and the governmental elderly home has met half of these safety items. The only common missing safety item for the studied homes was "Lack of non-skid strips or carpeting on the stair steps" and an additional common missing safety item for the two Alex. Homes, was "Lack of nightlight". No significant difference were reported between these safety items for the studied elderly homes, (p=0.261, where applicable).

Table (4): shows the distribution of living room area safety measures of the four studied elderly homes. It is clear that Dar al-Saada private at Damanhour has fulfilled all living room safety measures. While both Dar Ahmous private at Alex, and Dar el-Mogama governmental home at Damanhour have met more than half of these items, 57.1% (4- items of 10- items). As Dar el-Hedaya governmental home at Alex, has met only 28.7% (2-items of 7- items) of living room safety items. Both Alex homes and governmental home of Damanhour living-room had the poor safety conditions, whilst, the worst living-room safety conditions was reported for Dar el-Hedaya home at Alex. No significant differences, between the individual living-room safety items for the four studied homes, (p=0.261).

Table (5): presents the distribution of bedroom and outdoor areas safety measures for the four studied elderly homes. For the bedroom the four safety items were met by all the studied homes, excep Dar el-Hedaya governmental elderly home, which has met on half of these safety items. No significant differences were noticed between each item for the four studied homes, (p=0.261, where applicable), as shown on table (5). On the other side, all these elderly homes have fulfilled three outdoor area safety items of the 4-items. The most common unsafe item was the lack of proper lightening of doorways, steps, porches and walkways, at least for three homes of the four studied settings. No significant differences, were noticed for each individual item of these safety items of the outdoor area of the four studied homes, (p=0.261, where applicable) as shown on table(5).

Table (6): Illustrates the distribution of elderly home safety habits of the residents of the four studied elderly homes. All private and governmental elderly homes of the both governorate have met at least three good elderly safety habits. The most unsafe elderly habits for the residents of the studied homes were, "wearing unsafe shoes", "carrying heavy loads when using stairs" and "No one of the residents had a plan for getting help easily in an emergency". No significant differences were noticed between the elderly safety habits of the residents of the four

homes, (p=0.261, where applicable), as shown on table (6).

Figure (1): Shows percentage distribution and number of falls among the four elderly homes, residents. It is clear that Dar al-Saada private elderly home (n=20) reported the highest falling percentage 5 (25%) among its residents. While both Dar el-Hedaya and Dar el-Mogama governmental homes reported 16 (19%), and 6 (18.25), respectively. The least percentage of falls was recorded for Dar Ahmous 11 (10.7%), although about 45% of the study participants (n=103), were from this private nursing home.

Table (7): presents the distribution of falling, among the studied elderly homes residents according to their fall data that included: gender, fall site, falling time, results of falls, causes of falling and the number of falls during the last 6 months. It was observed that, female fall records exceeded those of males in both private and public elderly homes at the two governorates. The female falls, reported more than 60% for the three male / female fixed homes. While the fourth home, Dar el-Hedaya is for women only. No significant differences concerning gender status fallings between the studied elderly homes, (p=0.059). Concerning falling sites, the only reported falling sites are bathroom, bedroom and stairs forth four homes. Where falling at bedroom was higher among private care homes, reporting, (40% and 54.5%), versus (33.3% and 31.3%) for the governmental care homes. No significant differences were observed between the four studied elderly hoes concerning falling sites, (p=0.934). Falling time records revealed that Dar al-Saada private home at Damanhour and Dar el-Hedaya public home for women at Alex, reported highest evening falls, (60% and 56.35%, respectively). While, Dar Ahmous private at Alex, and Dar el-Mogama public home at Damanhour, reported the highest night time fallings, (70% and 50%, respectively). The least falling time records was noticed at morning time for the all studied homes. No significant differences were reported between the studied settings concerning falling time, (p =0.084).Causes of falling varied among fallers of the elderly home residents. The majority of falling was due to sliding among fallers of Dar al-Saada, (40%), Dar el-Mogama, (33.3%) and Dar el-Hedaya, (43.8%). Carpet edges as causes reported higher records of falls for the two private elderly homes, Dar al-Saada, (40%) and Dar Ahmous, (27%), versus 16.7% for Dar el-Mogama public home and 18.8% for Dar el-Hedaya public home.

The cause of falling reported was for chair uncontrolled (a case reported for Dar Ahmous). Blurred vision as a case of falling was reported only for the private elderly homes residents, valuing (20% and 18.2% for Damanhour and Alex respectively). No

significant differences were reported between causes of falls,between the compared facilitates.

The only falling results observed among fallers of the four sitting,were fracture and joint dislocation, where the majority of falls resulted in fracture for all fallers reporting a range of 56.3% to 66.7% of the fallers. While joint dislocation records ranged between 33.3% to 43.8% of the fallers. No significant differences were observed concerning injuries among fallers of the all elderly homes residents, (p =0.967). The majority of fallers of Dar al-Saada, (80%) fall twice during the last 6 months, while the majority of fallers of the other three elderly homes fall once during the same period, recording a range of (56.3% to 72.7%). No significant differences were noticed for number of falls during the last 6 months, between the fallers of the homes, (p =0.246).

Table (8): Reveals the distributions of falling causes according to fallers gender and their falling injuries resulted from falling. It is clear that 37.5% of the male fallers were sliding falls, and 28% was falling due to blurred vision. No fallers among males due to carpet edges, chair uncontrolled or no wall stands. On the other side, the highest female falls records were for sliding, (30%) and carpet edges, (30%). The least records among female fallers were reported for blurred vision and chair uncontrolled, (3.3% for each). No significant differences were noticed between falling causes for gender differences, except for carpet edges, (p =0.05) for female side, and blurred vision, (p =0.043) for the favor of males. Injuries due to sliding and drowsiness falls reported similar percentages, (50%) for both fractures and joint dislocations. While two-third of fall injuries to (66.7%), due to long clothes and no wall stands were resulted in fractures. As well as falls due to blurred vision, chair uncontrolled and no rubber edges at the walking stick, resulted in fractures. The highest joint dislocation injuries was among fallers due to carpet edges. No significant differences were detected between the type injuries and the causes of the falling as shown on table (8).

Table (1):   Comparison of four elderly homes general safety measures according to housing safety

General Home Safety Measures	Elderly Homes								MCP
	Private homes				Government homes				
	Dare Ahmous Alex		Dare Al-Saada Dam.		Dare El- Hedaya Alex.		Dare El-Mogama. Dam.		
	No	%	No	%	No	%	No	%	
Emergency numbers and your address are posted by each telephone	1	100.0	1	100.0	0	0.0	1	100.0	0.261
Telephones are located in each room. they can be reached from the floor in case of a fall	1	100.0	0	0.0	0	0.0	0	0.0	0.261
Inside and outside door handles and locks are easy to operate	1	100.0	1	100.0	0	0.0	1	100.0	0.261
Doors have lever-action handles instead of round knobs	1	100.0	1	100.0	1	100.0	1	100.0	NA
Doors thresholds are low and beveled or there are no thresholds	1	100.0	0	0.0	1	100.0	0	0.0	0.261
Windows open easily from the inside, but they have a secure locking system that can prevent someone from entering from the outside	1	100.0	1	100.0	1	100.0	1	100.0	NA
The water heater thermostat is set at 120degrees F or lower to prevent accidental scalding	0	0.0	1	100.0	0	0.0	1	100.0	0.261
Medications are stored in a safe place according to instructions on the label of the package or container	0	0.0	1	100.0	0	0.0	0	0.0	0.261
Carpeting and rugs are not worn or torn	0	0.0	1	100.0	0	0.0	1	100.0	0.261
Small, loose rugs have non-skid backing and are not placed in traffic areas of the home	1	100.0	0	0.0	0	0.0	0	0.0	0.261
Appliances,lamps,and cords are clean and in good condition	1	100.0	1	100.0	0	0.0	1	100.0	0.261
There are no exposed, glaring bulbs in lamps or fixtures	0	0.0	0	0.0	0	0.0	0	0.0	NA
Outlets are located where they are needed in every room	1	100.0	1	100.0	0	0.0	1	100.0	0.261
Electrical service has enough capacity to serve the house and is up to code	1	100.0	1	100.0	1	100.0	1	100.0	NA
Electrical cords are placed out of the flow of traffic and out from underneath rugs and furniture	0	0.0	1	100.0	1	100.0	1	100.0	0.261
Smoke alarms are present in the home and are in working order	0	0.0	0	0.0	0	0.0	0	0.0	NA

NA: Not Applicable.   MCP: P-value based on Mont Carlo exact probability.

Table (2): Kitchen and Bathroom Safety Area measures (%) of Four Elderly Homes.

Safety Area Measures	Elderly Homes								MCP
	Private homes				Governmental homes				
	Dare Ahmous Alex.		Dare Al – Saada. Dam		Dare El – Hedaya. Alex		Dare El –Mogama. Dam		
	No	%	No	%	No	%	No	%	
A- Kitchen area safety the range and sink areas have adequate light levels	0	0.0	1	100.0	1	100.0	1	100.0	0.261
kitchen wall cabinets are not too high to be easily reached	1	100.0	1	100.0	1	100.0	1	100.0	NA
lighting of counter tops is enough for meal preparation	1	100.0	1	100.0	0	0.0	1	100.0	0.261
light switches are located near the doors	0	0.0	1	100.0	0	0.0	1	100.0	0.261
flooring is not slippery and has a non-glare surface	1	100.0	1	100.0	0	0.0	1	100.0	0.261
hot pads and pan holders are kept near the range	0	0.0	1	100.0	0	0.0	1	100.0	0.261
knives are kept in a knife rack or drawer	0	0.0	1	100.0	1	100.0	1	100.0	0.261
drawers and cupboards are kept closed	0	0.0	1	100.0	0	0.0	1	100.0	0.261
store toxic products, such as household cleaners and laundry detergent, safely	0	0.0	1	100.0	1	100.0	1	100.0	0.261
avoiding clothes with loose flowing sleeves when cooking	0	0.0	1	100.0	1	100.0	1	100.0	0.261
B- Bathroom area safety Has the bathtub or shower a non-skid mat or strips on the standing area?	0	0.0	1	100.0	0	0.0	1	100.0	0.261
Is bathtub or shower doors has safety glass or plastic?	1	100.0	1	100.0	0	0.0	1	100.0	0.261
Are there grab bars installed on the walls by the bathtub and toilet?	0	0.0	1	100.0	1	100.0	1	100.0	0.261
Are the towel bars and the soap dish in the shower durably and firmly installed?	1	100.0	1	100.0	1	100.0	1	100.0	NA
Is there a single-lever mixing faucet used, or there are faucet handles that easy to grasp?	1	100.0	1	100.0	0	0.0	1	100.0	0.261
Is bathroom flooring matte-finished, textured tile, or low pile commercial carpet (no throw rugs or bathmats)?	0	0.0	1	100.0	1	100.0	1	100.0	0.261
Is the bathroom has even lighting without glare and. the light switch near the door?	1	100.0	1	100.0	0	0.0	1	100.0	0.261
Is the bathroom door open outward?	0	0.0	0	0.0	1	100.0	0	0.0	0.261
Is the bathroom has a safe supplemental heat source and ventilation system?	1	100.0	0	0.0	1	100.0	0	0.0	0.261

NA: Not Applicable   MCP: P value based on Mont Carlo exact probability

Table (3): Stairways and Halls Area Safety Measures (%) of Four Elderly Homes.

Stairways & Halls area safety	Elderly Homes								MCP
	Private homes				Governmental homes				
	Dare Ahmous alex.		Dare al-Saada.dam		Dare el-hedaya.alex		Dare el-Mogama.dam		
	No	%	No	%	No	%	No	%	
steps are in good condition and are free of objects	1	100.0	1	100.0	0	0.0	1	100.0	0.261
steps have non-skid strips. Carpeting on steps is securely fastened and free of fraying or holes	0	0.0	0	0.0	0	0.0	0	0.0	NA
smoke detectors are in place in hallways and near sleeping areas	0	0.0	1	100.0	1	100.0	1	100.0	0.261
hallways are equipped with night-lights	0	0.0	1	100.0	0	0.0	1	100.0	0.261
sturdy handrails are on both sides of stairway and securely fastened	1	100.0	1	100.0	0	0.0	1	100.0	0.261
light switches are located at the top and bottom of stairways and at both ends of long hallways	0	0.0	1	100.0	1	100.0	1	100.0	0.261
inside doors do not swing out over stair steps	1	100.0	1	100.0	1	100.0	1	100.0	NA
there is enough space in the stairway to avoid bumping your head	1	100.0	1	100.0	1	100.0	1	100.0	NA
room entrances do not have raised door thresholds	1	100.0	1	100.0	0	0.0	1	100.0	0.261
stairways and hallways are well lighted	1	100.0	1	100.0	1	100.0	1	100.0	NA

NA: Not Applicable   MCP: P value based on Mont Carlo exact probability

Table (4): Living- room Area Safety Measures (%) of Four Elderly Homes.

Living room area safety	Elderly Homes								MCP
	Private homes				Governmental homes				
	Dare Ahmous. Alex		Dare Al-Saada.dam		Dare El-Hedaya.Alex		Dare El-Mogama.Dam		
	No	%	No	%	No	%	No	%	
electrical cords are placed along walls (not under rugs) and away from traffic areas	1	100.0	1	100.0	0	0.0	1	100.0	0.261
chairs and sofas are sturdy and secure	0	0.0	1	100.0	0	0.0	0	0.0	0.261
chairs and sofas are not too low or too deep to get in and out of easily	0	0.0	1	100.0	1	100.0	0	0.0	0.261
chairs and sofas have full arms to aid in sitting or rising	0	0.0	1	100.0	1	100.0	0	0.0	0.261
the light switch is located near the entrance	1	100.0	1	100.0	0	0.0	1	100.0	0.261
there is enough space to walk through the room leaving clear passageways for traffic	1	100.0	1	100.0	0	0.0	1	100.0	0.261
furniture, which might be used for support when walking or rising, is steady and does not tilt	1	100.0	1	100.0	0	0.0	1	100.0	0.261

NA: Not Applicable   MCP: *P* value based on Mont Carlo exact probability

Table (5):   Bedroom and Outdoor Area Safety Measures (%) of Four Elderly Homes.

Checked Areas	Elderly Homes								MCP
	Private homes				Governmental homes				
	Dare Ahmous. Alex.		Dare Al-Saada.Dam		Dare El-Hedaya.Alex		Dare El-Mogama.Dam		
	No	%	No	%	No	%	No	%	
Bedroom Safety									
Is a lamp or flashlight kept within reach of your bed?	1	100.0	1	100.0	0	0.0	1	100.0	0.261
Is a night-light used to brighten the way to the bathroom at night?	1	100.0	1	100.0	0	0.0	1	100.0	0.261
Is a plenty of the room left for you to walk around the bed?	1	100.0	1	100.0	1	100.0	1	100.0	NA
Is there a sturdy chair with arms where you can sit to dress?	1	100.0	1	100.0	1	100.0	1	100.0	NA
Outdoor area									
Are steps and walkways in good condition?	1	100.0	1	100.0	1	100.0	1	100.0	NA
Are handrails are sturdy and securely fastened?	1	100.0	1	100.0	0	0.0	1	100.0	0.261
Are doorways, steps, porches, and walkways have good lighting?	0	0.0	0	0.0	1	100.0	0	0.0	0.261
Do hedges, trees, or shrubs not hide the view of the street?	1	100.0	1	100.0	1	100.0	1	100.0	NA

NA: Not Applicable   MCP: *P* value based on Mont Carlo exact probability

Table (6): Elderly Home Safety Habits (%) for Four Elderly Homes Residents.

Elderly Safety habits	Elderly Homes								MCP
	Private homes				Governmental homes				
	Dare Ahmous. Alex		Dare Al-Saada. Dam.		Dare el-Hedaya. Alex		Dare El-Mogama.Dam.		
	No	%	No	%	No	%	No	%	
Do you wear comfortable, low-heeled shoes with good traction?	0	0.0	0	0.0	0	0.0	0	0.0	NA
Are the hems of your clothes short enough to prevent tripping?	1	100.0	1	100.0	1	100.0	1	100.0	NA
Do you get up slowly from a sitting or lying position to avoid becoming dizzy?	1	100.0	0	0.0	1	100.0	0	0.0	0.261
Do you carry small loads, especially when using stairs, and make extra trips if necessary?	0	0.0	0	0.0	0	0.0	0	0.0	NA
Do you wear a seat belt when driving or riding in a car?	1	100.0	1	100.0	0	0.0	1	100.0	0.261
Are there emergency numbers at every telephone?	1	100.0	1	100.0	1	100.0	1	100.0	NA
Do you have a plan for getting help easily in an emergency?	0	0.0	0	0.0	0	0.0	0	0.0	NA

NA: Not Applicable   MCP: *P* value based on Mont Carlo exact probability

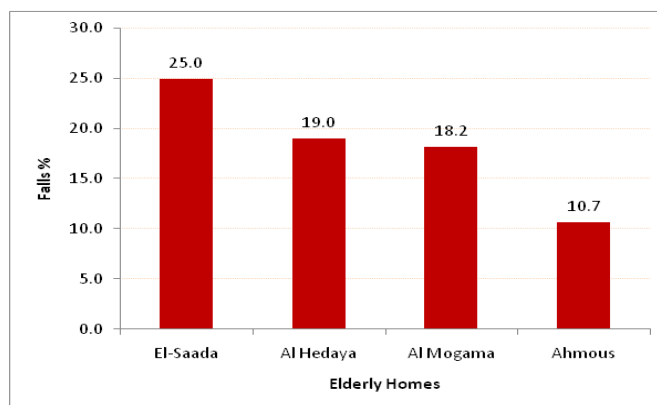**Table (7): Percentage Distributions of Elderly Falls among Four Elderly Home Residents, according to Fall Data.**

| Fall data | Elderly Homes | | | | | | | | MCP |
| | Dare Ahmous | | Al-Saada | | El- Hedaya | | El-Mogama | | |
	No	%	No	%	No	%	No	%	
Gender									
▪ Male	4	36.4	2	40.0	0	0.0	2	33.3	0.059
▪ Female	7	63.6	3	60.0	16	100.0	4	66.7	
Fall site									
▪ Bathroom	3	27.3	2	40.0	6	37.5	2	33.3	0.934
▪ Bed room	6	54.5	2	40.0	5	31.3	2	33.3	
▪ Stairs	2	18.2	1	20.0	5	31.3	2	33.3	
Fall time									
▪ Morning	3	30.0	1	20.0	4	25.0	1	16.7	0.084
▪ Evening	0	0.0	3	60.0	9	56.3	2	33.3	
▪ Night	7	70.0	1	20.0	3	18.8	3	50.0	
Causes of falling									
▪ Sliding	1	9.1	2	40.0	7	43.8	2	33.3	0.279
▪ Long clothes	0	0.0	0	0.0	2	12.5	1	16.7	0.480
▪ Carpet edges	3	27.3	2	40.0	3	18.8	1	16.7	0.755
▪ Drowsiness	3	27.3	0	0.0	0	0.0	1	16.7	0.112
▪ Blurred vision	2	18.2	1	20.0	0	0.0	0	0.0	0.213
▪ Chair uncontrolled	1	9.1	0	0.0	0	0.0	0	0.0	0.418
▪ No rubbery edges at stick	1	9.1	0	0.0	1	6.3	1	16.7	0.766
▪ No wall stands	0	0.0	0	0.0	3	18.8	0	0.0	0.214
Results of falling									
▪ Fracture	7	63.6	3	60.0	9	56.3	4	66.7	0.967
▪ Joint dislocation	4	36.4	2	40.0	7	43.8	2	33.3	
No. falls at last 6 months									
▪ Once	8	72.7	1	20.0	9	56.3	4	66.7	0.246
▪ Twice	3	27.3	4	80.0	7	43.8	2	33.3	

MCP: *P* value based on Mont Carlo exact probability

Table (8):Percentage Distributions of Causes of Falling according to the Gender and Results of Fallers.

| Causes of falling | Gender of Fallers | | | | FEP | Results of Falls | | | | FEP |
| | Male | | Female | | | Fracture | | Joint dislocation | | |
	No	%	No	%		No	%	No	%	
Sliding	3	37.5	9	30.0	0.685	6	50.0	6	50.0	0.367
Long clothes	1	12.5	2	6.7	0.587	2	66.7	1	33.3	0.821
Carpet edges	0	0.0	9	30.0	0.050*	4	44.4	5	55.6	0.259
Drowsiness	1	12.5	3	10.0	0.838	2	50.0	2	50.0	0.649
Blurred vision	2	25.0	1	3.3	0.043*	3	100.0	0	0.0	0.145
Chair uncontrolled	0	0.0	1	3.3	0.497	1	100.0	0	0.0	0.532
No rubbery edges at stick	1	12.5	2	6.7	0.587	3	100.0	0	0.0	0.145
No wall stands	0	0.0	3	10.0	0.351	2	66.7	1	33.3	0.821

FEP: P value based on Fisher exact probability * P < 0.05 (significant)

Figure (1): Percentage Distribution of Falling Among Four Elderly Home Residents.

4. Discussion:

The elderly people aged 65 years or older fall each year [21], implicating environmental factors in one – third to a half of their falls. [19] Which the entire spectrum of elderly suffer falls and their sequelae. The relative contribution of intrinsic characteristics and the environmental may differ according to the person's functional level [68]. The present study postulated that both elderly care homes of Damanhour and the Alex. Private Dar Ahmous care homes have met more than 60% (10 items of 16 items) of the general elderly home safety measures. The most unsafe homes according to the general safety measures was Dar el-hedaya governmental care home for women at Alexandria, which has fulfilled less than one-third of these general home safety measures. These findings are in agreement to previous studies in Egypt, those mentioned that public infrastructures in Cairo and throughout much of the Middle East are ill-equipped to care for older people's needs [69], and because the provisions of such care often is informal and poorly documented in Egypt [70]. As increasing in the number of older Egyptian refer to priate helpers and a small number of home care services and variations of home care seeking older persons [71], and as demographics, epidemiologic and socio-economic changes continue, Egyptian families may adopt new combinations of care to support their frail older relatives [69].

This study revealed that both Damanhour care homes have met all of the 10 items of the kitchen safety measures, more than three-quarters of bathroom safety and living room safety items. While both Alexandria settings were unsafe as observed for the safety measures of the kitchen, bathroom, in addition the Alexandria public care home Dar-el-hedaya was the most unsafe concerning the living room and bedroom areas safety. All residents of the studied care homes, at least have three good elderly safety habits. The most unsafe habits observed are "wearing unsafe shoes", "carrying heavy loads during using stairs" and "having no plan for emergency". Many studied reported that kitchen and bathroom areas are the most hazardous rooms in the home due to slippery fall [40], bedroom area or bedrails [25, 72, 73], and stairs for indoor falls [17]. Where most falls that occur inside home happen mostly in bedrooms, kitchens and dining rooms. In contrast to the study findings. relatively few falls occur in the bathroom, on the stairs, or from ladders and step tools [74]. It was also reported that the safety of environment has always been a priority in nursing home care [72], and the lack of safety features in bathroom [73]. However, environmental hazards are the leading causes of falls, accounting for about 25 to 45% in most studies [50]. It was found that close interaction habitual and intentional behaviors with situational and environmental cues assists in dealing the domain of interest for an assessment [55]. Also person's attitude to risk has been found to be associated with increased falls [21], as well as the type of behavior pattern in men [54].

The present study reported that falling according to gender, revealed that falling among females more than males among both private and public care homes residents. The majority of fallings was also reported during evening and night times, whereas, the least falling happened during morning time. These finding are in line with the findings of the incidence rates that were higher among females than males within the first and second age groups [75], and women are more likely than men to experience non-fatal falls [76]. In contrast to our findings a study stated that most falls occur during the day, and only 20% of falls occur at night time [74].

This study found the majority of the fallings was due to sliding at least at three of the four studied care homes. Carpet edges tripping and blurred vision are the main causes of falling among private elderly care homes residents. These findings are in accordance with concerned studies reported that slips and falls are the main causes of injury for older people in the home [42], and slippery floors and loose rugs are most house hold potential hazards [40]. Many older people attribute their falls to trips and slips inside home or immediate home arroundings [41]. On contrary, increasing numbers of tripping hazards in devilling unit did not increase the risk of fall injury events [42], vision and hearing are protective senses, when the acuteness of the senses diminishes, the risk for vision [77] falling injury increases [37], and impaired. The present study showed that the only two types of falling injuries reported are fractures and joint dislocation, fractures being the major injury. The study also observed that Dar al-Saada care home fallers only fell twice during the last 6 months period. It was also observed more than one-third of males fall due to sliding and one-quarter due to blurred vision. While the majority of the female falling resulted from sliding and carpet edge tripping. Injuries due to sliding, drowsiness, long clothes, no wall stands, blurred vision, chair uncontrolled and due to walking aids,resulted in fractures. On the other hand, the highest joint dislocation prevalence was due to tripping to carpet edges. In concurrence to the findings main injuries of fractures, several studies postulated that about 10-20% of fall resulted in fractures [78]. Most of the fractures occur at home [79], where fall that occur indoor result hip fractures and outdoor result in distal forearm fractures [80]. However, falls in older people in nursing home have multi-factional etiology [37].

Conclusion:

General safety measures, according to the Housing Safety Checklist of four elderly homes,

revealed that the two elderly care homes of Al-Behaira governorate and the private Alex Dar Ahmous care home have met more than 60% of the general safety measures. While Dar el- Hedaya public care home for women at Alex, has fulfilled only 31% of these safety measures. No significant differences were observed between these safety items for the studied care homes.

Both Dar al-Saada private and Dar el-Mogama governmental homes have fulfilled all of the 10-items of kitchen safety measures. The least safe kitchen was observed for Dar Ahmous private, (30%). It was noticed that both Alex – homes kitchens were unsafe compared to those of Damanhour ones. No significant differences were found between kitchen safety items for the four studied homes. Concerning bathroom area safety measures both Damanhour settings have met more than three-quarters. While Alex elderly care homes have met only 55% of these safety items. No significant differences between bathroom safety items for the four compared homes. The elderly care homes of Damanhour have met 90% of the stairways and halls safety measures. It was observed that Dar el-Hedaya public home for women as the most unsafe stairway, and has met only half of the safety items. No significant differences between the items of stairways safety for the four compared care homes. For living-room area safety Dar al-Saada private home has met all these measures. The most unsafe living-room area was reported for Dar el-Hedaya home, (28.7%). No significant differences between these safety items for the four studied elderly homes. All the geriatric homes have met all the bedroom safety measures, except Dar el-Hedaya governmental, which has met only half of these safety items.

All the studied homes have met 3 items of 4 items of outdoor area safety measures. No significant differences were found between these safety items for the compared homes. All residents of the studied care homes have at least three good elderly safety habits. The most unsafe habits for he studied residents were "Wearing unsafe shoes", "Carrying heavy loads when using stairs" and "Having no plans for emergencies". No significant differences between the safety habit items for the different residents of these homes.

The falling record among the residents of studied care homes, showed that the highest number of falls occurred in Dar al-Saada private homes, (25%). The least percentage of falls was reported Dar Ahmous private home, (10.7%)). The distribution of falling according to gender, reported that falling among females exceeded those males in both private and public care homes, reporting more than 60% female falls among the residents of sex mixed care homes. The only falling sites observed were bathroom, bedroom and stairs areas for all studied care homes. Falling at bedroom was higher among fallers of the two private care homes, (40% and 54.5%), versus (33.3% and 31.3%) for governmental care homes. Concerning falling time, Dar al-Saada private home and Dar el-Hedaya public care home, reported highest evening fall, (66% and 56.3%, respectively). While Dar Ahmous private and Dar el-Mogama public homes reported the highest night time fallings, (70% and 50%, respectively). The least falling time was noticed at morning time for all residents of the four homes. No significant differences were observed.

Causes of falls varied among fallers of all compared care home residents. Sliding was the major cause of falling among fallers of Dar al-Saada private and the two governmental care homes, (40% for Dar al-Saada, 33.3% for Dar el-Mogama and 43.8% for Dar el-Hedaya). Carpet edges caused in the highest percentages of falls among the two private care homes. The blurred vision as a cause of falling was observed only for the private care homes, valuing (20% and 18.2% for Damanhour and Alex respectively). The only falling resulted injuries observed among the fallers of the four settings, were fractures and joint dislocations, where the majority of falls resulted in fractures for all fallers, reporting a range of 56.3% to 66.7% of the fallers. While joint dislocations ranged between 33.3% and 43.8% of the fallers. No significant differences were observed concerning injuries among fallers of the all compared care homes. The majority (80%) of Dar al-Saada fallers fell twice during the last 6 months, with no significant differences between the fallers of all care homes.

The study reveals that 37.5% of the male fallers were due to sliding, and 25% of them fell due to blurred vision. The highest female fallers, were due to sliding, (30%) and carpet edges, (30%)The only significant differences were detected for carpet edges, for the side of females, and blurred vision for the favour of males. Injuries due to sliding, drowsiness, long clothes, no wall stands, blurred vision, chair uncontrolled and due to walking stick resulted in fractures. While the highest joint dislocation was due tripping to carpet edges. No significant differences were noticed between the two type's injuries and causes of falling.

Recommendations:
The study recommends:
1. To encourage elderly care home safety assessment to find out hazards in the care homes, its aroundings and to detect residents unsafe habits that resulted in falling.
2. To pay more attention to the evaluation and monitoring care home safety to the governmental

elderly home at Alexandria governorate, especially for those for women only.

3. To monitor fall incidence and incidences of faller injuries and compare fall incidence rates on the same nursing home over time.It is necessary to have fall programs in place for a systematic process of assessment and monitoring the safety aged persons, and to give nurses an important role to implement such programs to reduce falling and resulted related injuries.

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