University of Oslo

Faculty of Medicine

Institute of Health and Society

Department of community medicine

Section for International Community Health

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Risk factors for hip fracture due to falls in the elderly in Kiev

Student: Vladyslav Ashrafutdinov

Supervisor: Johan Lund

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Risk factors for hip fracture due to falls in the elderly in Kiev.

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Abbreviations

KRCH – Kiev Regional Clinical Hospital

KCCAH – Kiev City Clinical Ambulance Hospital

CI – risk factors cannot be identified

Abstract

Title of the study: Risk factors for hip fracture due to falls in the elderly in Kiev.

Researcher: Vladyslav Ashrafutdinov.

Supervisor: Johan Lund, MSc, PhD, senior consultant in Directorate of Health, Oslo Norway.

Settings: This study was carried out in two hospitals – Kiev Regional Clinical Hospital and Kiev City Clinical Ambulance Hospital. Both are located in Kiev, Ukraine.

Study design: qualitative, retrospective and prospective, exploratory case study. 45 patients were contacted in order to interview them and collect data about incidence which resulted in a hip fracture.

Objectives: study is aimed to identify risk factors for hip fracture (ICD-10 codes: S 72.0, S72.1, and S72.2) due to falls in the elderly in Kiev, in particular extrinsic risk factors, e.g. environmental hazards and to propose recommendations for its prevention.

Results: we interviewed 45 current and previous patients 55+ with hip fracture which responded to our open questions, aimed to identify risk factors, to hear a story *per se*, patient's perception of accident. Women makes out 77,8 % of a total amount of patients with average age 75.9 years old, while men's part takes other 22,2 % with average age 75.4 years old.

We identified that the most common causation of fall leading to hip fracture in our study is stumbling/tripping over different barriers – 22 cases. However some barriers play bigger role in falls, some – smaller. We concluded that indoors dangerous are thresholds, loose wire, broken interior elements. Outdoors people should pay attention to pets; other environmental hazards are broken asphalt, some architectural forms.

Stumbling/tripping is widespread an accident's type, which occurs mostly outdoors. There are 9 cases where slippery surface was a key-factor.

Other important accident types retrieved from the interviews are pushing, loss of balance, colliding etc.

Conclusions: numerous environmental risk factors were identified, among them the most common are icy/wet surface and physical barriers like thresholds, pets and wire. However it could be distinguished probability of risk factor occurrence based on seasonality. Slipping has significance in wintertime, while stumbling/tripping, pushing and loss of balance can occur throughout the year. A set of recommendations is proposed.

Key words: hip fracture, Ukraine, Kiev, elderly, risk factors, fall.

Introduction

Hip fracture is one the most serious injuries that can be experienced and is ranked "*in the top ten of all impairments worldwide in terms of loss in disability-adjusted years for people 50+ years old"*(1) and "*among elderly are recognized as a major public health problem in the Scandinavian countries.".(2)* This type of injury has a big percentage of morbidity - *"30% of people with a hip fracture will die in the following year and many more will experience significant functional loss"* (3), and especially in the age group 55+ involve a long-lasting great financial expenditure for patient's treatment. For instance, in Norway the cost of treatment and rehabilitation for one patient 70+ years old with a hip fracture in first year is 562 366 NOK. Moreover, all expenses –after two years of treatment it can reach 1 000 000 NOK (4) what is a great financial burden for the State. In the US figures are high as well – *"A typical patient with a hip fracture spends US $40 000 in the first year following hip fracture for direct medical costs and almost $5000 in subsequent years."(3)* Against the background of a permanent population's ageing, likely *"the annual quantity of hip fractures projected to double by the year 2040".* (5)

Unfortunately in Ukraine doesn't exist a specific data for a hip fracture – number of injured, treatment, finances, and consequences. Moreover, we have not found any similar studies which investigated the problem of interconnection of environment and hip fracture in Kiev. It could be explained by absence of interest from Ministry of Health, what coming from the low funding of health sector. Pertinently to write here words of one nurse from Kiev Regional Hospital: "If you were a health minister, you would rather count the number of doctors you need to complete staff vacancies and to count basic medications which we have a strong need in". Therefore the only way to gather statistical data is working directly in hospital's archives.

However, if to assume that incidence rate in Kiev is the same as in Norway, ca. 2 persons per 1000 inhabitants (6), so in Kiev likely is going to be approximately 6000 hip fracture cases per 3 000 000 inhabitants annually.

Hip fracture*s "are cracks or breaks in the top of the thigh bone (femur) close to the hip joint."*(7) However, in many sources it is known as *"a fracture of the proximal femur."* (5) Depending on the fracture's anatomical location it could be divided into three subcategories: 1) femoral neck (S72.0); 2) intertrochanteric (intertrochanteric fracture or trochanteric fracture) (S72.1); 3) subtrochanteric fractures (S72.2). It is interesting that *"the distribution of the types of hip fractures within the U.S. population is 49 percent intertrochanteric, 37 percent femoral*

neck, and 14 percent subtrochanteric" (1) These types of hip fractures differs not only by the location, but also in the healing period and complications which might be caused et cetera. However all aforementioned fractures have consequences that the whole of society experiences. (1) In most cases only a surgical treatment is recommended. Nonetheless it has an impact on probability of complications and mortality rate as a consequence. It might be develop such complications of surgical treatment as *"include serious complications, such as deep vein thrombosis, muscular deconditioning, postoperative infection, pain, and loss of mobility"*. (1)

It has been found that hip fracture occurs under the influence of numerous factors such as body anthropometrics, bone mineral density (BMD) level, environmental circumstances, seasonality, dizziness, cardiovascular diseases, stroke, drug effect e.g. of barbiturates, psychotropic drugs, sedatives et cetera (1;8;9;10;11;12;13;14). Some authors have distinguished causations in three ways, like *"personal factors (eg, chronic disorders and neurological deficits), environmental factors (eg, obstacles in a path of travel), and behavioral factors (eg, activities and choices that can destabilize balance, such as running or wearing improper shoes)." (8)* Some divide risk factors on environmental (e.g. extrinsic) and intrinsic factors. (9)

In this study we will define "extrinsic" and "intrinsic" factors. Behavioral and environmental factors are combined in "extrinsic" factors, while personal factors are called "intrinsic".

The major external factor in causation of hip fracture is fall. According to WHO, fall is *"event which results in a person coming to rest inadvertently on the ground or floor or other lower level". (15)* So, *"only 1 to 14 percent falls in women result in a hip fracture, over 90 percent of hip fractures are the result of a fall"(10;16)* However, it is just: *"less than one(fall) in 10 results in a fracture."(17)* The causation related to falls is varying of age. For instance, active and younger group are prone to fall, caused by extrinsic factors, e.g. obstacles in a path, an accident on a workplace etc., while in a group of elderly increase likelihood of contribution of intrinsic factors, e.g. cardiovascular diseases, dizziness etc. This statement meets often in numerous investigations, beginning over 30 years ago. For example, *"Tripping was the commonest cause in the younger (under 75 years old) patients, and drop attacks in the older" (9).*

To summarize, hip fracture is a dangerous, and perhaps in some way, underestimated disease. Ageing of population and, consequently, increasing of pensioners, simultaneously decreasing of tax-payers leads to foreseeing double pressure on a state health system.

Therefore man ought to make efforts to fill up the existing gap in our knowledge for a better future and research possible ways for prevention of hip fracture among elderly.

Fall accident model

An accident is a chain of events, which strict sequence could lead to injury. For our analysis a mechanism of an accident is important. Figure 1 shows the injury's "event's chain", which consist of "a moment before", "accident" and "injury". Based on man's activity and/or environment "accident" could be happened either through sliding, or stumbling and other similar effect. The result of "event's chain" could be some type of injury. A description of the "moment before" and "accident" is base for identification of risk factors, which lead to injury.

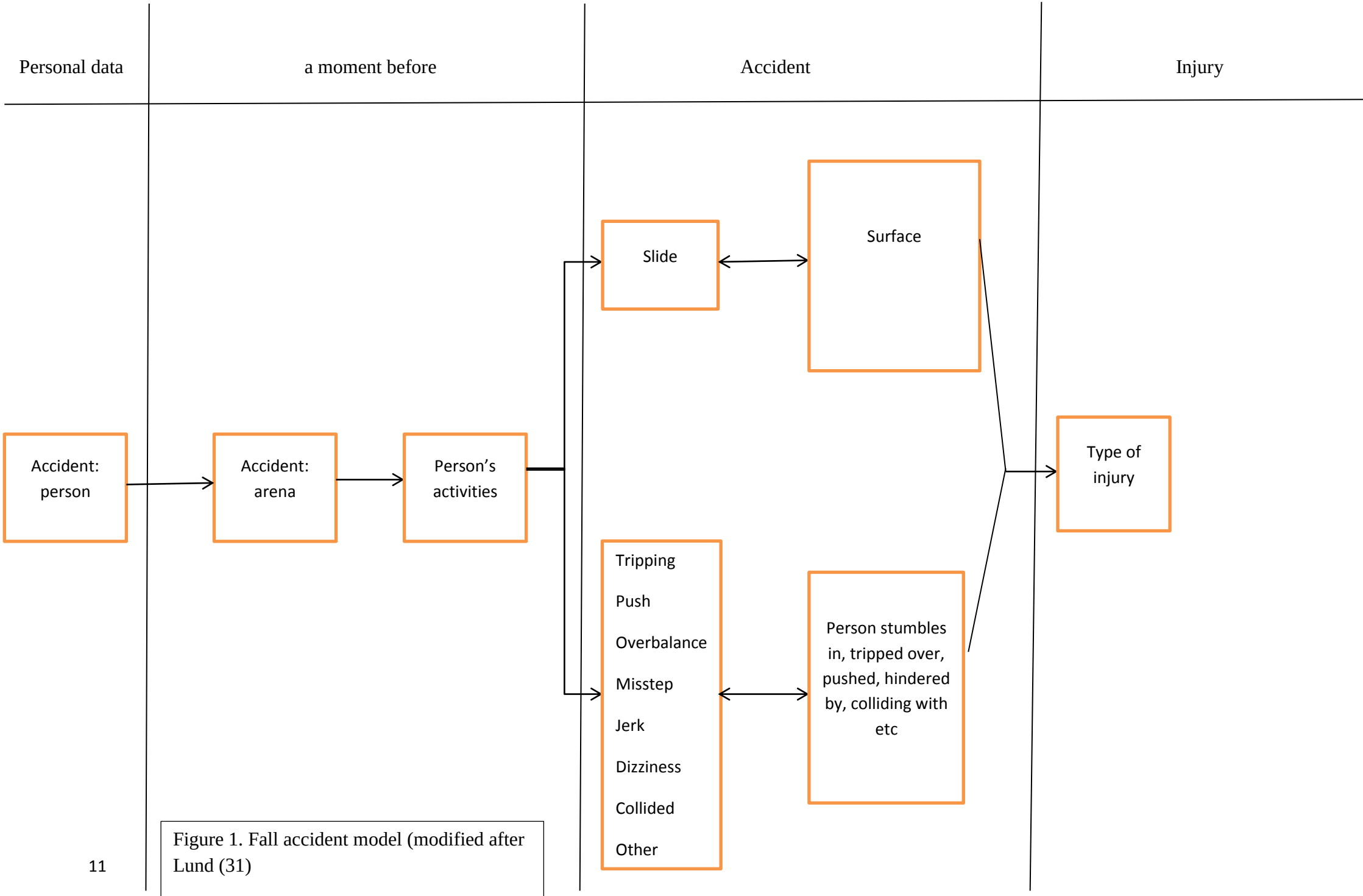


Figure 1. Fall accident model (modified after Lund (31)

Causation of falls, leading to hip fracture

It was aforementioned that causes of falls leading to hip fracture could be distinguished on "extrinsic" and "intrinsic". Majority of published papers have written that a reason to fall consist of both two factors. Such a think written by Feldman et al.: *"40-60% of falls are due to environmental hazards"* (18). However, slightly other results have another researcher Norton R et al.: *"only about 25% of these ("at home"-auth.) falls were associated with an object in the home"*, moreover, *"intrinsic factors appear to play a greater role than extrinsic factors, regardless of age and residential status"* (11)

Important meanings for future prevention services have the investigation of such variables of falls as place of occur, seasonality, age, sex etc.

Age

Age influences on causation of falls. Some studies have shown next*: "Environmental modification, at least up to the age of 75 years, would appear to have some scope for the prevention of home accident falls in the elderly"* (9). To continue with, Morfit has concluded that beyond this age, the intrinsic factors assume much greater importance. Most of the other researchers agreed on this point, what is logical, since ageing increase a probability of diseases. Howbeit, Karlsson et al. mentioned that: *"we must still…identify extrinsic risk factors in the old fall prone patient as 50-80% of patients treated in emergency departments for a fall related injury report environmental home hazards as one of the causes of their fall". (19)*

Sex

According to studies, women are more exposed to falls, leading to hip fracture, than men do. Emaus stated that 73% of falls occurs in females, and odds ratio female:male is 2.7. Other mentioned 69.8% (10), what is nearly the same. Aharonoff et al. have written that patients in her study were mostly women -78.6%. (20)

Seasonality

The seasonality result differs from one setting to another. For example, Aharonoff et al. showed next outcomes: 25% of cases occur during the winter, 24.9% during the spring, 23.8% in the summer, 26.9% happened in the autumn. On the other hand, most of the authors have shown neatly peak and off-peak of fall occur. It is logical to assume that during winter time, especially when it's snowy and icy, increasing the chance to slipped down. Emaus et al. have gotten such a result: *"the highest numbers of hip fractures occurring between December and*

March and the lowest between May and September." However, these authors continue: *"The seasonal variation was significant only in the models including the fractures that occurred outdoors, at home or in traffic areas, not in the models including fractures occurring indoors, at home or in nursing homes."* In accordance with Leavy et al. *"…with indoor fractures…a peak fracture occurrence in early February with a slight dip during the months July–September."*, but also he warn us that *"in terms of months of the year, little variation in hip fracture patterns was noted"*.

To summarize, seasonality could be bigger or smaller risk factor and it depends on which climate zone we investigate. Indeed, Aharonoff researched patients in New York and Leavy in Uppsala which both are humid continental climate (21; 22), while Emaus et al. studied population in Northern Norway, where wintertime could be longer and probability of hip fractures relates to slippery surface could be bigger. The same could be found in North American studies. (10)

Place

Most of the authors have agreed on that most of the falls occurs at home. The figures are nearly the same: *"nearly 70% of falls occurs indoors"* (12) and *"more than 70% were fall-related hip fractures occurring at different places indoors."* (23) Norton has written that 75.5% of falls occur indoors. However, in earlier studies were shown a wider range – 50-70% of falls, occurs indoors. (18) By the same token, Emaus et al. have separated home falls into two categories: home indoors and home outdoors. Other mentioned places of falls are transport area outdoors and nursing home/hospital.

Some information could be finding about specific place of injury. For example, those places at home/indoors are: bedroom, bathroom, kitchen, hallway, living room, lift or work/indoors. (13) Morfit et al. has connected actions and place: trip – garden equipment, toy, floor covering, household gear, caught heel; slip – wet or icy ground, indoor wet or polished floor, bath, footwear; and such actions like unwise climbing (ladder, chair etc); some technical impacts – poor lightning, loose handrail, hurrying, carrying something. Among other locations could be finding next: thresholds at door to exterior, hall, utility room (8), lavatory. (24) Aharonoff et al. have done distinguishing of fall and places in such a manner: car accident, assault, fall out of the bed and chair etc.

Others

Most of the existing literatures are devoted to intrinsic causations. Despite this fact, there still have had attempts to define risk environmental factors. Many authors distinguished extrinsic factors, leading to injurious falls, on an activity during falls, such as forward/backward motion, standing, sitting down, stairs, ladders, descending/ascending (11) or habitual/inappropriate environmental use, collisions in the dark, falling down trying to avoid temporary environmental hazards, frictional variations in foot contact (8), in a Dutch study by Boye et al. appear separations onto indoors/outdoors, age group (65-79) and 80+. (24) The author introduced housekeeping, sport & recreation, cycling etc. I would like to mark that some of activities are very specific to one country and not applicable to others. Boye et al. wrote that quantity of trips, done with cycle in the Netherlands is 27% of all travels. Furthermore, next western countries with high cycling-level are Denmark (18%), Finland (11%), Germany (10%) and Sweden (10%) etc., while the US and the UK are low-cycle use countries with only 1% of all travels. (24) To say specifically about Ukraine, my personal opinion is that cycling is not very common in cities, but often in use in a rural setting. Unfortunately no statistical data have been found to support this statement.

In summary, walking is the most spread cause – either indoors, or outdoors. (24) In the process of walking, people apt to tripping over something like thresholds, cords (9;11;12;14), slip either wet or icy surface (9;11;12;13). A good point to support environmental factors has written by Overstall et al.: *"Tripping is an accident that can happen to anyone and is not necessarily associated with disease or increased sway."* Some authors specified also a role of improper shoes (8;9;13), loss of balance, pets, collisions.(9;11;12;14), garden litter, bed clothes, uneven paving (11;12) et cetera. Some studies have found remarkable higher number of falls in the daytime with a peak in morning hours (12), while some studies – not. (10)

Intrinsic factors

It was aforementioned above those intrinsic factors like cardio-vascular disease, cognitive impairments, poor vision, weak knees and many other various causes of falls are playing a big role in falls leading to hip fracture. Besides, ageing increase probability of impact of intrinsic risk factor. Among of the most outspread risk factors are: loss of balance, dizziness, legs gave away, locomotors disability, previous stroke, body mass index, taking medications. (9;10;11;12;14)

Objectives of the study

Our study is aimed to identify risk factors for hip fracture (ICD-10 codes: S 72.0, S72.1, and S72.2) due to falls in the elderly in Kiev, in particular extrinsic risk factors, e.g. environmental hazards and to propose recommendations for its prevention.

MATERIALS AND METHODS

Study area

This study was carried out in Kiev – the capital city of Ukraine, which is delineating as the city with a special administrative status.

According to Kiev state statistical service, the population is 2 888 710 by 1 February 2015. (25) The population of Desnyanskiy district, where is located one of the hospitals participated in the study is 367 192 persons and is the biggest among other districts. (25) However due to insufficient resident's registration, unofficially the population is estimated 3 500 000 and Kiev agglomeration – approximately 4 000 000. (26)

The population 60+ years old is 546 279 and 65+ - 366 350 by 2014. (27)

Kiev is served by sixteen city hospitals and a number of specialized hospitals and curative institutions. (28)

Two hospitals were contacted in order to identify patients with a hip fracture – Kiev City Clinical Ambulance Hospital, located in Desnyanskiy district, and Kiev Regional Clinical Hospital, located in Shevchenkivskiy district.

Study Design

This is qualitative, retrospective and prospective, exploratory case study. This study was aimed to *"to understand the meaning of respondents' experiences and life worlds"* (29), therefore it is a qualitative. A retrospective design is suitable in terms of lack of financing, is not time-consuming and helped to fulfill a sample size.

Patients and sample size

We collected a sample of hip fracture patients from the patients treated in the two hospitals and registered with a "hip fracture" diagnosis.

The inclusion criteria were:

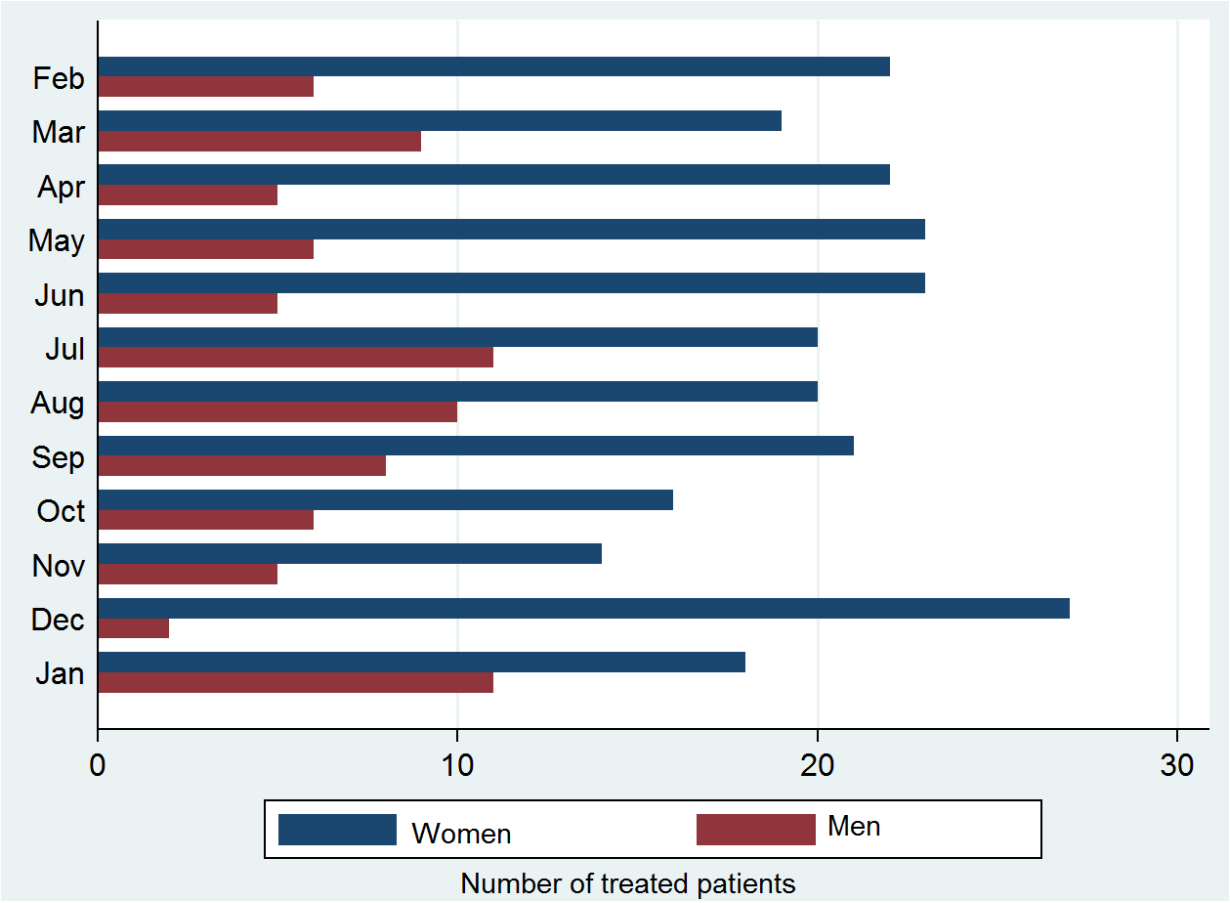
1. Patients treated in the two hospitals between February 2014 and January 2015.
2. Men/Women 55 years old and older.
3. Appropriate diagnosis "hip fracture" ICD-10 codes are S72.0, S72.1, S72.2

Table 1. Patients 55+ years old treated with hip fractures in two hospitals in Kiev February 2014 – January 2015 by month, sex and age. Source: archives of KCCAH and KRCH

Sex	Women			Men			Total		
Month	№	Average age	Range of ages	№	Average age	Range of ages	№	Average age	Range of ages
February	22	74.6	(55-87)	6	69.2	(57-84)	28	73.5	(55-87)
March	19	77.6	(56-90)	9	68.9	(57-81)	28	74.8	(56-90)
April	22	75.1	(62-92)	5	73.0	(60-83)	27	74.7	(60-92)
May	23	75.4	(62-91)	6	78.0	(59-87)	29	76.0	(59-91)
June	23	72.0	(59-85)	5	81.2	(75-94)	28	73.6	(59-94)
July	20	79.2	(62-97)	11	73.5	(57-88)	31	77.2	(57-97)
August	20	73.1	(61-86)	10	75.5	(56-89)	30	73.9	(56-89)
September	21	74.1	(55-88)	8	76.0	(58-89)	29	74.7	(55-89)
October	16	78.2	(67-91)	6	73.5	(63-85)	22	77.0	(63-91)
November	14	74.3	(60-88)	5	71.6	(61-85)	19	73.6	(60-88)
December	27	73.9	(59-94)	2	69.5	(68-71)	29	73.6	(59-94)
January	18	73.1	(56-87)	11	75.8	(59-91)	29	74.1	(56-91)
Total for one year	245	75.0	(55-97)	84.0	74.0	(56-94)	329	74.7	(55-97)

Table 1 shows the distribution of treated patients 55+ years old during one year. Women were treated more often than men – 245 against 84, and their average age at the moment of getting hip fracture is slightly higher – 75 against 74. Specter of patient's ages is almost the same without significant difference – (55÷97) against (56÷94).

Figure 2. Treated patients for February 2014- January 2015 in two Kiev hospitals.



According to Figure 2, women who were treated tend to the falls consequent in hip fracture more than men. Especially strong dominance can be observed in December.

For interviewing of patients we collected a sample of 50 people from the 329 patients. 3 interviewees denied to be interviewed. 2 interviewees told that a woman fell from a bicycle, and a man was involved in a car accident. Both of these two were excluded from our sample, which was supposed to consist of falls covered by the model (Fig.1) Sampling was done based on availability of current and previous patients. Interviewing was made between November 2014 and January 2015.

Data Collection

Data have been collected with an in-depth interviewing to collect the patient's stories about the fall which resulted in a hip fracture. Statistics was also made based on information about the patients.

Qualitative methods

We have been used following qualitative methods in order to retrieve required information:

1. **In-depth interviewing.**

   In-depth interview is an interactive process and its flowing can't be predicted before an interview. It is important to collect data directly from persons experienced meetings with environmental hazards daily.

   Interviewing process started with an old woman in Kiev City Clinical Hospital №6 and experience from this interview (case №8) was used to adjust questions in the questionnaire, to fit myself to the interviewing process.

   Next patients were only from KCCAH and KRCH. We did two types of in-depth interviewing – personal (patients currently admitted to hospital) and telephone (earlier patients to hospital). The method chosen depended on availability of patient. Patients were interviewed face to face in November 2014 – January 2015. Patients, who were admitted earlier to the hospital, were interviewed via telephone since it was more comfortable and suitable for them and took less time.
   All interviewed were tape-recorded upon the patient's agreement.

2. **Observational Method**

   In this study we also have used observation, aiming to observe and evaluate Kiev streets on the presence of environmental hazards, to find out something what could be missed by our participants, e.g. curbs, public transportation, roads - *"….observer can also discover things no one else has ever really paid attention to".* (30) As an observer I have watched how people cope with environment of their daily life both outside and inside.

Data Analysis

The collected data were performed, organized and analyzed with help of following programs: SPSS v.20, HyperResearch v.3.7.1 and HyperTranscribe 1.6.1.

Before analyzing, we went through possibilities of using aforementioned programs, concluded and execute next:

1. HyperTranscribe 1.6.1 was used for transcribing of interviews, particularly transcription of tape-record;
2. HyperResearch v.3.7.1 was used for coding of information, gathering, further working with cases et cetera.
3. STATA/SE 13.1 was used for figure creating

Ethics of study

This study was performed with accordance to the Helsinki Declaration and laws of Ukraine. All gathered data has been kept in a place, secure from entry of the third persons. In the results section of this thesis it is impossible to identify identity of patients, which have taken participation in the study.

Ethical clearance was evaluated and approved by the City Department of Public Health of Ministry of Public Health in Kiev, Ukraine.

Each interviewed person face to face got a consent form (see Annex 3). The patients interviewed via telephone were orally informed about study and their rights.

Results

1. Statistical data of patients

In the current period February 2014 – January 2015 study sights handled 329 patients with hip fracture over 55 year old, there were interviewed 45 patients over 55 years old for the same time period.

Table 2. Treated and interviewed patients by months.

	Treated	interviewed	
Months	N	N	%
February	28	3	11
March	28	1	4
April	27	4	15
May	29	3	10
June	28	2	7
July	31	2	7
August	30	2	7
September	29	3	10
October	22	2	9
November	19	3	26
December	29	11	31
January	29	9	31
Total for one year	329	45	14

To consider that wintertime in Kiev is November – March and summertime from April to October, then we interviewed 27 and 18 patients accordingly.

Table 3. Interviewed patients by month and sex.

Sex	Women		Men		Total	
Month	№	Average age	№	Average age	№	Average age
February	2	69.5	1	63	3	67.3
March	1	81.0	-	-	1	81.0
April	3	76.0	1	82	4	77,5
May	2	78.5	1	77	3	78.0
June	2	78.5	-	-	2	78.5
July	1	72.0	1	77	2	74.5
August	1	86.0	1	89	2	87.5
September	1	72.0	2	78.5	3	76.3
October	2	77.5	-	-	2	77.5
November	2	81.0	1	70	3	77.3
December	10	74.2	1	71	11	73.9
January	8	75.9	1	68	9	75.0
Total for one year	35	75.9	10	75.4	45	75.8

Table 3 shows the distribution for interviewed patients by month and sex. Women are the majority of interviewed patients: 36 women versus 11 men. Average age shows no significant difference between genders as 75.9 against 75.4.

Table 4. Treated and interviewed patients by sex and age

Sex	Women			Men			Total		
Variables	N	Age	Range of ages	N	Age	Range of ages	N	Age	Range of ages
Treated	245	75.0	55-97	84	74.0	56-94	329	74.7	55-97
Interviewed	35	75.9	55-97	10	75.4	63-89	45	75.8	55-97
%	14.3			11.9			13.7		

Table 4 shows a slight difference in age of treated and interviewed patients with hip fracture – treated patients with average 74.7 years old, while interviewed – 75.8 years old.

2. *Interviewed patients by falling outside/inside by season*

In this sample of treated patients there were more women than men. There was no significant difference between genders with regard to where fall occurred: 54 % women fell outdoor, 46 % - indoor. Men fell outdoors 50 % and 50 % - indoor.

Table 6. Frequency of outdoor/indoor falls by sex

Interviewed patients									
Variables	**Women**		Sum	**Men**		Sum	**Total**		
	Outside	Inside		Outside	Inside		Outside	Inside	Sum
№	19	16	35	5	5	10	24	21	45
%	54	46	100	50	50	100	53	47	100

Table 7. Outside/inside falls by seasons (summer and wintertime)

a) Summertime

Interviewed patients									
Variables	**Women**		Sum	**Men**		Sum	**Total**		
	Outside	Inside		Outside	Inside		Outside	Inside	Sum
№	6	6	12	2	4	6	8	10	18
%	50	50	100	33	67	100	44	56	100

b) Wintertime

Interviewed patients									
Variables	**Women**		Sum	**Men**		Sum	**Total**		
	Outside	Inside		Outside	Inside		Outside	Inside	Sum
№	13	10	23	2	2	4	15	12	27
%	56	44	100	50	50	100	56	44	100

In this sample there is no significant difference in falls by seasons and sexes.

3. Results of interviewing

A summary of the interviews are given for each case in Annex 1. In Figure 1 accidents' types were divided into: sliding, stumbling/tripping, pushing, overbalance and others. The interviews (Annex 1) were studied for grouping accordingly to these types and also for identifying possible risk factors (see Annex 2).

Accident type: sliding

There are 10 cases where slippery surface was involved in the fall. During the interviews we could not identify other significant co-factors. In all cases patients responded that they kept daily activities as usual, used the same type of shoes. In, for instance, case №29, a lady 73 years old kept walking along the sidewalk on the grass. The event took place in December. She decided to try whether sidewalk is slippery or not. She did a step on asphalt and fell. Important detail is that her both hands were busy with two bags, full of food.

Her case exposes a complex of several factors: underlying slippery surface combined with busy hands, what might affect the body balance.

Accident type: stumbling/tripping

Stumbling/tripping is the mechanism of falling in our sample with highest number of cases. Risk factors that were identified are threshold, loose wire, domestic pets, broken asphalt et cetera.

- *Threshold & loose wire*

We found 2 cases with only threshold as a risk factor, one with a loose wire and 2 cases are combination of threshold and loose wire as risk factors.

In one of these cases, loose wire led to fall of man, 89 years old (case №16). He did housekeeping and did not the vacuum cleaner's cord. Other two cases, №№20 and 45, where threshold was the only causation for a fall were obtained from men, 75 and 68 years old. A 75 years old man did housekeeping and tripped over a threshold upon passage from one room to another. The 68 years old tripped over and fell going from a bathroom to a living room. This was a possible combination of intrinsic and extrinsic factors.

Both cases with "loose wire & threshold" happened with women, 78 and 86 years old (cases №31; 41). It is interesting that circumstances of falling are also similar – loose wire

along the threshold. The patients marked that a wire is out by the reason of renovation inside of the house and quite high thresholds.

- *Asphalt*

Asphalt occurs as a risk factor in several interviews under such names like “uneven asphalt”, “bad asphalt” and “broken asphalt”. Altogether 4 cases were connected with asphalt – 2 cases with asphalt as the only one cause of fall, and 2 complex cases with asphalt as one of the possible causes of fall.

A man, 63 years old (case №3), was in rush in attempt to catch the tram. He could not see asphalt since they were covered with ice. As a result he stumbled in the hole, fell to the ground and got a hip fracture.

Other man, 70 years old (case №25), went outside to walk around the living building. He didn’t notice a hole in asphalt and fell over.

2 complex cases are cases where asphalt as extrinsic factor is combined with another factor (-s). A man, 82 years old (case №5), experienced fall near an apartment house because asphalt was broken. A lady, 82 years old (case №11), stepped on uneven asphalt’s surface and fell. However intrinsic factors were also involved as poor vision and previous leg’s surgery.

- *Pets*

This study has 1 case where pet was a risk key-factor. A 75 years old woman (case №10), being at home, stumbled over a cat and fell to the floor.

- *Others*

Different objects, which man could stumble in, can be involved into fall’s process. One patient (case №28) stumbled in a lattice. Another patient (case №15) stumbled over the linoleum’s edge in her home, and a patient stumbled over a curb in the case № 26.

- *CI*

In cases №6, 14, 18, 33, 37, 44 the interviewees could not recall details (№6, 14) or told that he/she stumbled in his/her feet (№18, 33, 37, 44) without giving any more details.

Accident type: overbalance

In three cases overbalance played an important role. The first one, a lady of 79 years old (case №12), tried to help a stranger, who had fallen, in the street. However she fell down

herself. Another woman 82 years old (case №42) was carrying jars and fell from small inner stairs. Lastly a patient 97 years old lost the balance when she stood up from the table in an elderly's house (case №23).

Accident type: push

In case №19 a pet was connected with pushing. A woman, 72 years old, was walking in the park with her dog. The dog played with another dog and occasionally pushed the woman who fell to the ground. As a result, woman got a hip fracture and was hospitalized.

Another case, №21, took place in a public bus. A woman 71 years old was travelling in the city bus and prepared to get off. While getting off, a young man behind her, likely being in a rush, pushed her off the bus. She flew 1 – 1,5 m down to asphalt and broke her hip against the curb. In this case numerous factors are represented, e.g. breaking of road rules and bad design of passenger vehicles.

Accident type: colliding

Two cases were collected where patients 55+ got a hip fracture after colliding. Both patients are women of 70 and 86 years old and occasionally collided on the street with younger adults (cases №1; 17).

Accident type: dizziness

In this study 5 (cases №4, 7, 9, 13, 24) patients claimed that their fall happened because of dizziness.

Accident type: others

The interview №22, which accident mechanism can't be classified based on Figure 1, have been set individually in this group.

A woman, 84 years old, was called by her grandson at ca.7-30 am. She was sleeping at that time. She got up abruptly to catch the phone, fell to the floor and got a hip fracture. One possible risk factor is that landline phone is situated too far away from the bed.

Discussion

Hip fracture is one of the most serious injuries in the age 55+ and seems to be an underestimated problem in Ukraine.

A fall is a process, many different and varied factors can be involved. These are intrinsic and extrinsic. Case studies show that falls happen due to two, three and more factors. For instance, a 65-year-old woman had been quickly walking to a parking lot and did not notice a change on the pavement – a new curb that had been installed just a day before. She stumbled over the curb and fell on her pelvis which resulted in a hip fracture. The fall was caused by two components – moving quickly and a new curb. In another case, an 89-year-old man did housekeeping and stumbled over the cord of a vacuum cleaner. This represents a single underlying circumstance leading to a hip fracture – stumbling over the cord. Some cases combine a few circumstances in one case – a chronic disease, age, poor attention and extrinsic factors (broken asphalt, bad shoes et cetera). Therefore it is an important task for researchers to define a key risk factor because among several possible events in accident, the one is "the first". The "first" means that incident which triggered a chain of events that resulted in a fall. Therefore under definition "risk factor" we mean the first circumstance of event would lead to a hip fracture. Finding of these "risk factors" is the main task of this work. We will now discuss the various accident types and risk factors might be involved.

Slippery surface

Slippery surface is recognized as a risk factor since sliding on it likely leads to a fall from the person's height and might result in a hip fracture (9;10;11;12;13).. It comes from the interviews that most cases occur outside – on streets, sidewalks and backyards. However, sometimes fall can occur inside as seen in the case №43 (see Annex 1). The underlying factor that caused the fall was an improperly maintained doormat next to an entrance door.

Generally, after performing analysis of the outdoor places where falls took place, it is possible to divide them onto two categories – public places, e.g. streets, sidewalks, and private space, e.g. backyards, near dwelling houses territory etc. Depends on this it seems possible to develop prevention measurements for both public and private places.

This study has 10 cases where slippery/wet surface was a leading risk factor. However, it is need to note that this study is biased since a majority of the interviewees fell during wintertime (Table 7) when probability of fall is increased due to ice and snow.

The majority of these 10 incidents took place in city service responsible places, e.g. sidewalks. In Kiev city road service still use a blend of salt and sand to powder sidewalks. Normally they powder all paths and sidewalks, but it depends on financing from the city budget. In a light of recent events in the country such as crucial inflation of local currency, war etc. there is notably decreased powdering of streets, especially minor streets and backyards. This could be one of the possible causation of number of falls. Some sliding took place in private ownerships which are out of city responsibility. We can assume lack of awareness amongst the population about severe consequences of possible fall due to sliding.

Stumbling/tripping

Stumbling/tripping is the major accident mechanisms resulting in hip fracture (9;11;12;14). It seems that stumbling might often happen with people 55+ since they become more absentminded, more imbalanced and therefore more easily fall after stumbling over barriers. Unlike slipping where the major factor is ice/snow, tripping could occur due to number of very different factors. In this study we collected stories with such risk factors involved as threshold, loose wire, pets, and uneven asphalt.

- *Threshold & loose wire*

As mentioned before, threshold and loose wire were in two cases connected with each other. However to get closer eye on the cases where a threshold is only the cause we can denote that personal features, e.g. clumsiness and lack of awareness play a big role together with some intrinsic factor such as a disease. The case №45 is a good example where a low threshold could have prevented a fall.

Two women (cases № 31&41) stumbled over loose wire which was lying near a threshold. Both patients responded that their houses were under minor renovation thus occurrence of loose wires. However in the case №41 the patient complained on a high threshold. People should be aware of challenges when renovation is in process. Loose wires should be covered with plinth. We advise to take away or install low thresholds in houses where it might be possible.

- *Asphalt*

Asphalt appears in 4 cases as a risk factor. These allow us to speak about the seriousness of this factor in Kiev. The interviewees use concepts as “uneven” or “broke” asphalt. They stepped into holes, stumbled over uneven surface. This situation is even harder to cope with for those who have intrinsic factors such as lower limbs sickness, poor vision (as in a case №5) etc.

In general, the condition of asphalt in Ukraine is bad. If central streets mostly have satisfied quality of asphalt, the minor streets and backyards’ paths often have asphalt full of holes and

cracks, or just totally destroyed. This situation occurs because of massive corruption in the state road company and lack of attention to the present broken minor roads and sidewalks.

- *Pets*

Having a pet demands attention from those living together with it. Case №10 shows the unpredictability of such an unlikely event as stumbling over cat, puppy etc. However, it is necessary to always warn such owners about possible risks of having pets and necessity of every possible precaution.

- *Others*

It is hard to predict all possible environmental hazards. Nevertheless ordinary people together with public space architects must take an effort to maintain as much as possible for getting secure and friendly surroundings. People must ensure that broken interior' elements are changed as in case №15, or maintain safe design.

Overbalance

Overbalance is another common fall accident type (9;12;14). Three cases were collected in our study. Two interviewees tried to carry/lift more than they could. In a case №42 a woman carried jars which hindered her from seeing her way on the stairs. In another case (№23) a woman 97 years old lost balance while getting up from a table. We could not identify any other factor than "age factor" since ageing make people more absentminded and inaccurate, so falls can occur even without an extrinsic factor.

Push

One of the possible activities which may cause a fall is pushing. We collected 2 cases when pushing was a leading activity to the hip fracture causation. As in the "stumbling/tripping" type, pets participated in the incident. This case shows the unpredictability and the necessity for the pets-owners to have a special attention towards to their pets.

The next case took place in a public transportation service's bus, where a young person, being in a rush, pushed an old lady off the bus. After studying the case, we found that modifiable factors could be lack of observance of traffic rules by the bus driver and a bad design of passenger vehicles. The bus driver stopped 1 meter away from the curb. Therefore the interviewee fell directly on the curb. Small buses are serving majority of city and suburban routes have high floor entrance and incapacious (see Annex 4). We presume that a strict

adherence to traffic rules and reformation of public transportation might have some impact on injury statistics, including hip fractures.

Colliding

Colliding is an accident type where people clash into one another, sometimes with a powerful impact (32). Colliding has some impact into the hip fracture statistics (8;14). From the two cases we collected it seems that colliding itself is an unlikely event. It happens mainly due to personal circumstances, e.g. clumsiness, absentmindedness, lack of personal culture. Prevention of colliding could be carried out through advertisements with warnings to be careful, calls to show respect to people around. However this accident type doesn't seem to happen so often, thus prevention activities might not bring perceptible reduction of hip fractures among elderly.

CI

In 6 cases, risk factors could not be identified because of lack of information. Such patients do not remember all details of moments before, during or after fall, and some patients could not identify the fall's causation. For example, a 70-year old man being interviewed recounted that it just happened with no reason and there were no grounds for investigation. Indeed, this study shows that people tend to blame themselves – "I was in a hurry", "I was attentive enough", "I was unlucky" – these are only few possible patient "explanations" for their fall. Therefore all such cases we described as "couldn't identify".

Dizziness

Dizziness is a common name for two different conditions – lightheadedness and vertigo (34). A common symptom is being off balance. It is obvious that the elderly are more likely to fall due to dizziness than other age groups. Dizziness is a condition caused by multiple factors like age, CVD, diabetes, environment. Some of the risk factors could be modifiable. Public health officers should turn their attention to a possibility of prevention of falls due to dizziness.

Other accident types

A good design of living environment is necessary. This provides not only comfort, but also security. The case №22 shows that proper designing of an apartment, e.g. right location of telephone, could prevent a fall.

Conclusion

1. The daily activities of elderly involve numerous risk factors for getting a hip fracture – indoors and outdoors. From the 45 patients we interviewed, we see that sliding, stumbling, pushing and colliding are the most common accident types leading to a hip fracture.
2. In our sample we have a bias towards falls, since a study was performed in wintertime and it has a consequence for proportion of accident types.
3. The main risk factors involved were: icy/wet surface, threshold, loose wire, broken asphalt, pets,
4. If a more detailed and comprehensive in-depth investigation than this is carried out, an action plan for prevention of hip fracture in the elderly could be developed.

Limitations of this study and recommendations for future studies

Limitation

Limited time had an impact on the quality of the current data. Since interviews were done in wintertime, the majority of the in-coming patients had “winter causations of fall” like ice, wet surface.

Recommendations

We advise that future investigators take good time for this kind of study. Study should be prospective, duration minimum 1 year and, if possible, carried out in several institutions. A special attention to quality of in-coming statistician data should be given.

Suggestions for preventive policy for hip fracture

"*All accident prevention programs tend to remove and/or modify existing dangers, and/or modify the safety behavior of the individual or the group*"
(35)

1. National level (e.g. Ministry of Health). To develop a national program for a prevention of hip fracture including:
   - National hip fracture surveillance included annual statistics of hip fractures which should include age, sex, place and causation of occurrence. This statistics should be distributed to all involved policy makers.
   - Recommendations for prevention of hip fracture should be developed, including control of effective execution of those recommendations.
   - Co-operation should be established with specialized ministries, regional authorities, e.g. State Road Agency, social security authorities, for implementation of preventive measurements for hip fracture in all parts of daily life.
2. Regional level (e.g. city public health departments). To develop regional and local programs within united national program, providing of health campaign among population, keeping control over implementation of preventive actions by other actors and cooperation with them. Regional level is very important with regard to implementation of the surveillance system, thus quality of statistics could be improved on this level.
3. Personal, e.g. elderly people. Elderly people should be informed about possible environmental hazards and its prevention via information campaign. Seminars from health care professionals should be given.

Separately we would like to suggest some improvements to others key-role players for a hip fractures' prevention.

1. Road authority. Considering the fact that a number of hip fractures happen due to ice, we should inform the road authorities to change the substances they are using for ice prevention: sand with salt. We suggest taking the Nordic experience and use gravel. Gravel gives a better grip on ice and is less aggressive towards shoes. Nevertheless proper snow cleaning should be carried out, even in terms of lack of financing.

2. Architectural authorities. We suggest to architectural authorities to develop and control more strictly rules concerned illegal construction, suitability of public places for everyone (include hand rails in stairs), good safety standards (e.g. thresholds, good design of lattices etc).
3. Landlords/owners/dwellings. We suggest them to take care of own properties, do snow cleaning in good time, change broken interior/exterior elements etc.

Annexes

Annex 1: Content of interviews

Case number	Sex	Age	Interview extract
1	W	70	She walked along the street in a slow pace at daytime and was in a clear mind. A young man was in a rush and likely turned aside for a moment. He bumped into her and she fell down to the ground. As a result – a hip fracture.
2	F	69	The interviewee walked on the icy sidewalk, trying to keep the balance. However she slipped and got a hip fracture. A fall happened in daytime. The patient said that she felt well and was in a clear mind.
3	M	63	The fall occurred at the tram stop "Metro Chernihivska, where located numerous small puddles due to broken asphalt and they were slightly frozen. He was in a hurry, trying to catch a tram. He stepped into one of frozen puddles. The interviewer's remark: this place is always overcrowded and requires improvements of environment due to safety reasons.
4	W	81	The patient went out to the backyard. She felt herself lightheaded, fell to the ground and got a hip fracture. In her anamnesis is anemia and earlier falls due to dizziness.
5	M	82	The patient went out to the yard to walk around. Asphalt near the entrance was broken. Therefore he stumbled in the hole, fell and got a hip fracture. However the street was illuminated. In his anamnesis is poor vision.
6	W	72	The patient does not remember all details: she was in countryside and went out to the summer shower. Then she tripped over something and fell. Nevertheless her husband told that likely she tripped over own sneakers due to misstep.
7	W	78	The interviewee went out of the store in the afternoon. She felt dizzy that caused most probably by a low blood pressure that day.
8	W	78	The patient watched a TV-set in the late evening in a lightened room. When she got up of the table she stumbled in the table's leg. As a consequence she

			felt to the linoleum-coated floor and got a hip fracture.
9	M	77	The interviewee did housekeeping and felt lightheaded. He felt to the floor and got a hip fracture. The man complained about sick legs.
10	W	75	The patient was coming out of the room and tripped over a cat. The woman fell on a threshold and got a hip fracture. She said that she felt well and has had no problems with her health.
11	W	82	The interviewee said that she kept a walk when stepped on uneven asphalt. Therefore she felt and got a hip fracture. In her anamnesis: operated 20 years ago a hip fracture on the left leg and prescription to use crutches and/or chopstick. However, according to her words she tries to use them as seldom as possible.
12	W	79	The interviewee was walking in the street and saw a woman lying on the ground. She tried to help her to lift off the ground, but was unlucky – she lost a balance, felt and got a hip fracture.
13	W	78	In the morning the patient got up and began to dress near the bed, felt dizzy, fell to the parquet floor and got a hip fracture. In her anamnesis: osteoporosis, diabetes 2 type.
14	M	77	The interviewee went out for a walk in the afternoon near his house, was in slippers. He tripped over something (cannot recall), fell on the curb and got a hip fracture. Asphalt near the house is nice and smooth.
15	W	72	The interviewee was walking at home in the sneakers with a closed toe. She stumbled on the edge of the linoleum, since due to the old age it buckled up. The state of health that day was normal, without complains.
16	M	89	A patient was in the apartment, doing housekeeping. He caught on a vacuum cleaner cord, which ran from one room to another, fell and got a hip fracture.
17	W	86	She was crossing the road at a pedestrian zebra in a daytime and collided with a young man - both were distracted. She felt down and had gotten a hip fracture.
18	M	82	The interviewee was in the flat doing housekeeping, when he stumbled in his

			feet, fell down and got a hip fracture. It happened in the evening, a man was in sneakers, and lights were on. He was in a clear mind and in his opinion it is just a misfortune.
19	W	72	She was walking with her dog at noon in the park. Her dog played with another dog, when suddenly pushed her from the back side. In the result she felt and got a hip fracture.
20	M	75	The interviewee was doing housekeeping when tripped over a threshold. He fell and got a hip fracture.
21	W	71	The interviewee told that she was travelling in the city bus in a daytime. When she went out on the bus stop, a young man was in a rush and pushed her off the bus. She flew approx. half of meter, fell on the curb and got a hip fracture.
22	W	84	The interviewee said that in the morning, ar. 7-30 am, her grandchild called her; she awoke and rushed to the phone, but after she stood up from the bed (height is around 50 cm), fell down to the floor on a fluffy carpet and got a hip fracture.
23	W	97	The interviewee is a tenant of elderly house. After having a dinner, she stood up from the table, but lost a balance. She fell down and was hospitalized to the emergency room with a hip fracture.
24	W	65	The interviewee was at home washing clothes. She felt dizzy, fell down and got a hip fracture. In anamnesis: 4 years ago she was operated – the resection of tumor in cranium. Since that, she has some problems with coordination.
25	M	70	The interviewee walked in a daytime outside in the yard, where was a bit slippery. Asphalt was uneven, in some places broken. He stumbled in the hole which he had not seen, and got a hip fracture.
26	W	65	The interviewee was in a hurry to the parking in the morning. Near pizzeria appeared a new pavement with new curbs. She was usual to the previous sidewalk, and didn't notice the latest changes. Therefore she stumbled over the curb, fell and got a hip fracture.

27	M	71	The interviewee went out in rubber overshoes to the yard in the morning to feed his dog. Asphalt was coated with ice; therefore he slipped, fell and was hospitalized with a hip fracture.
28	W	84	The interviewee was doing housekeeping at noon. When coming out from the house she stumbled into the lattice bars, fell and got a hip fracture.
29	W	73	The interviewee walked with two bags on the grass along the asphalt sidewalk, tried whether asphalt is slippery and slipped, fell and got a hip fracture of the left femur.
30	W	66	The interviewee was walking on the icy sidewalk. She slipped, fell and got a hip fracture. She said that the sidewalk was not sprinkled with sands by the city communal service.
31	W	78	The interviewee was at home where renovations works was performing. Therefore extension wires were lying on the floor. The house has high thresholds between the rooms. She walked from one room to another, but stumbled in the extension wire near the threshold. She fell and got a hip fracture.
32	W	78	The interviewee kept walking along the street and tripped over the stone d≈3 cm, fell and got a hip fracture. In anamnesis: 2 heart attacks, was broken vertebrae C5 5 years ago and had a fracture of the femoral neck of another leg. The patient takes sleeping pills.
33	W	75	The interviewee was walking at home, using a chop stick, but stumbled in her feet. The floor is covered with the old linoleum.
34	W	76	She went to the church. Asphalt on the sidewalk is flat, new and good, but since it was morning, it was covered with thin ice. She slipped, fell and got a hip fracture.
35	W	71	The interviewee descended the stairs from the store, but she slipped, fell and got a hip fracture. The stairs do not have handrails.
36	W	76	The interviewee was outside in the yard. The soil was slightly frozen and she slipped, fell and got a hip fracture.

37	W	82	The interviewee was inside, preparing food for her dog. When she started to walk, she stumbled in her feet, fell and got a hip fracture.
38	W	73	The interviewee went out to the barn, stepped down the stairs, slipped on the icy pavement and got a hip fracture.
39	W	84	The interviewee was in the house, the light was on. In the kitchen she stumbled over the boots, which stood in the corner (in the place of storage of shoes), fell and got a hip fracture.
40	W	76	The interviewee went out from the summer kitchen in the early morning. Asphalt was coated with ice and stale snow. She tried to go on the snow, but slipped, fell and got a hip fracture.
41	W	86	The interviewee was in the house in the morning, going from one room to another. She stepped over a high threshold and stumbled in the wire, fell and got a hip fracture. The house is in a renovation; therefore the wire was outside the wall.
42	W	82	The interviewee carried jars out of the room to the veranda using the small stairs, lost balance, fell and got a hip fracture.
43	W	55	The interviewee came in to the emergency station, where she work and her hands were busy with ECG-machine. That was a snowy day, at the entrance lay a wet door mat and inside of the building floor is covered with tiles. She slipped on the floor, fell and got a hip fracture.
44	W	79	The interviewee was engaged in housekeeping. When she came out to the veranda, she stumbled in her feet, fell down to the wooden floor and got a hip fracture.
45	M	68	The interviewee was excited by a telephone conversation and while leaving the bathroom, tripped over the threshold, fell and got a hip fracture. He has in anamnesis a paralyzed left leg.

Annex 2: Accident type, arena, activity and risk factors

Accident type	Case №	Accident arena/person's activity	Risk factors	
			Extrinsic	Intrinsic
Sliding	2	Walked on icy surface	Slippery surface	
	27	Walked on icy surface	Slippery surface	
	29	Walked on icy surface	Slippery surface	
	30	Walked on icy surface	Slippery surface	
	34	Walked on icy surface	Slippery surface	
	35	Walked on icy surface	Slippery surface	
	36	Walked on icy surface	Slippery surface	
	38	Walked on icy surface	Slippery surface	
	40	Walked on icy surface	Slippery surface	
	43	Came in to the building	Wet surface	
Stumble/trip	3	In a hurry to catch a tram	Broken asphalt	
	5	Walked outside in the yard	Broken asphalt	Poor vision
	11	Walked in the yard	Uneven asphalt	Previous surgery on lower limbs
	25	Walked in the yard	Broken asphalt	
	16	Did housekeeping	Loose wire (cord)	
	26	Going on the sidewalk	Bad design of curb	
	28	Went outside	Lattice's bad design	
	15	Walked at home	Old linoleum	
	32	Walked in the street		Previous operated with hip fracture
	10	Walked at home	Cat	
	20	Did housekeeping	Threshold	
	31	Walked at home	Loose wire & threshold	
	45	Went out the bathroom	Threshold	Paralyzed left leg

	41	Walked at home	Loose wire & high threshold	
	39	Walked in the kitchen	Boots in the corner	
	8	Stood up the table	Table	
	14	Walked in the yard	CI	
	18	Did housekeeping	CI	
	33	Walked at home	CI	
	37	Walked at home	CI	
	6	Walked at home	CI	
	44	Did housekeeping	CI	
Push	21	Travelled in the city bus	Bad passenger vehicles	
	19	Walked with her dog in the park	Dog	
Colliding	1	Walked along the street	A young person	
	17	Crossed zebra road	A young person	
Dizziness	4	Went to the backyard		Dizziness
	7	Went out from the store		Dizziness
	9	Did housekeeping		Dizziness
	13	Stood up from the bed		Dizziness
	24	Washed clothes at home		Dizziness
Loss-, overbalance	12	Was trying to lift a person in the street	Lifting heavy loads	
	42	Walked from the room to veranda on the stairs	Carrying loads	
	23	Got up from the table		Age (97)
Others	22	Rushed to the phone	Telephone is locating too far from the bed	

Annex 3: Consent form

Згода на добровільну участь у медичному дослідженні в рамках студентського проекту Університету Осло (Норвегія)

“Фактори ризику переломів шийки стегна у літніх людей м. Києва”

Передумови та мета

Це запрошення взяти участь в дослідженні, що має намір встановити фактори ризику стегна для літніх людей в м.Києві. Маємо честь запросити Вас до участі у дослідженні та внести свій вклад в розвиток медицини в рідному Києві. Ми обрали Вас тому, що ви мали/маєте перелом стегна, і ми хочемо дослідити причини "чому це сталося".

Що включає в себе дослідження?

Інтерв'ю з учасниками за допомогою опитування про причини перелому шийки стегна.

Потенційні переваги

Це може бути ваш шанс розвинути рідний регіон і поліпшити в майбутньому якість місцевої медицини. Ваша участь буде будуватися тільки на ваших відповідях на запитання анкети, і ви не зобов'язані відповідати. Дорожні витрати будуть відшкодовані.

Що станеться з даними, які були надані Вами?

Ви і дані, які зареєстровані про Вас, будуть використовуватися тільки відповідно до мети дослідження, як описано вище. Всі дані про Вас будуть оброблені без імені, номеру або інших безпосередньо ідентифікаційних типів інформації. Спеціальний код з'єднує Вас з Вашими даними і зразками за списком імен.

Тільки уповноважений персонал проекту матиме доступ до списку імен і матиме змогу ідентифікувати Вас. Всі Ваші особисті та інша відповідна інформація буде кодована 16 січня 2015.

Буде неможливо ідентифікувати Вас в результатах дослідження, коли вони будуть опубліковані.

Добровільна участь

Участь в дослідженні є добровільною. Ви можете відкликати свою згоду на участь в дослідженні в будь-який час і без пояснення будь-якої конкретної причини. Це не матиме жодних наслідків

для Вашого подальшого лікування. Якщо Ви хочете взяти участь, підпишіть заяву про згоду на останній сторінці. Якщо Ви згодні брати участь в цей час, Ви можете пізніше відкликати свою згоду без впливу на Ваше лікування. Якщо є питання, що стосуються дослідження, ви можете зв'язатися зі мною,кожного робочого дня з 9 до 20 по телефону +38063 142 5883 Владислав

Згода на участь в дослідженні

Я бажаю прийняти участь в дослідженні

(Підпис, ПІБ, дата)

Annex 4: Pictures*

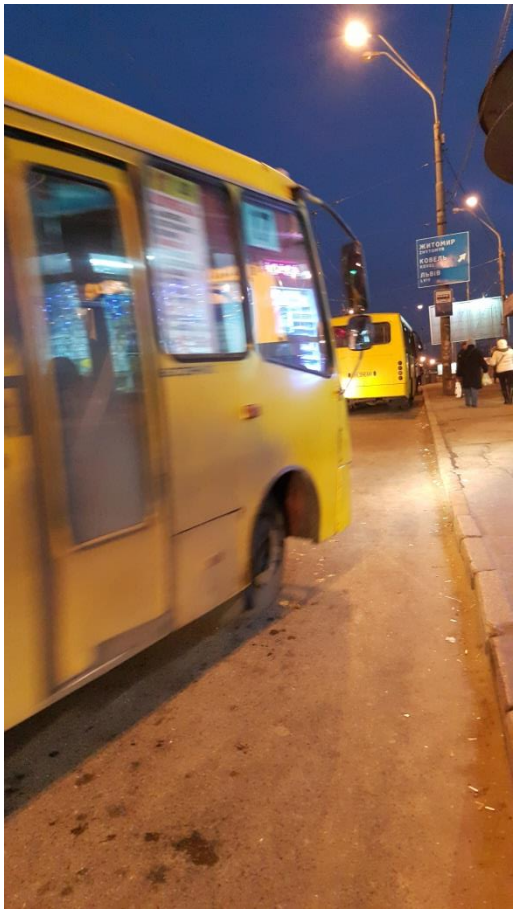
Case №26

These pictures of the sidewalk have been taken in Bila Tserkva, the city in Kiev region, Ukraine, and represent a type of the curb which the interviewee faced with. Such sidewalks are often constructed by owners of premises nearby, e.g. shops, café, restaurants etc. It is visible that curbs are “lost” in the sidewalk tiles.

*Pictures in annex have been taken in other places than actual incidents occurred.

Case №21

These pictures have been taken at the bus stop near Ocean Plaza in Kiev. It can be observe that buses stoppes sometimes away from the curb as well as these buses belong to a “small bus” type and have high floor entrance and reduced capacity (15-26 sitting paces, 35-43 places in total (36)



References

1. Butler M, Forte M, Kane RL, et al. *"Evidence Reports/Technology Assessments",* No. 184. Rockville (MD): Agency for Healthcare Research and Quality (US); 2009 Aug.

2. Nilson F *"A comparison of hip fracture incidence rates among elderly in Sweden by latitude and sunlight exposure" Scandinavian Journal of Public Health,* 2014; 42: 201–206

3. Brauer CA, Coca-Perraillon M, Cutler DM, Rosen AB *"Incidence and Mortality of Hip Fractures in the United States",* JAMA, October 14, 2009—Vol 302, No. 14 p.1573

4. Hektoen LF *"Kostnader ved hoftebrudd hos elder"* HiOA rapport 2014 №3 pp.24-25

5. Zuckerman J "*Hip fracture*" The New England Journal of Medicine Vol. 334 No. 23 1996

6. Støver M, Gystad SO "Personskadedata 2014. Norsk pasientregister" Helsedirektoratet 05/15 p.28

7. Hip fracture http://www.nhs.uk/conditions/hip-fracture/Pages/introduction.aspx [31.08.2015]

8. Connell BR, Wolf SL. *"Environmental and behavioral circumstances associated with falls at home among healthy elderly individuals."* Arch Phys Med Rehabil 1997; 78: 179-86.

9. Morfitt JM *"Falls in old people at home: intrinsic versus environmental factors in causation"* Publ. Hlth. Lond (1983) 97, pp.115-120

10. Leavy B,Åberg AC, Melhus H, Mallmin H., Michaëlsson K, Byberg L *"When and where do hip fractures occur? A population-based study"* Osteoporos Int (2013) 24:2387–2396

11. Norton R, Campbell AJ, LEE_Joe T, Robinson E, Butler M *"Circumstances of falls reultng in hip fractures among older people"* Jour of the Amer Geriatrics Soc 1997 Sep;45(9):1108-12

12. Hill AM, Hoffman T, Haines TP *"Circumstances of falls and falls-related injuries in a cohort of older patients following hospital discharge"* Clinical Interventions in Aging 2013:8 p.770

13. Haegvide ML, Larsson TJ, Borell L *"Fall scenarios In causing older women's hip fractures"* Scandinavian Journal of Occupational Therapy. 2013; 20: 21–28

14. Overstall PW, Exton-Smith AN, Imms FJ, Johnson AL *"Falls in the elderly related to postural imbalance"* British Medical Journal, 1977, 1, 261-264

15. WHO Fact Sheet #344 October 2012 http://www.who.int/mediacentre/factsheets/fs344/en/ [31.08.2015]

16. Grisso JA, Kelsey JL, Strom BL, Chiu GY, Maislin G et al. *"Risk factors for falls as a cause of hip fracture in women"* The New England Journal of Medicine Vol.324 #19 p.1326

17. Lesley D Gillespie1 et al. *"Interventions for preventing falls in older people living in the community (Review)"* 2013 The Cochrane Collaboration. Published by JohnWiley & Sons, Ltd. Pp.3

18. Feldman Fabio, Chaudhury Habib *"Falls and the physical environment: A review and a new multifactorial falls-risk conceptual framework"* Revue Cannadienne DErgotherapie Avril 2008 pp.83-95

19.Karlsson MK, Vonschewelow T, Karlsson C, et al. *"Prevention of falls in the elderly: A review"* Scandinavian Journal of Public Health 2013; 41:442-454

20.Aharonoff GB, Dennis MG et al. *"Circumstances of falls causing hip fractures in the elderly"* Clinical orthopedics and related research Number 348 pp.10-14

21. Climate in New York https://en.wikipedia.org/wiki/Climate_of_New_York [31.08.2015]

22. Climate in Uppsala https://en.wikipedia.org/wiki/Uppsala#Climate [31.08.2015]

23. Emaus N. et al. *"Hip fractures in a city in Northern Norway over 15 years: time trends, seasonal variation and mortality"* Osteoporos Int (2011) 22:2603–2610

24. Boyé NDA et al. *"Circumstances leading to injurious falls in older men and women in the Netherlands"* Injury Volume 45, Issue 8, Pages 1224–1230, August 2014

25. Kiev census http://www.kiev.ukrstat.gov.ua/p.php3?c=1123&lang=1 [31.08.2015]

26. Население Киева – трудности подсчета (The population of Kiev – challenges of calculation) http://travellife.com.ua/interesnoe/fakty/naselenie-kieva-trudnosti-podscheta.html [31.08.2015]

27. Permanent residents of Kiev, age group http://database.ukrcensus.gov.ua/Mult/Dialog/Saveshow.asp [31.08.2015]
28. Kiev Public Health Department's statistics http://health.kievcity.gov.ua/content/merezha-medychnyh-zakladiv.html [31.08.2015]

29. Warren CAB, *"Qualitative interviewing"*, Thousand Oaks, p.83, 2001

30. Patton MQ "*Qualitative research & Evaluation methods"3rd edition* Sage publications, London. 2002 pp. 241, 262

31. Lund J *"Accidental falls at work, in the home and during leisure activities"*, Journal of Occupational Accidents, 6(1984) p.187

32. Collide: definition http://dictionary.reference.com/browse/collide [31.08.2015]

33. Ukraine health profile http://www.worldlifeexpectancy.com/country-health-profile/ukraine [31.08.2015]

34. Dizziness: definition and symptoms https://www.nlm.nih.gov/medlineplus/ency/article/003093.htm [31.08.2015]

35. Lund J *"Epidemiology, registration and prevention of accidental injuries"* University of Oslo, 2004 p.28

36. Capacity of the small bus "Bohdan AO92" https://ru.wikipedia.org/wiki/%D0%91%D0%BE%D0%B3%D0%B4%D0%B0%D0%BD_%D0%90092 [25.09.2015]