



## Research Article

### COST ANALYSIS of PRESSURE ULCERS, INPATIENT FALLS and MEDICATION ERRORS in ACIBADEM HEALTHCARE GROUP

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#### ABSTRACT

**Objective:** Calculate the cost of treatment of pressure ulcers, inpatient falls and medication errors in Acibadem Healthcare Group (AHG) hospitals.

**Method:** The cost of treatment of patients developing pressure ulcers by stages, inpatient falls by groups and total medication errors in AHG hospitals was calculated for 2014. These costs were gathered through pricing department.

**Population:** All patients developing pressure ulcers, inpatient falls and medication errors in 12 hospitals of AHG in 2014.

**Findings and Results:** As a result of cost analysis conducted in AHG, it was established that for pressure ulcers the cost of nursing care was minimum \$11.6 and maximum \$30, the cost of hospital accommodation (bed & room) was \$862 to \$6,039 and the cost ranges of wound care products, physician consultation (per visit), surgical intervention, medications, laboratory tests were from \$9.6 to \$192.7, \$92.5 to \$127.2, \$138 to \$16,190, \$57.8 to \$7,709 and \$75.5 respectively. It was concluded that the total cost of pressure ulcers by stages were in the range of \$1,242 to \$104,247. For inpatient falls, it was found that the cost of nursing care was minimum \$7.7 and maximum \$154.2, the cost of hospital accommodation (bed & room) was \$575 to \$862.7 and the cost ranges of 2-3 days follow-up, 3-4 days follow-up, physician consultation (per visit), imaging, surgical intervention, medications and supplies and intensive care follow-up were from \$285.6 to \$428.3, \$862.3 to \$1,150, \$92.5 to \$127.2, \$1,497 to \$1,575, \$298.8 to \$19,275, \$78.6 and \$771 to \$1,735 respectively. The total cost of inpatient falls by groups was in the range of \$3,162 to \$14,706. The total cost of medication errors for AHG was determined as \$67,697.

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#### INTRODUCTION

Pressure ulcers are defined as “localized injury to the skin and/or underlying tissue usually over a bony prominence as a result of pressure or pressure in combination with shear” (1). They are graded in 4 stages according to the damage of the skin as shown in the Table 1 (<http://www.npuap.org/resources/educational-and-clinical-resources/npuap-pressure-ulcer-stagescategories/>; Beeckman *et al.*, 2007). Grading also facilitates the treatment choice and actions of clinicians (Palfreyman and Stone, 2015). According to the researches 15% of acute-care patients suffer from pressure ulcers and the rate is increased by 63% in recent years (Amlung *et al.*, 2001; Russo *et al.*, 2008). Pressure ulcers generally impact patients by pain, depression, local infection and sepsis (Redelings *et al.*, 2005; Meaume *et al.*, 2005).

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Thus, lower quality of life and even cause of death (Graves *et al.*, 2005). Besides, long-term hospitalization or frequent hospital admission is required. They also affect clinical staff and healthcare system in terms of workload on documentation, treatment, prevention, collection of data and increased costs and resources (Palfreyman and Stone, 2015). In 2006, the average hospital charge per patient with pressure ulcer was stated as \$48,000 in the United States (US) (Russo *et al.*, 2008). Cost of treatment of pressure ulcers per grades ranges between \$20,900 and \$151,700 and its annual cost is approximately \$11 billion (Agency for Healthcare Research Quality 2013). In UK, cost of pressure ulcer treatment was between £1.4-£2.1 billion per year (Bennett *et al.*, 2000). In Turkey, each year 2.5 million people suffer and 60,000 people lose their lives from pressure ulcers. Its annual cost is approximately \$11.5 billion (<http://turkuazstandart.org.tr/kategori/3/12-turkuaz-brosur>). The primary emphasis should be towards prevention which is less costly for healthcare providers and less traumatic for patients.

As regards of studies, identifying patients at risk of ulceration and reducing pressure decrease pressure ulcer development (Reddy *et al.*, 2006). Risk assessment scale should be used so that risk assessment is based on evidence. The most well-known of these scales are "Norton", "Gosnell", "Braden", "Knoll" and "Waterlow" scales. Among them, Braden (Braden and Bergstrom, 1994) are widely used within the UK, Europe and North America (Palfreyman and Stone, 2015). Although, pressure ulcers cannot be prevented for some patients (i.e. hemodynamic instability, severe protein-energy malnutrition), the importance of early detection and treatment emerges (Black *et al.*, 2011).

Despite the efforts made, falls among hospitalized patients occur frequently. The National Database of Nursing Quality Indicators (NDNQI) defines falls as "unplanned descent to the floor with or without injury to the patient" and identifies five level of injury as minor or slight, moderate, major, severe injury and fall death (National Database of Nursing Quality Indicators, 2013). Each year, between 700,000 and 1,000,000 patient fall in US hospitals (<http://www.ahrq.gov/legacy/qual/nursehdbk>). According to the Joint Commission Center, cost of an injured fall is about \$14,056 (<http://www.ahrq.gov/legacy/qual/nursehdbk>).

Hendrich I Falls Risk Assessment Scale (Hendrich *et al.*, 2003) and Morse Falls Risk Assessment Scale (Morse *et al.*, 1989) are effective tools to assess falls. However, the type of fall is not clarified in these scores. Longer stays and additional treatment due to the fall related injuries increase overall patient care cost approximately 61% (Fitzpatrick, 2011). Generally patients' age, health status, medication history and environmental issues are main reasons of falls. Additionally, hospitals need to generate their own interventions according to patient populations and wards within the institution. Medication errors can be defined as "an injury resulting from medication treatment which cause or potential to cause harm to the patient" (Ferner and Aronson, 2006). They occur more frequently than thought. Naessens *et al.* found that 4% of hospital discharges had an adverse event with 43% skin issues, 23% medication errors and 21% falls (Naessens *et al.*, 2009).

Although, studies showed that medication errors affect 1,5 million people each year in US where total cost per error was approximately \$13,000 resulting \$19,5 billion (Van Den Bos *et al.*, 2011). Unfortunately, each year in UK, 20% of patients suffering from medication errors are lost their lives. The total cost is around £500 billion and hospitalization increases up to 8.5 days (Department of Health. An Organisation With a Memory, 2000). There has not been any estimation of cost of treatment in Turkey for inpatient falls and medication errors. As it can be seen from the studies that, pressure ulcers, patient fall and medication errors are frequently encountered.

The importance of nursing care to prevent these adverse events, which are also stated as quality indicators from NDNQI, increases even more. Some of the main problem in our country concerned with nursing profession is the low commitment of new graduate nurses called Y generation due to 'reality shock' that they experienced unlike other generations (Dracup and Morris, 2008) and difference in quality and level of nursing educations i.e. from high schools to universities, which prevent

the usage of common nursing language. Quality indicators of Acibadem Health Group (AHG) are; time spend on patient care per day, pressure ulcers rate, inpatient fall rate, thrombophlebitis development rate after IV cannulation, extravasation rate due to port needle inserted into the oncology patients, newborn breastfeeding rate during the hospital stay, medication errors, satisfaction rate on nursing care, nursing complaint rates, nurse profile, and the turnover rate were followed regularly every month for 10 years to ensure that nurses speak the same language regarding on care. Selected indicators are also published on the website of our institution.

## MATERIALS AND METHODS

Throughout the research retrospective approach is used.

Pressure ulcers, patient fall and medication errors within 12 hospitals of Acibadem Healthcare Group (AHG) were included in the study. 186 pressure ulcers cases, 129 inpatient falls and 181 medication errors are investigated between January 2014 and December 2014 from 12 hospitals of AHG. The costs of pressure ulcers, falls and medication errors were calculated per patient. Cost headings are designed on the basis of each stage (Table 1 and Table 2).

There are two main ways of getting data to make an analysis which are; 1- Sentinel Event System Reports (for the determination of number of patients with the pressure ulcer) and 2- Patient Services Pricing Department (for the definition of treatment cost). The costs given by the pricing department based on a bottom-up approach and the costing are calculated from the patient perspective.

**Table 1. European Pressure Ulcer Advisory Panel Pressure Ulcer Classification System (Beekman *et al.*, 2007)**

Class	Characteristics
Stage I	Discoloration, rash, edema, warmth, hardness in the skin (particularly in individuals with darker skin).
Stage II	Skin loss in epidermis, dermis or both. Superficial abrasions and redness.
Stage III	Full-thickness skin loss, necrosis of subcutaneous tissues.
Stage IV	Extensive destruction, tissue necrosis, damage to bone, muscle and supporting structures-full thickness skin loss.

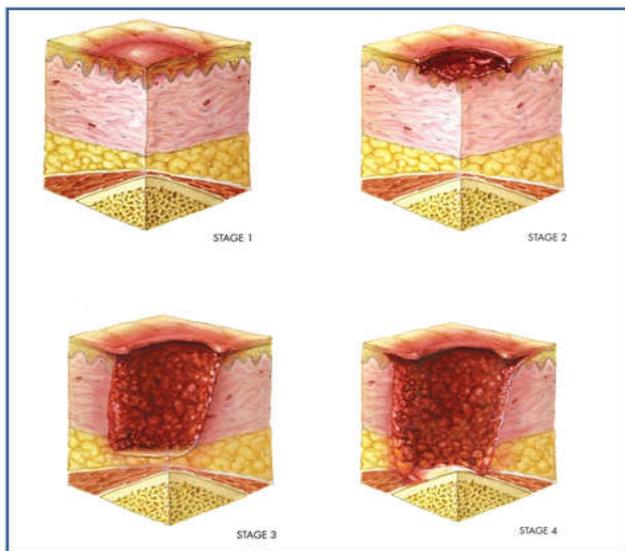
Although, the cost of pressure ulcers vary in each stage (Figure 1), during the assessment, the cost of the nursing care, accommodation (bed & room), use of care products, medications, laboratory tests, physician assessment, use of wound care products and surgical intervention were considered as shown in Table 3. Patient falls are classified and analyzed according to 5 groups (Table 2).

Also, the cost of the falls vary in each group. However, during the assessment, the cost of the nursing care, physician assessment, 2-3 day follow-up, accommodation (bed 6 room), imaging, surgical suture, drug and consumables and intensive care were evaluated as shown in Table 5. Medication errors are obtained from incident reports of each hospital reflected on patient safety board. Since hospitalization rate is increased by pressure ulcer, patient fall and medication error, costs of care and treatment were added to the invoice of the patient.

## RESULTS

### Pressure Ulcers

As a result of the cost analysis conducted in AHG, it was found that the cost of nursing care was minimum \$11.6 and maximum \$30, the cost of hospital accommodation (bed & room) was \$862 to \$6,039 and the cost ranges of wound care products, physician consultation (per visit), surgical intervention, medications, laboratory tests were from \$9.6 to \$192.7, \$92.5 to \$127.2, \$138 to \$16,190, \$57.8 to \$7,709 and \$75.5 respectively. NPUAP defined that stage I and stage II pressure ulcers are generally non operative intervention, while stage III and stage IV defined as a surgical intervention (<http://www.npuap.org/resources/educational-and-clinical-resources/npuap-pressure-ulcer-stagescategories/>).



**Figure 1. Schematization of pressure ulcers stages according to National Pressure Ulcer Advisory Panel**  
[\[http://www.npuap.org/resources/educational-and-clinical-resources/npuap-pressure-ulcer-stagescategories/\]](http://www.npuap.org/resources/educational-and-clinical-resources/npuap-pressure-ulcer-stagescategories/)

**Table 2. National Database of Nursing Quality Indicators Classification of Fall (2013)**

Class	Characteristics
Group I	Patient is uninjured.
Group II	Patient is/isnot injured. Monitored for complications.
Group III	Patient is injured. Treatment requires simple surgical intervention.
Group IV	Serious trauma involving bone fractures. Requires major surgical operation.
Group V	Death

In Table 2, it is seen that stage I and stage II pressure ulcer contains nursing care, bed and room accommodation, healing products, physician consultation, laboratory and medication costs while stage III and IV contains more comprehensive cost headings such as wound culture, VAC use, debridement, graft operation etc. In 2014, the majority of the number of patients were found to have stage I and stage II pressure ulcers, which accounted for the largest group as cost, as seen from the Table 4. Costs of nursing care, accommodation (bed and room), use of care products and medication were included in the calculation. Nursing care constitute a large part of the treatment in preventing pressure ulcers (assessment,

positioning, training the patient and patient's relatives). In AHG assessment for stage I, nursing care comprises 71% of the cost of pressure ulcer whereas accommodation (bed and room) accounts for 29%. For stage II, nursing care and accommodation account for 22% and 21% respectively. On the other hand, for stage III laboratory tests comprise 44% of the cost of pressure ulcer where medication accounts for 38%. When recovery period is considered, minimum and maximum costs for stage I pressure ulcers were \$11.6 (for one case) and \$14,159 (for 18 cases) respectively, while minimum and maximum costs for stage II were \$821 (for 5 cases) and \$57,255 (for 37 cases). Stage III pressure ulcers account for 5% of total number of patients where minimum and maximum costs were \$409 (for 1 case) and \$32,833 respectively. In 2014, stage IV pressure ulcers were not detected. According to Agency for Healthcare Research & Quality (9), pressure ulcer quality indicator target was 1 thousands, whereas the ratio of patients developing pressure ulcers in AHG in 2014 was calculated as 0.08%.

### Inpatient Falls

As a result of the cost analysis conducted in AHG, it was found that the cost of nursing care was minimum \$7.7 and maximum \$154.2, the cost of hospital accommodation (bed & room) was \$575 to \$862.7 and the cost ranges of 2-3 days follow-up, 3-4 days follow-up, physician consultation (per visit), imaging, surgical intervention, medications and supplies and intensive care follow-up were from \$285.6 to \$428.3, \$862.3 to \$1,150, \$92.5 to \$127.2, \$1,497 to \$1,575, \$298.8 to \$19,275, \$78.6 and \$771 to \$1,735 respectively. In 2014, inpatient falls at group IV were not detected.

NDNQI (15) defined that group I and group II inpatient falls require generally non operative intervention, while group III and group IV require surgical intervention. However, group V results with death. In Table 5, it is seen that group I and group II inpatient falls contains nursing care, bed and room accommodation, healing products, physician consultation, laboratory and medication costs while stage III and IV contains more comprehensive cost headings. In 2014, the majority of inpatient falls in ASG was found to be in group I and group II. On the other hand, inpatient falls for group V were not detected.

Costs of nursing care, accommodation (bed and room), an average of 2-3 days follow-up and imaging were included in the calculation. In the assessment, nursing care comprises 100% of the cost of group I falls. However, for group II, nursing care generates 14%, accommodation and 2-3 days follow-up comprises 5%, physician consultation generates 11% and imaging comprises 65% of total costs. For group III, physician consultation, imaging, nursing care, surgical intervention and medications and supplies generate 11%, 52%, 14%, 16% and 8% respectively.

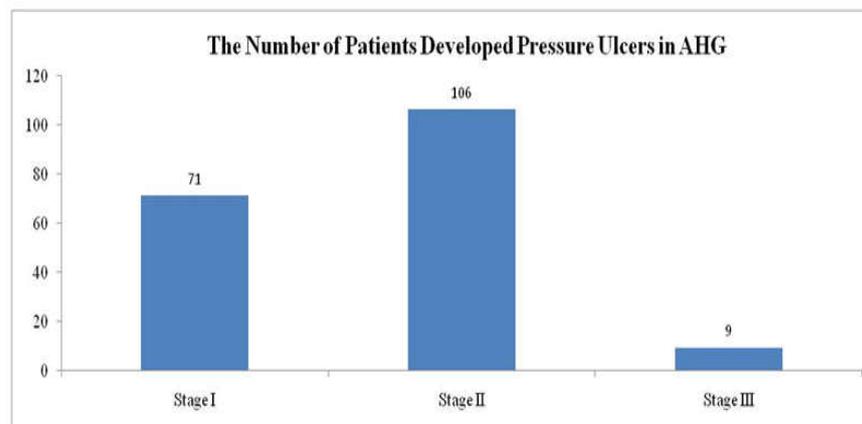
Group IV inpatient falls account for 1,6% of total falls where cost of 2-3 days follow-up, surgical interventions, nursing care, accommodation, imaging and medications and supplies comprise 43%, 30%, 8%, 10%, 3% and 5% respectively. When recovery period is considered, for group I, minimum and maximum costs were \$7.7 (for 1 case) to \$131 (for 17 cases), for group II, minimum and maximum costs were \$103 (for 1 case) to \$6,003 (for 3 cases), for group III,

**Table 3. Cost analysis of pressure ulcers in AHG**

Stage	Cost Headings	Cost Per Unit (TRY*)
Stage 1	**Cost of nursing care ( assessment, positioning, patient training...) 3 hours	30
	Cost of bed and room (3-4 days)	2237-2983
	Using care products ( moisturizing solution, transparent cover)	25-100
Stage 2	**Cost of nursing care ( assessment, positioning, patient training...) 4 hours	40
	Cost of bed and room (3-21 days)	2237-15666
	Medication (oxitin ,silverdin, normal saline amp.....)	150-10000
	Lab (CRP, albumin, blood count...)	196
	Use of wound care products (dressing, dressing with gel)	25-100
	Physician consultation	240-330
Stage 3	**Cost of nursing care ( assessment, positioning, patient training...) 5 hours	50
	Cost of bed and room (3-21 days)	2237-15666
	Medication and antibiotics (oxitin ,silverdin, normal saline amp.....)	150-15000
	Lab (CRP, albumin, blood count...)	196
	Wound culture	178
	Use of wound care products (dressing, dressing with gel)	300-500
	Physician consultation	240-330
	VAC use	2000-42000
	Debridement	358-4000
	Sepsis**	
Stage 4*	**Cost of nursing care ( assessment, positioning, patient training...) 7 hours	70
	Cost of bed and room (3-21 days)	2237-15666
	Medication and antibiotics (oxitin ,silverdin, normal saline amp.....)	150-20000
	Lab (CRP, albumin, blood count...)	196
	Wound culture	178
	Use of wound care products (dressing, dressing with gel)	300-500
	Physician consultation	240-330
	VAC use	2000-42000
	Debridement	358-4000
	Graft operation	12234-14234
	Sepsis**	
	Multiple organ deficiency	
Death		

\* Turkish Lira, 1 \$= 2.5941 TRY 1£ = 3.8375 TRY

\*\* Calculated on the basis of salary scale of nurses in AHG. Gross salary of a nurse with a nursing degree from university who's been working for 1-3 years in Istanbul locations was established as \$1195 (daily gross \$39.7)

**Figure 2. Number of patients developed pressure ulcer by stages in AHG****Table 4. Costs of pressure ulcers in AHG**

Group of Pressure Ulcer	Number of patients with pressure ulcer	Min Cost			Max Cost		
		TRY	\$	£	TRY	\$	£
Stage I	71- (%38)	30.00	12	8	36,730	14,159	9,571
Stage II	106- (%57)	2,130	821	555	148,525	57,255	38,704
Stage III	9- (%5)	1,062	409	277	85,172	32,833	22,195
Stage IV	0	0	0	0	0	0	0
Total	186	3,222	1,242	840	270,427	104,247	70,470

\* According to Central Bank of Republic of Turkey, exchange rate on 10.04.2015 was 1 \$= 2.5941 TRY

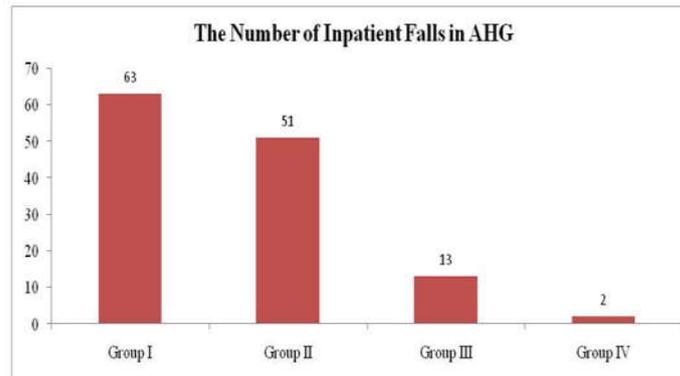
1£ = 3.8375 TRY

**Table 5. Cost analysis of inpatient falls in AHG**

Group	Cost Headings	Cost Per Unit (TRY*)
Group 1	** Cost of nursing care 2 hours	20
Group 2	Physician consultation	240-330
	Average cost of 2-3 days follow-up	741-1111
	Cost of bed and room	1492-2238
	Cost of imaging	4087
Group 3	* *Cost of nursing care	200-300
	Physician consultation	240-330
	Average cost of 2-3 days follow-up	2237-2983
	Cost of imaging	3884
	* *Cost of nursing care	300-400
	Cost of surgical intervention	775-1750
Group 4	Cost of medication and supply	204
	Physician consultation	240-330
	Average cost of 2-3 days follow-up	741-1111
	Cost of bed and room	1492-2238
	Cost of imaging	3884
	* *Cost of nursing care	200-300
	Cost of surgical intervention	20000-50000
Group 5	Cost of medication and supply	204
	Cost of intensive care follow-up	2000-4500
	Malpractice lawsuits	

\* Turkish Lira, 1 \$= 2.5941 TRY 1£ = 3.8375 TRY

\*\* Calculated on the basis of salary scale of nurses in AHG. Gross salary of a nurse with a nursing degree from university who's been working for 1-3 years in Istanbul locations was established as \$1195 (daily gross \$39.7)



**Figure 3. Number of inpatient falls by groups in AHG**

**Table 6. Costs of inpatient falls in AHG**

Group	Number of inpatient falls	Min Cost			Max Cost		
		TRY	\$	£	TRY	\$	£
Group I	63- (%48,8)	20	7	5	340	131	89
Group II	51- (%39,5)	267	103	70	15,574	6,003	4,058
Group III	13- (%10,1)	391	151	102	14,710	5,671	3,833
Group IV	2- (%1,6)	7,525	2,900	1,961	7,525	2,901	1,961
Group V	0	0	0	0	0	0	0
Total	129	8,203	3,162	2,138	38,149	14,706	9,941

\* According to Central Bank of Republic of Turkey, exchange rate on 10.04.2015 was 1 \$= 2.5941 TRY 1£ = 3.8375 TRY

minimum and maximum costs were \$150.7 (for 2 cases) to \$5,670 respectively. However, group IV occurred only in one hospital which costs approximately \$2,900.

**Medication Errors**

**Table 7. Medication errors throughout the year in AHG**

Total number of medication errors	Total Cost		
	TRY	\$	£
181	175,61	67,6	45,7
	4	97	63

According to exchange rates on 10.04.2015 1 \$= 2.5941 TRY 1£ = 3.8375 TRY

In 2014, 181 medication errors were detected and the total cost is calculated as \$67,697. In literature, medication errors were classified as preventable, potentially preventable and unpreventable with subheadings i.e. incorrect dose, implementation of the wrong medicine. However, such a classification has not been made in this study which may enlighten our future work.

**DISCUSSION**

Bennett *et al.* were found that nursing care comprises 96% of total cost (Bennett *et al.*, 2000) while the ratio of this cost calculated as 67% in AHG.

Medication errors were 21% and inpatient falls were calculated as 12% of total costs. In another study, Naessens *et al.* found that pressure ulcers, medication errors and inpatient falls comprise 43%, 23% and 21% of adverse events respectively (Naessens *et al.*, 2009). In this study, pressure ulcers were comprised 38%, medication errors were 36% and inpatient falls were 26% of total events. In the case of cost analysis of pressure ulcers conducted in AHG, the number of patients with stage II was higher. Even though, a patient who developed pressure ulcer at stage I should be admitted and monitored.

Stage of the pressure ulcer may pass into a higher stage depending on the diagnosis, state of being immobilized etc. In another study, Allman *et al.* showed that 57.9% of stage I pressure ulcers passed into stage I (Allman *et al.*, 1995). In our previous study, pressure ulcers at stage III and IV were 10 % (stage III was 7% and stage IV was 3%) (Koc *et al.*, 2014). However in this study, the ratio of pressure ulcers at stage III decreased to 5% and stage IV pressure ulcers were not observed. NDNQI pressure ulcer target was 1 in a thousand while AHG average was calculated 0.7 a thousand (National Database of Nursing Quality Indicators, 2013). This can be an indicator of AHG's policies on preventing adverse events by improving nursing competencies with training which increases quality of care. It is observed that infection in pressure ulcers increases the cost of treatment.

AHG's multidisciplinary nursing care to reduce the risk of developing infection is also an indicator of the quality of nursing services. Each year, between 700,000 and 1,000,000 patient fall in US hospitals (<http://www.ahrq.gov/legacy/qual/nursehdbk>). According to the Joint Commission Center, cost of an injured fall is about \$14,056 ([http://www.centerfortransforminghealthcare.org/assets/4/6/CTH\\_PFWI\\_Fact\\_Sheet.pdf](http://www.centerfortransforminghealthcare.org/assets/4/6/CTH_PFWI_Fact_Sheet.pdf)). In this study, the average cost of each fall was calculated as \$283. Group I and group II falls constituted the majority of cost analysis of inpatient falls. Parallel with NDNQI assessments, inpatient falls were classified in five groups where fall at group V was not observed. Although, the highest cost was calculated for group II, which can be explained by the intensity of patients (39.5%) and more comprehensive follow-up care.

Studies showed that medication errors affect 1,5 million people each year in US where total cost per error was approximately \$13,000 resulting \$19,5 billion (Van Den Bos *et al.*, 2011). In this study, it was found that medication errors encounters 36% of the total number of cases and 21% of total cost, where average cost per error calculated as \$374. Similar with literature, most encountered cases after pressure ulcers were medication errors (Naessens *et al.*, 2009). The lack of classification of medication errors will be starting point of our future work.

## REFERENCES

- Agency for Healthcare Research Quality, 2013. Measure Summary. Available at <http://www.qualitymeasures.ahrq.gov/content.aspx?id=38513>.
- Allman, R.Ö., Goode, P.S., Patrick, M.M., Burst, N. and Bartolucci, A.A. 1995. Pressure Ulcer Risk Factors Among Hospitalized Patients With Activity Limitation. *Journal of the American Medical Association*, 273(11):865-870.
- Amlung, S.R., Miller, W.L. and Bosley, L.M. 2001. The 1999 National Pressure Ulcer Prevalence Survey: a Benchmarking Approach. *Adv Skin Wound Care.*, 14:297-301.
- Beeckman, D., Schoonhoven, L., Fletcher, J., Furtado, K., Gunningberg, L., Heyman, H., Lindholm, C., Paquay, L., Verdt, J. and Defloor, T. 2007. EPUAP classification system for pressure ulcers: European reliability study. *J. Adv. Nurs.*, 60(6):682-691.
- Bennett, R.G., O'Sullivan, J., DeVito, E.M. and Remsburg, R. 2000. The increasing medical malpractice risk related to pressure ulcers in the United States. *J Am Geriatr Soc.*, 48(1):73-81.
- Black, J.M., Edsberg, L.E., Baharestani, M.M. and Langemo, D. 2011. Pressure Ulcers: Avoidable or Unavoidable? Results of the National Pressure Ulcer Advisory Panel Consensus Conference. *Ostomy/Wound Management*, 57(2):24-27.
- Braden, B.J. and Bergstrom, N. 1994. Predictive Validity of the Braden Scale For Pressure Sore Risk in a Nursing Home Population. *Res. Nurs. Health.*, 17(6):459-470.
- Currie, L. Fall and Injury Prevention. In R. Hughes (Ed.). Patient Safety and Quality. An Evidence Handbook for Nurses. Available at <http://www.ahrq.gov/legacy/qual/nursehdbk>
- Department of Health. An Organisation With a Memory: Report of an Expert Group on Learning From Adverse Events in the NHS Chaired by the Chief Medical Officer. The Stationary Office, London, 2000
- Dracup, K. and Morris, E.P. 2008. How will they learn? *American Journal of Critical Care.*, 17(4):306-309.
- Ferner, R.E. and Aronson, J.K. 2006. Clarification of terminology in medication errors: definitions and classification. *Drug Saf.*, 29:1011-1022.
- Fitzpatrick, M.A. 2011. Meeting the Challenge of Falls Reduction. *American Nurse Today*, 6(2): 1-20.
- Graves, N., Birrell, F. and Whitby, M. 2005. Effect of Pressure Ulcers on Length of Hospital Stay. *Infection Control and Hospital Epidemiology*, 26:293-297.
- Hendrich, A.L., Bender, S.P. and Nyhuis, A. 2003. Validation of the Hendrich II Fall Risk Model: A Large Concurrent Case/Control Study of Hospitalized Patients. *Applied Nursing Research*, 16(1): 9-21.
- Joint Commission Center for Transforming Healthcare. Available at [http://www.centerfortransforminghealthcare.org/assets/4/6/CTH\\_PFWI\\_Fact\\_Sheet.pdf](http://www.centerfortransforminghealthcare.org/assets/4/6/CTH_PFWI_Fact_Sheet.pdf)
- Koc, S., Bakoglu, N. and Bardak, A. 2014. Cost Analysis of Pressure Ulcers Cases in Acibadem Healthcare Group. *Assian Journal of Pharmacy, Nursing and Medical Sciences*, 2:125-130.
- Meaume, S., Vallet, D. and Morere, M.N. 2005. Evaluation of a Silver-Releasing Hydroalginate Dressing in Chronic Wounds With Signs of Local Infection. *J Wound Care.*, 14:411-419.
- Morse, J.M., Morse, R.M. and Tylko, S.J. 1989. Development of a Scale to Identify the Fall-Prone Patient. *Canadian Journal on Aging.*, 8:366-367.
- Naessens, J.M., Campbell, C.R., Huddleston, J.M. 2009. A Comparison of Hospital Adverse Events Identified by Three Widely Used Detection Methods. *Int J Qual Health Care.*, 21:301-307.

- National Database of Nursing Quality Indicators. 2013. Changes to NDNQI Fall Indicator Coming For 2Q 2013. *NDNQI Nursing Quality News*,14 (1):2.
- National Pressure Ulcer Advisory Panel. NPUAP Pressure Ulcer Stages. Available at <http://www.npuap.org/resources/educational-and-clinical-resources/npuap-pressure-ulcer-stagescategories/>
- Palfreyman, S.J. and Stone, P.W. 2015. A Systematic Review of Economic Evaluations Assessing Interventions Aimed at Preventing or Treating Pressure Ulcers. *International Journal of Nursing Studies*,52:769-788.
- Reddy, M., Gill, S.S. and Rochon, P.A. 2006. Preventing Pressure Ulcers: A systematic Review. *J. Am. Med. Assoc.*, 296 (8):974-984.
- Redelings, M.D., Lee, N.E. and Sorvillo, F. 2005. Pressure Ulcers: More Lethal Than We Thought? *Adv Skin Wound Care.*, 18:367-372.
- Russo, A., Steiner, C. and Spector, W. 2008. Hospitalizations Related to Pressure Ulcers Among Adults 18 Years and Older. *Healthcare Cost and Utilization Project (HCUP) Statistical Briefs*. Available at <http://www.hcup-us.ahrq.gov/reports/statbriefs/statbriefs.jsp>.
- Turkuaz Standards. Available at <http://turkuazstandart.org.tr/kategori/3/12-turkuaz-brosur>.
- Van Den Bos, Rustagi, J., Gray, K.T. 2011. The \$17.1 billion problem: The Annual Cost of Measurable Medical Errors. *Health Aff (Millwood)*,30:596-603.

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